U.S. Department
of Transportation
National Highway
Traffic Safety
Administration

NHTSA

DOT HS 812 573 August 2018

Functional Safety Assessment of an Automated Lane Centering System

Appendices

Appendix A: CURRENT SAFETY ISSUES FOR THE ALC SYSTEM

This appendix summarizes the findings from this study's review of current safety issues related to the ALC system. Since very few ALC systems are currently on the market, the review of current safety issues also included LKA systems with the assumption that ALC and LKA systems have similar architectural elements.

This study examined crash databases, and NHTSA's vehicle recall and VOQ databases to identify potential safety concerns related to the ALC system. However, crash data available in the General Estimates System and Fatality Analysis Reporting System do not include coding to identify crashes potentially attributable to LKA or ALC system failures.

<u>NHTSA Motor Vehicle Recall Campaigns</u>

This study reviewed motor vehicle recall campaigns[1] for model year 2002 through 2015 light vehicles. This review did not identify any recall campaigns directly attributable to LKA or ALC systems. However, recalls due to failures in the foundational steering or braking systems that implement LKA or ALC commands could potentially affect safe operation of the LKA or ALC system.

<u>NHTSA Vehicle Owner Questionnaires</u>

Vehicle owners can express their safety concerns to NHTSA via the vehicle owner questionnaire mechanism. NHTSA's Defects Assessment Division screens more than 30,000 VOQs annually to inform their decisions on issues requiring further investigation [5].

Volpe reviewed 12 VOQs related to LKA or ALC systems. These VOQs were identified by searching the VOQ database for the following key words or phrases.

- Lane Keep
- Lane Keeping
- Lane Center
- Lane Centering
- Traffic Jam Assist
- Distronic Plus[2]
- Lane Departure Prevention
- Lane Control
- Lane Assist

[1] Either NHTSA or the manufacturers may issue recalls due to vehicle or equipment defects once it is determined that a safety defect exists in a motor vehicle or items of motor vehicle equipment that poses a risk to safety [5]. CFR Title 49 Volume 7 Part 573.6 [6] requires the manufacturer to furnish a report to NHTSA for each defect once a recall is warranted.

[2] Distronic Plus (with Steering Assist) is a trade names for one ALC type of system.

The data obtained from the VOQs was categorized based on the STPA UCA guide phrases described in Section 2.2.3 of this report. **Error! Reference source not found.** shows the breakdown of the VOQs by UCA category.

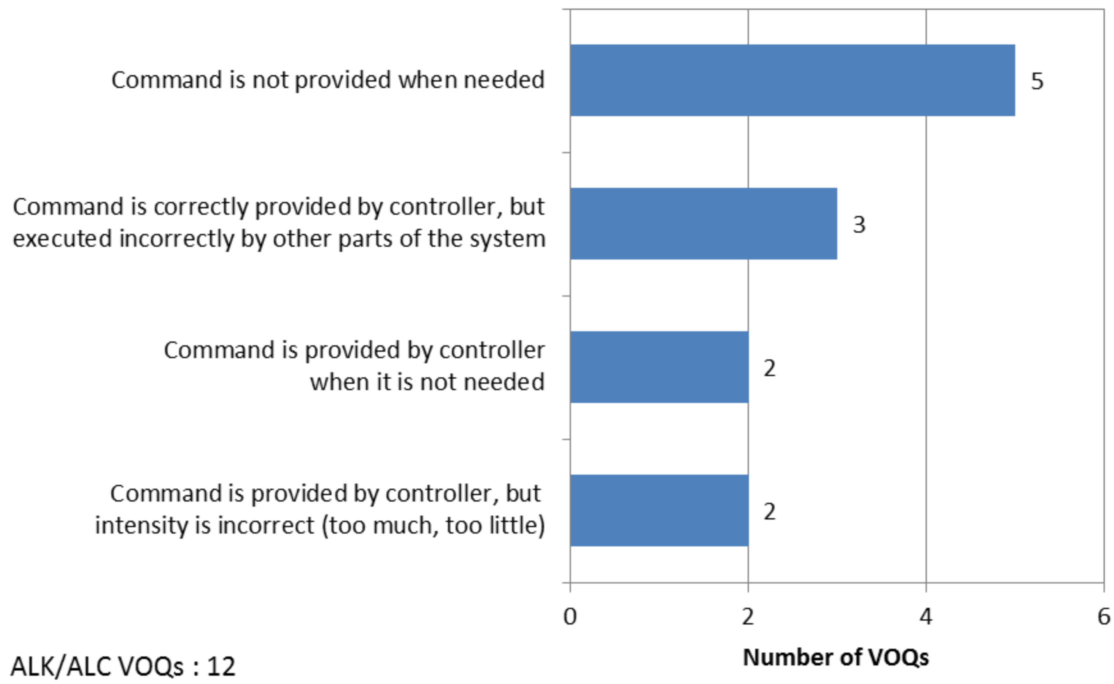

Figure A-1: Unsafe Control Action Breakdown of LKA or ALC System VOQs

Review of the LKA or ALC related VOQs indicated that highest number of owner complaints referenced cases where the LKA or ALC system was not available or did not intervene when needed.

Each recall was further categorized based on the potential CFs contributing to the recall. The CF categories used for the analysis are presented in Appendix B. Figure A-2 shows the breakdown of VOQs by CF category.

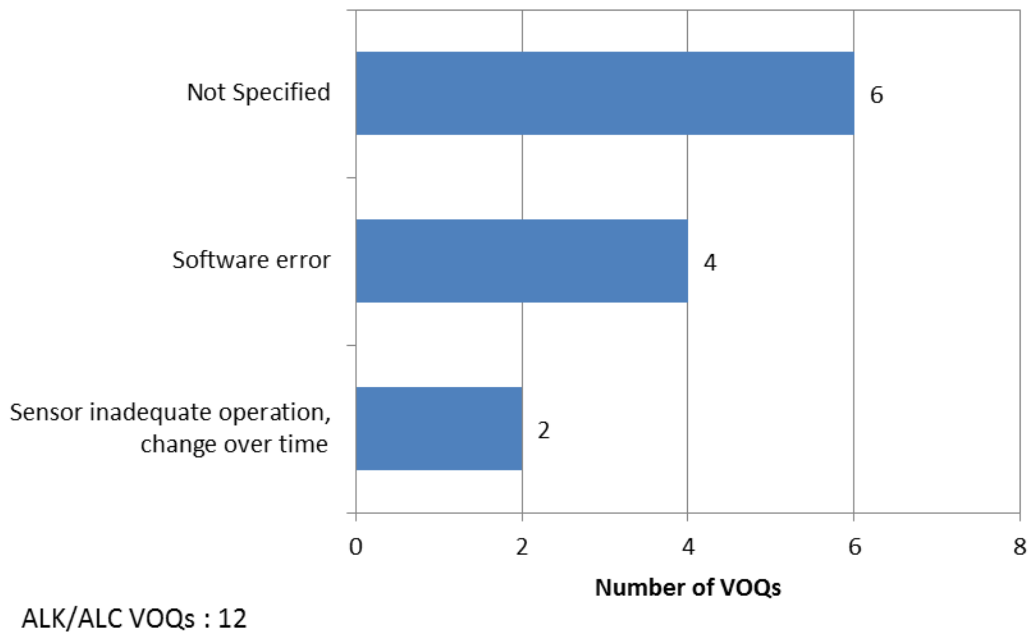

Figure A-2: Causal Factor Breakdown of LKA or ALC System VOQs

Of the VOQs that provided a cause, most indicated that a software algorithm error in the LKA or ALC control module led to the malfunction of the LKA or ALC system. Note that VOQs are often submitted by vehicle owners based on perceived vehicle behavior and the vehicle owners submitting VOQs may not have technical expertise on how the system operates.

Appendix B: **STPA CAUSAL FACTOR GUIDEWORDS AND GUIDEWORDS SUBCATEGORIES**

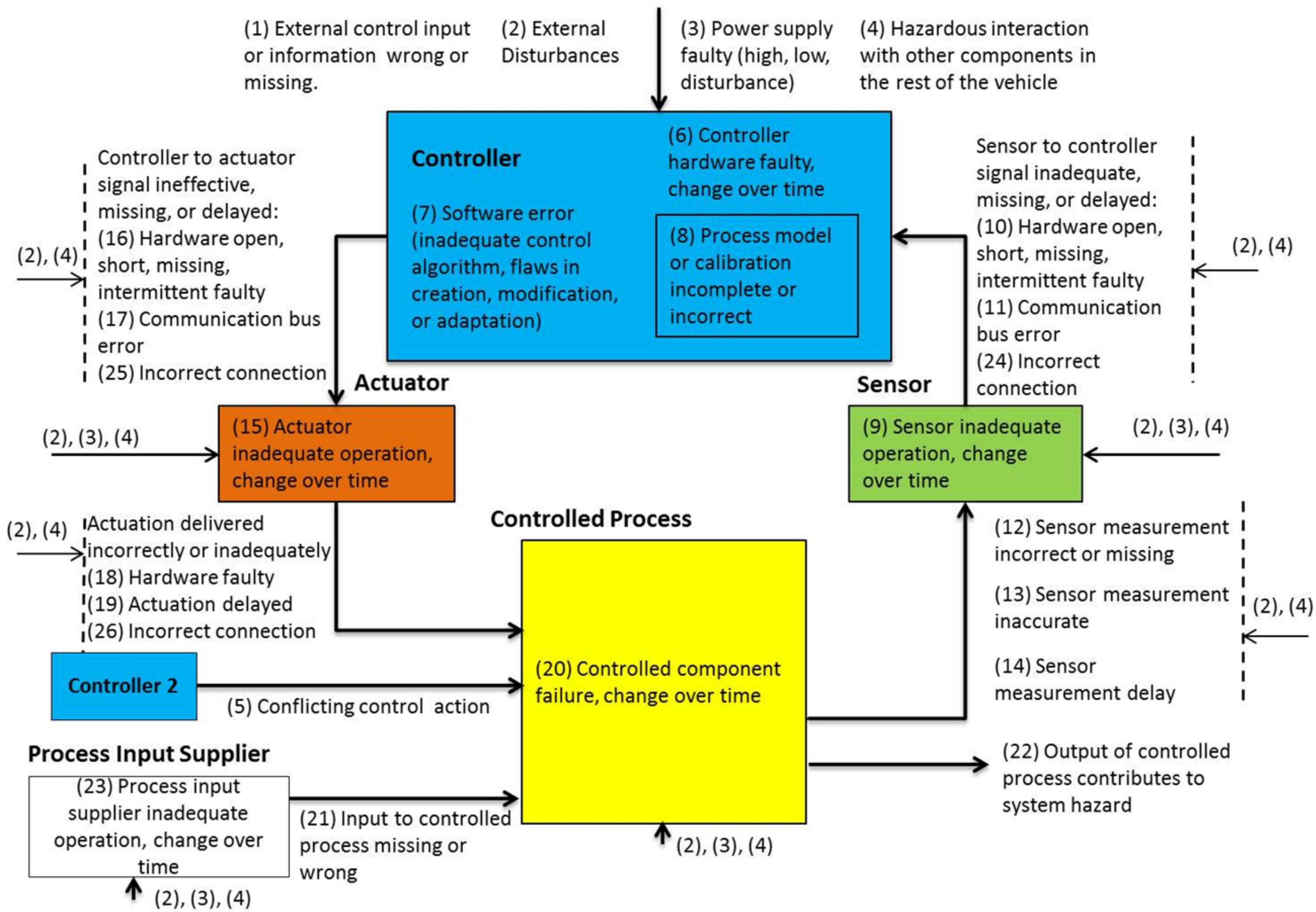

Figure B-1. Causal Factor Categories for Automotive Electronic Control Systems

Table B-1. Causal Factor Sub-categories for Automotive Electronic Control Systems

The numbering in the table below corresponds to that in Figure B-1.

\Components	
Controller	**(6) Controller hardware faulty, change over time** • Internal hardware failure • Overheating due to increased resistance in a subcomponent or internal shorting • Over temperature due to faulty cooling system • Degradation over time • Faulty memory storage or retrieval • Faulty internal timing clock • Faulty signal conditioning or converting (e.g., analog-to-digital converter, signal filters) • Unused circuits in the controller
	(7) Software error (inadequate control algorithm, flaws in creation, modification, or adaptation) • Inadequate control algorithm • Flaws in software code creation
	(8) Process model or calibration incomplete or incorrect • Sensor or actuator calibration, including degradation characteristics • Model of the controlled process, including its degradation characteristics
	(2) External control input or information wrong or missing • Timing-related input is incorrect or missing • Spurious input due to shorting or other electrical fault • Corrupted signal • Malicious Intruder
	(3) Power supply faulty (high, low, disturbance) • Loss of 12-volt power • Power supply faulty (high, low, disturbance)
	(2) External disturbances • EMI or ESD • Single-event effects (e.g., cosmic rays, protons) • Vibration or shock impact • Manufacturing defects and assembly problems • Extreme external temperature or thermal cycling • Moisture, corrosion, or contamination

	• Organic growth • Physical interference (e.g., chafing)
Sensor	**(4) Hazardous interaction with other components in the rest of the vehicle** • EMI or ESD • Vibration or shock impact • Physical interference (e.g., chafing) • Moisture, corrosion, or contamination • Excessive heat from other components • Electrical arcing from neighboring components or exposed terminals • Corona effects from high voltage components
	(9) Sensor inadequate operation, change over time • Internal hardware failure • Overheating due to increased resistance in a subcomponent or internal shorting • Degradation over time • Over temperature due to faulty cooling system • Reporting frequency too low
	(3) Power supply faulty (high, low, disturbance) • Loss of 12-volt power • Reference voltage incorrect (e.g., too low, too high) • Power supply faulty (high, low, disturbance)
	(2) External disturbances • EMI or ESD • Single-event effects (e.g., cosmic rays, protons) • Vibration or shock impact • Manufacturing defects and assembly problems • Extreme external temperature or thermal cycling • Moisture, corrosion, or contamination • Organic growth • Physical interference (e.g., chafing) • Magnetic interference
	(4) Hazardous interaction with other components in the rest of the vehicle • EMI or ESD • Vibration or shock impact • Physical interference (e.g., chafing) • Moisture, corrosion, or contamination • Excessive heat from other components • Magnetic interference • Electrical arcing from neighboring components or exposed terminals

	• Corona effects from high voltage components
Actuator	**(15) Actuator inadequate operation, change over time** • Internal hardware failure • Degradation over time • Over temperature due to faulty cooling system • Incorrectly sized actuator • Relay failure modes, including: 1) does not energize, 2) does not de-energize, and 3) welded contacts • Overheating due to increased resistance in a subcomponent or internal shorting
	(3) Power supply faulty (high, low, disturbance) • Loss of 12-volt power • Power supply faulty (high, low, disturbance)
	(2) External disturbances • EMI or ESD • Single-event effects (e.g., cosmic rays, protons) • Vibration or shock impact • Manufacturing defects and assembly problems • Extreme external temperature or thermal cycling • Moisture, corrosion, or contamination • Organic growth • Physical interference (e.g., chafing) • Magnetic interference
	(4) Hazardous interaction with other components in the rest of the vehicle • EMI or ESD • Vibration or shock impact • Physical interference (e.g., chafing) • Moisture, corrosion, or contamination • Excessive heat from other components • Magnetic interference • Electrical arcing from neighboring components or exposed terminals • Corona effects from high voltage components • Unable to meet demands from multiple components (e.g., inadequate torque)

Controlled Process	**(20) Controlled component failure, change over time** • Internal hardware failure • Degradation over time **(3) Power supply faulty (high, low, disturbance)** • Loss of 12-volt power • Power supply faulty (high, low, disturbance)
Controlled Process	**(2) External disturbances** • EMI or ESD • Single-event effects (e.g., cosmic rays, protons) • Vibration or shock impact • Manufacturing defects and assembly problems • Extreme external temperature or thermal cycling • Moisture, corrosion, or contamination • Organic growth • Physical interference (e.g., chafing) • Magnetic interference **(4) Hazardous interaction with other components in the rest of the vehicle** • EMI or ESD • Vibration or shock impact • Physical interference (e.g., chafing) • Moisture, corrosion, or contamination • Excessive heat from other components • Magnetic interference • Electrical arcing from neighboring components or exposed terminals • Corona effects from high voltage components • Unable to meet demands from multiple components (e.g., inadequate torque) **(22) Output of controlled process contributing to system hazard**
Process Input Supplier to Controlled Process	**(23) Process input supplier inadequate operation, change over time** • Process input supplier inadequate operation, change over time • Electrical noise other than EMI or ESD **(3) Power supply faulty (high, low, disturbance)** • Loss of 12-volt power • Power supply faulty (high, low, disturbance) **(2) External disturbances**

	• EMI or ESD • Single-event effects (e.g., cosmic rays, protons) • Vibration or shock impact • Manufacturing defects and assembly problems • Extreme external temperature or thermal cycling • Moisture, corrosion, or contamination • Organic growth • Physical interference (e.g., chafing) • Magnetic interference
	(4) Hazardous interaction with other components in the rest of the vehicle
	• EMI or ESD • Vibration or shock impact • Physical interference (e.g., chafing) • Moisture, corrosion, or contamination • Excessive heat from other components • Magnetic interference • Electrical arcing from neighboring components or exposed terminals • Corona effects from high voltage components • Unable to meet demands from multiple components (e.g., inadequate torque)
Connections	
Sensor to Controller, Controller to Actuator	**(10) and (16) Hardware open, short, missing, intermittent faulty**
	• Connection is intermittent • Connection is open, short to ground, short to battery, or short to other wires in harness • Electrical noise other than EMI or ESD • Connector contact resistance is too high • Connector shorting between neighboring pins • Connector resistive drift between neighboring pins
	(11) and (17) Communication bus error
	• Bus overload or bus error • Signal priority too low • Failure of the message generator, transmitter, or receiver • Malicious intruder
	(24) and (25) Incorrect connection
	• Incorrect wiring connection • Incorrect pin assignment

	(2) External disturbances • EMI or ESD • Single-event effects (e.g., cosmic rays, protons) • Vibration or shock impact • Manufacturing defects and assembly problems • Extreme external temperature or thermal cycling • Unused connection terminals affected by moisture, corrosion, or contamination • Organic growth • Physical interference (e.g., chafing) • Active connection terminals affected by moisture, corrosion, or contamination
	(4) Hazardous interaction with other components in the rest of the vehicle • EMI or ESD • Vibration or shock impact • Physical interference (e.g., chafing) • Unused connection terminals affected by moisture, corrosion, or contamination • Excessive heat from other components • Electrical arcing from neighboring components or exposed terminals • Corona effects from high voltage components • Active connection terminals affected by moisture, corrosion, or contamination • Mechanical connections affected by moisture, corrosion, or contamination
	(18) Actuation delivered incorrectly or inadequately: Hardware faulty
	(19) Actuation delayed
	(20) Actuator to controlled process incorrect connection
	(2) External disturbances • EMI or ESD • Single-event effects (e.g., cosmic rays, protons) • Vibration or shock impact

<table>
<tr><td>Actuator to Controlled Process</td><td>

Manufacturing defects and assembly problems
Extreme external temperature or thermal cycling
Unused connection terminals affected by moisture, corrosion, or contamination
Organic growth
Physical interference (e.g., chafing)
Active connection terminals affected by moisture, corrosion, or contamination
Mechanical connections affected by moisture, corrosion, or contamination

(4) Hazardous interaction with other components in the rest of the vehicle

EMI or ESD
Vibration or shock impact
Physical interference (e.g., chafing)
Unused connection terminals affected by moisture, corrosion, or contamination
Excessive heat from other components
Electrical arcing from neighboring components or exposed terminals
Corona effects from high voltage components
Active connection terminals affected by moisture, corrosion, or contamination
Mechanical connections affected by moisture, corrosion, or contamination

</td></tr>
<tr><td>Controlled Process to Sensor</td><td>
(12) Sensor measurement incorrect or missing
Sensor incorrectly aligned/positioned
(13) Sensor measurement inaccurate
Sensor incorrectly aligned/positioned
(14) Sensor measurement delay
Sensor incorrectly aligned/positioned
(2) External disturbances

EMI or ESD
Single-event effects (e.g., cosmic rays, protons)
Vibration or shock impact
Manufacturing defects and assembly problems
Extreme external temperature or thermal cycling
Unused connection terminals affected by moisture, corrosion, or contamination

</td></tr>
</table>

	• Organic growth • Physical interference (e.g., chafing) • Active connection terminals affected by moisture, corrosion, or contamination • Mechanical connections affected by moisture, corrosion, or contamination
	(4) Hazardous interaction with other components in the rest of the vehicle
	• EMI or ESD • Vibration or shock impact • Physical interference (e.g., chafing) • Unused connection terminals affected by moisture, corrosion, or contamination • Excessive heat from other components • Electrical arcing from neighboring components or exposed terminals • Corona effects from high voltage components • Active connection terminals affected by moisture, corrosion, or contamination • Mechanical connections affected by moisture, corrosion, or contamination
Other **Controller to Controlled Process**	**(5) Conflicting control action**
Process Input **Supplier to Controlled Process**	**(21) Input to controlled process missing or wrong**

Appendix C: **HAZOP STUDY RESULTS**

Table C-1. Function 1: Activate ALC system per driver's input

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F1-1	Does not activate ALC system	Not hazardous
F1-2	Intermittently activates ALC system	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F1-3	Activates ALC system without driver knowledge	Improper Transition of Control Back to Driver
F1-4	Stuck in deactivated mode	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-2. Function 2: Deactivate ALC system per driver's input

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F2-1	Does not deactivate ALC system	Improper Transition of Control Back to Driver
F2-2	Intermittently deactivates ALC system	Not hazardous
F2-3	Deactivates ALC system without driver's input	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Unintended Loss of ALC
F2-4	Stuck in activated mode	Not hazardous

Table C-3. Function 3: Monitor for required level of operator engagement

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F3-1	Does not monitor the driver's attention	Improper Transition of Control Back to Driver
F3-2	Monitors the driver's attention with greater frequency than intended	Not hazardous
F3-3	Monitors the driver's attention with less frequency than intended	Improper Transition of Control Back to Driver
F3-4	Intermittently monitors the driver's attention	Improper Transition of Control Back to Driver
F3-5	Monitors the driver's attention when ALC system is not activated	Not Hazardous
F3-6	Reports a constant driver attentiveness state	Improper Transition of Control Back to Driver

Table C-4. Function 4: Deactivate if operator engagement is inadequate

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F4-1	Does not deactivate if driver engagement is inadequate, but alerts to the Operator Alert are correct	Not Hazardous
F4-2	Intermittently deactivates	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F4-3	Deactivates while driver is engaged in driving task	Unintended Loss of ALC
F4-4	Deactivates while driver is NOT engaged in driving task	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Improper Transition of Control Back to Driver
F4-5	Stuck in deactivated mode	Not Hazardous
F4-6	Stuck in activated mode	Not Hazardous

Table C-5. Function 5: Alert operator when disengaging or faulted

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F5-1	Does not alert operator when disengaging or faulted	Improper Transition of Control Back to Driver: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F5-2	Alerts operator with more lead time than needed to resume control	Not Hazardous
F5-3	Alerts operator with less lead time or less urgency than needed to resume control	Improper Transition of Control Back to Driver
F5-4	Alerts to operator are not sufficient for driver to notice (soft chime, poor visual display)	Improper Transition of Control Back to Driver: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F5-5	Intermittently alerts operator when disengaging or faulted	Improper Transition of Control Back to Driver: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F5-6	Alerts operator when system is not disengaging or faulted	Improper Transition of Control Back to Driver
F5-7	Alert is stuck in the "on" position	Not Hazardous
F5-8	Alert is stuck in the "off" position	Improper Transition of Control Back to Driver: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-6. Function 6: Detect roadway environment using sensor array

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F6-1	Sensor does not detect the environment	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F6-2	Sensor detection with greater frequency than intended	Not Hazardous
F6-3	Sensor reports with greater importance/weight than appropriate (more than it is)	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F6-4	Sensor detection with less frequency than intended	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F6-5	Sensor reports with less importance/weight than important (less than it is)	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F6-6	Sensor intermittently detects roadway environment	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F6-7	Sensor detection is reversed (e.g., camera image is mirrored)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F6-8	Sensor detection is on opposite side of the vehicle (e.g., L/R camera channels are switched)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F6-9	Sensor detects roadway environment when ALC is not engaged	Not Hazardous
F6-10	Sensor provides constant information as environment changes (e.g., blocked radar)	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-7. Function 7: Detect individual sensor failure

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F7-1	Does not detect an internal failure	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F7-2	Detects more faults than actually present	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F7-3	Detects fewer faults than actually present	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F7-4	Intermittently detects faults (fault status cycles)	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F7-5	Reports a fault when no fault is present	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F7-6	Fault status/flag is stuck	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Unintended Loss of ALC
This function is a safety mechanism intended to mitigate hazards from other malfunctions. It is only shown for completeness.		

Table C-8. Function 8: Detect left lane/roadway markings

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F8-1	Does not detect lane markings on the left side of the vehicle	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F8-2	Detects more lane markings on the left side than actually present (double markings, ghost markings, etc.)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F8-3	Detects fewer lane markings on the left side than actually present	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F8-4	Intermittently detects lane markings on the left side of the vehicle	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F8-5	Reverses lane marking positions (left/right)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F8-6	Detects lane markings when no markings are present	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F8-7	Does not update the lane markings as the vehicle travels	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-9. Function 9: Detect right lane/roadway markings

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F9-1	Does not detect lane markings on the right side of the vehicle	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F9-2	Detects more lane markings on the right side than actually present (double markings, ghost markings, etc.)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F9-3	Detects fewer lane markings on the right side than actually present	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F9-4	Intermittently detects lane markings on the right side of the vehicle	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F9-5	Reverses lane marking positions (left/right)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F9-6	Detects lane markings when no markings are present	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F9-7	Does not update the lane markings as the vehicle travels	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-10. Function 10: Determine lane/roadway width (roadway boundary)

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F10-1	Does not determine the roadway/lane width	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F10-2	Determines the roadway/lane is wider than it actually is	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F10-3	Determines the roadway/lane is narrower than it actually is	Not Hazardous
F10-4	Intermittently determines the roadway/lane width	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F10-5	Determines the roadway/lane width when ALC is not engaged	Not Hazardous
F10-6	Does not update the roadway/lane width as the roadway/lane width varies	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-11. Function 11: Detect other vehicles on the roadway (e.g., lead vehicle)

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F11-1	Does not detect other vehicles on the roadway	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F11-2	Detects surrounding objects as vehicles	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F11-3	Only detects some types of vehicles on roadway	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F11-4	Intermittently detects other vehicles on roadway	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F11-5	Detects movement of other vehicles in the wrong direct (e.g., L/R reversed)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F11-6	Detects other vehicles on the roadway when none present	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F11-7	Reports the same position for the lead vehicle even after the lead vehicle moves	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-12. Function 12: Detect roadway signage (curve ahead, arrows, etc.)

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F12-1	Does not detect roadway signage	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F12-2	Detects surrounding objects as signage	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F12-3	Only detects some types of signs	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F12-4	Intermittently detects roadway signage	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F12-5	Roadway signage image is reversed (i.e., mirrored)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F12-6	Detects roadway signage when not present	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F12-7	Stuck reporting the same roadway signage information even as roadway signage changes	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-13. Function 13: Detect roadway references (guardrail, shoulders, etc.)

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F13-1	Does not detect roadway references	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F13-2	Incorrectly detects surrounding objects as roadway references	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F13-3	Does not detect all types of roadway references	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F13-4	Intermittently detects roadway references	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F13-5	Roadway references detected on opposite side of the vehicle	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F13-6	Detects roadway references when not present	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F13-7	Stuck reporting the same roadway references even as surrounding environment changes	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-14. Function 14: Determine roadway type

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F14-1	Does not determine roadway type	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F14-2	Intermittently determines the roadway type	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F14-3	Determines a roadway type with more steering authority	Not Hazardous
F14-4	Determines a roadway type with less steering authority	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F14-5	Determines roadway type when ALC is not engaged	Not Hazardous
F14-6	Always reports the same roadway type	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-15. Function 15: Determine vehicle position in the lane

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F15-1	Does not determine vehicle's position in the lane	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F15-2	Determines the vehicle is closer to the lane boundary than actual	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F15-3	Determines the vehicle is further from the lane boundary than actual	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F15-4	Intermittently determines the vehicle's position in the lane	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F15-5	Determines the vehicle is on the opposite side of the lane (e.g., L/R reversed)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F15-6	Determines the vehicle position in the lane when ALC is not engaged	Not Hazardous
F15-7	Reports the vehicle is at a constant lane position	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-16. Function 16: Calculate torque/yaw required to return vehicle to reference path

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F16-1	Does not calculate the required torque/yaw to return vehicle to reference path	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F16-2	Calculates more torque/yaw than necessary to return vehicle to reference path	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F16-3	Calculates less torque/yaw than necessary to return vehicle to reference path	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F16-4	Intermittently calculates the required torque/yaw to return vehicle to reference path	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F16-5	Calculates torque/yaw, but in the reversed direction (e.g., CW instead of CCW)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F16-6	Calculates a required torque/yaw when the vehicle is already on the reference path	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F16-7	Calculates a constant torque/yaw value	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-17. Function 17: Calculate torque/yaw limit (limit magnitude or torque overlay)

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F17-1	Does not calculate the torque/yaw limit	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F17-2	Calculates a higher torque/yaw limit than appropriate for operating conditions	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F17-3	Calculates a lower torque/yaw limit than appropriate for operating conditions	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F17-4	Intermittently calculates the torque/yaw limit	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F17-5	Calculates the torque/yaw limit in the wrong direction (e.g., minimum torque/yaw value instead of maximum torque/yaw value)	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F17-6	Calculates a torque/yaw limit when full torque authority is needed	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F17-7	Limits torque/yaw at a constant value regardless of operating conditions	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-18. Function 18: Deactivate when perception is not adequate

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F18-1	Does not deactivate when environment cannot be detected	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F18-2	Intermittently deactivates when environment cannot be detected	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F18-3	Deactivates when environment is detected adequately	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Unintended Loss of ALC
F18-4	Stuck in deactivated mode	Not Hazardous
F18-5	Stuck in activated mode	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-19. Function 19: Request torque/yaw from foundational steering or braking system

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F19-1	Does not request torque/yaw from steering or braking system	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F19-2	Requests more torque/yaw from steering or braking system than needed	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F19-3	Requests less torque than needed to change yaw rate	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F19-4	Intermittently requests torque from steering or braking system	Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F19-5	Requests torque/yaw from steering or braking system when ALC is deactivated or suspended	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F19-6	Requests the same amount of torque/yaw from the steering or braking system	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-20. Function 20: Communicates with other vehicle features/functions

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F20-1	Does not communicate with other vehicle features or functions	ALC Interferes With Operation of Other Vehicle Features/Systems
F20-2	Communicates with other vehicle features or functions with greater frequency than needed	Not Hazardous
F20-3	Communicates with other vehicle features or functions with less frequency than needed	ALC Interferes With Operation of Other Vehicle Features/Systems
F20-4	Intermittently communicates with other vehicle features or functions	ALC Interferes With Operation of Other Vehicle Features/Systems
F20-5	Communicates with other vehicle features or functions when not needed	Not Hazardous
F20-6	Communicates the same information with other vehicle features or functions	ALC Interferes With Operation of Other Vehicle Features/Systems

Table C-21. Function 21: Communicates with internal subsystems

I.D.	***Malfunction***	***Potential Vehicle Level Hazard***
F21-1	Does not communicate with internal subsystems (e.g., sensor modules)	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F21-2	Communicates with internal subsystems with more frequency than needed	Not Hazardous
F21-3	Communicates with internal subsystems with less frequency than needed	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F21-4	Intermittently communicates with internal subsystems	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
F21-5	Communicates with internal subsystems when not needed	Not Hazardous
F21-6	Communicates the same information with internal subsystems	Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

Table C-22. Function 22: Store data

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F22-1	System does not store data	Not Hazardous
F22-2	System stores too much data	Not Hazardous
F22-3	System stores too little data	Not Hazardous
F22-4	System stores data intermittently	Not Hazardous
F22-5	System stores data when not needed	Not Hazardous
F22-6	System stores same data (stuck value)	Not Hazardous

Table C-23. Function 23: Provide diagnostics

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F23-1	System does not perform diagnostics	Not Hazardous
F23-2	System provides more diagnostics than needed	Not Hazardous
F23-3	System does not provide enough diagnostics	Not Hazardous
F23-4	System intermittently provides diagnostics	Not Hazardous
F23-5	System provides diagnostics when not needed	Not Hazardous
F23-6	System diagnostics stuck at value	Not Hazardous

Table C-24. Function 24: Provide fault detection and mitigation

I.D.	*Malfunction*	*Potential Vehicle Level Hazard*
F24-1	System does not provide fault detection and failure mitigation	Not Hazardous
F24-2	Provides more fault detection and mitigation than intended	Not Hazardous
F24-3	Provides less fault detection and mitigation than intended	Not Hazardous
F24-4	Provides intermittent fault detection and mitigation than intended	Not Hazardous
F24-5	Provides fault detection and mitigation when not requested	Not Hazardous
F24-6	Fault detection and mitigation is stuck at value	Not Hazardous
This function is a safety mechanism intended to mitigate hazards from other malfunctions. It is only shown for completeness.		

Appendix D: **UNSAFE CONTROL ACTION (UCA) ASSESSMENT TABLES**

Table D-1: Control Action: “Adjust Vehicle’s Lateral Position in the δ Direction”

Context Variables (Adjust vehicle’s lateral position in the δ direction)		**Guidewords for Assessing Whether the Control Action May Be Unsafe**								
Lateral Adjustment Request From Other Vehicle Systems	Movement Relative to Reference Trajectory	Not provided in this context	Provided in this context	Provided, but duration is too long	Provided, but duration is too short	Provided, but the intensity is incorrect (too much)	Provided, but the intensity is incorrect (too little)	Provided, but executed incorrectly	Provided, but the starting time is too soon	Provided, but the starting time is too late
None	Direction of δ is away from the reference trajectory		H2	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided
In the same direction as δ	Direction of δ is away from the reference trajectory	H5	H2	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided
In the opposite direction of δ	Direction of δ is away from the reference trajectory		H2, H5	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided
In both the opposite and the same direction as δ	Direction of δ is away from the reference trajectory	H5	H2, H5	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided
None	Direction of δ is toward the reference trajectory	H1		H2	H1	H2	H1	H1, H2	H2	H1
In the same direction as δ	Direction of δ is toward the reference trajectory	H1, H5		H2	H1	H2	H1	H1, H2, H5	H2	H1
In the opposite direction of δ	Direction of δ is toward the reference trajectory	H1	H5	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided

Context Variables (Adjust vehicle's lateral position in the δ direction)		**Guidewords for Assessing Whether the Control Action May Be Unsafe**								
Lateral Adjustment Request From Other Vehicle Systems	Movement Relative to Reference Trajectory	Not provided in this context	Provided in this context	Provided, but duration is too long	Provided, but duration is too short	Provided, but the intensity is incorrect (too much)	Provided, but the intensity is incorrect (too little)	Provided, but executed incorrectly	Provided, but the starting time is too soon	Provided, but the starting time is too late
In both the opposite and the same direction as δ	Direction of δ is toward the reference trajectory	H1, H5	H5	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided

STPA Vehicle Level Hazards:

- H1: Potential Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
- H2: Potential Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
- H5: ALC System Impedes Actions of Other Vehicle Systems

Table D-2: Control Action: "Disengage ALC System"

Context Variables (Disengage ALC system)			**Guidewords for Assessing Whether the Control Action May Be Unsafe**								
ALK/ALC Operational State Request from Driver	**ALK/ALC Operational State Request From Other Vehicle Systems**	**Is Driver Paying Attention to Roadway**	Not provided in this context	Provided in this context	Provided, but duration is too long	Provided, but duration is too short	Provided, but the intensity is incorrect (too much)	Provided, but the intensity is incorrect (too little)	Provided, but executed incorrectly	Provided, but the starting time is too soon	Provided, but the starting time is too late
Engage/ None	Engage/ Resume/None	No		H6	Does not apply	Does not apply	Does not apply	Does not apply	Hazardous if Provided	Does not apply	Hazardous if Provided
Disengage	Engage/ Resume/None	No	H4	H6	Does not apply	Does not apply	Does not apply	Does not apply	Hazardous if Provided	Does not apply	Hazardous if Provided
Engage/ None	Disengage / Suspend	No	H5	H6	Does not apply	Does not apply	Does not apply	Does not apply	Hazardous if Provided	Does not apply	Hazardous if Provided
Disengage	Disengage / Suspend	No	H4, H5	H6	Does not apply	Does not apply	Does not apply	Does not apply	Hazardous if Provided	Does not apply	Hazardous if Provided
Engage/ None	Engage/ Resume/None	Yes		H1, H3	Does not apply	Does not apply	Does not apply	Does not apply	Hazardous if Provided	Does not apply	Hazardous if Provided
Disengage	Engage/ Resume/None	Yes	H4		Does not apply	Does not apply	Does not apply	Does not apply	H4	Does not apply	H4
Engage/ None	Disengage / Suspend	Yes	H5		H1	H5	Does not apply	Does not apply	H1, H5	H1	H5
Disengage	Disengage / Suspend	Yes	H4, H5		Does not apply	Does not apply	Does not apply	Does not apply	H4, H5	Does not apply	H4, H5

STPA Vehicle Level Hazards:

- H1: Potential Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
- H4: Impeding Driver's Ability to Control the Vehicle
- H5: ALC System Impedes Actions of Other Vehicle Systems
- H6: Absence of Lateral Control Input

Table D-3: Control Action: "Engage ALC System"

Context Variables (Engage ALC system)			Guidewords for Assessing Whether the Control Action May Be Unsafe								
ALK/ALC Operational State Request from Driver	**ALK/ALC Operational State Request From Other Vehicle Systems**	**Is Driver Paying Attention to Roadway**	Not provided in this context	Provided in this context	Provided, but duration is too long	Provided, but duration is too short	Provided, but the intensity is incorrect (too much)	Provided, but the intensity is incorrect (too little)	Provided, but executed incorrectly	Provided, but the starting time is too soon	Provided, but the starting time is too late
Engage	Engage/ Resume	No		H4	Does not apply	Does not apply	Does not apply	Does not apply	Hazardous if Provided	Does not apply	Hazardous if Provided
Disengage/ None	Engage/ Resume	No	H6		Does not apply	Does not apply	Does not apply	Does not apply	H6	Does not apply	H6
Engage	Disengage/ Suspend/ None	No	H5		Does not apply	Does not apply	Does not apply	Does not apply	H5	Does not apply	H5
Disengage/ None	Disengage/ Suspend/ None	No	H5, H6		Does not apply	Does not apply	Does not apply	Does not apply	H5, H6	Does not apply	H5, H6
Engage	Engage/ Resume	Yes		H4	Does not apply	Does not apply	Does not apply	Does not apply	Hazardous if Provided	Does not apply	Hazardous if Provided
Disengage/ None	Engage/ Resume	Yes	H6		Does not apply	Does not apply	Does not apply	Does not apply	H6	Does not apply	H6
Engage	Disengage/ Suspend/ None	Yes	H5		Does not apply	Does not apply	Does not apply	Does not apply	H5	Does not apply	H5
Disengage/ None	Disengage/ Suspend/ None	Yes	H5, H6		Does not apply	Does not apply	Does not apply	Does not apply	H5, H6	Does not apply	H5, H6

STPA Vehicle Level Hazards:

- H1: Potential Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
- H4: Impeding Driver's Ability to Control the Vehicle
- H5: ALC System Impedes Actions of Other Vehicle Systems
- H6: Absence of Lateral Control Input

Table D-4: Control Action: "Actuate Switch to Enable ALC System"

Context Variables (Actuate Switch to Enable ALC System)	**Guidewords for Assessing Whether the Control Action May Be Unsafe**								
ALC System Status	Not provided in this context	Provided in this context	Provided, but duration is too long	Provided, but duration is too short	Provided, but the intensity is incorrect (too much)	Provided, but the intensity is incorrect (too little)	Provided, but executed incorrectly	Provided, but the starting time is too soon	Provided, but the starting time is too late
Enabled		H6	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided
Disabled	H6		H6	H6	H6	H6	H6	H6	H6
STPA Vehicle Level Hazards: • H6: Absence of Lateral Control Input									

Table D-5: Control Action: "Actuate Switch to Disable ALC System"

Context Variables (Actuate Switch to Disable ALC System)	**Guidewords for Assessing Whether the Control Action May Be Unsafe**								
ALC System Status	Not provided in this context	Provided in this context	Provided, but duration is too long	Provided, but duration is too short	Provided, but the intensity is incorrect (too much)	Provided, but the intensity is incorrect (too little)	Provided, but executed incorrectly	Provided, but the starting time is too soon	Provided, but the starting time is too late
Enabled	H4		H4	H4	H4	H4	H4	H4	H4
Disabled		H4	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided	Hazardous if Provided
STPA Vehicle Level Hazards: • H4: Impeding Driver's Ability to Control the Vehicle									

Table D-6: Control Action: "Resume Steering Control"

Context Variables (Resume Steering Control)	Guidewords for Assessing Whether the Control Action May Be Unsafe								
ALC System Status	Not provided in this context	Provided in this context	Provided, but duration is too long	Provided, but duration is too short	Provided, but the intensity is incorrect (too much)	Provided, but the intensity is incorrect (too little)	Provided, but executed incorrectly	Provided, but the starting time is too soon	Provided, but the starting time is too late
Enabled		Not hazardous	Does not apply	Does not apply	Does not apply	Does not apply	Does not apply	Does not apply	Does not apply
Disabled	H6		Does not apply	Does not apply	Does not apply	Does not apply	H6	Does not apply	H6

STPA Vehicle Level Hazards:

- H4: Impeding Driver's Ability to Control the Vehicle
- H6: Absence of Lateral Control Input

Appendix E: STPA STEP 1: UCAS AND MAPPING TO HAZARDS

Table E-1: Unsafe Control Actions for the "Command Adjustment to Change Vehicle's Lateral Position in the δ Direction" Control Action

Vehicle Level Hazard	Unsafe Control Actions (Command Adjustment to Change Vehicle's Lateral Position in the δ Direction)
H5	The ALC controller does not command a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • Other vehicle systems request an adjustment in the vehicle's lateral position in the same direction as δ or in both the opposite direction and the same direction as δ.
H1	The ALC controller does not command a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is toward the lane center.
H5	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • Other vehicle systems request an adjustment in the vehicle's lateral position in the opposite direction of δ or in both the opposite direction and the same direction as δ.
H2	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is away from the lane center.
H1	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is toward the lane center, and • Other vehicle systems do not request an adjustment in the vehicle's lateral position or request an adjustment in the vehicle's lateral position in the direction of δ, but the lateral adjustment is commanded for too short of a period.
H2	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is toward the lane center, and • Other vehicle systems do not request an adjustment in the vehicle's lateral position or request an adjustment in the vehicle's lateral position in the direction of δ, but the lateral adjustment is commanded for too long.
H1, H2, H5	The ALC controller correctly commands a lateral adjustment that changes the vehicle's lateral position in the δ direction, but the command is executed incorrectly.

Vehicle Level Hazard	Unsafe Control Actions (Command Adjustment to Change Vehicle's Lateral Position in the δ Direction)
H1	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is toward the lane center, and • Other vehicle systems do not request an adjustment in the vehicle's lateral position or request an adjustment in the vehicle's lateral position in the direction of δ, but the amount of lateral adjustment commanded is too little (e.g., too little torque overlay is requested).
H2	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is toward the lane center, and • Other vehicle systems do not request an adjustment in the vehicle's lateral position or request an adjustment in the vehicle's lateral position in the direction of δ, but amount of lateral adjustment commanded is too much (e.g., too much torque overlay is requested).
H1	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is toward the lane center, and • Other vehicle systems do not request an adjustment in the vehicle's lateral position or request an adjustment in the vehicle's lateral position in the direction of δ, but the command is issued too late.
H5	The ALC controller commands a lateral adjustment that changes the vehicle's lateral position in the δ direction when: • The direction of δ is toward the lane center, and • Other vehicle systems request an adjustment in the vehicle's lateral position in the direction of δ, but the command is issued too soon.

STPA Vehicle Level Hazards:

- H1: Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
- H2: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
- H5: ALC System Impedes Action by Other Vehicle Systems

Table E-2: Unsafe Control Actions for the "Engage ALC System" Control Action

Vehicle Level Hazard	Unsafe Control Actions (Engage ALC System)
H5	The ALC system does not issue the command to engage when: • Other vehicle systems request that the ALC system engage.
H6	The ALC system does not issue the command to engage when: • The driver requests that the ALC system engage.
H4	The ALC system issues the command to engage when: • The driver does not request that the ALC system engage, and • Other vehicle systems do not request that the ALC system engage.
H5, H6	The ALC system correctly issues the command to engage, but the command is executed incorrectly.
H5	The ALC system issues the command to engage when: • Other vehicle systems request that the ALC system engage, but the command is issued too late.
H6	The ALC system issues the command to engage when: • The driver requests that the ALC system engage, but the command is issued too late.

STPA Vehicle Level Hazards:
- H4: Impeding the Driver's Ability to Control the Vehicle
- H5: ALC System Impedes Action by Other Vehicle Systems
- H6: Absence of Lateral Control Input

Table E-3: Unsafe Control Actions for the "Disengage/Suspend ALC System" Control Action

Vehicle Level Hazard	**Unsafe Control Actions** **(Disengage/Suspend ALC System)**
H5	The ALC system does not issue the command to disengage or suspend operation when: • Other vehicle systems request that the ALC system disengage or suspend.
H4	The ALC system does not issue the command to disengage or suspend operation when: • The driver requests that the ALC system disengage.
H6	The ALC system issues the command to disengage or suspend operation when: • The driver is not paying attention.
H1, H3	The ALC system issues the command to disengage or suspend operation when: • The driver does not request the ALC system to disengage, • Other vehicle systems do not request that the ALC system disengage or suspend, and • The driver is paying attention.
H1	The ALC system issues the command to disengage or suspend operation when: • The driver does not request the ALC system to disengage, • Other vehicle systems request that the ALC system disengage or suspend, and • The driver is paying attention, but the ALC system remains disengaged for too long (i.e., suspends for too long).
H5	The ALC system issues the command to disengage or suspend operation when: • The driver does not request the ALC system to disengage, • Other vehicle systems request that the ALC system disengage or suspend, and • The driver is paying attention, but the ALC system remains disengaged for too short of a period (i.e., suspends for too short).
H1, H4, H5, H6	The ALC system correctly issues the command to disengage or suspend operation, but the command is executed incorrectly.
H4	The ALC system issues the command to disengage or suspend operation when: • The driver requests the ALC system to disengage, and • The driver is paying attention, but the ALC system disengages too late.

Vehicle Level Hazard	Unsafe Control Actions (Disengage/Suspend ALC System)
H5	The ALC system issues the command to disengage or suspend operation when: • Other vehicle systems request that the ALC system disengage or suspend, and • The driver is paying attention, but the ALC system disengages too late.
H1	The ALC system issues the command to disengage or suspend operation when: • The driver does not request the ALC system to disengage, • Other vehicle systems request that the ALC system disengage or suspend, and • The driver is paying attention, but the command is issued too soon.

STPA Vehicle Level Hazards:

- H1: Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged
- H4: Impeding the Driver’s Ability to Control the Vehicle
- H5: ALC System Impedes Action by Other Vehicle Systems
- H6: Absence of Lateral Control Input

Table E-4: Unsafe Control Actions for the "Actuate Switch to Enable ALC System" Control Action

Vehicle Level Hazard	Unsafe Control Actions (Actuate Switch to Enable ALC System)
H6	The driver does not actuate the switch to enable lateral motion automation when: • The ALC system is disabled.
H6	The driver actuates the switch to enable lateral motion automation when: • The ALC system is already enabled.
H6	The driver actuates the switch to enable lateral motion automation when: • The ALC system is disabled, but the button is pressed for too long.
H6	The driver actuates the switch to enable lateral motion automation when: • The ALC system is disabled, but the button is pressed for too short a period.
H6	The driver correctly actuates the switch to enable lateral motion automation, but the command is executed incorrectly.
H6	The driver actuates the switch to enable lateral motion automation when: • The ALC system is disabled, but the button is pressed with too much force.
H6	The driver actuates the switch to enable lateral motion automation when: • The ALC system is disabled, but the button is pressed with too little force.
H6	The driver actuates the switch to enable lateral motion automation when: • The ALC system is disabled, but the switch is actuated too late.

Vehicle Level Hazard	Unsafe Control Actions (Actuate Switch to Enable ALC System)
H6	The driver actuates the switch to enable lateral motion automation when: • The ALC system is disabled, but the switch is actuated too soon.

STPA Vehicle Level Hazards:

- H6: Absence of Lateral Control Input

Table E-5: Unsafe Control Actions for the "Actuate Switch to Disable ALC System" Control Action

Vehicle Level Hazard	Unsafe Control Actions (Actuate Switch to Disable ALC System)
H4	The driver does not actuate the switch to disable lateral motion automation when: • The ALC system is enabled.
H4	The driver actuates the switch to disable lateral motion automation when: • The ALC status is already disabled.
H4	The driver actuates the switch to disable lateral motion automation when: • The ALC system is enabled, but the button is pressed for too short a period.
H4	The driver actuates the switch to disable lateral motion automation when: • The ALC system is enabled, but the button is pressed for too long.
H4	The driver correctly actuates the switch to disable lateral motion automation, but the command is executed incorrectly.
H4	The driver actuates the switch to disable lateral motion automation when: • The ALC system is enabled, but the button is pressed with too little force.
H4	The driver actuates the switch to disable lateral motion automation when: • The ALC system is enabled, but the button is pressed with too much force.
H4	The driver actuates the switch to disable lateral motion automation when: • The ALC system is enabled, but the command is pressed too soon.

Vehicle Level Hazard	Unsafe Control Actions (Actuate Switch to Disable ALC System)
H4	The driver actuates the switch to disable lateral motion automation when: • The ALC system is enabled, but the command is pressed too late.

STPA Vehicle Level Hazards:

- H6: Absence of Lateral Control Input

Table E-6: Unsafe Control Actions for the "Resume Steering" Control Action

Vehicle Level Hazard	Unsafe Control Actions (Actuate Switch to Disable ALC System)
H6	The driver does not resume steering when: • The ALC system is disabled.
H6	The driver correctly decides to resumes steering, but the command is executed incorrectly.
H6	The driver resumes steering when: • The ALC system is disabled, but the driver resumes steering too late.

STPA Vehicle Level Hazards:

- H6: Absence of Lateral Control Input

Appendix F: **OPERATIONAL SITUATIONS**

1. Driving at low speed (< 40 kph) on an arterial interstate (i.e., limited access) highway. The driver is not executing a maneuver.
2. Driving at low speed (< 40 kph) on an arterial interstate (i.e., limited access) highway. The driver is executing a maneuver.
3. Driving at low speed (< 40 kph) on a divided arterial highway. The driver is not executing a maneuver.
4. Driving at low speed (< 40 kph) on a divided arterial highway. The driver is executing a maneuver.
5. Driving at low speed (< 40 kph) on an undivided arterial highway with no pedestrians present. The driver is not executing a maneuver.
6. Driving at low speed (< 40 kph) on an undivided arterial highway with no pedestrians present. The driver is executing a maneuver.
7. Driving at low speed (< 40 kph) on an undivided arterial highway with pedestrians present. The driver is not executing a maneuver.
8. Driving at low speed (< 40 kph) on an undivided arterial highway with pedestrians present. The driver is executing a maneuver.
9. Driving at low speed (< 40 kph) on a divided collector highway with no pedestrians present. The driver is not executing a maneuver.
10. Driving at low speed (< 40 kph) on a divided collector highway with no pedestrians present. The driver is executing a maneuver.
11. Driving at low speed (< 40 kph) on a divided collector highway with pedestrians present. The driver is not executing a maneuver.
12. Driving at low speed (< 40 kph) on a divided collector highway with pedestrians present. The driver is executing a maneuver.
13. Driving at low speed (< 40 kph) on an undivided collector highway with pedestrians present. The driver is not executing a maneuver.
14. Driving at low speed (< 40 kph) on an undivided collector highway with pedestrians present. The driver is executing a maneuver.
15. Driving at low speed (< 40 kph) on a local road with pedestrians present. The driver is not executing a maneuver.
16. Driving at low speed (< 40 kph) on a local road with pedestrians present. The driver is executing a maneuver.
17. Driving at medium speed (40 kph < V < 100 kph) on an arterial interstate (i.e., limited access) highway. The driver is not executing a maneuver.
18. Driving at medium speed (40 kph < V < 100 kph) on an arterial interstate (i.e., limited access) highway. The driver is executing a maneuver.
19. Driving at medium speed (40 kph < V < 100 kph) on a divided arterial highway. The driver is not executing a maneuver.

20. Driving at medium speed (40 kph < V < 100 kph) on a divided arterial highway. The driver is executing a maneuver.
21. Driving at medium speed (40 kph < V < 100 kph) on an undivided arterial highway with no pedestrians present. The driver is not executing a maneuver.
22. Driving at medium speed (40 kph < V < 100 kph) on an undivided arterial highway with no pedestrians present. The driver is executing a maneuver.
23. Driving at medium speed (40 kph < V < 100 kph) on an undivided arterial highway with pedestrians present. The driver is not executing a maneuver.
24. Driving at medium speed (40 kph < V < 100 kph) on an undivided arterial highway with pedestrians present. The driver is executing a maneuver.
25. Driving at medium speed (40 kph < V < 100 kph) on a divided collector highway with no pedestrians present. The driver is not executing a maneuver.
26. Driving at medium speed (40 kph < V < 100 kph) on a divided collector highway with no pedestrians present. The driver is executing a maneuver.
27. Driving at medium speed (40 kph < V < 100 kph) on a divided collector highway with pedestrians present. The driver is not executing a maneuver.
28. Driving at medium speed (40 kph < V < 100 kph) on a divided collector highway with pedestrians present. The driver is executing a maneuver.
29. Driving at medium speed (40 kph < V < 100 kph) on an undivided collector highway with pedestrians present. The driver is not executing a maneuver.
30. Driving at medium speed (40 kph < V < 100 kph) on an undivided collector highway with pedestrians present. The driver is executing a maneuver.
31. Driving at medium speed (40 kph < V < 100 kph) on a local road with pedestrians present. The driver is not executing a maneuver.
32. Driving at medium speed (40 kph < V < 100 kph) on a local road with pedestrians present. The driver is executing a maneuver.
33. Driving at high speed (100 kph < V < 130 kph) on an arterial interstate (i.e., limited access) highway. The driver is not executing a maneuver.
34. Driving at high speed (100 kph < V < 130 kph) on an arterial interstate (i.e., limited access) highway. The driver is executing a maneuver.
35. Driving at high speed (100 kph < V < 130 kph) on a divided arterial highway. The driver is not executing a maneuver.
36. Driving at high speed (100 kph < V < 130 kph) on a divided arterial highway. The driver is executing a maneuver.
37. Driving at high speed (100 kph < V < 130 kph) on an undivided arterial highway with no pedestrians present. The driver is not executing a maneuver.
38. Driving at high speed (100 kph < V < 130 kph) on an undivided arterial highway with no pedestrians present. The driver is executing a maneuver.
39. Driving at high speed (100 kph < V < 130 kph) on a divided collector highway. The driver is not executing a maneuver.

40. Driving at high speed (100 kph $< V <$ 130 kph) on a divided collector highway. The driver is executing a maneuver.
41. Driving at high speed (100 kph $< V <$ 130 kph) on an undivided collector highway with no pedestrians present. The driver is not executing a maneuver.
42. Driving at high speed (100 kph $< V <$ 130 kph) on an undivided collector highway with no pedestrians present. The driver is executing a maneuver.
43. Driving at very high speed ($V >$ 130 kph) on an arterial interstate (i.e., limited access) highway. The driver is not executing a maneuver.
44. Driving at very high speed ($V >$ 130 kph) on an arterial interstate (i.e., limited access) highway. The driver is executing a maneuver.
45. Driving at very high speed ($V >$ 130 kph) on a divided arterial highway. The driver is not executing a maneuver.
46. Driving at very high speed ($V >$ 130 kph) on a divided arterial highway. The driver is executing a maneuver.
47. Driving at very high speed ($V >$ 130 kph) on an undivided arterial highway with no pedestrians present. The driver is not executing a maneuver.
48. Driving at very high speed ($V >$ 130 kph) on an undivided arterial highway with no pedestrians present. The driver is executing a maneuver.

Appendix G: **ASIL ASSESSMENT**

Table G-1: Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged (NHTSA Level 1 Automation)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-2: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged (NHTSA Level 1 Automation)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C2	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S1	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S1	C2	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-3: Unintended Loss of ALC System (NHTSA Level 1 Automation)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-4: Improper Transition of Control Between the Driver and ALC System (NHTSA Level 1 Automation)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C2	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-5: ALC System Interferes With Operation of Other Vehicle Features/Systems (NHTSA Level 1 Automation)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S1	C1	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C1	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C1	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-6: Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged (NHTSA Level 2 Automation, With the Driver Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-7: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged (NHTSA Level 2 Automation, With the Driver Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C2	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S1	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S1	C2	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-8: Unintended Loss of ALC System (NHTSA Level 2 Automation, With the Driver Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unintended Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-9: Improper Transition of Control Between the Driver and ALC System (NHTSA Level 2 Automation, With the Driver Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C1	**A**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C2	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-10: ALC System Interferes With Operation of Other Vehicle Features/Systems (NHTSA Level 2 Automation, With the Driver Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C1	**A**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C1	**A**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C1	**B**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C1	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C1	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C1	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S1	C1	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C1	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C1	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C1	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C1	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C1	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C1	**B**

Table G-11: Passive Lane/Roadway Departure While the ALC System Is Engaged (NHTSA Level 2 Automation, With the Driver Not Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-12: Active Lane/Roadway Departure While the ALC System Is Engaged (NHTSA Level 2 Automation, With the Driver Not Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C3	**A**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-13: Unexpected Loss of ALC System (NHTSA Level 2 Automation, With the Driver Not Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-14: Improper Transition of Control Between the Driver and ALC System (NHTSA Level 2 Automation, With the Driver Not Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C2	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-15: ALC System Interferes With Operation of Other Vehicle Features/Systems (NHTSA Level 2 Automation, With the Driver Not Engaged)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-16: Passive Lane/Roadway Departure While the ALC System Is Engaged (NHTSA Level 3)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-17: Active Lane/Roadway Departure While the ALC System Is Engaged (NHTSA Level 3)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C3	**A**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-18: Unexpected Loss of ALC System (NHTSA Level 3)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-19: Improper Transition of Control Between the Driver and ALC System (NHTSA Level 3)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C2	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-20: ALC System Interferes With Operation of Other Vehicle Features/Systems (NHTSA Level 3)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-21: Passive Lane/Roadway Departure While the ALC System Is Engaged (NHTSA Level 4)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Passive Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-22: Active Lane/Roadway Departure While the ALC System Is Engaged (NHTSA Level 4)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C3	**B**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C3	**B**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C3	**A**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C3	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Active Lane/Roadway Departure While the ALC System Is Engaged)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-23: Unexpected Loss of ALC System (NHTSA Level 4)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Unexpected Loss of ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-24: Improper Transition of Control Between the Driver and ALC System (NHTSA Level 4)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C2	**A**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S2	C3	**C**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S2	C2	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C2	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (Improper Transition of Control Between the Driver and ALC System)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C2	**A**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Table G-25: ALC System Interferes With Operation of Other Vehicle Features/Systems (NHTSA Level 4)

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
Very High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
Very High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E3	S3	C3	**C**
Very High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Very High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Very High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**
High Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
High Speed	Collector Undivided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E3	S3	C3	**C**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	Roadway Type	Pedestrian Presence	Driver Maneuver	Vehicle-Level Effect	Potential Accident Scenario	E	S	C	ASIL
High Speed	Collector Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
High Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
High Speed	Collector Undivided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S3	C3	**D**
Medium Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Medium Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S3	C3	**D**
Medium Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Medium Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Medium Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S3	C0	**QM**
Medium Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Collector Divided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Collector Divided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Arterial Undivided Highway	No	No	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Head-On Collision With Possible Off-Set	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Collector Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**
Low Speed	Local	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Undivided Highway	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C3	**B**
Low Speed	Arterial Divided Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Interstate Highway	N/A	No	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E4	S1	C3	**B**
Low Speed	Arterial Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Arterial Divided Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Arterial Interstate Highway	N/A	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**
Low Speed	Collector Divided Highway	No	Yes	Immediate Deviation From Selected Trajectory	Vehicle Impact With Rigid Off-Road Obstruction	E2	S1	C0	**QM**

Operating Scenario Description				Impact to Vehicle		ASIL Assessment (ALC System Interferes With Operation of Other Vehicle Features/Systems)			
Vehicle Speed	**Roadway Type**	**Pedestrian Presence**	**Driver Maneuver**	**Vehicle-Level Effect**	**Potential Accident Scenario**	**E**	**S**	**C**	**ASIL**
Low Speed	Collector Undivided Highway	Pedestrians	Yes	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E2	S3	C0	**QM**
Low Speed	Local	Pedestrians	No	Immediate Deviation From Selected Trajectory	Vehicle Runs Into a Pedestrian	E4	S3	C3	**D**

Appendix H: **FMEA**

Table H-1. FMEA for H1: Insufficient Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

System/Subsystem	Failure Mode	Cause of Failure
ALC Control Module	Torque/yaw calculation failure	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in control module I/Os connections
		Short in control module I/Os connections to ground or voltage
		Short in control module I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Arbitration logic fault
		Firmware crash/failure (SW parameters corrupted)
		Torque algorithm calculation fault
		Supply power out of range
		Supply power quality failure
		EMI/EMC fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Incorrectly determines vehicle position in lane	HW or SW fault (covered above)
		Vehicle position calculation algorithm fault
	Incorrectly determines torque/yaw limit	HW or SW fault (covered above)
		Torque/yaw limit algorithm fault
	Incorrectly determines roadway type	HW or SW fault (covered above)
	Miscommunicates with internal subsystems	From: Lane detection sensors
	Miscommunicates with external systems	From: Vehicle dynamics sensors
		From: Steering system
ALC Control Module		From: Active differential system

System/Subsystem	Failure Mode	Cause of Failure
		From: Brake/stability control system
		From: Other vehicle automation systems
		To: Steering system
		To: Active differential system
		To: Brake/stability control system
	Diagnostic fault	Considered only in mitigation of multiple point failure analysis (FTA)
Lane Detection Sensors	Incorrectly detects lane or roadway markings	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Sensor offline/no connection
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Incorrectly detects other roadway features	HW or SW fault (covered above)
	Incorrectly determines lane/roadway width	HW or SW fault (covered above)
	Incorrectly determines roadway type	HW or SW fault (covered above)

System/Subsystem	Failure Mode	Cause of Failure
Lane Detection Sensors	Lane Detection Sensors communicate incorrectly with ALC control module	HW or SW fault (covered above)
		Communication bus fault
Yaw Rate Sensor	Measured yaw rate (deg/sec) value is higher than the actual yaw rate.	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Yaw rate sensor communicates with ALC control module incorrectly	HW or SW fault (covered above)
		Communication bus fault
Lateral Acceleration Sensor	Measured lateral acceleration (g to the left or right) value is higher than actual lateral acceleration.	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage

System/Subsystem	Failure Mode	Cause of Failure
Lateral Acceleration Sensor		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Lateral Acceleration sensor communicates with ALC control module incorrectly	HW or SW fault (covered above)
		Communication bus fault
Steering System	Does not provide requested steering	Communication fault with ALC system
	Does not provide system status to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Active Differential System	Does not provide requested torque vectoring	Communication fault with ALC system
	Does not provide system status to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Brake/Stability Control System	Does not provide requested brake vectoring	Communication fault with ALC system
	Does not provide system status to ALC control module	Communication fault with ALC system
	Provides incorrect vehicle speed information to ALC control module	Communication fault with ALC system

System/Subsystem	Failure Mode	Cause of Failure
Brake/Stability Control System	Other system faults	Out of scope
Other Vehicle Systems	Request for lateral adjustment or ALC suspension is incorrect when received by ALC control module	Communication fault with ALC \system
	Other system faults	Out of scope

Table H-2. FMEA for H2: Excessive Lateral Adjustment That Results in Lane/Roadway Departure With ALC Engaged

System/Subsystem	Failure Mode	Cause of Failure
ALC Control Module	Torque/yaw calculation failure	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in control module I/Os connections
		Short in control module I/Os connections to ground or voltage
		Short in control module I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Arbitration logic fault
		Firmware crash/failure (SW parameters corrupted)
		Torque algorithm calculation fault
		Supply power out of range
		Supply power quality failure
		EMI/EMC fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Incorrectly determines vehicle position in lane	HW or SW fault (covered above)
		Vehicle position calculation algorithm fault
	Incorrectly determines torque/yaw limit	HW or SW fault (covered above)
		Torque/yaw limit algorithm fault
	Incorrectly determines roadway type	HW or SW fault (covered above)
	Miscommunicates with internal subsystems	From: Lane detection sensors
	Miscommunicates with external systems	From: Vehicle dynamics sensors
		From: Steering system
ALC Control Module		From: Active differential system

System/Subsystem	Failure Mode	Cause of Failure
		From: Brake/stability control system
		From: Other vehicle automation systems
		To: Steering system
		To: Active differential system
		To: Brake/stability control system
	Diagnostic fault	Considered only in mitigation of multiple point failure analysis (FTA)
Lane Detection Sensors	Incorrectly detects lane or roadway markings	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Sensor offline/no connection
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Incorrectly detects other roadway features	HW or SW fault (covered above)
	Incorrectly determines lane/roadway width	HW or SW fault (covered above)
	Incorrectly determines roadway type	HW or SW fault (covered above)

System/Subsystem	Failure Mode	Cause of Failure
Lane Detection Sensors	Lane Detection Sensors communicate incorrectly with ALC control module	HW or SW fault (covered above)
		Communication bus fault
Yaw Rate Sensor	Measured yaw rate (deg/sec) value is lower than the actual yaw rate.	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Measured yaw rate (deg/sec) value is in opposite direction of actual yaw rate.	HW or SW fault (covered above)
	Yaw rate sensor communicates with ALC control module incorrectly	HW or SW fault (covered above)
		Communication bus fault
Lateral Acceleration Sensor	Measured lateral acceleration (g to the left or right) value is lower than actual lateral acceleration.	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)

System/Subsystem	Failure Mode	Cause of Failure
Lateral Acceleration Sensor		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Lateral Acceleration sensor communicates with ALC control module incorrectly	HW or SW fault (covered above)
		Communication bus fault
Steering System	Does not provide requested steering	Communication fault with ALC system
	Does not provide system status to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Active Differential System	Does not provide requested torque vectoring	Communication fault with ALC system
	Does not provide system status to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Brake/Stability Control System	Does not provide requested brake vectoring	Communication fault with ALC system

System/Subsystem	Failure Mode	Cause of Failure
Brake/Stability Control System	Does not provide system status to ALC control module	Communication fault with ALC system
	Provides incorrect vehicle speed information to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Other Vehicle Systems	Request for lateral adjustment or ALC suspension is incorrect when received by ALC control module	Communication fault with ALC system
	Other system faults	Out of scope

Table H-3. FMEA for H3: Unexpected Loss of ALC System

System/Subsystem	Failure Mode	Cause of Failure
ALC Control Module	ALC control module incorrectly deactivates	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in control module I/Os connections
		Short in control module I/Os connections to ground or voltage
		Short in control module I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Arbitration logic fault
		Firmware crash/failure (SW parameters corrupted)
		Supply power out of range
		Supply power quality failure
		EMI/EMC fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Incorrectly determines driver is not paying attention	HW or SW fault (covered above)
	Incorrectly determines sensor perception is inadequate	HW or SW fault (covered above)
	Incorrectly determines that operating conditions are not appropriate for ALC system	HW or SW fault (covered above)
	Incorrectly determines roadway type	HW or SW fault (covered above)
	Miscommunicates with internal subsystems	From: Lane detection sensors
		From: Driver awareness sensors
		From: Primary driver controls
		From: Secondary driver controls

System/Subsystem	Failure Mode	Cause of Failure
ALC Control Module	Miscommunicates with external systems	From: Vehicle dynamics sensors
		From: Steering system
		From: Active differential system
		From: Brake/stability control system
		From: Other vehicle automation systems
	Diagnostic fault	Considered only in mitigation of multiple point failure analysis (FTA)
Lane Detection Sensors	Does not sufficiently detect lane/roadway markings	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Sensor offline/no connection
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Incorrectly detects other roadway features	HW or SW fault (covered above)
	Incorrectly determines roadway type	HW or SW fault (covered above)
	Lane Detection Sensors communicate incorrectly with ALC control module	HW or SW fault (covered above)

System/Subsystem	Failure Mode	Cause of Failure
Lane Detection Sensors		Communication bus fault
Yaw Rate Sensor	Measured yaw rate (deg/sec) value is higher than the actual yaw rate.	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Yaw rate sensor communicates with ALC control module incorrectly	HW or SW fault (covered above)
		Communication bus fault
Lateral Acceleration Sensor	Measured lateral acceleration (g to the left or right) value is higher than actual lateral acceleration.	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure

System/Subsystem	Failure Mode	Cause of Failure
Lateral Acceleration Sensor		Power connector connection failure
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Lateral Acceleration sensor communicates with ALC control module incorrectly	HW or SW fault (covered above)
		Communication bus fault
Brake/Stability Control System	Provides incorrect vehicle speed information to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Other Vehicle Systems	Request for lateral adjustment or ALC suspension is incorrect when received by ALC control module	Communication fault with ALC system
	Other system faults	Out of scope

Table H-4. FMEA for H4: Improper Transition of Control Between the Driver and ALC System

System/Subsystem	Failure Mode	Cause of Failure
ALC Control Module	ALC control module incorrectly determines driver's status	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in control module I/Os connections
		Short in control module I/Os connections to ground or voltage
		Short in control module I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Firmware crash/failure (SW parameters corrupted)
		Supply power out of range
		Supply power quality failure
		EMI/EMC fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	ALC system deactivates too soon	HW or SW fault (covered above)
	ALC system does not deactivate when requested	HW or SW fault (covered above)
	ALC system activates when not needed	HW or SW fault (covered above)
	Miscommunicates with internal subsystems	From: Driver awareness sensors
		From: Primary driver controls
		From: Secondary driver controls
	Miscommunicates with external systems	From: Vehicle dynamics sensors
		From: Other vehicle automation systems
	Diagnostic fault	Considered only in mitigation of multiple point failure analysis (FTA)
	Incorrectly determines level of driver engagement	Hardware fault (sensors, ICs, circuit components, circuit boards…)

System/Subsystem	Failure Mode	Cause of Failure
Driver Awareness Sensors		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Sensors incorrectly calibrated
		Algorithm incorrectly computes engagement level
		Sensor output calculation algorithm fault
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Awareness sensors communicate incorrectly with the ALC control module	HW or SW fault (covered above)
		Communication bus fault
Instrument Panel Display	Incorrectly reports ALC system status to the driver	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in sensor I/Os connections
		Short in sensor I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
Instrument Panel Display		Power connector connection failure

System/Subsystem	Failure Mode	Cause of Failure
		Sensors incorrectly calibrated
		Visual display SW algorithm failure
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Instrument panel display incorrectly communicates with ALC control module	HW or SW fault (covered above)
		Communication bus fault
Primary Driver Controls (e.g., ALC button)	Switch fails to on position	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in switch I/Os connections
		Short in switch I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure

System/Subsystem	Failure Mode	Cause of Failure
Primary Driver Controls (e.g., ALC button)		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Switch fails to off position	HW or SW fault (covered above)
	Communication fault to ALC control module	HW or SW fault (covered above)
		Communication bus fault
Secondary Driver Controls (e.g., turn signal stalk, brake pedal)	Switch fails to on position	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in switch I/Os connections
		Short in switch I/Os connections to ground or voltage
		Short in I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		SW parameters corrupted
		Supply power out of range
		Supply power quality failure
		EMC/EMI fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Switch fails to off position	HW or SW fault (covered above)
	Communication fault to ALC control module	HW or SW fault (covered above)
		Communication bus fault

Table H-5. FMEA for H5: ALC System Impedes Actions by Other Vehicle Systems/Functions

System/Subsystem	Failure Mode	Cause of Failure
ALC Control Module	ALC control module fails to suspend	Hardware fault (sensors, ICs, circuit components, circuit boards…)
		Internal connection fault (short or open)
		Break in control module I/Os connections
		Short in control module I/Os connections to ground or voltage
		Short in control module I/Os connections to another connection
		Signal connector connection failure
		Power connector connection failure
		Arbitration logic error
		Firmware crash/failure (SW parameters corrupted)
		Supply power out of range
		Supply power quality failure
		EMI/EMC fault
		Contamination/corrosion
		NVH fault
		Environmental temperature exposure failure
		Aging (durability)
		Manufacturing defect
		Manufacturing variability
		Service/maintenance
	Miscommunicates with internal subsystems	From: Secondary driver controls
	Miscommunicates with external systems	From: Other vehicle automation systems
	Diagnostic fault	Considered only in mitigation of multiple point failure analysis (FTA)
Brake/Stability Control System	Stability control actions not communicated to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Steering System	Stability control actions not communicated to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope

System/Subsystem	Failure Mode	Cause of Failure
Active Differential System	Stability control actions not communicated to ALC control module	Communication fault with ALC system
	Other system faults	Out of scope
Other Vehicle Systems	Request for lateral adjustment or ALC suspension is incorrect when received by ALC control module	Communication fault with ALC system
	Other system faults	Out of scope

Appendix I: **STPA STEP 2: CAUSAL FACTORS**

Table I-1: ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
20	Controller hardware faulty, change over time	Internal hardware failure	An internal failure of the ALC control module could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
21	Controller hardware faulty, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	Overheating due to increased resistance could damage the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
22	Controller hardware faulty, change over time	Over temperature due to faulty cooling system	Failure of the cooling system could lead to failure of the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
23	Controller hardware faulty, change over time	Degradation over time	Degradation of the ALC control module over time (e.g., wear and tear) could lead to a failure of the control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
25	Controller hardware faulty, change over time	Faulty memory storage or retrieval	Faulty memory storage or retrieval could lead to an error in the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
26	Controller hardware faulty, change over time	Faulty internal timing clock	A faulty internal timing clock could lead to the ALC control module issuing a command for either too short, too long, too soon, too late, or not at all.
27	Controller hardware faulty, change over time	Faulty signal conditioning or converting (e.g., analog-to-digital converter, signal filters)	Error in the signal filters from the vehicle sensors could lead to the ALC control module making an incorrect decision.
1100	Controller hardware faulty, change over time	Unused circuits in the controller	Unused circuits that are improperly handled (e.g., grounded) could affect the ALC control module operation.
1154	Controller hardware faulty, change over time	Faulty memory storage or retrieval	The ALC control module incorrectly transitions or writes the current operating status to memory.
1	External control input or information wrong or missing	Spurious input due to shorting or other electrical fault	If the control module receives erroneous input data from the sensors or other vehicle systems due to a short or other electrical fault, then the controller may incorrectly determine the location of the vehicle or lane boundaries. This could affect the ALC control module's ability to issue a command (e.g., adjust lateral position).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
2	External control input or information wrong or missing	Corrupted input signal	If the control module receives corrupted input data from the sensors or other vehicle systems (e.g., due to a short or other signal error), the ALC controller may incorrectly determine the location of the vehicle or lane boundaries. This could affect the ALC control module's ability to issue a command (e.g., adjust lateral position).
9	External control input or information wrong or missing	Timing related input is incorrect or missing	If there is an external timing signal, an error with the signal could lead to delayed or premature actions by the ALC control module.
10	External control input or information wrong or missing	Other	After market components could interfere with control signals provided to the ALC control module (e.g., by mimicking a sensor). This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
1101	External control input or information wrong or missing	Malicious intruder	A malicious intruder may access the ALC control module or may spoof sensor data provided to the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
3	External disturbances	EMI or ESD	EMI or ESD from the external environment could lead to an incorrect signal or damage to the IC of the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
4	External disturbances	Vibration or shock impact	A vibration or shock impact from the external environment could physically damage the control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
5	External disturbances	Manufacturing defects and assembly problems	An incorrectly assembled ALC control module, or one with manufacturing defects, could function incorrectly (e.g., incorrect input signal, slow clock, etc.). This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
6	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature could lead to problems with the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
7	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment could lead to internal problems with the ALC control module like shorts. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
8	External disturbances	Organic growth	Organic growth could lead to problems with the ALC control module (e.g., internal shorts). This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
11	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) could lead to errors with the IC for the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
12	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) could physically damage the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
15	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component or sensor could lead to failure of ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
16	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from another vehicle component could lead to damage of ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
17	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components could lead to damage of ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
18	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components (e.g., condensed moisture) could lead to damage of ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
19	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components could lead to overheating and failure of ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
1098	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components could affect the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1099	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In electric vehicles, corona effects from high voltage components might damage the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
13	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power could lead to complete failure of ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
14	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	Disturbances in the owner supply could lead to intermittent or complete failure of the ALC control module. This could affect the ALC control module's ability to issue a command (e.g., engage/disengage or adjust lateral position).
24	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may not fully adjust the lateral position to center the vehicle in the lane because it expects another vehicle system to also provide some lateral adjustment (e.g., ESC system).
30	Process model or calibration incomplete or incorrect	Sensor or actuator calibration, including degradation characteristics	Errors in ALC control module's sensor or actuator calibration could affect the ALC control module's model of the vehicle's behavior. This may cause the ALC control module to issue an unsafe control action.
31	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control modules may have the incorrect vehicle parameters stored (e.g., vehicle width or sensor locations). This could affect the ALC control algorithm's ability to determine the vehicle positioning.
32	Process model or calibration incomplete or incorrect	Errors in stored maps	If the ALC control module uses data from stored calibration maps and there is an error in that data, this could affect critical parameters used in the ALC module's algorithms. This may cause the ALC control module to issue an unsafe control action.
310	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may incorrectly determine the current orientation of the wheels.
311	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may incorrectly determine the location of the car in the lane.
312	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may have incorrect values for how much torque (steering torque, or brake/torque vectoring) it should apply based on the vehicle speed. For example, less steering torque is needed to steer the vehicle at higher speeds.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
313	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may incorrectly assume that the front wheels cannot be turned further.
804	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may incorrectly think it should disengage in response to the driver's input (e.g., sharp steering maneuvers).
806	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module's process model may have incorrectly stored default signals for various switches (i.e. thinks an NC switch is NO).
1102	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may incorrectly combine sensor data, resulting in an incorrect or incomplete understanding of the surrounding environment (i.e., sensor fusion).
1103	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may incorrectly interpret data provided by the sensors (e.g., a truck skid-mark may be misinterpreted as a lane marker).
1104	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may not realize that a sensor has been compromised (either through an electronic failure or by changing environmental conditions).
1107	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may receive multiple sensor inputs that trigger conflicting actions (e.g., engage and disengage/suspend).
1108	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The ALC control module may not realize that another vehicle system has entered a degraded operating mode that affects its ability to implement ALC commands.
1155	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver action on a primary control (e.g., engage via the ALC switch) may conflict with the action on a secondary control (e.g., pressing the brake pedal).
28	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	An error in the control algorithm for calculating the required torque adjustment may result in an error in the lateral displacement (e.g., too little, too much, wrong direction, not at all).
299	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may introduce a delay due to processing time.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
300	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm reduces the duration or magnitude of the lateral adjustment because it incorrectly computes the contribution in lateral position adjustment provided by another vehicle system.
301	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control module may incorrectly calculate vehicle parameters (e.g., the width of the car).
302	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may incorrectly determine the safe region for the travel lane (this is the region around the center of the lane where the vehicle is not in danger of drifting and colliding with another object).
303	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may make an incorrect assumption when sensor data is not provided at a high enough rate (e.g., the ALC control module operates off of outdated data).
305	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	If the ALC system uses more than one foundational system to implement lateral adjustments (e.g., braking and steering systems), the control algorithm may not correctly allocate lateral adjustment requests between these systems.
306	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may incorrectly determine the curvature of the road.
307	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may incorrectly determine the current trajectory of the vehicle.
308	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may incorrectly process lane marking data (e.g., detecting faded markings or interpreting other road features as lane markings).
309	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may not correctly determine the driver's intent (e.g., the ALC control module incorrectly believes the driver is going to make a lateral adjustment).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
524	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control algorithm for disengaging or suspending the system does not execute or executes too late resulting in an error in the operating state of the system.
531	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Flaws in software code creation	Error in code creation (e.g., compiler error) could cause a failure in the ALC control module.
532	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm may have directions reversed.
533	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control module may have the incorrect timing.
534	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control module may incorrectly determine the vehicle's speed.
799	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	An error in the control algorithm may result in an error when enabling or disabling the system
800	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control algorithm may incorrectly process the driver awareness sensor data.
805	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control algorithm may incorrectly process the actions of an unaware driver as paying attention.
807	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control algorithm may incorrectly decide that it is unsafe to suspend ALC control.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
808	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control algorithm may not respect the authority of higher priority vehicle systems.
809	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control algorithm may incorrectly interpret the requests from other vehicle systems (e.g., suspend request from an automated lane change system).
810	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	A logical issue with the ALC control algorithm, could cause it to accidentally engage.
812	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	An error with the ALC control algorithm may develop if it is not able to correctly handle signals from some sensors that would cause it to disable, and input from the driver or other vehicle systems telling it to enable at the same time.
1105	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC system may not properly coordinate actions with other vehicle systems that are providing longitudinal control for the vehicle, such as ACC.
1106	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The ALC control algorithm may not be capable of responding during abrupt changes in vehicle speed (e.g., sudden release of the accelerator pedal).
1153	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The control algorithm increases the duration or magnitude of the lateral adjustment because it incorrectly computes the contribution in lateral position adjustment provided by another vehicle system.

Table I-2: ALC On/Off Switch (Primary Control)

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
566	External disturbances	EMI or ESD	External EMI or ESD that affects the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (i.e., on or off).
567	External disturbances	Vibration or shock impact	External vibration or shock impacts that affect the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (i.e., on or off).
568	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (i.e., on or off).
569	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature around the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (i.e., on or off).
570	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from external sources that affects the ALC on/off switch (e.g., shorting) could affect the ability for the ALC control module to properly detect the driver's intended system state (i.e., on or off).
571	External disturbances	Organic growth	Organic growth from external sources that affects the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (i.e., on or off).
578	External disturbances	Physical interference (e.g., chafing)	Physical interference from external sources (e.g., objects in the cabin) that affect the on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (i.e., on or off).
574	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other components that affects the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (e.g., on or off).
575	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other components that affect the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (e.g., on or off).
576	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from components around the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (e.g., on or off).
577	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (e.g., on or off).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
579	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components could damage the ALC on/off switch and affect the ability for the ALC control module to properly detect the driver's intended system state (e.g., on or off).
580	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from components around the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (e.g., on or off).
581	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In a vehicle with high voltage circuits, the corona effect from components around the ALC on/off switch could affect the ability for the ALC control module to properly detect the driver's intended system state (e.g., on or off).
564	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	The ALC on/off switch may lose power. Depending on the design, this may cause the system to disengage unexpectedly or may affect the driver's ability to manually engage or disengage the system (e.g., if the button is on a touch screen panel).
565	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	The ALC on/off switch may experience a power disturbance. Depending on the design, this may cause the system to change state unexpectedly (i.e., turn on or off), or may affect the driver's ability to manually engage or disengage the system (e.g., if the button is on a touch screen panel).
559	Sensor inadequate operation, change over time	Internal hardware failure	If the ALC on/off switch has an internal hardware failure, the ALC system may not be able to accurately determine the driver's intended system state (i.e., engaged or disengaged).
560	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the ALC on/off switch overheats due to an internal short, the ALC system may not be able to accurately determine the driver's intended system state (i.e., engaged or disengaged).
561	Sensor inadequate operation, change over time	Degradation over time	If the ALC on/off switch degrades over time, the ALC system may not be able to accurately determine the driver's intended system state (i.e., engaged or disengaged).
563	Sensor inadequate operation, change over time	Reporting frequency too low	If the ALC on/off switch's reporting frequency is too low, there may be a delay before the ALC system is able to determine the driver's intended system state (i.e., engaged or disengaged).

Table I-3: Driver Awareness Sensors

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
542	External disturbances	EMI or ESD	External EMI or ESD that affects the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
543	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) that affect the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
544	External disturbances	Vibration or shock impact	External vibration or shock impacts that affect the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
545	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
546	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature around the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
547	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from external sources that affects the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
548	External disturbances	Organic growth	Organic growth from external sources that affects the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
549	External disturbances	Physical interference (e.g., chafing)	External physical interference like road debris that affects the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
551	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from nearby components that affects the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
552	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from nearby components that affect the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
553	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components around the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
554	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other components that affects the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
555	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other components that affects the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
557	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other components around the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
558	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from other components around the driver awareness sensor could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
540	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power to the driver awareness sensors could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
541	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A disturbance in the power supply to the driver awareness sensors could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
1088	Power supply faulty (high, low, disturbance)	Reference voltage incorrect (e.g., too low, too high)	If the reference voltage supplied to the driver awareness sensors is too high or too low, this could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
535	Sensor inadequate operation, change over time	Internal hardware failure	If the driver awareness sensor has a hardware failure, this could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
536	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the driver awareness sensor overheats due to a short, this could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
537	Sensor inadequate operation, change over time	Degradation over time	If the driver awareness sensor degrades over time, this could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
538	Sensor inadequate operation, change over time	Over temperature due to faulty cooling system	If the driver awareness sensor overheats due to a faulty cooling system, this could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.
539	Sensor inadequate operation, change over time	Reporting frequency too low	If the driver awareness sensor's reporting frequency is too low, this could affect the ability of the ALC system to determine if the driver is engaged in the driving task. This may cause the ALC system to disengage or may affect transition of control from the ALC system to the driver.

Table I-4: Connective/On-Line Sensors (GPS, maps, etc.)

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
57	External disturbances	EMI or ESD	External EMI or ESD that affects the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
58	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) affecting the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
59	External disturbances	Vibration or shock impact	External vibrations or a shock impact that affects the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
60	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects in the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
61	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling could affect the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
62	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion or contamination from an external source could affect the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
63	External disturbances	Organic growth	Organic growth in the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g. exit ramps).
64	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) could affect the GPS or navigation system (e.g., damaging an external antenna). This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
65	External disturbances	Magnetic interference	External magnetic interference of the GPS system could lead to an error in lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
68	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
69	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
70	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components could affect the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
71	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components could affect the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
72	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components could affect the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
73	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from other vehicle components may affect inertial sensors used by the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
74	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from neighboring components could affect the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
75	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage components, the corona effects could damage the GPS or navigation system. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
66	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power to the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
67	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A fault with the power supply to the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
52	Sensor inadequate operation, change over time	Internal hardware failure	An internal hardware failure in the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
53	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	Overheating of the GPS or navigation system (e.g., due to internal shorts) could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
54	Sensor inadequate operation, change over time	Degradation over time	Degradation of the GPS or navigation system over time could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
55	Sensor inadequate operation, change over time	Over temperature due to faulty cooling system	Faulty cooling for the controller in the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
56	Sensor inadequate operation, change over time	Other	Loss of signal or a bad signal from the satellites to the GPS or navigation system could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
1089	Sensor inadequate operation, change over time	Other	The GPS or navigation system stored maps or data could be outdated. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
1090	Sensor inadequate operation, change over time	Other	The GPS or navigation system data may be off-set from actual conditions. This could affect the ALC system's lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).

Table I-5: Lane Detection Sensors (cameras, radar, LIDAR, etc.)

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
84	External disturbances	Vibration or shock impact	Vibrations or a shock impact could damage the Lane Detection Sensors, which could affect the roadway data (e.g., lane markings) they provide to the ALC control module.
85	External disturbances	EMI or ESD	External EMI or ESD impacting the lane detection sensor could affect the roadway data (e.g., lane markings) they provide to the ALC control module.
86	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) could affect integrated circuits incorporated into the lane detection sensors. This could affect the roadway data (e.g., lane markings) they provide to the ALC control module.
87	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects in the lane detection sensors could lead to issues with the roadway data (e.g., lane markings) they provide to the ALC control module.
88	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature temperatures could affect the lane detection sensors leading to issues with the roadway data (e.g., lane markings) they provide to the ALC control module.
89	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion or contamination from the external environment could damage the lane detection sensors leading to issues with the roadway data (e.g., lane markings) they provide to the ALC control module.
90	External disturbances	Organic growth	Organic growth could affect the lane detection sensors (e.g., internal shorting) leading to issues with the roadway data (e.g., lane markings) they provide to the ALC control module.
91	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) could affect the lane detection sensors, leading to issues with the roadway data (e.g., lane markings) provided to the ALC control module. For example the lens of a camera could get scratched.
92	External disturbances	Magnetic interference	External magnetic interference could affect the lane detection sensors (e.g., magnetometer-type sensors), leading to issues with the roadway data (e.g., embedded lane sensors) provided to the ALC control module.
95	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components affecting the lane detection sensors could lead to issues with the roadway data (e.g., lane markings) provided to the ALC control module.
96	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impact from other vehicle components may affect the lane detection sensors. This could lead to issues with the roadway data (e.g., lane markings) provided to the ALC control module.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
97	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components may affect the lane detection sensors. This could lead to issues with the roadway data (e.g., lane markings) provided to the ALC control module.
98	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components may affect the lane detection sensors. This could lead to issues with the roadway data (e.g., lane markings) provided to the ALC control module.
99	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from other components may affect the lane detection sensors (e.g., magnetometer-type sensors). This could lead to issues with the roadway data (e.g., embedded lane markings) provided to the ALC control module.
100	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other components may affect the lane detection sensors. This could lead to issues with the roadway data (e.g., lane markings) provided to the ALC control module.
101	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage components, the corona effect from other components may affect the lane detection sensors. This could lead to issues with the roadway data (e.g., lane markings) provided to the ALC control module.
1092	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components may affect the lane detection sensors. This could lead to issues with the roadway data (e.g., lane markings) provided to the ALC control module.
1093	Hazardous interaction with other components in the rest of the vehicle	Other	Environmental conditions (e.g., rain, snow, etc.) may affect the ability of the lane detection sensors to accurately perceive the environment. This could affect the roadway data (e.g., lane markings) provided to the ALC control module.
93	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	A loss of power to the lane detection sensors could prevent roadway data (e.g., lane markings) from being provided to the ALC control module.
94	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A disturbance in the power supply to the lane detection sensors could affect the integrity of the roadway data (e.g., lane markings) provided to the ALC control module.
76	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the lane detection sensors overheat (e.g., as a result of internal shorts), the roadway data (e.g., lane markings) provided to the ALC control module could be incorrect or corrupted.
77	Sensor inadequate operation, change over time	Internal hardware failure	If the lane detection sensors have an internal hardware failure, the roadway data (e.g., lane markings) provided to the ALC control module could be incorrect or corrupted.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
78	Sensor inadequate operation, change over time	Degradation over time	If the lane detection sensors degrade over time, the roadway data (e.g., lane markings) provided to the ALC control module could be incorrect or corrupted.
79	Sensor inadequate operation, change over time	Over temperature due to faulty cooling system	If the CPUs for the lane detection sensors overheat (e.g., due to faulty cooling systems), the roadway data (e.g., lane markings) provided to the ALC control module could be incorrect or corrupted.
80	Sensor inadequate operation, change over time	Reporting frequency too low	If the lane detection sensors fail to report the roadway data with a high enough frequency, the ALC control module could issue an incorrect command or delay issuing a command.

Table I-6: Active Differential System

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
813	Actuator inadequate operation, change over time	Internal hardware failure	If the active differential system suffers an internal hardware failure, then the active differential system may not be available or may incorrectly respond to requests for torque vectoring from the ALC system.
814	Actuator inadequate operation, change over time	Degradation over time	If the active differential system degrades over time, then the active differential system may not be available or may incorrectly respond to requests for torque vectoring from the ALC system.
815	Actuator inadequate operation, change over time	Over temperature due to faulty cooling system	If the active differential system overheats due to a faulty cooling system, then the active differential system may not be available or may incorrectly respond to requests for torque vectoring from the ALC system.
816	Actuator inadequate operation, change over time	Relay failure modes, including: (1) does not energize, (2) does not de-energize, and (3) welded contacts	If internal relays in the active differential system fail, then the active differential system may not be available or may incorrectly respond to requests for torque vectoring from the ALC system.
817	Actuator inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the active differential system overheats (e.g., due to an internal short), then the active differential system may not be available or may incorrectly respond to requests for torque vectoring from the ALC system.
1080	Actuator inadequate operation, change over time	Other	The active differential system controller may have software flaws or inadequately designed control algorithms. As a result, the active differential system may not be available or may incorrectly respond to requests for torque vectoring from the ALC system.
1081	Actuator inadequate operation, change over time	Other	The active differential system may have an incorrect process model for the vehicle dynamics (e.g., the system incorrectly thinks the vehicle is at its stability limits). As a result, the active differential system may not be available or may incorrectly respond to requests for torque vectoring from the ALC system.
820	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
821	External disturbances	Vibration or shock impact	Vibrations or shock impacts from an external source that affect the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
822	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems could affect functioning of the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
823	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source could affect the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
824	External disturbances	Organic growth	Organic growth from an external source could affects the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
825	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) could damage the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
830	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature could affect the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
1078	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) could affect the functioning of the active differential system controller or other electronic circuits. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
826	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components could affect the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
827	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components could affect the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
828	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components could damage the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
829	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components could affect the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
831	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components could damage the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
832	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other components could affect the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
833	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from other components near the active differential system could damage the active differential system. As a result, torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.
1079	Hazardous interaction with other components in the rest of the vehicle	Unable to meet demands from multiple components (e.g., inadequate torque)	The active differential system may not be able to implement concurrent torque vectoring requests from the ALC system and other vehicle systems (e.g., brake/vehicle stability system).
818	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	If the active differential system loses power, then torque vectoring may not be available to respond to lateral adjustment requests from the ALC system.
819	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	If the active differential system has a power supply fault, then torque vectoring may not be available or may incorrectly respond to lateral adjustment requests from the ALC system.

Table I-7: Brake Pedal Position Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
588	External disturbances	EMI or ESD	External EMI or ESD that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
590	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) that affect the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
591	External disturbances	Vibration or shock impact	Vibration or shock impacts from external sources that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
592	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
593	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature may affect the brake pedal position sensor, which may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
594	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from external sources may damage the brake pedal position sensor, which may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
595	External disturbances	Organic growth	Organic growth from external sources that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
596	External disturbances	Physical interference (e.g., chafing)	Physical interference from external sources (e.g. road debris) may damage the brake pedal position sensor, which may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
597	External disturbances	Magnetic interference	Magnetic interference from external sources could affect the brake pedal position sensor, which may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
602	External disturbances	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
598	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other components that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
599	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
600	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components may affect the brake pedal position sensor, which may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
601	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
602	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
603	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from other vehicle components that affects the brake pedal position sensor may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
587	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	If the brake pedal position sensor loses power, then the ALC control module may not disengage when the driver presses the brake pedal. This causal factor only applies if the brake pedal can be used to disengage the ALC system.
589	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A disturbance in the power supply could affect the brake pedal position sensor. This may affect the ability for ALC to disengage when the driver applies the brake pedal or may cause ALC to disengage unexpectedly. This causal factor only applies if the brake pedal can be used to disengage the ALC system.
1066	Power supply faulty (high, low, disturbance)	Reference voltage incorrect (e.g., too low, too high)	The reference voltage to the brake pedal position sensor may be incorrect. This may affect the ability for ALC to disengage when the driver applies the brake pedal or may cause ALC to disengage unexpectedly. This causal factor only applies if the brake pedal can be used to disengage the ALC system.
582	Sensor inadequate operation, change over time	Internal hardware failure	If the brake pedal position sensor suffers from an internal hardware failure, the ALC system may not disengage when the brake pedal is pressed or the ALC system may disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
583	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the brake pedal position sensor overheats (e.g., due to internal shorting), the ALC system may not disengage when the brake pedal is pressed or the ALC system may disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
584	Sensor inadequate operation, change over time	Degradation over time	If the brake pedal position sensor degrades over time, the ALC system may not disengage when the brake pedal is pressed or the ALC system may disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
586	Sensor inadequate operation, change over time	Reporting frequency too low	If the brake pedal position sensor's reporting frequency is too low, there may be a delay before the ALC system disengages when the brake pedal is pressed. This causal factor applies if the brake pedal can be used to disengage ALC.

Table I-8: Brake Pedal Position Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
837	Actuator inadequate operation, change over time	Relay failure modes, including: 1) does not energize, 2) does not de-energize, and 3) welded contacts	If the brake system has a relay failure and the lateral adjustment uses differential braking, then the lateral adjustment may be executed incorrectly.
204	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the brake system could lead to the brake system providing the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
206	External disturbances	Vibration or shock impact	External vibration or shock impacts that affect the brake system could lead to the brake system providing the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
207	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) that affect the brake system could lead to the brake system providing the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
208	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems that affect the brake system could lead to the brake system providing the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
209	External disturbances	Moisture, corrosion, or contamination	External moisture, corrosion or contamination that affects the brake system could lead to a short, causing the brake system to provide the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
210	External disturbances	Organic growth	Organic growth that affects the brake system could lead to a short, causing the brake system to provide the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
211	External disturbances	Physical interference (e.g., chafing)	Physical interference from external sources (e.g., road debris) could cause the brake system to provide the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
212	External disturbances	Magnetic interference	Magnetic interference from external sources could affect sensors in the brake system. This may cause the brake system to provide the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
1082	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures may affect the brake system. This may cause the brake system to provide the ALC control module with an incorrect vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
215	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from a nearby component could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
216	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impact from a nearby component that affects the brake system could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
217	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from a nearby component could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
218	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from a nearby component that affects the brake system could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
219	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from a nearby component could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
220	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from a nearby component could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
221	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from a nearby component could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
222	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from a nearby component could cause the brake system to report the incorrect vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
1084	Hazardous interaction with other components in the rest of the vehicle	Other	The brake system may not be capable of providing the requested lateral forces because another system has requested a conflicting braking command (e.g., stability control requests other differential braking action).
213	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power to the brake system could prevent the brake system from reporting the vehicle speed to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
214	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A faulty or disrupted power supply to the brake system may cause the brake system to provide the ALC control module with the incorrect vehicle speed or may prevent reporting the vehicle speed. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
199	Sensor inadequate operation, change over time	Internal hardware failure	Internal hardware failures in the brake system could lead the brake system to report an incorrect vehicle speed data to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
200	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If brake system components overheat (e.g., due to a short), it could lead the brake system to report an incorrect vehicle speed data to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.
201	Sensor inadequate operation, change over time	Degradation over time	If the brake system components degrade over time, it could lead the brake system to report an incorrect vehicle speed data to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.
202	Sensor inadequate operation, change over time	Over temperature due to faulty cooling system	If the brake system components (e.g., control module) overheat due to the cooling system failing, it could lead the brake system to report an incorrect vehicle speed data to the ALC control module. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.
203	Sensor inadequate operation, change over time	Reporting frequency too low	If the brake system reports the vehicle speed at too low of a frequency, there may be a delay before the ALC control module receives updated vehicle speed data.

Table I-9: Driver

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1058	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may not correctly understand the current state of the ALC system from the dashboard display (e.g., confusing or obscured icons, mode confusion).
1059	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may incorrectly believe that the ALC system will automatically disengage or engage under certain conditions. For example, if ALC disengages due to poor lane markings, the driver may expect ALC to re-engage when the lane markings are clear.
1067	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may incorrectly believe that multiple automated systems are linked together. The driver may think that by disengaging an automated system other than ALC (e.g., ACC) that ALC will also disengage.
1070	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may not correctly understand how to actuate the ALC on/off switch properly. In particular, if multiple steps or a long button press are required to engage or disengage the system, the driver may not complete the action.
1071	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may accidentally press the ALC on/off button while trying to control a different system (e.g., climate control, radio, etc.).
1072	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may not realize how much force is being applied to the button. For example, if the system is not engaging because of inadequate lane markings, the driver may become frustrated and apply the button with increasing force.
1085	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may incorrectly believe other vehicle controls, such as steering or applying the brakes, will automatically disengage ALC.
1086	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may not realize that operating certain controls will disengage the ALC system (e.g., sharp steering, brake pedal application, etc.)
1087	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may think the ALC system automatically turns on when the vehicle is started.
1150	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may not have sufficient situational awareness of the surrounding roadway to safely steer.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1151	Process model or calibration incomplete or incorrect	Model of the controlled process, including degradation characteristics	The driver may panic, resulting in incorrect steering actions.
1060	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The driver may not operate the ALC system correctly because of a cognitive impairment (drugs, alcohol, lack of sleep, etc.).
1061	Software error (inadequate control algorithm, flaws in creation, modification, or adaptation)	Inadequate control algorithm	The driver may not know how to properly operate the system (e.g., how to enable/disable, conditions that automatically disable the system, what different warnings mean, etc.).

Table I-10: Hazard Warning Switch (Secondary Driver Control)

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
611	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
612	External disturbances	Vibration or shock impact	Vibration or shock impacts from external sources that affect the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
613	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
614	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature affecting the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
615	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from external sources that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
616	External disturbances	Organic growth	Organic growth from external sources that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
617	External disturbances	Physical interference (e.g., chafing)	Physical interference from external sources (e.g., objects in the cabin) that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
619	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
620	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
621	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
622	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
623	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
625	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
626	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from other vehicle components that affects the hazard warning switch may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
609	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	If the hazard warning switch loses power, then the ALC system may not disengage when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
610	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	If the hazard warning switch has a power supply disturbance, then the ALC system may not disengage when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
604	Sensor inadequate operation, change over time	Internal hardware failure	If the hazard warning switch has an internal hardware failure, this may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
605	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the hazard warning switch overheats (e.g., due to an internal short), this may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
606	Sensor inadequate operation, change over time	Degradation over time	If the hazard warning switch degrades over time, this may cause the ALC system to disengage unexpectedly or may prevent the ALC system from disengaging when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.
608	Sensor inadequate operation, change over time	Reporting frequency too low	If the hazard warning switch's reporting frequency is too low, this may cause a delay in disengaging the ALC system when the driver presses the hazard switch. This causal factor applies if the hazard warning switch can be used to disengage ALC.

Table I-11: Instrument Panel Display

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1017	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1018	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., cosmic rays, protons) that affect the instrument panel display control module could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1019	External disturbances	Vibration or shock impact	Vibration and shock impacts from an external source that damage the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1020	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1021	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures affecting the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1022	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1023	External disturbances	Organic growth	Organic growth from an external source that affects the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1024	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source that affects the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1025	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1026	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration and shock impacts from another vehicle component that affect the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1027	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1028	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components that affect the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1029	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1030	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other components affecting the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1031	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from other components affecting the instrument panel display system could affect the ALC notifications and cause the driver to incorrectly operate the ALC system.
1015	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	If the instrument panel display system loses power, then the driver may incorrectly operate the ALC system.
1016	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	If the instrument panel display system has a power supply fault (e.g., low voltage), then the driver may incorrectly operate the ALC system.
1012	Sensor inadequate operation, change over time	Internal hardware failure	If the instrument panel display system has an internal hardware failure, this could affect the ALC notification and the driver may incorrectly operate the ALC system.
1013	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the instrument panel display system overheats (e.g., due to an internal short), this could affect the ALC notification and the driver may incorrectly operate the ALC system.
1014	Sensor inadequate operation, change over time	Degradation over time	If the instrument panel display system degrades over time, this could affect the ALC notification and the driver may incorrectly operate the ALC system.
1091	Sensor inadequate operation, change over time	Over temperature due to faulty cooling system	If the instrument panel display system control module has a faulty cooling system, the controller may overheat. This could affect the ALC notification and the driver may incorrectly operate the ALC system.
1156	Sensor inadequate operation, change over time	Other	The instrument panel display may convey the incorrect timing information to the driver (e.g., incorrect duration is provided to the driver or the instrument panel clock countdown rate may differ from the clock timing used by the ALC control module).

Table I-12: Roll Rate Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
107	External disturbances	EMI or ESD	EMI or ESD from an external source could affect the roll rate sensor, leading to incorrect roll rate data being sent to the ALC control module.
108	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) could affect the roll rate sensor, leading to incorrect roll rate data being sent to the ALC control module.
110	External disturbances	Vibration or shock impact	Vibration and shock impacts could affect the roll rate sensor, resulting in incorrect roll rate data being sent to the ALC control module.
111	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects or an assembly problem (e.g., sensor installed upside down) affecting the roll rate sensor could result in incorrect roll rate data being provided to the ALC control module.
112	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature affecting the roll rate sensor could lead to incorrect roll rate data being provided to the ALC control module.
113	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment may damage the roll rate sensor. This could lead to incorrect roll rate data being provided to the ALC control module.
114	External disturbances	Organic growth	Organic growth affecting the roll rate sensor could lead to shorts and other problems that result in incorrect roll rate data being provided to the ALC control module.
115	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment that affects the roll rate sensor could lead to issues with the roll rate data the roll rate provided to the ALC control module.
116	External disturbances	Magnetic interference	Magnetic interference from external sources could affect the roll rate sensor, resulting in incorrect roll rate data being provided to the ALC control module.
119	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the roll rate sensor could cause incorrect roll rate data to be provided to the ALC control module.
120	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affects the roll rate sensor could cause incorrect roll rate data to be provided to the ALC control module.
121	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components that affects the roll rate sensor could cause incorrect roll rate data to be provided to the ALC control module.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
122	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the roll rate sensor could cause incorrect roll rate data to be provided to the ALC control module.
123	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components that affects the roll rate sensor could cause incorrect roll rate data to be provided to the ALC control module.
124	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from other vehicle components that affects the roll rate sensor could cause incorrect roll rate data to be provided to the ALC control module.
125	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components that affects the roll rate sensor could cause incorrect roll rate data to be provided to the ALC control module.
126	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with a high voltage circuit, the corona effect from high voltage components could damage the roll rate sensor causing incorrect roll rate data to be provided to the ALC control module.
117	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	A loss of power to the roll rate sensor could prevent the sensor from providing roll rate data to the ALC control module.
118	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	Disturbances in the power supply to the roll rate sensor could affect the vehicle dynamics data provided to the ALC control module.
1063	Power supply faulty (high, low, disturbance)	Reference voltage incorrect (e.g., too low, too high)	If the roll rate sensor's reference voltage is incorrect, the roll rate sensor could send incorrect vehicle dynamics data to the ALC control module.
102	Sensor inadequate operation, change over time	Internal hardware failure	If the roll rate sensors have an internal hardware failure, the roll rate data provided to the ALC control module could be missing or incorrect.
103	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the roll rate sensors overheat (e.g., due to a short), the roll rate data provided to the ALC control module could be missing or incorrect.
104	Sensor inadequate operation, change over time	Degradation over time	If the roll rate sensors degrade over time, the roll rate data provided to the ALC control module could be missing or incorrect.
106	Sensor inadequate operation, change over time	Reporting frequency too low	If the roll rate sensors have a reporting frequency that is too low, the roll rate data provided to the ALC control module could be delayed.

Table I-13: Steering system

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
855	Actuator inadequate operation, change over time	Internal hardware failure	If the steering system has an internal hardware failure, then the lateral adjustment requested by the ALC system may be executed incorrectly.
856	Actuator inadequate operation, change over time	Degradation over time	If the steering system degrades over time, then the lateral adjustment requested by the ALC system may be executed incorrectly.
857	Actuator inadequate operation, change over time	Over temperature due to faulty cooling system	If the steering system controller overheats due to a faulty cooling system, then the lateral adjustment requested by the ALC system may be executed incorrectly.
858	Actuator inadequate operation, change over time	Relay failure modes, including: 1) does not energize, 2) does not de-energize, and 3) welded contacts	If a steering system component has a relay failure, then the lateral adjustment requested by the ALC system may be executed incorrectly.
859	Actuator inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If a steering system component overheats (e.g., due to a short), then the lateral adjustment requested by the ALC system may be executed incorrectly.
1097	Actuator inadequate operation, change over time	Other	The steering system control module may have a programming flaw or faulty software logic that affects its ability to respond to lateral adjustment requests from the ALC system.
1152	Actuator inadequate operation, change over time	Other	The steering system may incorrectly execute the driver's steering requests.
862	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
863	External disturbances	Vibration or shock impact	Vibrations or shock impacts from an external source that affect the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
864	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
865	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems that affect the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
866	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures that affect the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
867	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
868	External disturbances	Organic growth	Organic growth that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
1095	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) that affect the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
869	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
870	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from another vehicle component that affect the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
871	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from another vehicle component that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
872	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
873	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
874	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components that affects the steering system could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
875	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components could damage the steering system. This might could cause the lateral adjustment requested by the ALC system to be executed incorrectly.
1096	Hazardous interaction with other components in the rest of the vehicle	Unable to meet demands from multiple components (e.g., inadequate torque)	The steering system may not provide the amount of torque requested by the ALC system because of a conflicting steering request from the driver or another vehicle system.
860	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	If the steering system has a loss of power, then it may not be able to provide a lateral adjustment to support the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
861	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	If there is a disturbance in the power supply to the steering system, then the lateral adjustment requested by the ALC system may be executed incorrectly (e.g., steering system enters a safe state).

Table I-14: Steering Wheel Angle Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
131	External disturbances	EMI or ESD	External EMI or ESD could affect the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
132	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) could affect the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
133	External disturbances	Vibration or shock impact	External vibrations or shock impacts from the external environment could affect the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
134	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects or assembly problems with the steering wheel angle sensor could affect the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
135	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures may damage the steering wheel angle sensor, affecting the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
136	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from external sources could damage the steering wheel angle sensor, affecting the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
137	External disturbances	Organic growth	Organic growth may damage the steering wheel angle sensor, affecting the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
138	External disturbances	Physical interference (e.g., chafing)	Physical interference from external sources could damage the steering wheel angle sensor, affecting the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
139	External disturbances	Magnetic interference	Magnetic interference from external sources could affect the steering wheel angle sensor, affecting the steering wheel angle sensor, affecting the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
142	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component could affect the steering wheel angle sensor. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
143	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impact from another vehicle component could affect the steering wheel angle sensor. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
144	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component could affect the steering wheel angle sensor. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
145	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component could affect the steering wheel angle sensor (e.g., short). This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
146	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from another vehicle component could affect the steering wheel angle sensor. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
147	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from another vehicle component could affect the steering wheel angle sensor (especially if the sensor uses magnetism to sense the rotation). This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
148	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from another vehicle component could affect the steering wheel angle sensor. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
149	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage systems the corona effect from high voltage components could affect the steering wheel angle sensor. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
140	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power to the steering wheel angle sensor could prevent the ALC control module from receiving the driver's steering input. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
141	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A power supply fault to the steering wheel angle sensor could affect the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
1065	Power supply faulty (high, low, disturbance)	Reference voltage incorrect (e.g., too low, too high)	If the steering wheel angle sensor's reference voltage is incorrect, this could affect the steering input data transmitted to the ALC system. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
127	Sensor inadequate operation, change over time	Internal hardware failure	An internal hardware failure in the steering wheel angle sensor could provide the ALC control module with incorrect information about the actions of the driver. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
128	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the steering wheel angle sensor overheats (e.g., from an internal short), it could provide the ALC control module with incorrect information about the actions of the driver. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
130	Sensor inadequate operation, change over time	Reporting frequency too low	If the steering wheel angle sensor's reporting frequency is too low, this could delay information about the actions of the driver being provided to the ALC control module.
198	Sensor inadequate operation, change over time	Degradation over time	If the steering wheel angle sensor degrades overtime, it could provide the ALC control module with incorrect information about the actions of the driver. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Table I-15: Steering Wheel Torque Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
154	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
155	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) that affect the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
156	External disturbances	Vibration or shock impact	Vibrations or shock impacts from the external environment that affect the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
157	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects or assembly problems affecting the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
158	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from external sources that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
159	External disturbances	Organic growth	Organic growth (e.g., mold) that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
160	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
161	External disturbances	Magnetic interference	Magnetic interference from external sources that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
182	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures that affect the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
164	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
165	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from another vehicle component that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
166	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
167	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects the steering wheel torque sensor could create a short, leading to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
168	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from another vehicle component that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
169	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from another vehicle component that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
170	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from another vehicle component that affects the steering wheel torque sensor could lead to the steering wheel torque sensor providing the ALC control module with incorrect data. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
171	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from a high voltage component may damage the steering wheel torque sensor. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
162	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power to the steering wheel torque sensor could prevent the ALC control module from receiving the driver's steering input. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
163	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A disruption in the power supply to the steering wheel torque sensor could affect the steering input data transmitted to the ALC control module. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
150	Sensor inadequate operation, change over time	Internal hardware failure	An internal hardware failure affecting the steering wheel torque sensor could lead to the steering wheel torque sensor providing incorrect data to the ALC control module. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
151	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the steering wheel torque sensor overheats (e.g., due to an internal short), it could lead to the steering wheel torque sensor providing incorrect data to the ALC control module. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).
153	Sensor inadequate operation, change over time	Reporting frequency too low	If the steering wheel torque sensor reports at a frequency that is too low, this could create a delay in transmitting data about the driver's actions to the ALC control module.
175	Sensor inadequate operation, change over time	Degradation over time	If the steering wheel torque sensor degrades over time, it could lead to the steering wheel torque sensor providing incorrect data to the ALC control module. This may prevent ALC from disengaging (e.g., during an aggressive maneuver) or may limit ALC's steering authority (if limited to a range around the driver's steering setpoint).

Table I-16: Turn Signal Sensor (Secondary Driver Control)

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
634	External disturbances	EMI or ESD	EMI or ESD from external sources that affects the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
636	External disturbances	Vibration or shock impact	Vibration and shock impacts from the external environment that affect the turn signal sensor affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
637	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
638	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures affecting the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
639	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
640	External disturbances	Organic growth	Organic growth that affects the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
641	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external sources that affects the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
643	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
644	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration and shock impacts from other vehicle components that affect the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
645	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components affecting the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
646	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
647	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components that affects the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
649	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from components around the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
650	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from components around the turn signal sensor could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
632	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	If the turn signal sensor loses power, this may affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
633	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	If the turn signal sensor has a power supply disruption, this may affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
627	Sensor inadequate operation, change over time	Internal hardware failure	If the turn signal sensor has an internal hardware failure, then this could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
628	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the turn signal sensor overheats (e.g., due to an internal short), then this could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
629	Sensor inadequate operation, change over time	Degradation over time	If the turn signal sensor degrades over time, then this could affect the ability for the ALC system to automatically disengage when the driver activates the turn signal or resume when the driver deactivates the turn signal. This causal factor only applies if the turn signal can be used to disengage or suspend the ALC system.
631	Sensor inadequate operation, change over time	Reporting frequency too low	If the turn signal sensor's reporting frequency is too low, this could delay reporting the turn signal status to the ALC control module.

Table I-17: Wheel Position Sensor (if used)

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
178	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
179	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) that affect integrated circuits in the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
180	External disturbances	Vibration or shock impact	Vibrations or shock impacts from the external environment that affect the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
181	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects or assembly problems affecting the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
183	External disturbances	Extreme external temperature or thermal cycling	Extreme temperature from external sources that affects the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
184	External disturbances	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
185	External disturbances	Organic growth	Organic growth that affects the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
186	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) that affects the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
187	External disturbances	Magnetic interference	Magnetic interference from the external environment that affects the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
190	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
191	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle component that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
192	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
193	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
194	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
195	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference from other vehicle components that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
196	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
197	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components that affects the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
188	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power to the wheel position sensor could prevent the ALC control module from receiving data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
189	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A disturbance in the power supply to the wheel position sensor could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
1064	Power supply faulty (high, low, disturbance)	Reference voltage incorrect (e.g., too low, too high)	If the wheel position sensor's reference voltage is incorrect, this could cause the ALC control module to receive incorrect data on the current wheel position. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
172	Sensor inadequate operation, change over time	Internal hardware failure	An internal hardware failure in the wheel position sensor could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
173	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the wheel position sensor overheats (e.g., due to an internal short), it could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.
174	Sensor inadequate operation, change over time	Degradation over time	If the wheel position sensor degrades over time, it could lead to the sensor providing the ALC control module with incorrect wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
177	Sensor inadequate operation, change over time	Reporting frequency too low	If the wheel position sensor reports at a frequency that is too low, it could cause a delay in providing the ALC control module with the wheel position data. This causal factor applies if a dedicated sensor is used to provide the ALC system with the current wheel position.

Table I-18: Yaw Rate/Lateral Acceleration Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
228	External disturbances	EMI or ESD	External EMI or ESD that affects the yaw rate/lateral acceleration sensor could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
229	External disturbances	Single-event effects (e.g., cosmic rays, protons)	Single-event effects (e.g., high energy particles) that affect the yaw rate/lateral acceleration sensor could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
230	External disturbances	Vibration or shock impact	External vibrations or shock impacts that affect the yaw rate/lateral acceleration sensor could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
231	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects or assembly problems of the yaw rate/lateral acceleration sensor could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
232	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures that affect the yaw rate/lateral acceleration sensor could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
233	External disturbances	Moisture, corrosion, or contamination	External moisture, corrosion, or contamination that affects the yaw rate/lateral acceleration sensor (e.g., causing a short) could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
234	External disturbances	Organic growth	Organic growth that affects the yaw rate/lateral acceleration sensor (e.g., causing a short) could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics acceleration to the ALC control module.
235	External disturbances	Physical interference (e.g., chafing)	Physical interference from external sources (e.g., road debris) that affects the yaw rate/lateral acceleration sensor could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
236	External disturbances	Magnetic interference	Magnetic interference from external sources that affects the yaw rate/lateral acceleration sensor could lead to the yaw rate/lateral acceleration sensor providing incorrect vehicle dynamics data to the ALC control module.
239	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
240	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.
241	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.
242	Hazardous interaction with other components in the rest of the vehicle	Moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.
243	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.
244	Hazardous interaction with other components in the rest of the vehicle	Magnetic interference	Magnetic interference other vehicle components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.
245	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.
246	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components could cause the yaw rate/lateral acceleration sensor to send incorrect yaw/lateral acceleration data to the ALC control module.
237	Power supply faulty (high, low, disturbance)	Loss of 12-volt power	Loss of power to the yaw rate/lateral acceleration sensor could prevent vehicle dynamics data from being provided to the ALC system.
238	Power supply faulty (high, low, disturbance)	Power supply faulty (high, low, disturbance)	A disturbance in the power supply to the yaw rate/lateral acceleration sensor could cause the sensor to send incorrect vehicle dynamics data to the ALC control module.
1062	Power supply faulty (high, low, disturbance)	Reference voltage incorrect (e.g., too low, too high)	If the yaw rate/lateral acceleration sensor's reference voltage is incorrect, the yaw rate/lateral acceleration sensor could send incorrect vehicle dynamics data to the ALC control module.
223	Sensor inadequate operation, change over time	Internal hardware failure	An internal hardware failure of the yaw rate/lateral acceleration sensor could cause the yaw rate/lateral acceleration sensor to provide incorrect yaw/lateral acceleration data to the ALC system.
224	Sensor inadequate operation, change over time	Overheating due to increased resistance in a subcomponent or internal shorting	If the yaw rate/lateral acceleration sensor overheats (e.g., due to a short), the vehicle dynamics data it provides to the ALC control module may be incorrect.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
225	Sensor inadequate operation, change over time	Degradation over time	If the yaw rate/lateral acceleration sensor degrades over time, the vehicle dynamics data it provides to the ALC control module may be incorrect.
227	Sensor inadequate operation, change over time	Reporting frequency too low	If the yaw rate/lateral acceleration sensor reports at a low frequency, the ALC control module would be forced to guess on the yaw/lateral acceleration values or go without.

Table I-19: ALC Control Module Connection to Active Differential System

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
897	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Bus overload or bus error	If the signal between the ALC system and the active differential system is communicated by a communication bus, a bus overload or bus error may cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
898	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Signal priority too low	If the signal between the ALC system and the active differential system is communicated by a communication bus and the signal priority is too low, then the ALC system's lateral adjustment request may be delayed. This causal factor applies if the active differential system is used to implement ALC system requests.
899	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the signal between the ALC system and the active differential system is communicated by a communication bus and the message generator, transmitter, or receiver fails, then the ALC system's lateral adjustment request may be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
900	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Malicious Intruder	If the signal between the ALC system and the active differential system is communicated by a communication bus and the communication bus is attacked by a malicious intruder, then the vehicle may move laterally in response to a request that wasn't issued by the ALC system. This causal factor applies if the active differential system is used to implement ALC system requests.
889	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the ALC control module and the active differential system is intermittent, then the ALC system's lateral adjustment request may be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
890	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the ALC control module and the active differential system is open, shorted to ground, shorted to battery, or shorted to another wire, then the ALC system's lateral adjustment request may be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
891	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the ALC control module and the active differential system is affected by electrical noise other than EMI or ESD, then the ALC system's lateral adjustment request may be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
892	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connectors for the connection between the ALC control module and the active differential system is too high, then the ALC system's lateral adjustment request may be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
893	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If there is shorting between neighboring pins in the connection between the ALC control module and the active differential system then then the ALC system's lateral adjustment request may be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
894	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If the connection between the ALC control module and the active differential system is affected by resistive drift, then the ALC system's lateral adjustment request may be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
895	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the ALC control module and the active differential system is wired incorrectly, then the lateral adjustment may be executed incorrectly.
896	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the ALC control module and the active differential system has an incorrect pin assignment, then the lateral adjustment may be executed incorrectly.
901	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
902	External disturbances	Vibration or shock impact	Vibration or shock impacts from an external source that affect the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
903	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
904	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures affecting the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
905	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an unused connection terminal in the wiring harness connecting the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
906	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects the active connection terminals of the ALC control module or the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
907	External disturbances	Organic growth	Organic growth from that affects the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
908	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., chafing) that affects the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
909	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
910	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from another vehicle component that affect the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
911	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
912	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects an unused connection terminal in the wiring harness connecting the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
913	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects the active connection terminals of the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
914	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components affecting the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
915	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other components affecting the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.
916	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage circuits, the corona effect from other components affecting the connection between the ALC control module and the active differential system could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the active differential system is used to implement ALC system requests.

Table I-20: ALC Control Module Connection to Brake/Stability Control System

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
260	External disturbances	EMI or ESD	External EMI or ESD that affects the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
261	External disturbances	Vibration or shock impact	External vibration or shock impacts that affect the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
262	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
263	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature (e.g., insulation melting) affecting the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
265	External disturbances	Organic growth	Organic growth affecting the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
266	External disturbances	Physical interference (e.g., chafing)	External physical interference (e.g., road debris) that impacts the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
267	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source affecting the active connection terminals of the brake system or the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
1124	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment affecting unused connection terminals in the wiring harness connecting the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
264	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components affecting unused connection terminals in the wiring harness connecting the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
268	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
269	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
270	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that impacts connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
271	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Extreme heat from other vehicle components affecting the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
272	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components that affects the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
273	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components could affect the connection between the brake system and the ALC control module. This could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
1125	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component affecting the active connection terminals of the brake system or the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
253	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the vehicle speed data is transmitted from the brake system to the ALC control module over the communication bus, a bus overload or bus error could cause the ALC control module to receive incorrect vehicle speed data... If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
255	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the vehicle speed data is transmitted from the brake system to the ALC control module over the communication bus and vehicle speed data signal priority is too low, this could delay when the ALC control module receives the vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
256	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the vehicle speed data is transmitted from the brake system to the ALC control module over the communication bus, a failure of the message generator, transmitter, or receiver could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.
257	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the vehicle speed data is transmitted from the brake system to the ALC control module over the communication bus, a malicious intruder or aftermarket component could write a signal to the communication bus that mimics the vehicle speed data. If the brake system is used to implement ALC lateral position requests, a malicious intruder or aftermarket component could also mimic a lateral positioning request from the ALC control module to the brake system.
247	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the brake system and the ALC control module is intermittent, then the ALC control module may intermittently receive vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.
248	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the brake system and the ALC control module is open, shorted to ground, shorted to battery, or shorted to another wire, this could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.
249	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the brake system and the ALC control module is affected by electrical noise other than EMI or ESD, this could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.
250	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connectors for the brake system and the ALC control module is too high, this could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle’s position in the lane.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
251	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connectors for the brake system or the ALC control module, this could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
252	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs in the connectors for the brake system or the ALC control module, this could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
258	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	Incorrect wiring of the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.
259	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	An incorrect pin assignment in the connection between the brake system and the ALC control module could cause the ALC control module to receive incorrect vehicle speed data. If the brake system is used to implement ALC lateral position requests, this could also affect the ability for ALC to maintain the vehicle's position in the lane.

Table I-21: ALC Control Module Connection to Instrument Panel Display

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1110	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Bus overload or bus error	If the ALC system and instrument panel display are connected via the communication bus, a communication bus error may prevent status updates from the ALC system from reaching the instrument panel display controller. This may cause the driver to incorrectly operate the vehicle.
1111	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Signal priority too low	If the ALC system and instrument panel display are connected via the communication bus, the ALC system signal priority may be too low. This may delay status updates provided to the instrument panel controller, resulting in the driver incorrectly operating the vehicle.
1112	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the ALC system and instrument panel display are connected via the communication bus, failure of the message generator, transmitter, or receiver may prevent status updates from reaching the instrument panel display. This may result in the driver incorrectly operating the vehicle.
1113	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Malicious Intruder	If the ALC system and instrument panel display are connected via the communication bus, a malicious intruder or aftermarket component may write a signal to the communication bus that mimics a signal from the ALC control module. This may result in incorrect notifications to the driver, causing the driver to operate the vehicle incorrectly.
1114	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	The connection between the ALC control module and the instrument panel display may become intermittent. This may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1115	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	The connection between the ALC control module and the instrument panel display may become open, shorted to ground, shorted to battery, or shorted to other wires in the connection harness. This may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1116	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	Electrical noise other than EMI or ESD may affect the signal from the ALC control module to the instrument panel display. This may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1117	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	The contact resistance in the connectors for the ALC control module or instrument panel display may be too high. This may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1118	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	Shorting between neighboring pins in the connectors for the ALC control module or instrument panel display may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1119	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	Resistive drift between neighboring pins in the connectors for the ALC control module or instrument panel display may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1120	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Incorrect wiring connection	The connection between the ALC control module and the instrument panel display may be incorrectly wired. This may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1121	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Incorrect pin assignment	The connection between the ALC control module and the instrument panel display may have an incorrect pin assignment. This may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1035	External disturbances	EMI or ESD	If the connection between the ALC control module and the instrument panel display is affected by EMI or ESD from an external source, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1036	External disturbances	Vibration or shock impact	If the connection between the ALC control module and the instrument panel display is affected by a vibration or shock impact from an external source, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1037	External disturbances	Manufacturing defects and assembly problems	If the connection between the ALC control module and the instrument panel display has a manufacturing defect, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1038	External disturbances	Extreme external temperature or thermal cycling	If the connection between the ALC control module and the instrument panel display is affected by an extreme external temperature, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1039	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	If an unused connection terminal in the wiring harness connecting the ALC control module and the instrument panel display is affected by moisture, corrosion, or contamination from an external source, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1040	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	If an active connection terminal in the connection between the ALC control module and the instrument panel display is affected by moisture, corrosion, or contamination from an external source, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1041	External disturbances	Organic growth	If the connection between the ALC control module and the instrument panel display is affected by organic growth from an external source, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1042	External disturbances	Physical interference (e.g., chafing)	If the connection between the ALC control module and the instrument panel display is affected by physical interference from an external source (e.g., road debris), this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1043	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	If the connection between the ALC control module and the instrument panel display is affected by EMI or ESD from another vehicle component, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1044	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	If the connection between the ALC control module and the instrument panel display is affected by a vibration or shock impact from another vehicle component, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1045	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	If the connection between the ALC control module and the instrument panel display is affected by physical interference (e.g., chafing) from another vehicle component, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1046	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	If an unused connection terminal in the wiring harness connecting the ALC control module and the instrument panel display is affected by moisture, corrosion, or contamination from another vehicle component, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1047	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	If an active connection terminal in the wiring harness connecting the ALC control module and the instrument panel display is affected by moisture, corrosion, or contamination from another vehicle component, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1048	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	If the connection between the ALC control module and the instrument panel display is surrounded by excessive heat from other components, then the driver may incorrectly operate the ALC system.
1049	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	If the connection between the ALC control module and the instrument panel display is affected by electrical arcing from other components, this may affect the ability to display driver notifications and the driver may incorrectly operate the ALC system.
1050	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from other components could affect the connection between the ALC control module and the instrument panel display. This could affect the ability to display driver notifications and potentially cause the driver to incorrectly operate the ALC system.
1034	Sensor measurement delay	Other	If the instrument panel display receives delayed information on the status of the ALC control module, this may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1032	Sensor measurement inaccurate	Other	If the instrument panel display receives inaccurate information on the status of the ALC control module, this may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.
1033	Sensor measurement incorrect or missing	Other	If the instrument panel display receives incorrect or no information on the status of the ALC control module, this may affect the notification to the driver and cause the driver to operate the vehicle incorrectly.

Table I-22: ALC Control Module Connection to Steering System

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
954	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Signal priority too low	If the connection between the ALC control module and the steering system uses a communication bus and the signal priority is too low, then the ALC system's lateral adjustment request to the steering system may be delayed.
955	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Bus overload or bus error	If the connection between the ALC control module and the steering system uses a communication bus and the bus is overloaded or has an error, then the ALC system's lateral adjustment request to the steering system may be executed incorrectly.
956	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the connection between the ALC control module and the steering system uses a communication bus and the message generator, transmitter, or receiver fails, then the ALC system's lateral adjustment request to the steering system may be executed incorrectly.
957	Controller to actuator signal ineffective, missing, or delayed: Communication bus error	Malicious Intruder	If the connection between the ALC control module and the steering system uses a communication bus and the connection is attacked by a malicious intruder, then the ALC system's lateral adjustment request to the steering system may be executed incorrectly.
945	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the ALC control module and the steering system is open, shorted to ground, shorted to battery, or shorted to another wire, then the ALC system's lateral adjustment request may be executed incorrectly.
946	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the ALC control module and the steering system is intermittent, then the ALC system's lateral adjustment request may be executed incorrectly.
947	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the ALC control module and the steering system is affected by electrical noise other than EMI or ESD, then the ALC system's lateral adjustment request may be executed incorrectly.
948	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the ALC control module or the steering system is too high, then the ALC system's lateral adjustment request may be executed incorrectly.
949	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If there is shorting between neighboring pins in the connection terminals of the ALC control module or the steering system, then the ALC system's lateral adjustment request may be executed incorrectly.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
950	Controller to actuator signal ineffective, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If there is resistive drift between neighboring pins in the connection terminals of the ALC control module or the steering system, then the ALC system's lateral adjustment request may be executed incorrectly.
951	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the ALC control module and the steering system is wired incorrectly, then the ALC system's lateral adjustment request may be executed incorrectly.
952	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the ALC control module and the steering system has an incorrect pin assignment, then the ALC system's lateral adjustment request may be executed incorrectly.
958	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
959	External disturbances	Vibration or shock impact	Vibration or shock impacts from an external source that affect the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
960	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
961	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects unused terminals in the wiring harness connecting the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
962	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects active terminals in the wiring harness connecting the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
963	External disturbances	Organic growth	Organic growth from an external source that affects the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
964	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
965	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature around the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
966	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
967	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from another vehicle component that affect the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
968	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
969	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects unused terminals in the wiring harness connecting the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
970	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects active terminals in the wiring harness connecting the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
971	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components near the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
972	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other components near the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.
973	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage circuits, the corona effect from other components near the connection between the ALC control module and the steering system could cause the ALC system's lateral adjustment request to be executed incorrectly.

Table I-23: ALC On/Off Switch Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
662	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
663	External disturbances	Vibration or shock impact	Vibration or shock impacts from an external source that affect the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
664	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems of the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
665	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature affecting the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
666	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an unused connection terminal in the wiring harness connecting the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
667	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an active connection terminal of the ALC on/off switch or the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
668	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
669	External disturbances	Organic growth	Organic growth that affects the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
670	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
671	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
672	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an unused connection terminal in the wiring harness connecting the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
673	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components around the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
674	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
675	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal of the ALC on/off switch or the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
676	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components around the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.
677	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components affecting the connection between the ALC on/off switch and the ALC control module could cause the ALC system to engage/disengage unexpectedly or to remain engaged/disengaged when the driver actuates the switch.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
657	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the signal for the ALC on/off switch is communicated to the ALC control module over the communication bus, a bus overload or bus error may cause the ALC system to engage/disengage unexpectedly, or may prevent the ALC system from engaging/disengaging when the driver actuates the switch.
658	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the signal for the ALC on/off switch is communicated to the ALC control module over the communication bus, a signal priority that is too low may delay or prevent the ALC system from engaging/disengaging when the driver actuates the switch.
659	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the signal for the ALC on/off switch is communicated to the ALC control module over the communication bus, a failure of the message generator, transmitter, or receiver may cause the ALC system to engage/disengage unexpectedly, or may prevent the ALC system from engaging/disengaging when the driver actuates the switch.
1122	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the signal for the ALC on/off switch is communicated to the ALC control module over the communication bus, a malicious intruder may issue a command that mimics the signal from the ALC on/off switch. This may cause the ALC system to engage/disengage unexpectedly, or may prevent the ALC system from engaging/disengaging when the driver actuates the switch.
651	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the ALC on/off switch and the ALC control module is intermittent, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.
652	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the ALC on/off switch and the ALC control module is open, shorted to ground, shorted to battery, or shorted to another wire, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.
653	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the ALC on/off switch and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.
654	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the ALC on/off switch or the ALC control module is too high, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
655	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If there is shorting between neighboring pins in the connection terminals of the ALC on/off switch or the ALC control module, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.
656	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If there is resistive drift between neighboring pins in the connection terminals of the ALC on/off switch or the ALC control module, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.
660	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the ALC on/off switch and the ALC control module is wired incorrectly, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.
661	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the ALC on/off switch and the ALC control module has an incorrect pin assignment, then the ALC system may engage/disengage unexpectedly, or may not engage/disengage when the driver actuates the switch.

Table I-24: Brake Pedal Position Sensor Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
689	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
691	External disturbances	Vibration or shock impact	Vibration or shock impacts from the external environment that affect the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
692	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
693	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature affecting the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
694	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an unused connection terminal in the wiring harness connecting the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
695	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an active connection terminal of the brake pedal position sensor or the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
696	External disturbances	Organic growth	Organic growth that affects the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
697	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
698	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
699	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
700	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
701	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an unused connection terminal in the wiring harness connecting the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
702	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal of the brake pedal position sensor or the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
703	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components affecting the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
704	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
705	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage circuits, the corona effect from high voltage components affecting the connection between the brake pedal position sensor and the ALC control module may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
684	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the brake pedal position data is sent to the ALC control module over the communication bus and the communication bus has a bus overload or bus error, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
685	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the brake pedal position data is sent to the ALC control module over the communication bus and the brake pedal position sensor's signal priority is too low, this may prevent or delay disengagement of the ALC system when the brake pedal is pressed. This causal factor applies if the brake pedal can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
686	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the brake pedal position data is sent to the ALC control module over the communication bus and there is a failure of the communication bus message generator, transmitter, or receiver, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
1123	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the brake pedal position data is sent to the ALC control module over the communication bus, a malicious intruder or aftermarket component may write a signal to the communication bus that mimics the brake pedal position sensor signal. This may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
678	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the brake pedal position sensor and the ALC control module is intermittent, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
679	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the brake pedal position sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wire, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
680	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the brake pedal position sensor and the ALC control module is affected by electrical noise other than EMI or ESD, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
681	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the brake pedal position sensor or the ALC control module is too high, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
682	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If there is shorting between neighboring pins in the connection terminals of the brake pedal position sensor or the ALC control module, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
683	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If there is resistive drift between pins in the connection terminals of the brake pedal position sensor or the ALC control module, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
687	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the brake pedal position sensor and the ALC control module is wired incorrectly, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.
688	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the brake pedal position sensor and the ALC control module has an incorrect pin assignment, this may prevent the ALC system from disengaging when the brake pedal is pressed or cause the ALC system to disengage unexpectedly. This causal factor applies if the brake pedal can be used to disengage ALC.

Table I-25: Driver Interface with ALC On/Off Switch

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1074	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Other	If the driver incorrectly actuates the ALC on/off Switch, then the ALC system may not correctly engage or disengage.
1128	Hazardous interaction with other components in the rest of the vehicle	Other	The driver may accidentally actuate the wrong switch when intending to engage/disengage the ALC system.

Table I-26: Driver Interface with Driver Awareness Sensors

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
791	External disturbances	EMI or ESD	If the drive awareness sensor uses electronic sensing of the driver's physiological state (EKG, EMG etc.), then EMI or ESD from an external source could affect the driver awareness sensor's ability to detect the driver's engagement.
792	External disturbances	Vibration or shock impact	Vibrations or shock impacts from an external source could interrupt a camera based driver awareness sensor. This could affect the driver awareness sensor's ability to detect the driver's engagement.
793	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects with the driver awareness sensor could lead to issues with the sensor's ability to measure the driver's engagement.
794	External disturbances	Extreme external temperature or thermal cycling	If the driver awareness sensor uses electronic sensing of the driver's physiological state (EKG, EMG etc.), then extreme external temperatures (e.g., making the driver sweat) could affect the driver awareness sensor's ability to detect the driver's engagement.
1129	External disturbances	Physical interference (e.g., chafing)	Physical interference with objects in the vehicle's cabin could affect the driver awareness sensor's ability to measure the driver's engagement (e.g., objects blocking an inward-facing camera).
1130	External disturbances	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment could affect the ability for the driver awareness sensor to detect the driver's engagement (e.g., smoke or particulates in the vehicle affecting an inward-facing camera).
796	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	If the driver awareness sensor uses electronic sensing of the driver's physiological state (EKG, EMG etc.), then EMI or ESD from other vehicle components could affect the driver awareness sensor's ability to determine if the driver is engaged.
797	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components could affect the driver awareness sensor (e.g., a camera based sensor), affecting the sensor's ability to determine if the driver is engaged.
798	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	If the driver awareness sensor uses electronic sensing of the driver's physiological state (EKG, EMG etc.), then excessive heat from other components could affect the driver awareness sensor's ability to determine if the driver is engaged.
1131	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components may affect the ability for the driver awareness sensor to detect if the driver is paying attention (e.g., obscuring an inward-facing camera).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
790	Sensor measurement delay	Sensor incorrectly aligned or positioned	If the driver awareness sensor is incorrectly positioned or aligned relative to the driver, this may cause a delay in detecting changes in the driver's engagement.
789	Sensor measurement inaccurate	Other	The driver may attempt to trick the sensor so that it does not correctly measure the driver's engagement.
788	Sensor measurement incorrect or missing	Sensor incorrectly aligned or positioned	If the driver monitoring awareness sensor is incorrectly aligned or positioned relative to the driver, the sensor may not accurately detect if the driver is engaged.

Table I-27: Driver Awareness Sensors Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
717	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
718	External disturbances	Vibration or shock impact	Vibrations or shock impacts from an external source that affect the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
719	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects of the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
720	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature affecting the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
721	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an unused connection terminals in the wiring harness connecting the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
722	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an active connection terminal of the driver awareness sensor or the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
723	External disturbances	Organic growth	Organic growth that affects the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
724	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
725	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
726	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from another vehicle component that affect the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
727	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
728	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects an unused connection terminal in the wiring harness connecting the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
729	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects an active connection terminal of the driver awareness sensor or the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
730	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components affecting the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
731	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
732	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components affecting the connection between the driver awareness sensor and the ALC control module could cause the ALC control module to receive incorrect information on the driver's level of engagement.
712	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the driver awareness data is communicated over the communication bus, a bus error or bus overload may cause the ALC control module to receive incorrect information on the driver's level of engagement.
713	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the driver awareness data is communicated over the communication bus and the driver awareness sensor's signal priority is too low, this may cause a delay when transmitting the driver's level of engagement to the ALC control module.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
714	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the driver awareness data is communicated over the communication bus, a failure in the message generator, transmitter, or receiver may cause the ALC control module to receive incorrect information on the driver's level of engagement.
1134	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the driver awareness data is communicated over the communication bus, a malicious intruder or aftermarket component may write a signal to the communication bus that mimics or interferes with the driver awareness sensor's transmission of the driver's level of engagement.
706	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the driver awareness sensor and the ALC control module is intermittent, then the ALC control module may receive incorrect data related to the driver's engagement.
707	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the driver awareness sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to another wire, then the ALC control module may receive incorrect data related to the driver's engagement.
708	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the driver awareness sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may receive incorrect data related to the driver's engagement.
709	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals for the driver awareness sensor and the ALC control module is too high, then the ALC control module may receive incorrect data related to the driver's engagement.
710	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminals of the driver awareness sensor and the ALC control module, then the ALC control module may receive incorrect data related to the driver's engagement.
711	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs between neighboring pins in the connection terminals of the driver awareness sensor and the ALC control module, then the ALC control module may receive incorrect data related to the driver's engagement.
715	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the driver awareness sensor and the ALC control module is wired incorrectly, then the ALC control module may receive inaccurate data related to the driver's engagement.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
716	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the driver awareness sensor and the ALC control module has an incorrect pin assignment, then the ALC control module may receive inaccurate data related to the driver's engagement.

Table I-28: Connective/Online Sensors Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
285	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the GPS receiver and the ALC control module could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
286	External disturbances	Vibration or shock impact	Vibrations or shock impacts from an external source that affect the connection between the GPS receiver and the ALC control module could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
287	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems with the connection between the GPS receiver and the ALC control module could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
288	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling damaging the connection between the GPS receiver and the ALC control module (e.g., melting insulation) could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
289	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects unused connection terminals in the wiring harness connecting the GPS receiver and the ALC control module could lead to a short in the harness. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
291	External disturbances	Organic growth	Organic growth affecting the connection terminals of the GPS receiver or the ALC control module could lead to a short in the connection. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
292	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the connection between the GPS receiver and the ALC control module could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
314	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment may affect active connection terminals of the GPS receiver or the ALC control module. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
293	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the GPS receiver and the ALC control module could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
294	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the connection between the GPS receiver and the ALC control module could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
295	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components could affect the connection between the GPS receiver and the ALC control module. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
296	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components (e.g. chafing) may damage the connection between the GPS receiver and the ALC control module. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
297	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components may affect the connection between the GPS receiver and the ALC control module. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
298	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage components, the corona effect near the connection between the GPS receiver and the ALC control module could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
1135	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects unused connection terminals in the wiring harness connecting the GPS receiver and the ALC control module could lead to a short in the harness. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
1136	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components may affect active connection terminals of the GPS receiver or the ALC control module. This could affect the lateral positioning, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
280	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the GPS communication to the ALC control module is over the communication bus, a bus overload or bus error could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
281	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the GPS communication to the ALC control is over the communication and the GPS system's signal priority is too low, this may cause a delay in the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
282	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the GPS communication to the ALC control module is over the communication bus and there's a failure of the message generator, transmitter, or receiver, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
527	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the GPS communication to the ALC control module is over the communication bus, a malicious intruder could mimic the GPS receiver signal and affect the ALC system's lateral positioning calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
274	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the GPS receiver and the ALC control module becomes intermittent, this may affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
275	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the GPS receiver and the ALC control module is open, shorted to ground, shorted to battery, or shorted to another wire, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
276	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the GPS receiver and the ALC control module is affected by electrical noise other than EMI or ESD, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
277	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals for the GPS receiver and the ALC control module is too high, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
278	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminal for the GPS receiver and the ALC control module, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
279	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs in the connection terminals for the GPS receiver and the ALC control module, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
283	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the GPS receiver and the ALC control module is wired incorrectly, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).
284	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the GPS receiver and the ALC control module has an incorrect pin assignment, this could affect the ALC system's lateral position calculation, the authority determination for the ALC control system, or identification of roadway features (e.g., exit ramps).

Table I-29: Hazard Warning Switch Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
745	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
746	External disturbances	Vibration or shock impact	Vibration or shock impacts from an external source that affect the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
747	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
748	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature or thermal cycling affecting the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
749	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an unused connection terminal in the wiring harness connecting the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
750	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an active connection terminal of the hazard warning switch or the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
751	External disturbances	Organic growth	Organic growth that affects the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
752	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that damages the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
753	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
754	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from another vehicle component that affect the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
755	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
756	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects an unused connection terminal in the wiring harness connecting the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
757	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects an active connection terminal of the hazard warning switch or the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
758	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components affecting the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
759	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
760	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components around the connection between the hazard warning switch and the ALC control module could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
740	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the hazard warning switch signal to the ALC control module is communicated over the communication bus, a bus overload or bus error could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
741	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the hazard warning switch signal to the ALC control module is communicated over the communication bus and the signal priority is too low, this could delay disengagement of the ALC system when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
742	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the hazard warning switch signal to the ALC control module is communicated over the communication bus, a failure in the message generator, transmitter, or receiver could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
1137	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the hazard warning switch signal to the ALC control module is communicated over the communication bus, a malicious intruder or aftermarket component may write a signal to the communication bus that mimics the hazard warning switch signal. This could affect the ability for the ALC system to disengage when the driver actuates the hazard warning switch or may cause the ALC system to disengage unexpectedly. This causal factor applies if the hazard warning switch is able to disengage the ALC system.
734	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the hazard warning switch and the ALC control module is open, shorted to ground, shorted to battery, or shorted to another wire, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.
735	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the hazard warning switch and the ALC control module is intermittent, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.
736	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the hazard warning switch and the ALC control module is affected by electrical noise other than EMI or ESD, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
737	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals for the hazard warning switch and the ALC control module is too high, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.
738	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If there is shorting to neighboring pins in the connection terminal for the hazard warning switch or the ALC control module, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.
739	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs between neighboring pins in the connection terminals for the hazard warning switch and the ALC control module, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.
743	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the hazard warning switch and the ALC control module is wired incorrectly, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.
744	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the hazard warning switch and the ALC control module has an incorrect pin assignment, this may cause the ALC system to disengage unexpectedly or prevent the ALC system from disengaging when the driver presses the hazard warning switch. This causal factor only applies if the hazard warning switch can be used to disengage the ALC system.

Table I-30: Lane Detection Sensors Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
327	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
329	External disturbances	Vibration or shock impact	Vibration or shock impacts from external sources that affect the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
330	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects or assembly problems with the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
331	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures affecting the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
332	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an unused connection terminal in the wiring harness connecting the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
333	External disturbances	Organic growth	Organic growth affecting the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
334	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) could damage the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
335	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination that affects an active connection terminal in the wiring harness connecting the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
1138	External disturbances	Single-event effects (e.g., cosmic rays, protons)	If the lane detection sensors and the ALC control module share a circuit board, single-event effects may affect the accuracy or quality of roadway data provided to the ALC control module. This may include lane markings, roadway curvature, locations of other vehicles and surrounding objects, etc., and could affect the ability for the ALC control module to maintain the vehicle's lateral position.
336	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from a nearby component that affects the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
337	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
338	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components could damage the connection between the lane detection sensors and the ALC control module, which could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
339	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects unused connection terminals in the wiring harness connecting the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
340	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Extreme heat from other vehicle components affecting the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
341	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal of the lane detection sensors or the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
342	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
343	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components affecting the connection between the lane detection sensors and the ALC control module could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
321	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If lane detection sensor data is transmitted to the ALC control module over the communication bus, a bus error or bus overload could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
322	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If lane detection sensor data is transmitted to the ALC control module over the communication bus and the signal priority is too low, this could delay the roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
323	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If lane detection sensor data is transmitted to the ALC control module over the communication bus, a failure of the message generator, transmitter, or receiver could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
324	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If lane detection sensor data is transmitted to the ALC control module over the communication bus, a malicious intruder or aftermarket component could write a signal to the communication bus that mimics the lane detection sensor data. This could affect the ALC control module's ability to control the vehicle's lateral position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
315	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the lane detection sensor and the ALC control module is intermittent, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
316	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the lane detection sensor and the ALC control module is open, shorted to ground, or shorted to battery, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
317	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the lane detection sensor and the ALC control module is affected by electrical noise other than EMI or ESD, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
318	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals for the lane detection sensor and the ALC control module is too high, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
319	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminals of the lane detection sensor and the ALC control module, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
320	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs in the connection terminals of the lane detection sensor and the ALC control module, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
325	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the lane detection sensor and the ALC control module is wired incorrectly, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.
326	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the lane detection sensor and the ALC control module has an incorrect pin assignment, this could affect the accuracy or quality of roadway data provided to the ALC control module. This includes lane markings, roadway curvature, locations of surrounding objects, etc., and could affect the ALC control module's ability to control the vehicle's lateral position.

Table I-31: Roll Rate Sensor Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
355	External disturbances	EMI or ESD	External EMI or ESD that affects the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
356	External disturbances	Vibration or shock impact	External vibrations or shock impacts that affect the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
357	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
358	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature affecting the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
359	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects unused connection terminals in the wiring harness connecting the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
360	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects active connection terminals of the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
361	External disturbances	Organic growth	Organic growth that affects the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
362	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) that impacts the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
363	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
364	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
365	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other vehicle components (e.g., chafing) that impacts the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
366	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects unused connection terminals in the wiring harness connecting the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
367	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects active connection terminals of the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
368	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components affecting the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
369	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
370	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components affecting the connection between the roll rate sensor and the ALC control module could lead to the ALC control module receiving incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
350	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the roll rate data is transmitted to the ALC control module through the communication bus, a bus overload or bus error could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
351	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the roll rate data is transmitted to the ALC control module through the communication bus and the signal priority is too low, this could delay providing roll rate data to the ALC control module. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
352	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the roll rate data is transmitted to the ALC control module through the communication bus, a failure of the message generator, transmitter, or receiver could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
528	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the roll rate data is transmitted to the ALC control module through the communication bus, a malicious intruder or aftermarket component could write a message to the communication bus that mimics the roll rate data. This could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
344	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the roll rate sensor and the ALC control module is intermittent, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
345	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the roll rate sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wires, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
346	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the roll rate sensor and the ALC control module is suffering from electrical noise other than EMI or ESD, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
347	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the roll rate sensor and the ALC control module is too high, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
348	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminal for the roll rate sensor and the ALC control module, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
349	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs in the connection terminal for the roll rate sensor and the ALC control module, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
353	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the roll rate sensor and the ALC control module's message is wired incorrectly, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.
354	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the roll rate sensor and the ALC control module's message has incorrect pin assignment, this could cause the ALC control module to receive the incorrect roll rate data. This causal factor applies if the ALC control module uses roll rate data in determining the vehicle state.

Table I-32: Steering Wheel Angle Sensor Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
383	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
384	External disturbances	Vibration or shock impact	External vibration or shock impacts that affect the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
385	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
386	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling affecting the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
387	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment affecting an unused connection terminal in the wiring harness connecting the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
388	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment affecting an active connection terminal of the steering wheel angle sensor or the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
389	External disturbances	Organic growth	Organic growth affecting the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
390	External disturbances	Physical interference (e.g., chafing)	External physical interference (e.g., roadway debris) impacting the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
391	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle component that affects the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
392	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
393	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
394	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components around the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
395	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an unused connection terminal in the wiring harness connecting the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
396	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal of the steering wheel angle sensor or the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
397	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
398	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, corona effects from high voltage components affecting the connection between the steering wheel angle sensor and the ALC control module could lead to the ALC control module receiving incorrect data on the driver's steering input.
378	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the steering wheel angle data is transmitted to the ALC control module over the communication bus and the signal priority is too low, then there may be a delay before the ALC control module receives data on the driver's steering input.
379	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the steering wheel angle data is transmitted to the ALC control module over the communication bus, a bus overload or bus error may prevent the ALC control module from receiving data on the driver's steering input.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
380	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the steering wheel angle data is transmitted to the ALC control module over the communication bus a failure of message generator, transmitter, or receiver may cause the ALC control module to receive incorrect data on the driver's steering input.
529	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the steering wheel angle data is transmitted to the ALC control module over the communication bus, a malicious intruder or aftermarket component may write a signal to the communication bus that mimics the steering wheel angle sensor signal. This may cause the ALC control module to receive incorrect data on the driver's steering input.
371	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the steering wheel angle sensor and the ALC control module is intermittent, then the ALC control module may receive incorrect data on the driver's steering input.
372	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the steering wheel angle sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wires, then the ALC control module may receive incorrect data on the driver's steering input.
373	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the steering wheel angle sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may receive incorrect data on the driver's steering input.
374	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the steering wheel angle sensor or the ALC control module is too high, then the ALC control module may receive incorrect data on the driver's steering input.
375	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminals of the steering wheel angle sensor or the ALC control module, then the ALC control module may receive incorrect data on the driver's steering input.
376	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs between pins in the connection terminals of the steering wheel angle sensor or the ALC control module, then the ALC control module may receive incorrect data on the driver's steering input.
381	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the steering wheel angle sensor and the ALC control module is wired incorrectly, then the ALC control module may receive incorrect data on the driver's steering input.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
382	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the steering wheel angle sensor and the ALC control module has an incorrect pin assignment, then the ALC control module may receive incorrect data on the driver's steering input.

Table I-33: Steering Wheel Torque Sensor Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
411	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
412	External disturbances	Vibration or shock impact	External vibration or shock impacts that affect the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
413	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
414	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling affecting the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
415	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment affecting an unused connection terminal in the wiring harness connecting the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
416	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment affecting an active connection terminal of the steering wheel torque sensor or the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
417	External disturbances	Organic growth	Organic growth that affects the connection between steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
418	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) impacting the connection between steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
419	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
420	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	External vibration or shock impacts from other vehicle components that affect the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
421	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components affecting the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
422	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
423	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from high voltage components may damage the connection between the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
424	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components affecting the connection between steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
425	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components affecting an unused connection terminal in the wiring harness connecting the steering wheel torque sensor and the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
426	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components affecting an active connection terminal of the steering wheel torque sensor or the ALC control module may cause the ALC control module to receive incorrect data on the driver's steering input.
405	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the steering wheel torque data is transmitted to the ALC control module over the communication bus, a bus overload or bus error may prevent the ALC control module from receiving data on the driver's steering input.
406	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the steering wheel torque data is transmitted to the ALC control module over the communication bus and the signal priority is too low, this may cause a delay before the ALC control module receives data on the driver's steering input.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
407	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the steering wheel torque data is transmitted to the ALC control module over the communication bus, a failure in the message generator, transmitter, or receiver may cause the ALC control module to receive incorrect data on the driver's steering input.
408	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the steering wheel torque data is transmitted to the ALC control module over the communication bus, a malicious intruder or aftermarket component may write a signal to the communication bus that mimics the steering wheel torque data. This may cause the ALC control module to receive incorrect data on the driver's steering input.
399	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the steering wheel torque sensor and the ALC control module is intermittent, the ALC control module may receive incorrect data regarding the driver's steering input.
400	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the steering wheel torque sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wires, then the ALC control module may receive incorrect data regarding the driver's steering input.
401	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the steering wheel torque sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may receive incorrect data regarding the driver's steering input.
402	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the steering wheel torque sensor or the ALC control module is too high, then the ALC control module may receive incorrect data regarding the driver's steering input.
403	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminals of the steering wheel torque sensor or the ALC control module, then the ALC control module may receive incorrect data regarding the driver's steering input.
404	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs between neighboring pins in the connection terminals of the steering wheel torque sensor or the ALC control module, then the ALC control module may receive incorrect data regarding the driver's steering input.
409	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the steering wheel torque sensor and the ALC control module is wired incorrectly, then the ALC control module may receive incorrect data regarding the driver's steering input.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
410	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the steering wheel torque sensor and the ALC control module has incorrect pin assignment, then the ALC control module may receive incorrect data regarding the driver's steering input.

Table I-34: Turn Signal Sensor Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
772	External disturbances	EMI or ESD	EMI or ESD from an external source that affects the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes.
773	External disturbances	Vibration or shock impact	Vibration or shock impacts from an external source that affect the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes.
774	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
775	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
776	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature affecting the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
777	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an unused connection terminal in the wiring harness connecting the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
778	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects an active connection terminal of the turn signal sensor or the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
779	External disturbances	Organic growth	Organic growth that affects the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
780	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from another vehicle component that affects the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
781	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from another vehicle component that affect the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
782	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
783	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from components around the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
784	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects an unused connection terminal in the wiring harness connecting the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
785	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects an active connection terminal of the turn signal sensor or the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
786	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from components around the connection between the turn signal sensor and the ALC control module could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
787	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage circuits, the corona effect from high voltage components may damage the connection between the turn signal sensor and the ALC control module. This could cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
767	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the turn signal sensor communicates with the ALC control module over the communication bus, a bus error or bus overload may prevent the ALC control module from detecting that the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
768	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the turn signal sensor communicates with the ALC control module over the communication bus and the signal priority is too low, then there may be a delay before the ALC control module detects that the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
769	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the turn signal sensor communicates with the ALC control module over the communication bus, a failure in the message generator, transmitter, or receiver may cause the ALC control module to have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1149	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the turn signal sensor communicates with the ALC control module over the communication bus, a malicious intruder or aftermarket component may write a signal to the communication bus that mimics the turn signal sensor data. This may cause the ALC control module to incorrectly determine if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation during a lane change maneuver.
761	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the turn signal sensor and the ALC control module is intermittent, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.
762	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the turn signal sensor and the ALC control module is open, short to ground, short to battery, or short to another wire, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.
763	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the turn signal sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.
764	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the connection between the turn signal sensor and the ALC control module's resistance is too high, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.
765	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If the connection between the turn signal sensor and the ALC control module is shorting to neighboring pins, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
766	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If the connection between the turn signal sensor and the ALC control module is suffering from resistive drift, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.
770	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the turn signal sensor and the ALC control module is wired incorrectly, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.
771	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the turn signal sensor and the ALC control module has an incorrect pin assignment, then the ALC control module may have trouble detecting if the driver is trying to change lanes. This causal factor applies if the ALC system is designed to suspend operation when the driver executes a lane change maneuver.

Table I-35: Wheel Position Sensor Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
438	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
439	External disturbances	Vibration or shock impact	Vibration or shock impacts from the external environment that affect the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
440	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
441	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
442	External disturbances	Organic growth	Organic growth affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
443	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) impacting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
444	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an unused connection terminal in the wiring harness connecting the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
445	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an active connection terminal of the wheel position sensor or the ALC control module could lead to the ALC control module receiving incorrect wheel position data
446	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
447	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
448	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components surrounding the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
449	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference other vehicle components (e.g., chafing) that affects the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
450	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an unused connection terminal in the wiring harness connecting the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
451	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal near the connection of the wheel position sensor or the ALC control module could lead to the ALC control module receiving incorrect wheel position data
452	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
453	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage circuits, the corona effect from high voltage components affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
433	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If wheel position data is transmitted to the ALC control module over the communication bus, a bus overload or bus error may prevent the ALC control module from receiving the wheel position data.
434	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the wheel position data is transmitted to the ALC control module over the communication bus and the signal priority is too low, then there may be a delay before the ALC control module receives the wheel position data.
435	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the wheel position data is transmitted to the ALC control module over the communication bus, a failure in the message generator, transmitter, or receiver may cause the ALC control module to receive incorrect wheel position data.
530	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the wheel position data is transmitted to the ALC control module over the communication bus, a malicious intruder or aftermarket component may write data to the communication bus that mimics the wheel position data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
427	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the wheel position sensor and the ALC control module is intermittent, the ALC control module may receive incorrect wheel position data.
428	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the wheel position sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wires, then the ALC control module may receive incorrect wheel position data.
429	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the wheel position sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may receive incorrect wheel position data.
430	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the wheel position sensor or the ALC control module is too high, then the ALC control module may receive incorrect wheel position data.
431	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between pins in the connection terminals of the wheel position sensor or the ALC control module, then the ALC control module may receive incorrect wheel position data.
432	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs between pins in the connection terminals of the wheel position sensor or the ALC control module, then the ALC control module may receive incorrect wheel position data.
436	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the wheel position sensor and the ALC control module is wired incorrectly, then the ALC control module may receive incorrect wheel position data.
437	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the wheel position sensor and the ALC control module has an incorrect pin assignment, then the ALC control module may receive incorrect wheel position data.

Table I-36: Yaw Rate/Lateral Acceleration Sensor Connection to ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
467	External disturbances	Vibration or shock impact	Vibrations or shock impacts from the external environment that affect the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
468	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
469	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
470	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
471	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an unused connection terminal in the wiring harness connecting the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
472	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an active connection terminal in the yaw rate/lateral acceleration sensor or the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
474	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
476	External disturbances	Organic growth	Organic growth that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
477	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
478	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
479	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components around the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
480	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an unused connection terminal in the wiring harness connecting the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
481	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
482	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
483	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from other vehicle components affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
484	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal of the yaw rate/lateral acceleration sensor or the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
460	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the yaw rate data is transmitted to the ALC control module over the communication bus, a bus overload or bus error may prevent the ALC control module from receiving the yaw/lateral acceleration data.
461	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the yaw rate data is transmitted to the ALC control module over the communication bus and the signal priority is too low, then there may be a delay before the ALC control module receives the yaw/lateral acceleration data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
462	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the yaw rate data is transmitted to the ALC control module over the communication bus, a failure of the message generator, transmitter, or receiver may cause the ALC control module to receive incorrect yaw/lateral acceleration data.
463	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the yaw rate data is transmitted to the ALC control module over the communication bus, a malicious intruder or aftermarket component may write data to the communication bus that mimics the yaw/lateral acceleration data.
454	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is intermittent, then the ALC control module may receive incorrect yaw/lateral acceleration data.
455	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wires, then the ALC control module may receive incorrect yaw/lateral acceleration data.
456	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may receive incorrect yaw/lateral acceleration data.
457	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the yaw rate/lateral acceleration sensor or the ALC control module is too high, then the ALC control module may receive incorrect yaw/lateral acceleration data.
458	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminal of the yaw rate/lateral acceleration sensor or the ALC control module, then the ALC control module may receive incorrect yaw/lateral acceleration data.
459	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs in the connection terminal of the yaw rate/lateral acceleration sensor or the ALC control module, then the ALC control module may receive incorrect yaw/lateral acceleration data.
464	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is wired incorrectly, then the ALC control module will receive incorrect yaw/lateral acceleration data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
465	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module has an incorrect pin assignment, then the ALC control module will receive incorrect yaw/lateral acceleration data.

Table I-37: Active Differential System Interface With Vehicle

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
975	Actuation delivered incorrectly or inadequately: Actuation delayed	Actuation delivered incorrectly or inadequately: Actuation delayed	If the actuation from the active differential system to the vehicle is done incorrectly or inadequately because the actuation was delayed, then the ALC lateral displacement request may be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
974	Actuation delivered incorrectly or inadequately: Hardware faulty	Actuation delivered incorrectly or inadequately: Hardware faulty	If the actuation from the active differential system to the vehicle is done incorrectly or inadequately because of a hardware failure, then the ALC lateral displacement request may be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
1109	Actuation delivered incorrectly or inadequately: Incorrect connection	Actuation delivered incorrectly or inadequately: Incorrect connection	An incorrect connection affecting the torque delivery from the active differential system (e.g., left and right sides of the vehicle are reversed) could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
976	External disturbances	Vibration or shock impact	Vibrations or shock impacts from external sources that affect the connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
977	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems with the connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
978	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature around the connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
980	External disturbances	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external sources that affects the mechanical connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
982	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external sources (e.g., road debris) that affects the connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
981	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from another vehicle component that affect the connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
983	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components affecting the connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
984	Hazardous interaction with other components in the rest of the vehicle	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from another vehicle component that affects the mechanical connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.
985	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from another vehicle component that affects the connection between the active differential system and vehicle could cause the ALC lateral displacement request to be executed incorrectly. This causal factor applies if the active differential system provides torque vectoring to implement ALC commands.

Table I-38: Brake/Stability Control System Interface With Vehicle

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
987	Actuation delivered incorrectly or inadequately: Actuation delayed	Actuation delivered incorrectly or inadequately: Actuation delayed	If the actuation from the brake system to the vehicle is delayed, this could cause the lateral adjustment to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral positioning requests from the ALC system.
986	Actuation delivered incorrectly or inadequately: Hardware faulty	Actuation delivered incorrectly or inadequately: Hardware faulty	If the actuation from the brake system to the vehicle is done incorrectly or inadequately because of a hardware failure, this could cause the lateral adjustment to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral positioning requests from the ALC system.
1127	External control input or information wrong or missing	Reporting frequency too low	If the actuation from the brake system applies braking forces to the incorrect wheels of the vehicle (e.g., left/right sides are reversed), this could cause the lateral adjustment to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral positioning requests from the ALC system.
988	External disturbances	Vibration or shock impact	Vibrations or shock impacts from an external source that affect the ability for the brake system to brake the vehicle's wheels could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral position requests from the ALC system.
989	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems that affect the ability for the brake system to brake the vehicle's wheels could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral position requests from the ALC system.
990	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures that affect the ability for the brake system to brake the vehicle's wheels could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral position requests from the ALC system.
992	External disturbances	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects the ability for the brake system to brake the vehicle's wheels could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral position requests from the ALC system.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
993	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the ability for the brake system to brake the vehicle's wheels could cause the ALC system's lateral adjustment request to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral position requests from the ALC system.
1126	External disturbances	Other	Roadway conditions may limit the effectiveness of using the brakes to adjust the vehicle's lateral position in response to ALC requests. This causal factor applies if the brake system is used to implement lateral position requests from the ALC system.
994	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the ability for the brake system to apply braking forces to the vehicle could cause the lateral adjustment to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral positioning requests from the ALC system.
995	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components that affect the ability for the brake system to apply braking forces to the vehicle could cause the lateral adjustment to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral positioning requests from the ALC system.
996	Hazardous interaction with other components in the rest of the vehicle	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the ability for the brake system to apply braking forces to the vehicle could cause the lateral adjustment to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral positioning requests from the ALC system.
997	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the ability for the brake system to apply braking forces to the vehicle could cause the lateral adjustment to be executed incorrectly. This causal factor applies if the brake system is used to implement lateral positioning requests from the ALC system.

Table I-39: Driver Interface With Secondary Controls

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1075	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Other	If the driver incorrectly presses the brake pedal in an effort to disable ALC control (e.g., if the pedal must travel a certain distance before disengaging ALC), then the system may not disengage when expected.
1076	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Other	If the driver incorrectly presses the hazard warning switch in an effort to disengage ALC, then the ALC system may not disengage as expected by the driver.
1077	Controller to actuator signal ineffective, missing, or delayed: Incorrect connection	Other	If the driver incorrectly actuates the turn signal sensor in an effort to disable ALC control, then the system may not disengage as expected by the driver.
1132	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Other vehicle components may interfere with the driver's ability to actuate the hazard warning switch to disable ALC.
1133	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Other vehicle components may interfere with the driver's ability to actuate the turn stalk to disable ALC.

Table I-40: Instrument Panel Display Interface With Driver

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1052	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source could impede the ability of the driver to read the instrument panel display.
1056	External disturbances	Vibration or shock impact	Vibration or shock impacts from the external environment could impede the ability of the driver to read the instrument panel display (e.g., bumpy roads).
1057	External disturbances	Physical interference (e.g., chafing)	Physical interference from foreign objects in the cabin could impede the ability of the driver to read the instrument panel display (e.g., obscure the display).
1068	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures could affect the ability for the driver to read the instrument panel display (e.g., frost).
1069	External disturbances	Other	Glare on the instrument panel display could impede the ability of the driver to read the instrument panel display.
1054	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from another vehicle component could impede the ability of the driver to read the instrument panel display.
1055	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from another vehicle component could impede the ability of the driver to read the instrument panel display (e.g., obscure the display).

Table I-41: Steering System Interface With the Vehicle

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
999	Actuation delivered incorrectly or inadequately: Actuation delayed	Actuation delivered incorrectly or inadequately: Actuation delayed	If the actuation from the steering system to the vehicle is delayed, then the lateral adjustment may be executed incorrectly.
998	Actuation delivered incorrectly or inadequately: Hardware faulty	Actuation delivered incorrectly or inadequately: Hardware faulty	If the actuation from the steering system to the vehicle is done incorrectly or inadequately because of a hardware failure, then the lateral adjustment may be executed incorrectly.
1000	External disturbances	Vibration or shock impact	Vibrations or shock impacts from an external source that affect the connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.
1001	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.
1002	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperature could affect the transfer of lateral forces from the steering system to the vehicle, which could cause the lateral adjustment to be executed incorrectly.
1004	External disturbances	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from an external source that affects the mechanical connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.
1005	External disturbances	Physical interference (e.g., chafing)	Physical interference from an external source (e.g., road debris) that affects the connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.
1147	External disturbances	Other	Roadway conditions may limit the effectiveness of using the steering system to adjust the vehicle's lateral position in response to ALC requests.
1006	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.
1007	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other components around the connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.
1008	Hazardous interaction with other components in the rest of the vehicle	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the mechanical connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
1009	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the connection between the steering system and vehicle could cause the lateral adjustment to be executed incorrectly.
1148	Hazardous interaction with other components in the rest of the vehicle	Other	Other vehicle systems may limit the amount of lateral forces that can be transferred to the roadway (e.g., ABS failure leading to wheel lock-up).

Table I-42: Vehicle Connection With the Roll Rate Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
486	External disturbances	Vibration or shock impact	Vibrations or shock impacts from the external environment that affect the interface between the vehicle and the roll rate sensor could lead to the sensor incorrectly measuring the vehicle's roll rate.
487	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the interface between the vehicle and the roll rate sensor could lead to the sensor incorrectly measuring the vehicle's roll rate.
489	External disturbances	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from the external environment that affects the interface between the vehicle and the sensor incorrectly measuring the vehicle's roll rate.
490	External disturbances	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination affecting the mechanical interface between the vehicle and the roll rate sensor could lead to the sensor incorrectly measuring the vehicle's roll rate.
492	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the interface between the vehicle and the roll rate sensor could lead to the sensor incorrectly measuring the vehicle's roll rate.
495	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g. chafing) from other vehicle components that affects the interface between the vehicle and the roll rate sensor could lead to the sensor incorrectly measuring the vehicle's roll rate.
496	Hazardous interaction with other components in the rest of the vehicle	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components affecting the mechanical interface between the vehicle and the roll rate sensor could lead to the sensor incorrectly measuring the vehicle's roll rate.
485	Sensor measurement inaccurate	Sensor incorrectly aligned or positioned	If the roll rate sensor is misaligned relative to the vehicle, then the roll rate sensor may not correctly measure the roll rate (i.e., within range, but incorrect value).
522	Sensor measurement incorrect or missing	Sensor incorrectly aligned or positioned	If the roll rate sensor is misaligned relative to the vehicle, then the roll rate sensor may incorrectly measure the roll rate (i.e., out of calibration range).

Table I-43: Vehicle Connection with the Wheel Position Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
498	External disturbances	Vibration or shock impact	External vibrations or shock impacts that affect the mechanical connection between the wheel position sensor and the vehicle could lead to the wheel position sensor incorrectly measuring the wheel position.
499	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the mechanical connection between the wheel position sensor and the vehicle could lead to the wheel position sensor incorrectly measuring the wheel position
502	External disturbances	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from the external environment that affects the mechanical connection between the wheel position sensor and the vehicle could lead to the wheel position sensor incorrectly measuring the wheel position
503	External disturbances	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects the mechanical connection between the wheel position sensor and the vehicle could lead to the wheel position sensor incorrectly measuring the wheel position
504	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the mechanical connection between the wheel position sensor and the vehicle could lead to the wheel position sensor incorrectly measuring the wheel position
506	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g. chafing) from other vehicle components that affects the mechanical connection between the wheel position sensor and the vehicle could lead to the wheel position sensor incorrectly measuring the wheel position
507	Hazardous interaction with other components in the rest of the vehicle	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects the mechanical connection between the wheel position sensor and the vehicle could lead to the wheel position sensor incorrectly measuring the wheel position
497	Sensor measurement inaccurate	Sensor incorrectly aligned or positioned	If the wheel position sensor is misaligned relative to the vehicle, then the sensor may incorrectly measure the wheel position (i.e., incorrect value, but within calibration range).
523	Sensor measurement incorrect or missing	Sensor incorrectly aligned or positioned	If the wheel position sensor is misaligned relative to the vehicle, then the sensor might incorrectly measure the wheel position (i.e., out of the calibration range).

Table I-44: Vehicle Connection With the Yaw Rate/Lateral Acceleration Sensor

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
509	External disturbances	Vibration or shock impact	Vibrations or shock impacts from the external environment that affect the mechanical connection between the vehicle and the yaw rate/lateral acceleration sensor could lead to the sensor recording the incorrect yaw rate/lateral acceleration.
510	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the mechanical connection between the vehicle and the yaw rate/lateral acceleration sensor could lead to the sensor recording the incorrect yaw rate/lateral acceleration.
513	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment that affects the mechanical connection between the vehicle and the yaw rate/lateral acceleration sensor could lead to the sensor recording the incorrect yaw rate/lateral acceleration.
514	External disturbances	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects the mechanical connection between the vehicle and the yaw rate/lateral acceleration sensor could lead to the sensor recording the incorrect yaw rate/lateral acceleration.
515	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the mechanical connection between the vehicle and the yaw rate/lateral acceleration sensor could lead to the sensor incorrectly measuring yaw rate/lateral acceleration.
519	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference from other components that affects the mechanical connection between the vehicle and the yaw rate/lateral acceleration sensor could lead to the sensor incorrectly measuring yaw rate/lateral acceleration.
520	Hazardous interaction with other components in the rest of the vehicle	Mechanical connections affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other components that affects the mechanical connection between the vehicle and the yaw rate/lateral acceleration sensor could lead to the sensor incorrectly measuring yaw rate/lateral acceleration.
508	Sensor measurement inaccurate	Sensor incorrectly aligned or positioned	If the yaw rate/lateral acceleration sensor is misaligned relative to the vehicle, then the sensor may measure an incorrect yaw rate/lateral acceleration (i.e., incorrect value, but within calibration range).
521	Sensor measurement incorrect or missing	Sensor incorrectly aligned or positioned	If the yaw rate/lateral acceleration sensor is misaligned relative to the vehicle, then the sensor may incorrectly measure the yaw rate/lateral acceleration (i.e., value is outside the calibration range).

Table I-45: Wheel Position Sensor Connection With the ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
438	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
439	External disturbances	Vibration or shock impact	Vibration or shock impacts from the external environment that affect the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
440	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
441	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
442	External disturbances	Organic growth	Organic growth affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
443	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) impacting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
444	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an unused connection terminal in the wiring harness connecting the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
445	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an active connection terminal of the wheel position sensor or the ALC control module could lead to the ALC control module receiving incorrect wheel position data
446	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.
447	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibration or shock impacts from other vehicle components that affect the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
448	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components surrounding the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
449	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference other vehicle components (e.g., chafing) that affects the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
450	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an unused connection terminal in the wiring harness connecting the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
451	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal near the connection of the wheel position sensor or the ALC control module could lead to the ALC control module receiving incorrect wheel position data
452	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
453	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric car with high voltage circuits, the corona effect from high voltage components affecting the connection between the wheel position sensor and the ALC control module could lead to the ALC control module receiving incorrect wheel position data
433	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If wheel position data is transmitted to the ALC control module over the communication bus, a bus overload or bus error may prevent the ALC control module from receiving the wheel position data.
434	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the wheel position data is transmitted to the ALC control module over the communication bus and the signal priority is too low, then there may be a delay before the ALC control module receives the wheel position data.
435	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the wheel position data is transmitted to the ALC control module over the communication bus, a failure in the message generator, transmitter, or receiver may cause the ALC control module to receive incorrect wheel position data.
530	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the wheel position data is transmitted to the ALC control module over the communication bus, a malicious intruder or aftermarket component may write data to the communication bus that mimics the wheel position data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
427	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the wheel position sensor and the ALC control module is intermittent, the ALC control module may receive incorrect wheel position data.
428	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the wheel position sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wires, then the ALC control module may receive incorrect wheel position data.
429	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the wheel position sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may receive incorrect wheel position data.
430	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the wheel position sensor or the ALC control module is too high, then the ALC control module may receive incorrect wheel position data.
431	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between pins in the connection terminals of the wheel position sensor or the ALC control module, then the ALC control module may receive incorrect wheel position data.
432	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs between pins in the connection terminals of the wheel position sensor or the ALC control module, then the ALC control module may receive incorrect wheel position data.
436	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the wheel position sensor and the ALC control module is wired incorrectly, then the ALC control module may receive incorrect wheel position data.
437	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the wheel position sensor and the ALC control module has an incorrect pin assignment, then the ALC control module may receive incorrect wheel position data.

Table I-46: Yaw Rate/Lateral Acceleration Sensor Connection With the ALC Control Module

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
467	External disturbances	Vibration or shock impact	Vibrations or shock impacts from the external environment that affect the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
468	External disturbances	EMI or ESD	EMI or ESD from the external environment that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
469	External disturbances	Manufacturing defects and assembly problems	Manufacturing defects and assembly problems affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
470	External disturbances	Extreme external temperature or thermal cycling	Extreme external temperatures or thermal cycling affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
471	External disturbances	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an unused connection terminal in the wiring harness connecting the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
472	External disturbances	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from the external environment that affects an active connection terminal in the yaw rate/lateral acceleration sensor or the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
474	External disturbances	Physical interference (e.g., chafing)	Physical interference from the external environment (e.g., road debris) that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
476	External disturbances	Organic growth	Organic growth that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
477	Hazardous interaction with other components in the rest of the vehicle	EMI or ESD	EMI or ESD from other vehicle components that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
478	Hazardous interaction with other components in the rest of the vehicle	Vibration or shock impact	Vibrations or shock impacts from other vehicle components that affect the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
479	Hazardous interaction with other components in the rest of the vehicle	Excessive heat from other components	Excessive heat from other vehicle components around the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
480	Hazardous interaction with other components in the rest of the vehicle	Unused connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an unused connection terminal in the wiring harness connecting the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
481	Hazardous interaction with other components in the rest of the vehicle	Physical interference (e.g., chafing)	Physical interference (e.g., chafing) from other vehicle components that affects the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
482	Hazardous interaction with other components in the rest of the vehicle	Electrical arcing from neighboring components or exposed terminals	Electrical arcing from other vehicle components affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
483	Hazardous interaction with other components in the rest of the vehicle	Corona effects from high voltage components	In an electric vehicle with high voltage circuits, the corona effect from other vehicle components affecting the connection between the yaw rate/lateral acceleration sensor and the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
484	Hazardous interaction with other components in the rest of the vehicle	Active connection terminals affected by moisture, corrosion, or contamination	Moisture, corrosion, or contamination from other vehicle components that affects an active connection terminal of the yaw rate/lateral acceleration sensor or the ALC control module could lead to the ALC control module receiving incorrect yaw/lateral acceleration data.
460	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Bus overload or bus error	If the yaw rate data is transmitted to the ALC control module over the communication bus, a bus overload or bus error may prevent the ALC control module from receiving the yaw/lateral acceleration data.
461	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Signal priority too low	If the yaw rate data is transmitted to the ALC control module over the communication bus and the signal priority is too low, then there may be a delay before the ALC control module receives the yaw/lateral acceleration data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
462	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Failure of the message generator, transmitter, or receiver	If the yaw rate data is transmitted to the ALC control module over the communication bus, a failure of the message generator, transmitter, or receiver may cause the ALC control module to receive incorrect yaw/lateral acceleration data.
463	Sensor to controller signal inadequate, missing, or delayed: Communication bus error	Malicious Intruder	If the yaw rate data is transmitted to the ALC control module over the communication bus, a malicious intruder or aftermarket component may write data to the communication bus that mimics the yaw/lateral acceleration data.
454	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is intermittent	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is intermittent, then the ALC control module may receive incorrect yaw/lateral acceleration data.
455	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connection is open, short to ground, short to battery, or short to other wires in harness	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is open, shorted to ground, shorted to battery, or shorted to other wires, then the ALC control module may receive incorrect yaw/lateral acceleration data.
456	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Electrical noise other than EMI or ESD	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is affected by electrical noise other than EMI or ESD, then the ALC control module may receive incorrect yaw/lateral acceleration data.
457	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector contact resistance is too high	If the contact resistance in the connection terminals of the yaw rate/lateral acceleration sensor or the ALC control module is too high, then the ALC control module may receive incorrect yaw/lateral acceleration data.
458	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector shorting between neighboring pins	If shorting occurs between neighboring pins in the connection terminal of the yaw rate/lateral acceleration sensor or the ALC control module, then the ALC control module may receive incorrect yaw/lateral acceleration data.
459	Sensor to controller signal inadequate, missing, or delayed: Hardware open, short, missing, intermittent faulty	Connector resistive drift between neighboring pins	If resistive drift occurs in the connection terminal of the yaw rate/lateral acceleration sensor or the ALC control module, then the ALC control module may receive incorrect yaw/lateral acceleration data.
464	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect wiring connection	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module is wired incorrectly, then the ALC control module will receive incorrect yaw/lateral acceleration data.

Causal Factor ID	Guideword	Guideword Subcategory	Causal Factor Description
465	Sensor to controller signal inadequate, missing, or delayed: Incorrect connection	Incorrect pin assignment	If the connection between the yaw rate/lateral acceleration sensor and the ALC control module has an incorrect pin assignment, then the ALC control module will receive incorrect yaw/lateral acceleration data.

Appendix J: **THREE-LEVEL MONITORING STRATEGY**

The three-level monitoring strategy is a redundant design strategy that is employed to meet requirements for components that address high ASIL (C or D) hazards. When this design approach is applied to the EPS system, the EPS system will include two micro controllers: a main controller and an auxiliary controller.

The main controller is the one that runs the system. It receives the inputs, runs the algorithms, makes the decisions, and sends out the output. It is also the one that communicates with the rest of the vehicle systems, and takes the vehicle to a safe state in the case of a sufficiently severe hazard.

The sole purpose of the auxiliary controller is to ensure the health and "sanity" of the main controller. It cannot run any system controls. However, it is capable of shutting down the main controller and taking the vehicle into a safe state.

The three levels of the strategy can be described as follows:

Level 1: The main controller runs its calculations or algorithms. It re-runs them again using different calculation methods or algorithms. If the two results don't match, a fault is set, and a fault mitigation strategy is enacted.

Level 2: The auxiliary controller collects the inputs independently, and runs the calculations or algorithms that the main controller ran, although it uses different methods and algorithms. The auxiliary controller then compares its results to those of the main controller. If the results don't match, a fault is set, and a fault mitigation strategy is enacted.

Level 3: This level has different names in industry: "Seed & Key," "Quizzer," "Questions & Answers," etc. It employs a set of scenarios or questions with pre-determined answers. The auxiliary controller poses these questions or scenarios to the main controller randomly. If the main controller does not respond correctly, then a fault is set, and a fault mitigation strategy is enacted.

Appendix K: **DIAGNOSTIC TROUBLE CODES RELEVANT TO THE ALC SYSTEM**

Table K-1. Identification of Selected SAE J2012 DTCs for the ALC System

SAE J2012 Code	Phenomenon	ALC System Component or Interface
U0163	Lost Communication With Navigation Control Module	Connective/Online Sensors
U016A	Lost Communication With Global Positioning System Module	Connective/Online Sensors
U023A	Lost Communication With Image Processing Module "A"	Lane Detection Sensors
U023B	Lost Communication With Image Processing Module "B"	Lane Detection Sensors
U023C	Lost Communication With Image Processing Module "C"	Lane Detection Sensors
U0300	Internal Control Module Software Incompatibility	ALC Control Module
U0464	Invalid Data Received From Navigation Control Module	Connective/Online Sensors
U046B	Invalid Data Received From Global Positioning System Module	Connective/Online Sensors
U053B	Invalid Data Received From Image Processing Module "A"	Lane Detection Sensors
U053C	Invalid Data Received From Image Processing Module "A"	Lane Detection Sensors
U053D	Invalid Data Received From Image Processing Module "A"	Lane Detection Sensors
U3001	Control Module Improper Shutdown	ALC Control Module

Table K-2. Identification of Selected SAE J2012 DTCs for Critical ALC System Interfaces

SAE J2012 Code	Phenomenon	Interfacing System
C0040	Brake Pedal Switch "A" (Subfault)	Brake Pedal Position Sensor
C0041	Brake Pedal Switch "B" (Subfault)	Brake Pedal Position Sensor
C0042	Brake Pedal Position Sensor "Circuit A" (Subfault)	Brake Pedal Position Sensor
C0042	Brake Pedal Position Sensor "Circuit B" (Subfault)	Brake Pedal Position Sensor
C0051	Steering Wheel Position Sensor (Subfault)	Steering Wheel Angle Sensor
C0052	Steering Wheel Position Sensor "Signal A" (Subfault)	Steering Wheel Angle Sensor
C0053	Steering Wheel Position Sensor "Signal B" (Subfault)	Steering Wheel Angle Sensor
C0054	Steering Wheel Position Sensor "Signal C" (Subfault)	Steering Wheel Angle Sensor
C0055	Steering Wheel Position Sensor "Signal D" (Subfault)	Steering Wheel Angle Sensor
C0061	Lateral Acceleration Sensor (Subfault)	Vehicle Dynamics Sensors
C0063	Yaw Rate Sensor (Subfault)	Vehicle Dynamics Sensors
C0064	Roll Rate Sensor	Vehicle Dynamics Sensors
C0069	Yaw Rate/Longitude Sensors (Subfault)	Vehicle Dynamics Sensors
C006A	Multi-axis Acceleration Sensor (Subfault)	Vehicle Dynamics Sensors
C0081	ABS Malfunction Indicator	Brake/Stability Control System
C0082	Brake System Malfunction Indicator	Brake/Stability Control System
P0500	Vehicle Speed Sensor "A"	Vehicle Dynamics Sensors
P0501	Vehicle Speed Sensor "A" Range/Performance	Vehicle Dynamics Sensors
P0502	Vehicle Speed Sensor "A" Circuit Low	Vehicle Dynamics Sensors
P0503	Vehicle Speed Sensor "A" intermittent/Erratic/High	Vehicle Dynamics Sensors
P0504	Brake Switch "A"/"B" Correlation	Brake Pedal Position Sensor
P0565	Cruise Control "On" Signal	Cruise Control System
P0566	Cruise Control "Off" Signal	Cruise Control System
P0567	Cruise Control "Resume" Signal	Cruise Control System
P2158	Vehicle Speed Sensor "B"	Vehicle Dynamics Sensors
P2159	Vehicle Speed Sensor "B" Range/Performance	Vehicle Dynamics Sensors
P2160	Vehicle Speed Sensor "B" Circuit Low	Vehicle Dynamics Sensors
P2161	Vehicle Speed Sensor "B" Intermittent/Erratic/High	Vehicle Dynamics Sensors
P2162	Vehicle Speed Sensor "A"/"B" Correlation	Vehicle Dynamics Sensors
U0001	High Speed CAN Communication Bus	Communication System
U0002	High Speed CAN Communication Bus Performance	Communication System
U0003	High Speed CAN Communication Bus (+) Open	Communication System
U0004	High Speed CAN Communication Bus (+) Low	Communication System
U0005	High Speed CAN Communication Bus (+) High	Communication System
U0006	High Speed CAN Communication Bus (-) Open	Communication System
U0007	High Speed CAN Communication Bus (-) Low	Communication System
U0008	High Speed CAN Communication Bus (-) High	Communication System
U0009	High Speed CAN Communication Bus (-) Shorted to Bus (+)	Communication System

SAE J2012 Code	Phenomenon	Interfacing System
U0010	Medium Speed CAN Communication Bus	Communication System
U0011	Medium Speed CAN Communication Bus Performance	Communication System
U0012	Medium Speed CAN Communication Bus (+) Open	Communication System
U0013	Medium Speed CAN Communication Bus (+) Low	Communication System
U0014	Medium Speed CAN Communication Bus (+) High	Communication System
U0015	Medium Speed CAN Communication Bus (-) Open	Communication System
U0016	Medium Speed CAN Communication Bus (-) Low	Communication System
U0017	Medium Speed CAN Communication Bus (-) High	Communication System
U0018	Medium Speed CAN Communication Bus (-) Shorted to Bus (+)	Communication System
U0019	Low Speed CAN Communication Bus	Communication System
U0020	Low Speed CAN Communication Bus Performance	Communication System
U0021	Low Speed CAN Communication Bus (+) Open	Communication System
U0022	Low Speed CAN Communication Bus (+) Low	Communication System
U0023	Low Speed CAN Communication Bus (+) High	Communication System
U0024	Low Speed CAN Communication Bus (-) Open	Communication System
U0025	Low Speed CAN Communication Bus (-) Low	Communication System
U0026	Low Speed CAN Communication Bus (-) High	Communication System
U0027	Low Speed CAN Communication Bus (-) Shorted to Bus (+)	Communication System
U0028	Vehicle Communication Bus A	Communication System
U0029	Vehicle Communication Bus A Performance	Communication System
U0030	Vehicle Communication Bus A (+) Open	Communication System
U0031	Vehicle Communication Bus A (+) Low	Communication System
U0032	Vehicle Communication Bus A (+) High	Communication System
U0033	Vehicle Communication Bus A (-) Open	Communication System
U0034	Vehicle Communication Bus A (-) Low	Communication System
U0035	Vehicle Communication Bus A (-) High	Communication System
U0036	Vehicle Communication Bus A (-) Shorted to Bus A (+)	Communication System
U0037	Vehicle Communication Bus B	Communication System
U0038	Vehicle Communication Bus B Performance	Communication System
U0039	Vehicle Communication Bus B (+) Open	Communication System
U0040	Vehicle Communication Bus B (+) Low	Communication System
U0041	Vehicle Communication Bus B (+) High	Communication System
U0042	Vehicle Communication Bus B (-) Open	Communication System
U0043	Vehicle Communication Bus B (-) Low	Communication System
U0044	Vehicle Communication Bus B (-) High	Communication System
U0045	Vehicle Communication Bus B (-) Shorted to Bus B (+)	Communication System
U0046	Vehicle Communication Bus C	Communication System
U0047	Vehicle Communication Bus C Performance	Communication System
U0048	Vehicle Communication Bus C (+) Open	Communication System

SAE J2012 Code	Phenomenon	Interfacing System
U0049	Vehicle Communication Bus C (+) Low	Communication System
U0050	Vehicle Communication Bus C (+) High	Communication System
U0051	Vehicle Communication Bus C (-) Open	Communication System
U0052	Vehicle Communication Bus C (-) Low	Communication System
U0053	Vehicle Communication Bus C (-) High	Communication System
U0054	Vehicle Communication Bus C (-) Shorted to Bus C (+)	Communication System
U0055	Vehicle Communication Bus D	Communication System
U0056	Vehicle Communication Bus D Performance	Communication System
U0057	Vehicle Communication Bus D (+) Open	Communication System
U0058	Vehicle Communication Bus D (+) Low	Communication System
U0059	Vehicle Communication Bus D (+) High	Communication System
U0060	Vehicle Communication Bus D (-) Open	Communication System
U0061	Vehicle Communication Bus D (-) Low	Communication System
U0062	Vehicle Communication Bus D (-) High	Communication System
U0063	Vehicle Communication Bus D (-) Shorted to Bus D (+)	Communication System
U0064	Vehicle Communication Bus E	Communication System
U0065	Vehicle Communication Bus E Performance	Communication System
U0066	Vehicle Communication Bus E (+) Open	Communication System
U0067	Vehicle Communication Bus E (+) Low	Communication System
U0068	Vehicle Communication Bus E (+) High	Communication System
U0069	Vehicle Communication Bus E (-) Open	Communication System
U0070	Vehicle Communication Bus E (-) Low	Communication System
U0071	Vehicle Communication Bus E (-) High	Communication System
U0072	Vehicle Communication Bus E (-) Shorted to Bus E (+)	Communication System
U0104	Lost Communication With Cruise Control Module	Cruise Control System
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	Brake/Stability Control System
U0122	Lost Communication With Vehicle Dynamics Control Module	Brake/Stability Control System
U0123	Lost Communication With Yaw Rate Sensor Module	Vehicle Dynamics Sensors
U0124	Lost Communication With Lateral Acceleration Sensor Module	Vehicle Dynamics Sensors
U0125	Lost Communication With Multi-axis Acceleration Sensor Module	Vehicle Dynamics Sensors
U0126	Lost Communication With Steering Angle Sensor Module	Steering Wheel Angle Sensor
U0129	Lost Communication With Brake System Control Module	Brake/Stability Control System
U0131	Lost Communication With Power Steering Control Module	Steering System
U0135	Lost Communication With Differential Control Module (Front)	Active Differential System
U0136	Lost Communication With Differential Control Module (Rear)	Active Differential System
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	Instrument Panel Display

SAE J2012 Code	Phenomenon	Interfacing System
U0156	Lost Communication With Information Center "A"	Instrument Panel Display
U0157	Lost Communication With Information Center "B"	Instrument Panel Display
U0160	Lost Communication With Audible Alert Control Module	Instrument Panel Display
U0305	Software Incompatibility With Cruise Control Module	Cruise Control System
U0315	Software Incompatibility With Anti-Lock Brake System Control Module	Brake/Stability Control System
U0316	Software Incompatibility With Vehicle Dynamics Control Module	Brake/Stability Control System
U0318	Software Incompatibility With Brake System Control Module	Brake/Stability Control System
U0320	Software Incompatibility With Power Steering Control Module	Steering System
U0323	Software Incompatibility With Instrument Panel Control Module	Instrument Panel Display
U0328	Software Incompatibility With Steering Angle Sensor Module	Steering Wheel Angle Sensor
U0332	Software Incompatibility With Multi-axis Acceleration Sensor Module	Vehicle Dynamics Sensors
U0415	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module	Brake/Stability Control System
U0416	Invalid Data Received From Vehicle Dynamics Control Module	Brake/Stability Control System
U0418	Invalid Data Received From Brake System Control Module	Brake/Stability Control System
U0420	Invalid Data Received From Power Steering Control Module	Steering System
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Instrument Panel Display
U0428	Invalid Data Received From Steering Angle Sensor Module	Steering Wheel Angle Sensor
U0432	Invalid Data Received From Multi-axis Acceleration Sensor Module	Vehicle Dynamics Sensors
U0436	Invalid Data Received From Differential Control Module (Front)	Active Differential System
U0437	Invalid Data Received From Differential Control Module (Rear)	Active Differential System
U0461	Invalid Data Received From Audible Alert Control Module	Instrument Panel Display
U0513	Invalid Data Received From Yaw Rate Sensor Module	Vehicle Dynamics Sensors
U0532	Invalid Data Received From Rain Sensing Module	Rain Sensing Module
U0536	Invalid Data Received From Lateral Acceleration Sensor Module	Vehicle Dynamics Sensors
U3003	Battery Voltage	Power Supply
U3006	Control Module Input Power "A"	Power Supply
U3007	Control Module Input Power "B"	Power Supply
U3008	Control Module Ground "A"	Power Supply
U3009	Control Module Ground "B"	Power Supply
U300A	Ignition Switch	Ignition Switch
U300B	Ignition Input Accessory/On/Start	Ignition Switch
U300C	Ignition Input Off/On/Start	Ignition Switch
U300D	Ignition Input On/Start	Ignition Switch

SAE J2012 Code	Phenomenon	Interfacing System
U300E	Ignition Input On	Ignition Switch
U300F	Ignition Input Accessory	Ignition Switch
U3010	Ignition Input Start	Ignition Switch
U3011	Ignition Input Off	Ignition Switch

DOT HS 812 573
August 2018

U.S. Department
of Transportation

National Highway
Traffic Safety
Administration

13498b-080318-v3