TP-213-12
May 30, 2025
(FMVSS No. 213a mandatory compliance date June 30, 2025[1])
(FMVSS No. 213b mandatory compliance date December 05, 2026)

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE
for
FMVSS No. 213 Child Restraint Systems,
FMVSS No. 213a Child Restraint Systems – Side Impact Protection, and
FMVSS No. 213b Child Restraint Systems

ENFORCEMENT
Office of Vehicle Safety Compliance
Mail Code: NVS-220
1200 New Jersey Avenue, SE
Washington, DC 20590

[1] See Federal Register (90 FR 23009) and subsequent notices pertaining to the FMVSS No. 213a mandatory compliance date.

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REVISION CONTROL LOG
FOR OVSC LABORATORY
TEST PROCEDURES

TP-213
Child Restraint Systems

TEST PROCEDURE		FMVSS 213		DESCRIPTION
REV. No.	DATE	AMENDMENT	EFFECTIVE DATE	
00				Original Issue
01				Minor Revisions
02				Revised for additional requirements
03	April 12, 1994			Conversion to WordPerfect and minor corrections
04	Sept. 1, 1997	59 FR 37167 60 FR 35126	Aug. 22, 1994 Jan. 3, 1996	General update. Addition of booster seats and expanded number of test dummies.
05	Dec. 18, 2003	64 FR 47566 67 FR 61523	Sep. 1, 2002 Oct. 1, 2003	Addition of LATCH requirements. Addition of revised label requirements.
06	June 30, 2004	68 FR 37620	Voluntary Compliance Dec. 22, 2003 Fully Effective Aug. 1, 2005	Additional requirements to upgrade S213 per TREAD Act mandate.
07	June 1, 2005	69 FR 42595 70 FR 15596	August 1, 2005	Addition of Hybrid III 6-year-old weighted dummy. Minor revision based on Denton ATD petition for reconsideration.
08	November 1, 2005	70 FR 35556 70 FR 44520 70 FR 53569	June 21, 2006 Aug. 1, 2005 Nov. 8, 2005	Revised Hotline number and addition of web address. Optional use of 6 yr. old HII dummy. Addition of online registration requirements.
09	June 7, 2006	71 FR 32855	August 7, 2006 (effective date) September 1, 2007 (compliance date)	Revised to incorporate minimum breaking strength requirements for webbing.
10	February 1, 2014	77 FR 11626 79 FR 10396	February 27, 2014	Revised to incorporate 10-yr-old HIII dummy requirements and procedures. Other minor changes throughout document

11	August 23, 2023	87 FR 39310	August 1, 2022 (effective date) June 30, 2025 (mandatory applicability)	Incorporated FMVSS No. 213a, Child Restraint Side Impact Protection test procedures. Revised test configuration code legend. Updated test data sheets to include side impact test measurements. Revised seat assembly belt webbing requirements. Revised seat back width measurement figure. Revised for corrections and added or revised detail in 213 component. Other updates throughout, to clarify and modernize the document.
12	May 30, 2025	88 FR 84514	February 5, 2024 (effective date) December 5, 2026 (mandatory applicability)	Incorporated FMVSS No. 213b, Child Restraint System frontal test procedures. Clarifications made to sections 12.B.1.1, 12.B.2.7, 12.B.3.1, 12.B.3.1.2 & 12.B.3.1.3 FMVSS No. 213a updates include but are not limited to: • SISA camera locations • Relative velocity calculation instructions • Q3s thorax deflection filter class specifications • Q3s qualification test exposure limit • Test buck and sliding seat accelerometer specifications • Seat cover wrapping methods

1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contractor laboratories with Laboratory Test Procedures as guidelines for obtaining compliance test data. The data are used to inform OVSC if there is a potential noncompliance of a specific vehicle or item of motor vehicle equipment based on a failure to meet the minimum requirements of the applicable Federal Motor Vehicle Safety Standard (FMVSS). The purpose of these OVSC Laboratory Test Procedures is to present a uniform testing and data recording format and provide suggestions for the use of specific equipment and procedures. These Laboratory Test Procedures do not constitute an endorsement or recommendation for use of any product or method. If any contractor views any part of the OVSC Laboratory Test Procedures (TP) to conflict with a FMVSS or observes deficiencies in a TP, the contractor is required to advise the Contracting Officer's Representative (COR) and resolve the discrepancy prior to the start of compliance testing.

The TP is not intended to limit or restrain a contractor from developing or utilizing any testing techniques or equipment that will assist in procuring the required compliance test data. However, the application of any such testing technique or equipment is subject to prior approval of the COR.

The mandatory effective date for compliance with FMVSS No. 213a listed throughout this test procedure is June 30, 2025, which is current as of the date of publication of this document. On May 30, 2025, NHTSA published a notice of proposed rulemaking[2] that included among other things, changing the mandatory effective date for compliance with FMVSS No. 213a to December 5, 2026. Following the resolution of that rulemaking, this test procedure will be updated accordingly.

NOTE: This TP, prepared for the limited purpose of use by contracted independent laboratories conducting compliance tests for the OVSC, are not rules, regulations, or NHTSA interpretations regarding the meaning of a FMVSS. Neither is the TP intended to limit the requirements of the applicable FMVSS(s). In some cases, the TP or the report produced as a result of the work performed by the contracted laboratory does not include all of the various FMVSS minimum performance requirements. Recognizing applicable test tolerances, the TP may specify test conditions that are less severe than the minimum requirements of the standard. In addition, the TP may be modified by the OVSC at any time without notice, and the COR may direct or authorize contractors to deviate from these procedures, as long as the tests are performed in a manner consistent with the standard itself and within the scope of the contract. Laboratory Test Procedures may not be relied upon to create any right or benefit in any person. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits its certification tests to those described in the TP. The test reports produced as a result of OVSC’s testing are likely insufficient to serve as a manufacturer’s basis for certification that its vehicle or product conforms to all applicable requirements of a FMVSS.

[2] See 90 FR 23009 and subsequent notices pertaining to the FMVSS No. 213a mandatory compliance date.

2. GENERAL REQUIREMENTS

The test procedures, methods, and associated equipment are based on the requirements of the following documents to the extent referenced herein.

49 CODE OF FEDERAL REGULATIONS (CFR) 571 FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS)

FMVSS 209 - Seat Belt Assemblies
FMVSS 213 - Child Restraint Systems
FMVSS 213a - Child Restraint Systems-Side Impact Protection
FMVSS 213b – Child Restraint Systems
FMVSS 225 - Child Restraint Anchorage Systems
FMVSS 302 - Flammability of Interior Materials

49 CODE OF FEDERAL REGULATIONS (CFR) 572 ANTHROPOMORPHIC TEST DEVICES

Subpart K – Newborn Infant
Subpart R – 12-month-old Infant
Subpart P – 3-year-old Child
Subpart W – Q3s 3-year-old Child
Subpart N – 6-year-old (HIII) Child
Subpart I – 6-year-old (HII) Child
Subpart S – 6-year-old Weighted Child
Subpart T – 10-year-old Child

DRAWING PACKAGES

NHTSA Standard Seat Assembly; FMVSS No. 213, No. NHTSA-213-2003 dated June 3, 2003

NHTSA Standard Seat Assembly; FMVSS No. 213a- Side impact No. NHTSA-213a-2021 dated December 2021

NHTSA Standard Seat Assembly; FMVSS No. 213, No. NHTSA-213-2021 dated March 2023

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC Geometric Gray Scale

AATCC Test Method 30-81	Fungicides Evaluation of Textiles; Mildew and Rot Resistance of Textiles

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117-73	Standard Method for Salt Spray (Fog) Testing
ASTM D756-78	Standard Practice for Determination of Weight and Shape Changes of Plastics Under Accelerated Service Conditions
ASTM D1056-07	Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber
ASTM D3574-11	Standard Methods of Testing Flexible Cellular Materials--Slab Urethane Foam
ASTM D1565-76	Standard Specifications for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)
ASTM E4-79	Standard Methods of Load Verification of Testing Machines
ASTM G23-81	Standard Practice for Operating Light Exposure Apparatus (Carbon Arc Type) with and without Water for Exposure of Nonmetallic Materials

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE J211 (1995) Instrumentation for Impact Tests

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI/NCSL Z540-1 Calibration Laboratories and Measuring and Test Equipment – General Requirements

ENVIRONMENTAL CONDITIONS

The environmental conditions specific to each test and measurement procedure is described in the relevant portion of this test procedure. However, if environmental conditions are not specified, all tests and measurements shall be conducted under the following environmental conditions:

Temperature	20.6 °C (69 °F) to 22.2 °C (72 °F)
Relative Humidity	10% to 70%

All data on environmental conditions required throughout this procedure shall be continuously monitored and recorded in analog or electronic format which shall be produced on the applicable data sheet or at the discretion of the COR.

TEST SEQUENCE

The following test series may be done simultaneously or sequentially in any order.

MATERIALS TESTS (see section 12.B of this test procedure)

INSPECTION OF PHYSICAL FEATURES (see section 12.C of this test procedure)

FRONTAL IMPACT DYNAMIC TEST (see section 12.D of this test procedure)

213a SIDE IMPACT DYNAMIC TEST (see section 12.E of this test procedure)

213b FRONTAL IMPACT DYNAMIC TEST (see section 12.F of this test procedure)

Child restraint systems that are manufactured for use in aircraft, in addition to use in motor vehicles, require the following additional tests.

TESTING FOR AIRCRAFT USE (see section 12.G of this test procedure)

3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test items from unauthorized personnel during the entire compliance-testing program. The contractor is financially responsible for any acts of theft and/or vandalism which occur during the storage of test equipment. Any security problems, which arise, shall be reported by telephone to the Industrial Property Manager (IPM), Office of Contracts and Procurement, within two working days after the incident. A letter containing specific details of the security problem will be sent to the IPM (with copy to the COR) within 48 hours.

The contractor shall protect and segregate the data that is collected during compliance testing before and after each test. No information concerning the safety compliance testing program shall be released to anyone except the COR, unless specifically authorized by the COR or the COR's Supervisor.

NOTE: NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL DIRECTLY INVOLVED IN THE COMPLIANCE TESTING PROGRAM, SHALL BE ALLOWED TO WITNESS ANY COMPLIANCE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COR.

4. GOOD HOUSEKEEPING

Contractors shall maintain the entire compliance testing area, test fixtures and instrumentation in a neat, clean, and painted condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

5. TEST SCHEDULING AND MONITORING

The contractor shall submit a test schedule to the COR prior to testing. Tests shall be completed in accordance with the schedule required in the contract. All testing shall be coordinated to allow monitoring by the COR.

6. TEST DATA

A. AVAILABILITY

The contractor shall make all preliminary compliance test data available to the COR on location within four hours after the test. Final test data, including digital printouts and computer-generated plots (if applicable), shall be furnished to the COR within five working days. Additionally, the contractor shall analyze the preliminary test results as directed by the COR.

B. ENTREE FILES

The contractor shall provide accelerometer data and test videos to the COR for each child restraint sled test conducted, as applicable. Accompanying the videos (and accelerometer data) shall be Entree files created using the instructions and templates provide in Appendix A.

C. DISPOSITION

All backup data sheets, data files, reports, photos, recordings, plots, technicians' notes, etc., shall be either sent to the COR or retained by the contractor for a minimum of 3 years after conclusion of each delivery order, purchase order, etc. The COR shall direct final disposition at that time.

D. INVALID TESTS

For contractual purposes, an invalid compliance test is one which does not conform to all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the test. Any action or plan which deviates from the OVSC Laboratory Test Procedure shall be discussed with the COR.

The contractor shall notify the COR of any test not meeting all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of

Work applicable to the test, by telephone, within 24 hours of the test and send written notice to the COR within 48 hours of the test completion.

The Contracting Officer of NHTSA is the only NHTSA official authorized to notify the contractor that a retest for an invalid test is required. The retest shall be completed within 2 weeks after receipt of notification by the Contracting Officer that a retest is required.

NHTSA, in its sole discretion, reserves the right to waive the retest requirement. This provision shall not constitute a basis for dispute over NHTSA's waiving or not waiving any requirement.

No test report is required for any test that is determined to be invalid unless NHTSA specifically decides, in writing, to require the contractor to submit such report. The test data from the invalid test must be safeguarded until the data from the retest has been accepted by the COR. The report and other required deliverables for the retest are required to be submitted to the COR in accordance with the terms of the contract.

The contractor is subject to the default and subsequent reprocurement costs for non-delivery of valid or conforming tests (pursuant to the Termination for Default clause in the contract).

None of the requirements herein stated shall diminish or modify the rights of NHTSA to determine that any test submitted by the contractor does not conform precisely to all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the test.

7. GOVERNMENT FURNISHED PROPERTY (GFP) and TEST ITEMS (GFTI)

The contractor is financially responsible for any acts of theft and/or vandalism that occur during the storage of GFTI and GFP.

A. TEST EQUIPMENT

All test equipment items shall be inventoried upon receipt and checked against the shipping documents. Any missing or broken parts shall be reported immediately to the COR. A running inventory list shall be maintained until the complete matrix list of test samples is received.

B. TEST DUMMIES

The newborn infant dummy (Part 572K), 12-month-old dummy (Part 572R), 3-year-old dummy (Part 572P), Q3s 3-year-old side impact dummy (Part 572W), 6-year-old dummies (Parts 572I, 572N, and 572S), and 10-year-old dummy (Part 572T) will be provided to the laboratory by OVSC. The dummies shall be calibrated by the laboratory before the start of the test program, after a failure with any dynamic impact test requirement (unless waived by the COR), or if any one of the following conditions is met:

- after 30 tests have been completed
- if the dummy has not been used in a dynamic sled test during the prior thirty calendar days
- if the previous calibration occurred 6 months or more before the test, regardless of the number of tests since the previous calibration

If the test dummy has been in storage for a week or more and is within the calibration period, move its subassemblies (arms, legs, head) within their range of motion to loosen up its joints and warm up the materials before testing. The dummy shall not be used for more than one test per hour. The 12-month-old, 3-year-old, Q3s 3-year-old, 6-year-old (HII)[3], 6-year-old (HIII), 6-year-old weighted, and 10-year-old dummy calibration procedures are available for downloading from NHTSA's website[4]. The newborn size dummy does not have a calibration procedure.

All test dummies shall be visually inspected at the start of the test program and after each test failure obtained during the dynamic impact test requirements to check for cracks, tears, or other physical damage to either be repaired or replaced at the discretion of the COR.

8. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system shall be implemented and maintained in accordance with established calibration practices. The calibration system shall include the following as a minimum:

A. Standards for calibrating the measuring and test equipment will be stored and used under appropriate environmental conditions to assure their accuracy and stability.

B. All measuring instruments and standards shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals NOT TO EXCEED TWELVE (12) MONTHS! Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

C. All measuring and test equipment and measuring standards will be labeled with the following information:

(1) Date of calibration
(2) Date of next scheduled calibration

[3] Testing with the Hybrid-II 6-year-old dummy (Part 572I) will sunset on December 5, 2026.
[4] https://www.nhtsa.gov/vehicle-manufacturers/test-procedures

(3) Name of the technician who calibrated the equipment

D. A written calibration procedure shall be provided by the contractor which includes as a minimum the following information for all measurement and test equipment:

(1) Type of equipment, manufacturer, model number, etc.
(2) Measurement range
(3) Accuracy
(4) Calibration interval
(5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)

E. Records of calibration for all test instrumentation shall be kept by the contractor in a manner that assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when requested by the COR. The calibration system needs the acceptance by the COR before the test program commences.

F. Further guidance is provided in the International Standard ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment" and American National Standard ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment – General Requirements.")

G. The calibration procedures and data sheets for the child ATDs are located in separate test procedures available on NHTSA's website[5].

(1) CRABI 12-month-old - TP-572-R-00
(2) Q3s 3-year-old – TP-572-W-00
(3) 3-year-old HIII - TP572-P-00
(4) 6-year-old HIII - TP572-N-00
(5) 6-year-old HII - TP572-I-00
(6) 6-year-old weighted - TP572-S-00
(7) 10-year-old – TP572-T-00

9. PHOTOGRAPHIC AND VIDEO DOCUMENTATION

A. PHOTOGRAPHS

The contractor shall document each test using a digital camera to take pretest and posttest digital photographs of the test item that are to be included in each final test report. Photographs shall be taken in color and contain clear images. A tag, label, or placard identifying, as applicable, the test as pretest or posttest and the lab test number shall appear in each photograph and must be legible. The required resolution for digital photographs is a minimum of 1,600 x 1,200 pixels. The digital photographs shall be

[5] https://www.nhtsa.gov/vehicle-manufacturers/test-procedures

included in the test report as a clear printed image measuring 102 mm x 152 mm (4 x 6 inch) in size or its digital equivalent format. Digital photographs are required to be saved in a JPG format. Glare or light from any illuminated or reflective surface should be minimized while taking photographs.

The test reports should include enough photographs to describe the testing in detail and shall be organized in a logical succession of consecutive pictures. At a minimum, the following test photographs shall be included in each final test report submitted by the contractor:

(1) Each final report shall include color photographs of testing equipment. For example, for dynamic sled tests, ¾ front view of bench seat (without the CRS or dummy) from the right or left side.

(2) For each set of pretest and posttest photographs of any dynamic sled test, the dummy must be secured in the CRS, which is secured to the bench seat. Six photographs for each set of pretest and posttest photographs must be taken, which includes an overhead shot and angle shots at 0°, 45°, 90°, 135°, and 180°. The first angle shot is taken from the side of the CRS setup (0° angle shot) and subsequent photographs are taken at 45° angle increments, stopping when the left side of the setup (180° angle shot) has been photographed.

(3) When aircraft seat inversion tests are conducted, two pretest and two posttest photographs shall be taken. In each case, a side-shot and a shot showing the dummy in the seat shall be taken when possible. Include only the side shots in the final report.

(4) Component test reports shall include photos of the component hardware and webbing as installed in the child restraint from the front, side, and rear views. Additional photos of the components, e.g., before or after testing, may be requested at the discretion of the COR.

(5) Any failure must be photographed at various angles to assure complete coverage. Upon request, the photographs should be sent to the COR and saved in a “read only” format to ensure that the digital photographs are the exact pictures taken during testing and have not been altered from the original condition.

(6) Each final test report shall include color photographs of the test item as received.

(7) Each final test report shall include color photographs of the labels on the test items such that the labels are legible when enlarged. Component test reports need only include label(s) identifying manufacturer, model name and/or number and date of manufacture.

(8) Each final test report shall include color photographs of the attached registration

card, electronic registration form, and the front and back cover of the printed instructions. Component test reports need only include photographs of the front and back of the attached registration card.

B. DYNAMIC TEST HIGH-SPEED DIGITAL VIDEOS

The contractor shall document the test event with high-speed digital video cameras for at least 10 msec prior to the sled firing and for at least 210 msec after the pulse is complete.

i. For frontal impact dynamic tests tested on sled systems, at least three (3) high-speed video cameras (or more if required by the contract) operating at 1,000 frames per second (fps) or greater are required to record the dynamic performance of each child restraint system being tested. The minimum resolution for these cameras shall be 1536 CMOS sensors per every two rows of pixels with 80% of the horizontal distance of the two rows covered by effective light sensors. There shall be a minimum of 1024 row of sensors. Cameras that do not meet these specifications may be used if approved by the COR. Two video cameras are typically used to measure the head and knee excursion limits in forward facing restraints, a third camera shall be positioned to record a complete view of the restraint system and dummy behavior during the entire.

   The following housekeeping procedures will aid in obtaining quality videos for excursion measurements and analysis:

   - Provide a visual indicator within the field of view of each video that allows for synchronization of the data collected by instrumentation used in the child dummies to the events captured in the video, where applicable.
   - Place a rigidly fixed reference grid that displays four field calibration target points on the far side of the FISA.
   - Prevent unnecessary target obstructions by securing non-test items that could move during testing and obstruct the targets
   - Mount targets low on the stadia poles[6] so they are more stationary during the recorded event
   - Apply black and yellow 1 x 1 inch square inch tape on the stadia poles and seat frame
   - Place targets on rigid bodies as far apart as possible to help determine scale

   Accuracy and tolerance of measured values shall be indicated on applicable data sheets and other hard copy charts of test measurements and results.

ii. For built-in child restraint systems using the specific vehicle for the frontal impact dynamic tests it is suggested that a minimum of two high-speed video cameras

[6] Stadia poles refers to the stable, vertical bars having scale markings on them that typically assist in determining if excursion limits are met or exceeded.

(or more if required by the contract) capable of 1,000 frames per second (fps) be utilized on board the vehicle. The location of the camera must be perpendicular to the SORL and placed on the outdoor skin of the vehicle at a known distance forward of the child restraint system.

Because of the vehicle construction and obstructions (B pillar, front seats, etc.), the camera cannot be placed 864 mm (34 inches) forward of the seat back pivot as suggested above, therefore, the camera must be located at an accurately measured distance forward of the restraint system to avoid parallax so the forward excursions can be measured with a minimum of error.

For built-in child restraint systems using the specific vehicle, a rigidly fixed reference grid should be placed in the vehicle in line with the onboard camera. This reference must be a known distance from the seat back pivot point. The distance between the pivot and the reference point shall be indicated on applicable data sheets and other hard copy charts of test results.

iii. For side impact dynamic tests, at least four (4) high-speed video cameras (or more if required by the contract) operating at 1,000 frames per second (fps) or greater are required to record the dynamic performance of each child restraint system being tested. The minimum resolution for these cameras shall be 1536 CMOS sensors per every two rows of pixels with 80% of the horizontal distance of the two rows covered by effective light sensors. There shall be a minimum of 1024 row of sensors. Cameras that do not meet these specifications may be used if approved by the COR. Three video cameras are typically used for monitoring side impact dynamic tests response. A fourth camera shall be positioned overhead to record a complete view of the restraint system and dummy behavior during the entire test.

iv. If an alternate method of comparable accuracy is available for observing and measuring occupant excursions, this method may be used instead of a high-speed video system with the concurrence of the COR.

C. DYNAMIC TEST VIDEO FILES

The images recorded during the test (the original) should never be edited. The raw, uncompressed original video file should be retained by the contractor and provided to the COR if requested.

At the very beginning, legible video identification placards shall be incorporated into the video covering the following information:

(1) Test number (consistent with the test report)
(2) Child restraint manufacturer and model name
(3) Test code
(4) Camera location

All test videos shall be provided to the COR on the DOT Secure Large File Transfer Solution (SLFTS) website or another NHTSA authorized system for submitting deliverables with the final test report as AVI or MPEG files with any standard or generally available “codex” compatible with Microsoft Windows, or other format only if approved by the COR. Specify the codex necessary to read the video file. Video footage shall be saved in a “read only” format.

Accompanying the videos provided to the COR shall be an Entree file that can be used to upload the test videos to NHTSA’s database. For information about creating the Entree files, see Section 6.

D. DISPOSITION OF DYNAMIC TEST VIDEO FILES

The contractor shall retain the original video for a minimum of 3 years after conclusion of each delivery order, purchase order, etc. The COR shall direct the final disposition at that time.

10. DEFINITIONS

ADD-ON CHILD RESTRAINT SYSTEM

Any portable child restraint system.

ATD HEAD PROTECTION DEVICE

An optional cushion padded fixture that mounts to the seat back of the 213b frontal impact seat assembly to protect the head and neck of the 6-year-old and 10-year-old test dummies when installed in backless belt-positioning child restraints and tested in a frontal impact dynamic test.

BACKLESS CHILD RESTRAINT SYSTEM

A child restraint other than a belt-positioning seat, that consists of a seating platform that does not extend up to provide a cushion for the child’s back or head and has a structural element designed to restrain forward motion of the child’s torso in a forward impact.

BELT-POSITIONING SEAT (BPS)

A child restraint system that positions a child on a vehicle seat to improve the fit of a vehicle Type II belt system on the child and that lacks any component, such as a belt system or a structural element, designed to restrain forward movement of the child’s torso in a forward impact. Abbreviated as “BPS”.

BOOSTER SEAT

A child restraint that is either a backless child restraint system or a belt-positioning seat.

BUILT-IN CHILD RESTRAINT SYSTEM

Any child restraint system that is designed to be an integral part of and permanently installed in a motor vehicle.

CAR BED

A child restraint system designed to restrain or position a child in the supine or prone position on a continuous flat surface.

CHILD RESTRAINT ANCHORAGE SYSTEM

A vehicle system that is designed for attaching a child restraint system to a vehicle at a particular designated seating position, consisting of: (a) Two lower anchorages meeting the requirements of S9, FMVSS No. 225; and (b) A tether anchorage meeting the requirements of S6, FMVSS No. 225.

CHILD RESTRAINT SYSTEM (CRS)

Any device, except Type I or Type II seat belts, designed for use in a motor vehicle or aircraft to restrain, seat, or position children who weigh 36 kg (80 lb.) or less. Abbreviated as “CRS”.

CONTACTABLE SURFACE

Any child restraint system surface (other than that of a belt, belt buckle, or belt adjustment hardware) that may contact any part of the head or torso of the appropriate test dummy, specified in S7, when a child restraint system is tested in accordance with S6.1 of FMVSS 213, 213a, and 213b.

CONTRACTING OFFICER’S REPRESENTATIVE (COR)

A technical representative designated by the Contracting Officer to assist in monitoring the work under a contract. The Contracting Officer’s Representative serves as the technical liaison between the Government and the Contractor. Abbreviated as “COR”.

CRS

Child Restraint System. Abbreviated as “CRS”.

FACTORY INSTALLED BUILT-IN CHILD RESTRAINT

A built-in child restraint system that has been or will be permanently installed in a motor vehicle before that vehicle is certified as a completed or altered vehicle in accordance with part 567 of 49 CFR Chapter 5, certification requirements for passenger vehicles.

FRONTAL IMPACT SEAT ASSEMBLY (FISA)

A frontal impact seat assembly, consisting of a simulated vehicle rear seat. The FISA is mounted on a dynamic test platform so that the SORL of the seat is in line with the impact direction of the test platform. The FISA is used to replicate a frontal impact of a child restraint system (CRS). Abbreviated as “FISA”.

For FMVSS No. 213, refer to NHTSA Standard Seat Assembly; FMVSS No. 213, No. NHTSA-213-2003 dated June 3, 2003 for more details.

For FMVSS No. 213b, refer to NHTSA Standard Seat Assembly; FMVSS No. 213, No. NHTSA-213-2021 dated March 2023 for more details.

HARNESS

A combination pelvic and upper torso child restraint system that consists primarily of flexible material, such as straps, webbing, or similar material, and that does not include a rigid seating structure for the child.

LOWER ANCHOR

The lower anchorage of the child restraint anchorage system in the vehicle.

LOWER ANCHOR ATTACHMENT

The child restraint anchorage or the detachable base’s (in the case of a rear-facing child restraint with a detachable base) lower anchorage connector and the lower anchorage strap (for flexible lower anchorage attachments).

REAR-FACING CHILD RESTRAINT SYSTEM

A child restraint system, except a car bed, that positions a child to face in the direction opposite to the normal direction of travel of the motor vehicle.

REPRESENTATIVE AIRCRAFT PASSENGER SEAT

Either a Federal Aviation Administration approved production aircraft passenger seat or a simulated aircraft passenger seat conforming to Figure 57 of this OVSC

Laboratory Test Procedure.

RIGID LOWER ANCHOR ATTACHMENT

The child restraint system or the detachable base's (in the case of a rear-facing child restraint with a detachable base) lower anchorage connector that is rigidly attached to the CRS and does not have a lower anchorage strap.

SCHOOL BUS CHILD RESTRAINT SYSTEM

An add-on child restraint system (including a harness) manufactured and sold only for use on school bus seats, that has a label conforming with S5.3.1(b).

SEAT ORIENTATION REFERENCE LINE (SORL)

The horizontal line through Point Z as illustrated in Figures 7, 8, 21, 39, and 40 of this OVSC Laboratory Test Procedure. Abbreviated as "SORL".

SIDE IMPACT SEAT ASSEMBLY (SISA)

A side impact seat assembly, consisting of a simulated vehicle rear seat, with one seating position, and a simulated door assembly. The simulated door assembly is rigidly attached to the floor of the SISA, and the simulated vehicle rear seat is mounted on rails to allow it to move relative to the floor of the SISA in the direction perpendicular to the seat orientation reference line (SORL). The SISA is mounted on a dynamic test platform so that the SORL of the seat is 10 degrees from the perpendicular direction of the test platform travel. The SISA is rotated to replicate a side impact on a near-side child restraint system (CRS). Abbreviated as "SISA".

Refer to NHTSA Standard Seat Assembly; FMVSS no. 213a- Side impact No. NHTSA-213a-2021 dated December 2021 for more details.

SECURE LARGE FILE TRANSFER SOLUTION

A U.S. Government information system intended as a temporary means of securely transferring files between authorized parties. This information system is provided for U.S. Government-authorized use only.
Abbreviated as "SLFTS".

SPECIFIC VEHICLE SHELL

The actual vehicle model part into which the built-in child restraint system is or is intended to be fabricated, including the complete surroundings of the built-in system. If the built-in child restraint system is or is intended to be fabricated as part of any seat other than a front seat, these surroundings include the back of the seat in front, the interior rear side door panels and trim, the floor pan, adjacent pillars (e.g., the B and C pillars), and the ceiling. If the built-in system is or is intended to be fabricated as part of the front seat, these surroundings include the dashboard, the steering mechanism and its associated trim hardware, any levers and knobs installed on the floor or on a console, the interior front side door panels and trim, the front seat, the floor pan, the A pillars, and the ceiling.

TEST ITEMS

Samples that are used in the performance of a contract. The test items to be tested to FMVSS 213, FMVSS 213a, and FMVSS 213b as part of OVSC's enforcement program, consist of commercially available child restraint systems and components of those child restraint systems.

TETHER

The child restraint system's tether hook and tether strap

TETHER ANCHORAGE

A user-ready, permanently installed vehicle system that transfers loads from a tether strap through the tether hook to the vehicle structure and that accepts a tether hook.

TETHER ANCHOR

The top tether anchorage of the child restraint anchorage system in the vehicle.

TETHER HOOK

A device used to attach a tether strap to a tether anchorage which must comply with the interface profile requirements (see Figure 7).

TETHER STRAP

A strap that is secured to the rigid structure of the seat back of a child restraint system and is connected to a tether hook that transfers the load from that system to the tether anchorage.

TORSO

The portion of the body of a seated anthropomorphic test dummy, excluding the thighs, that lies between the top of the child restraint system seating surface and the top of the shoulders of the test dummy.

11. PRETEST REQUIREMENTS

A. OPERATING TEST PROCEDURE

Prior to conducting compliance testing, contracted laboratories are required to submit a detailed test procedure to the COR to demonstrate concurrence with the OVSC laboratory test procedure and the applicable FMVSS. The procedure must include a step-by-step description of the methodology to be used. The contractor's test procedure shall contain a complete listing of test equipment with make and model numbers and detailed check-off sheets. The list of test equipment shall include instrument accuracy and calibration dates. All equipment shall be calibrated in accordance with the manufacturer’s instructions. There shall be no contradictions between the TP and the contractor’s in-house test procedure. Written approval of the in-house test procedures shall be obtained from the COR before initiating the compliance test program.

B. TEST DATA LOSS

A compliance test is not to be conducted unless all of the various test conditions specified in the Standard and the applicable OVSC Laboratory Test Procedure have been met. Failure of a contractor to obtain the required test data and to maintain acceptable limits on test parameters in the manner outlined in the applicable OVSC Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs will include the cost of the replacement item of motor vehicle equipment and all costs associated with conducting the retest. The original test specimen used for the invalid test shall remain the property of OVSC, and the retest specimen shall remain the property of the contractor. If there is a test failure, the contractor shall retain the retest specimen for a period not exceeding two years. If there is no test failure, the Contractor may dispose of the test specimen upon notification from the COR that the final test report has been accepted.

The Contracting Officer of NHTSA is the only NHTSA official authorized to notify the contractor that a retest is required. The retest shall be completed within two (2) weeks after receipt of notification by the Contracting Officer that a retest is required. If a retest is conducted, no test report is required for the original test.

C. TEST PERSONNEL PERFORMANCE

Technicians charged with the responsibility of performing the compliance test program shall be thoroughly familiar with the requirements and test conditions for each test phase to be performed. Each technician shall be specifically instructed in the proper operation of all equipment employed in conducting these tests.

Personnel supervising the compliance test program shall be thoroughly familiar with the requirements, test conditions, and equipment for the test to be conducted.

12. COMPLIANCE TEST EXECUTION

12.A TEST ITEMS

The items to be tested under FMVSS 213, FMVSS 213a, and FMVSS 213b consist of child restraint systems and child restraint system components. Test items will either be provided to the Contractor by the COR or acquired by the Contractor using contract funds at the discretion and instruction of the COR.

12.A.1 MATERIALS & COMPONENT TESTING

Samples of all materials used in a given CRS shall be supplied by OVSC in appropriate quantities for the materials tests in this procedure.

(1) FLAMMABILITY TESTS

One (1) sample of each direction as applicable (longitudinal and lateral), 102 mm (4 inches) wide by 356 mm (14 inches) long, or the maximum available width or length if less, of each nonmetallic material is required for the flammability tests described in this document (see 12.B.1). The laboratory may be required to cut specimens from an actual CRS.

(2) WEBBING PERFORMANCE TESTS

Either webbing samples representative of the webbing used on the child restraint or webbing obtained from production CRSs shall be used for testing. With respect to representative webbing samples obtained directly from the CRS manufacturer or its supplier of the webbing, twenty-four (24) samples, each 1,067 mm (42 inches) long, of each type of webbing used on the CRS are required for the webbing performance tests described in 12.B.2. With respect to production CRSs, ten (10) restraints will typically be required to support webbing and buckle/adjustment hardware performance testing. Webbing materials shall be obtained from each restraint to the fullest extent practicable. Webbing materials shall be carefully removed and prepared for testing ensuring that webbing materials are not damaged or altered in the region subjected to tensile breaking strength.

(3) BELT BUCKLE AND BELT ADJUSTMENT HARDWARE PERFORMANCE TESTS

Buckle samples shall be obtained directly from the child restraints noting that any restraints containing built-in buckle assemblies will likely require additional preparation prior to testing. Three (3) sets of all buckle and adjustment hardware and an additional three sets of any plastic or nonmetallic buckle and adjustment hardware are required for the hardware performance tests described in 12.B.3.

12.A.2 INSPECTION OF PHYSICAL FEATURES

One CRS may be supplied by OVSC for the inspection of physical features described in 12.C.

12.A.3 FRONTAL IMPACT DYNAMIC TESTS

CRSs shall be procured by the labs as directed by OVSC for the frontal impact dynamic tests described in 12.D.

(1) FRONTAL IMPACT DYNAMIC TEST CONFIGURATION I

One (1) CRS is required for EACH TEST according to frontal impact dynamic test Configuration I. One or more tests are possible depending on the number of installation modes (forward facing/infant mode), adjustment positions (upright/recline), and height and weight recommendations of the manufacturer.

(2) FRONTAL IMPACT DYNAMIC TEST CONFIGURATION II

One (1) CRS is required for EACH TEST according to frontal impact dynamic test Configuration II. One or more tests are possible for each forward-facing system, other than a child harness, that is equipped with an anchorage belt or a fixed or movable surface directly forward of the dummy, in EACH ADJUSTMENT POSITION (i.e., upright or reclined), recommended by the manufacturer for actual use. CRSs having both of the above features shall be tested with each feature “misused,” i.e., with the tether or restraint belts not attached, both separately and simultaneously. For each child restraint model, one or more tests are possible depending on the number of installation modes (forward facing/infant mode), adjustment positions (upright/recline), and height and weight recommendations of the manufacturer.

(3) ADDITIONAL TEST or RETEST

Pending availability of funds, one (1) CRS shall be procured as a spare unit in the event that an additional test or a retest is required. Use of the spare unit for the retest is at the COR’s discretion.

12.A.4 SIDE IMPACT DYNAMIC TESTS

CRSs shall be supplied by OVSC or procured by the labs in accordance with the contract by OVSC for the side impact dynamic tests described in 12.E.

(1) TEST

One (1) CRS is required for EACH TEST. One or more tests are possible depending on the number of installation modes (forward or rear-facing), adjustment positions (upright/recline), and height and weight recommendations of the manufacturer.

(2) RETEST

One (1) CRS shall typically be retained as a spare unit in the event that a retest is required. Use of the spare unit for the retest is at the COR’s discretion.

12.A.5 213b FRONTAL IMPACT DYNAMIC TESTS

CRSs shall be supplied by OVSC or procured by the labs in accordance with the contract for the frontal impact dynamic tests described in 12.F.

(1) 213b FRONTAL IMPACT DYNAMIC TEST CONFIGURATION I

One (1) CRS is required for EACH TEST according to frontal impact dynamic test Configuration I. One or more tests are possible depending on the number of installation modes (forward facing/infant mode), adjustment positions (upright/recline), and height and weight recommendations of the manufacturer.

(2) 213b FRONTAL IMPACT DYNAMIC TEST CONFIGURATION II

One (1) CRS is required for EACH TEST according to frontal impact dynamic test Configuration II. One or more tests are possible for each forward-facing system, other than a child harness, that is equipped with an anchorage belt or a fixed or movable surface directly forward of the dummy, in EACH ADJUSTMENT POSITION (i.e., upright or reclined), recommended by the manufacturer for actual use. CRSs having both of the above features shall be tested with each feature “misused,” i.e., with the tether or restraint belts not attached, both separately and simultaneously. For each child restraint model, one or more tests are possible depending on the number of installation modes (forward facing/infant mode), adjustment positions (upright/recline), and height and weight recommendations of the manufacturer.

(3) ADDITIONAL TEST or RETEST

Pending availability of funds, one (1) CRS shall be procured as a spare unit in the event that an additional test or a retest is required. Use of the spare unit for the retest is at the COR’s discretion.

12.A.6 FAA INVERSION TEST

For CRS certified for use in aircraft, one (1) child restraint is typically used for the FAA performance testing described in 12.G.

For each child restraint model, one or more tests are possible depending on the number of installation modes (forward/reward), adjustment positiocns (upright/recline), and height and weight recommendations of the manufacturer.

12.A.7 TEST SAMPLE INSPECTION, INVENTORY, IDENTIFICATION, AND STORAGE

All CRSs and associated extra materials and parts shall be stored upon receipt in a clean, dry, secure storage area to prevent any damage or deterioration that might affect test results. Within one week of receipt, all samples shall be inspected, and the date of receipt and condition of the samples shall be recorded. Each sample shall also be marked or labeled with a systematic item-coding scheme to indicate the following:

1. OVSC provided identification number that is unique for the entire sample set, 2460975 in examples below.
2. Child restraint manufacturer and model, C08079646 in examples below.
3. Sequential sample number within set, 01, 02, and 03 in examples below.
4. Type of test to be conducted with sample, TH3FFN3FF, NINRFN2FR, and 3H3RFN2FR in examples below.

FORMAT: YYZZZZZ-A12345678-XX-ABCDEFGHI

EXAMPLE 1: 2460975-C08079646-01-TH3FFN3FF
EXAMPLE 2: 2460975-C08079646-02-NINRFN2FR
EXAMPLE 3: 2460975-C08079646-03-3H3RFN2FR

This item code shall be recorded on all data sheets applicable to the test sample.

12.B MATERIALS and COMPONENT TEST PROCEDURES

12.B.1 FLAMMABILITY TEST (S213, S5.7; S213b, 5.7; S302, S4.1, S4.2))

12.B.1.1 GENERAL

Each material used in a CRS shall meet the flammability requirements of FMVSS No. 302 as outlined in this procedure. Any portion of a single or composite material which is within 13 mm of the occupant air space, and that does not adhere to other material(s) at every point of contact, shall meet the given requirements when tested separately. Any material that adheres to other material(s) at every point of contact shall meet these same requirements when tested as a composite with the other materials. Indicate on the appropriate data sheets the type of material being tested and the specimen's function on the restraint system (i.e., padding, buckle, shell, etc.). In the case of metal and/or metallic materials, consult the COR before testing.

12.B.1.2 ENVIRONMENTAL CONDITIONS (S302, S5.1.2)

Flammability tests shall be conducted under the following environmental conditions:

Temperature	16°C (60°F) to 27°C (80°F)
Relative Humidity	40% to 60%

Each specimen shall be conditioned for a minimum of 24 hours under these environmental conditions before subjecting it to the flammability test.

12.B.1.3 EQUIPMENT REQUIREMENTS (S302, S5.1.1)

Conduct the test in a metal cabinet for protecting the test specimens from drafts, as shown in Figure 1 below. The interior of the cabinet is 381 mm (15 inches) long, 203 mm (8 inches) deep, and 356 mm (14 inches) high. It has a glass observation window in the front, a closable opening to permit insertion of the specimen holder, and a hole to accommodate tubing for a gas burner. For ventilation, it has a 13 mm (0.50 inch) clearance space around the top of the cabinet, ten (10) 19 mm (0.75 inch) diameter holes in the base of the cabinet, and legs to elevate the bottom of the cabinet by 10 mm (0.375 inch), all located as shown in the figure. If tested in exhaust hood, the maximum allowable airflow is 55 CFM as measured at intake with sash opening of 127 mm (5 inches).

SPECIMEN SUPPORT FRAME (S302, S5.1.3)

Insert the test specimen between two matching U-shaped frames of metal stock 25 mm (1 inch) wide and 10 mm (0.375 inch) high. The interior dimensions of the U-shaped frames are 51 mm (2 inches) wide by 330 mm (13 inches) long. A specimen that softens and bends at the flaming end so as to cause erratic burning is kept horizontal by supports consisting of thin, heat resistant wires, spanning the width of the U-shaped frame under the specimen at 25 mm (1 inch) intervals. A device that may be used for supporting this type of material is an additional U-shaped frame, wider than the U-shaped frame containing the specimen, spanned by 10 mil wires of heat-resistant composition at 25 mm (1 inch) intervals, inserted over the bottom U-shaped frame.

FLAME SOURCE (S302, S5.1.4 and S5.1.5)

Use a Bunsen burner with a tube of 10 mm (0.375 inch) inside diameter. Set the gas-adjusting valve to provide a flame, with the tube vertical, of 38 mm (1.50 inches) ± 2 mm (0.0625 inch) in height. Close the air inlet to the burner. The gas supplied to the burner should have a flame temperature equivalent to that of natural gas.

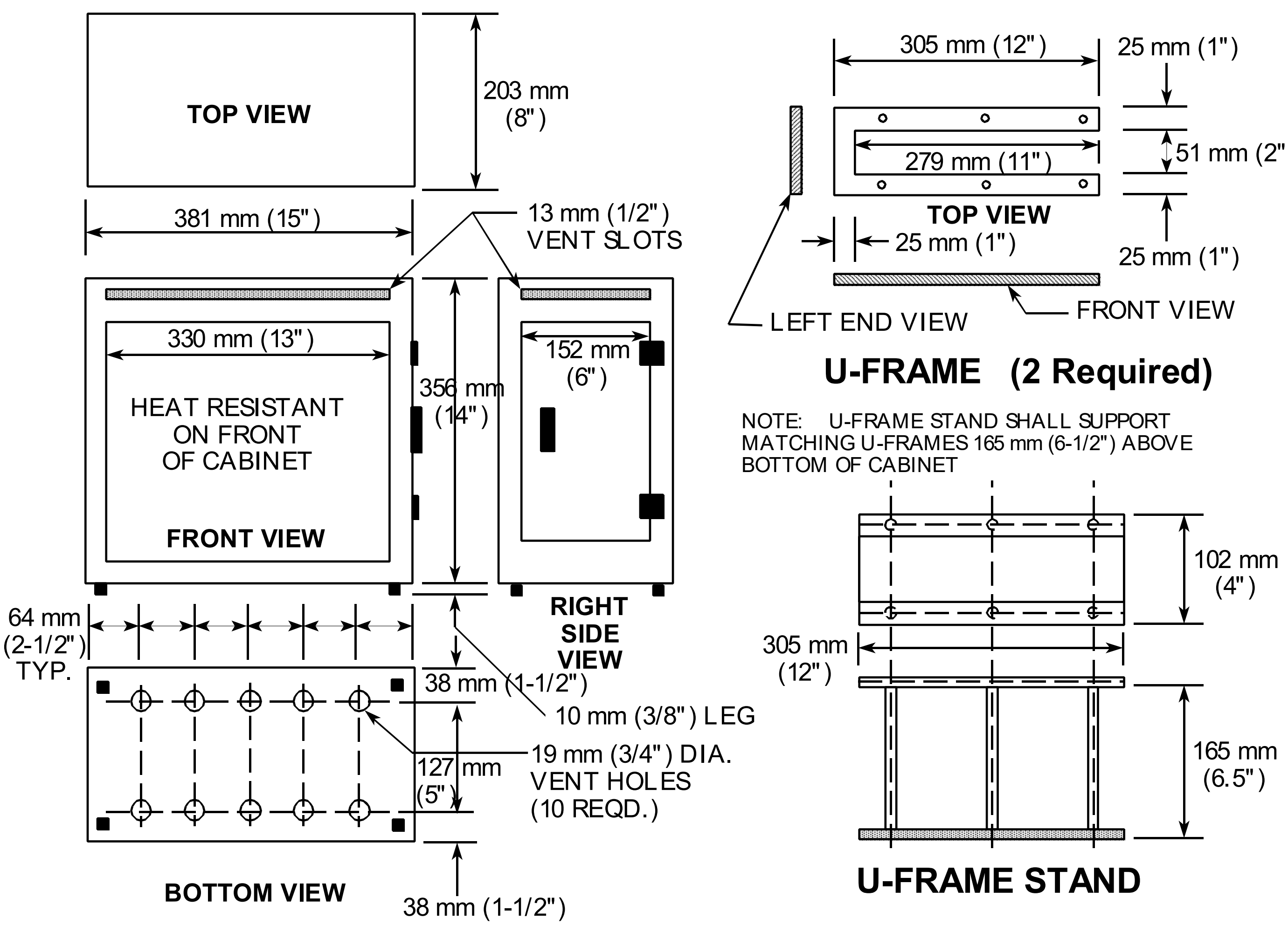


FIGURE 1. ENCLOSURE CABINET, U-FRAME, AND U-FRAME STAND

12.B.1.4 SPECIMEN PREPARATION (S302, S5.2.1, S5.2.2, S5.2.3)

Each specimen of material to be tested shall be a rectangle 102 mm (4 inches) wide by 356 mm (14 inches) long, whenever possible. The thickness of the specimen is that of the single or composite material used in the CRS, except that if the specimen's thickness exceeds 13 mm (0.5 inch), cut the specimen down to that thickness. When it is not possible to obtain a flat specimen because of surface curvature, cut the specimen to not more than 13 mm (0.5 inch) in thickness at any point. Use the maximum available length or width of a specimen when either dimension is less than 356 mm (14 inches) or 102 mm (4 inches), respectively. For homogeneous material, prepare a single specimen.

For material with directional structure, cut and test two specimens, one oriented parallel to and the other oriented perpendicular to this directional structure. If during a test, a diagonal direction appears to yield a more adverse result, prepare and test a third specimen oriented in that diagonal direction. Place material with a napped or tufted surface on a flat surface and comb twice against the nap with a comb having 7 to 8 smooth, rounded teeth per 25 mm (1 inch).

12.B.1.5 TEST PROCEDURE (S302, S5.3)

Orient the specimen so that the surface closest to the child restraint occupant faces downward on the test frame. Mount the specimen so that both sides and one end are held by the U-shaped frame, and one end is even with the open end of the frame. When the maximum available width of a specimen is not more than 51 mm (2 inches), so that the sides of the specimen cannot be held in the U-shaped frame, place the specimen in position on wire supports with one end held by the closed end of the U-shaped frame.

Place the mounted specimen in a horizontal position, in the center of the cabinet. With the flame properly adjusted, position the Bunsen burner and specimen so that the center of the burner tip is 19 mm (0.75 inch) below the center of the bottom edge of the open end of the specimen. Expose the specimen to the flame for 15 seconds, + 0, - 1 second. Turn off the gas supply to the burner and reset the timer to zero.

Begin timing (without reference to the period of application of the burner flame) when the flame from the burning specimen reaches a point 38 mm (1.50 inches) ± 2 mm (0.0625 inch) from the open end of the specimen. Use the forward-most point of visible flame as a reference point. Measure the time that it takes the flame to progress to a point 38 mm (1.50 inches) from the clamped end of the specimen. If the flame does not reach the specified end point, time its progress to the point where flaming stops.

Calculate the burn rate from the following formula:

$B = 60 \times D/T$, where —

B = burn rate in millimeters (inches) per minute

D = length the flame travels in millimeters (inches)
T = time in seconds for the flame to travel D millimeters (inches)

Record the burn rate data on the appropriate data sheet along with any observations on burn characteristics.

12.B.1.6 PERFORMANCE REQUIREMENTS (S302, S4.3)

When tested in accordance with the appropriate section of this procedure, the material shall not burn, nor transmit a flame front across its surface, at a rate of more than 102 mm per minute (mpm) (4 inches per minute (ipm)). However, the requirement concerning transmission of a flame front shall not apply to a surface created by the cutting of a test specimen for purposes of testing.

If a material stops burning before it has burned for 60 seconds from the start of timing and has not burned more than 51 mm (2 inches) from the point where timing was started, it shall be considered to meet the burn-rate requirement.

In the case of a noncompliance, repeat burn test on a fresh specimen using support wires and exhaust hood off (or minimum airflow to remove smoke). Record repeat results in remarks section of appropriate data sheet.

Record the results on the appropriate data sheet.

12.B.2 WEBBING PERFORMANCE TESTS (S213, S5.4.1; S213b, S5.4.1)

This section applies to the webbing of belts provided with a CRS and used to attach the system to the vehicle or to restrain the child within the system. Three specimens of each type of webbing are to be subjected to each of the following webbing performance tests. If one or more samples fail to meet, or cannot be tested to, the requirements of this section, testing shall be paused, and the COR shall be contacted for further instructions.

12.B.2.1 ENVIRONMENTAL CONDITIONING (S209, S5.1(a))

When specified below for particular tests, webbing samples shall be conditioned for at least 24 hours under the following environmental conditions:

Temperature	21°C (69.8°F) to 25°C (77°F)
Relative Humidity	48% to 67%

12.B.2.2 BREAKING STRENGTH (S213, S5.4.1.2(a); S213b, S5.4.1.2(a); S209, S5.1(b))

Subject three specimens of each type of belt webbing used in the CRS to the environmental conditioning. Measure the webbing width prior to conducting the breaking strength test (see S12.B.2.7).

Test the webbing for breaking strength in a testing machine having a load-generating capacity of approximately 2,268 kg (5,000 lb.) and verified to have an error of not more than 1 percent in the range of the breaking strength of the tested webbing by ASTM E4-79, Standard Methods of Load Verification of Testing Machines. The machine shall be equipped with split drum grips illustrated in Figure 2, having a diameter between 51 mm (2 inches) and 102 mm (4 inches). The figure "Method of Wrapping Webbing Grip" in Figure 2 is provided for reference only, as this method is not required by Standard 213 or Standard 209. The rate of grip separation shall be between 51 mm (2 inches) and 102 mm (4 inches) per minute. The distance between the centers of the grips at the start of the test shall be between 102 mm (4 inches) and 254 mm (10 inches). After placing the specimen in the grips, stretch the webbing continuously at a uniform rate to failure. Record the breaking strength for each webbing specimen on the appropriate data sheet. Each breaking strength value shall not be less than 15,000 N for webbing used to secure a CRS to the vehicle, including to the tether and lower anchorages of a child restraint anchorage system, and shall not be less than 11,000 N for webbing used to secure a child to a CRS. Also, calculate and record the median breaking strength. The median breaking strength shall be used in determining the retention of breaking strength as specified in section 12.B.2.3 (Resistance to Abrasion), section 12.B.2.4 (Resistance to Buckle Abrasion), section 12.B.2.5 (Resistance to Light), and section 12.B.2.6 (Resistance to Micro-Organisms). At conclusion, if one or more samples does not meet the minimum breaking strength required, testing shall be paused, and the COR shall be contacted for further instructions.

12.B.2.3 RESISTANCE TO ABRASION (S213, S5.4.1.2(b)(1); S213b, S5.4.1.2(b)(1); S209, S5.1(d))

Verify that the hexagon bar conforms with the requirements for hardness, size and edge radii illustrated in Figure 3. Number each edge (6 total) on the bar and record its measured radius according to its corresponding number; NONCONFORMING edges will NOT be used. Using only conforming edges, test three specimens for resistance to abrasion by rubbing over the hexagon bar in the following manner. Mount the webbing in the apparatus as shown schematically in the figure. One end of the webbing (A) shall be attached to a mass (B) of 2.35 kg (5.18 lb.) ± .05 kg (0.1 lb.), including for webbing used to secure a CRS to the tether and lower anchorages of a child restraint anchorage system, except that a mass of 1.5 kg (3.3 lb.) ± .05 kg (0.1 lb.) shall be used for webbing in pelvic and upper torso restraints of a belt assembly used in a CRS. Pass the webbing over two new, conforming abrading edges of the hexagon bar (C) and attach the other end to an oscillating drum (D) that has a stroke of 330 mm (13 inches). Record which edges, by number, are used for each webbing sample. Use suitable guides to prevent movement of the webbing along the axis of hexagonal bar C. Oscillate drum D for 5,000 strokes or 2,500 cycles at a rate of 60 strokes ± 2 strokes per minute or 30 cycles ± 1 cycle per minute. The records for each hexagon bar used in testing, i.e., bar number, hardness, size, and edge numbers with corresponding edge radii shall follow in accordance with Calibration of Test Instruments, (see Section 8.E).

Upon completion of the webbing abrasion, conduct a breaking strength test on the three belt webbing specimens as outlined in this procedure, including the required environmental conditioning. Record the breaking strength for each abraded specimen on the appropriate data sheet, calculate the median braking strength for the three specimens, and record this value on the data sheet. The median breaking strength of the abraded specimens shall be at least 75% of the median breaking strength of the non-abraded belt webbing specimens of the same type.

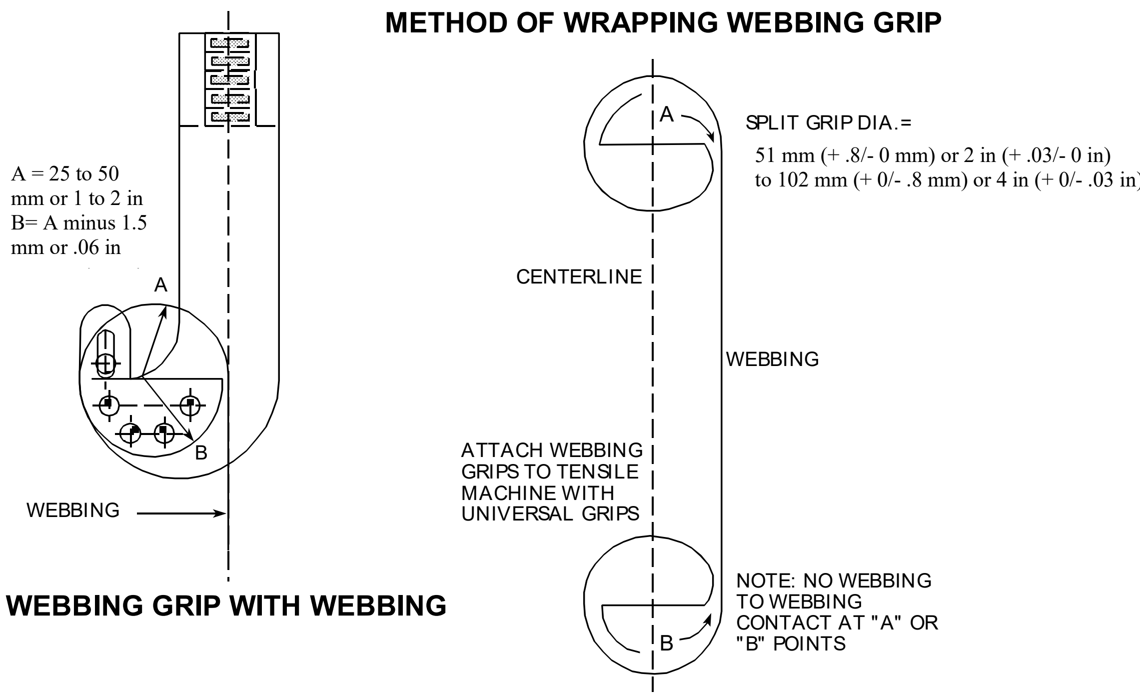


FIGURE 2. BREAKING STRENGTH TEST DEVICE

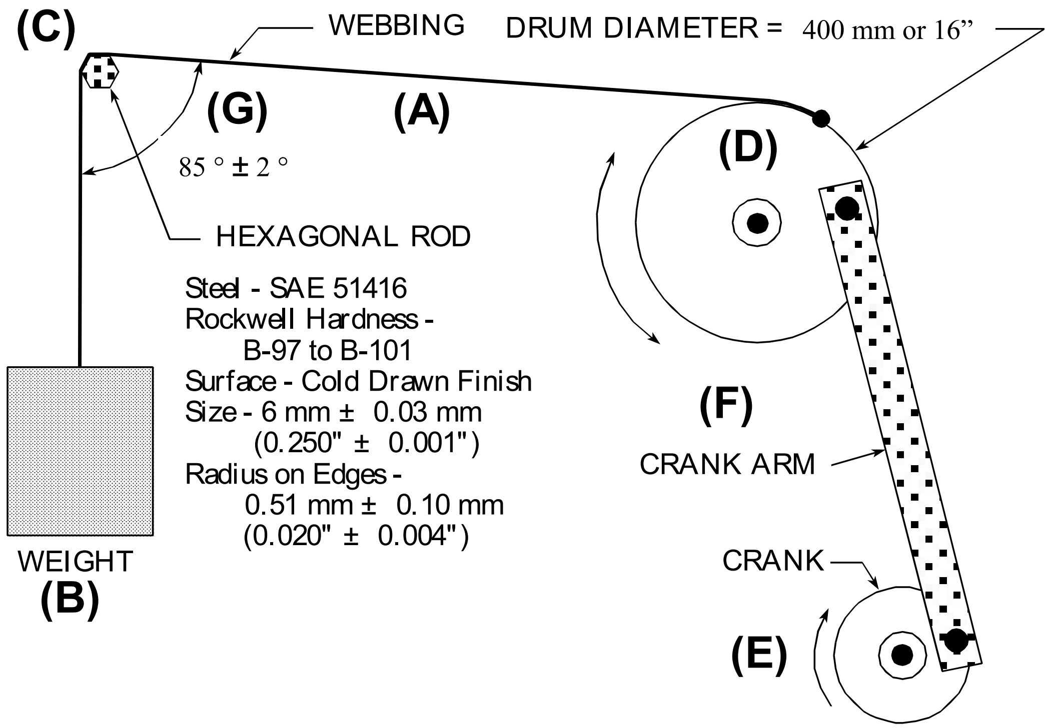


FIGURE 3. ABRASION TEST SCHEMATIC

12.B.2.4 RESISTANCE TO BUCKLE ABRASION (S213, S5.4.1.2(b)(1); S213b, S5.4.1.2(b)(1); S209, S5.3(c))

Buckle abrasion test method is limited to webbing equipped with a buckle or manual adjusting device, as installed in the child restraint, that is capable of being used in conducting the tests in accordance with S5.3(c) of Standard 209. The COR shall be contacted prior to any testing using the buckle abrasion test method. Test three specimens of each type of belt webbing used in a CRS for resistance to abrasion by each buckle or manual adjusting device normally used to adjust the size of the assembly. Expose the webbing for 4 hours, + 0 minutes, - 5 minutes, to an atmosphere having relative humidity of 65 percent, ± 5 percent, and temperature of 18°C (64.4°F), +1, - 0 °C (+ 33, - 0°F). Pull the webbing back and forth through the buckle or manual adjusting device as shown schematically in Figure 4. Attach the anchor end of the webbing (A) to a weight (B) or 1.4 kg (3 lb.). Pass the webbing through the buckle (C) and attach the other end (D) to a reciprocating device so that the webbing forms an angle of 8° ± 2° with the hinge stop (E). Operate the reciprocating device for 2,500 cycles at a rate of 18 cycles per minute with a stroke length of 203 mm (8 inches) +0, - 12.7 mm (+ 0, - 0.5 inches). Upon completion of the webbing buckle abrasion, conduct a breaking strength test on the three belt webbing specimens as outlined in this procedure, including the required environmental conditioning. Record the breaking strength for each buckle-abraded specimen on the appropriate data sheet, calculate the median breaking strength for the three specimens, and record this value on the data sheet. The median breaking strength of the buckle-abraded samples shall be at least 75% of the median breaking strength of the non-abraded belt webbing specimens of the same type.

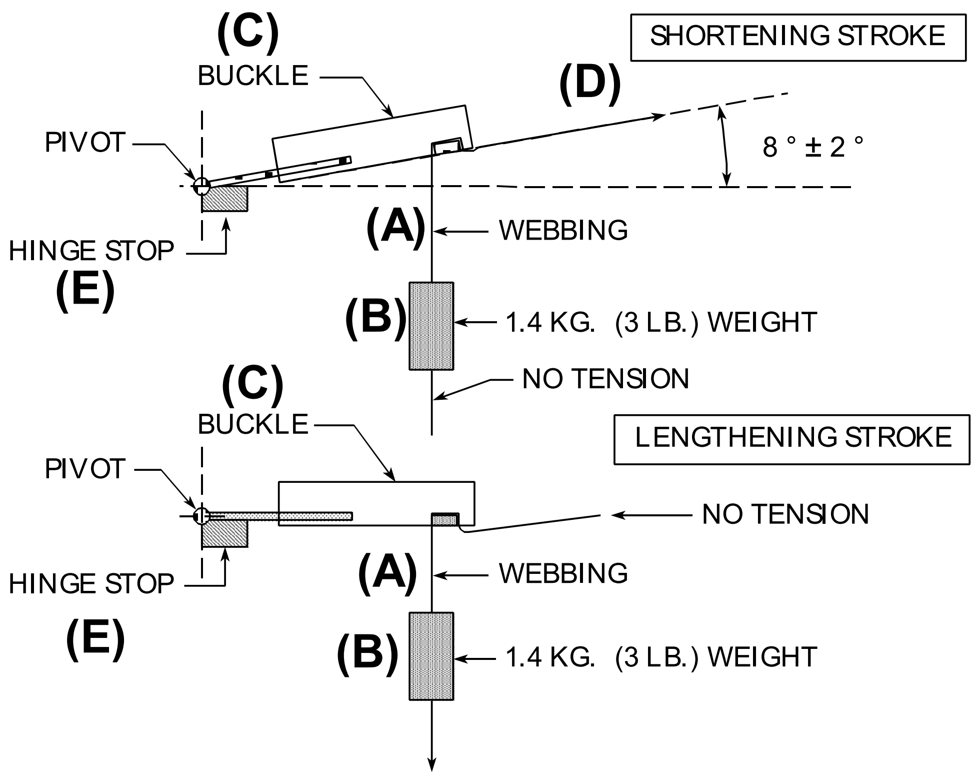


FIGURE 4. BUCKLE ABRASION TEST SCHEMATIC

12.B.2.5 RESISTANCE TO LIGHT (S213, S5.4.1.2(c)(1); S213b, S5.4.1.2(c)(1); S209, S5.1(e))

Test three specimens of each type of belt webbing used in the CRS for resistance to light. Webbing specimens shall be at least 508 mm (20 inches) in length. Suspend these specimens vertically on the inside of the specimen rack in a Type E carbon-arc light-exposure apparatus described in ASTM G23-81, Standard Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials. Operate the apparatus without water spray at an air temperature of 60°C (140°F) ± 2°C (35.6°F) measured at a point 25 mm (1.0 inch) ± 5 mm (0.2 inch) outside the specimen rack and midway in height. The temperature-sensing element shall be shielded from radiation. Use cortex filter for nylon and soda-lime filter for polyester webbing.

Expose the specimens to the light from the carbon arc for 100 hours, + 0 hours, - 0.5 hours, and then condition the specimens under the environmental conditions given in this procedure.

Determine the Color fastness of the exposed and conditioned specimens on the AATCC Geometric Gray Scale. The webbing shall have a color retention not less than No. 2 on this scale. Record the results for each specimen on the appropriate data sheet.

Conduct a breaking strength test on the three light-exposed and conditioned belt-webbing specimens as outlined in this procedure without repeating the environmental conditioning. Record the breaking strength of each carbon-arc-exposed belt webbing specimen on the appropriate data sheet, calculate the median breaking strength for the three specimens, and record this value on the data sheet. The median breaking strength of the carbon-arc-exposed samples shall be at least 60% of the median breaking strength of specimens of the same type of belt webbing without any exposure to the carbon arc.

12.B.2.6 RESISTANCE TO MICRO-ORGANISMS (S213, S5.4.1.2(c)(2); S213b, S5.4.1.2(c)(2); S209, S5.1(f))

Test three specimens of each type of belt webbing used in the CRS for resistance to micro-organisms unless the webbing is made from material inherently resistant to micro-organisms. Webbing specimens shall be at least 508 mm (20 inches) in length. Subject these specimens successively to the procedures prescribed in AATCC Test Method 30-1981, Fungicides, Evaluation of Textiles; Mildew and Rot Resistance of Textiles, Section 1B3 -- Soil Burial Leaching, Section 1C2 -- Volatilization, and Section 1B3 -- Soil Burial Test. After soil-burial for a period of 2 weeks, wash the specimens in water, allow them to dry and condition them under the environmental conditions given in this procedure.

Upon completion of exposure to micro-organisms, conduct a breaking strength test on the three belt webbing specimens as outlined in this procedure, without repeating the environmental conditioning. Record the breaking strength of each micro-organism-exposed belt webbing specimen on the appropriate data sheet, calculate the median breaking strength for the three specimens, and record this value on the data sheet. The median breaking strength of the micro-organism-exposed samples shall be at least 85% of the median breaking strength of specimens of the same type of belt webbing without any exposure to micro-organisms.

12.B.2.7 WIDTH (S213, S5.4.1.2(d), S5.4.1.3; S213b, S5.4.1.2(d), S5.4.1.3)

Subject three specimens of each type of belt webbing used in a CRS and contactable by the test dummy torso during the dynamic impact test to width measurement. Condition the webbing for 24 hours under the following environmental conditions:

Temperature	21°C (70°F) to 25°C (77°F)
Relative Humidity	48% to 67%

Measure belt webbing width under a tension of 2.3 kg (5 lb.) applied lengthwise. The measured width of the belt webbing shall not be less than 38.1 mm (1.50 inches). Record the results for each specimen on the appropriate data sheet. Use the samples for measuring width to conduct breaking strength tests of 12.B.2.2.

12.B.3 BELT BUCKLE AND ADJUSTMENT HARDWARE (S213, S5.4.2; S213b, S5.4.2)

12.B.3.1 BUCKLE LATCH AND PARTIAL ENGAGEMENT (S213, S5.4.3.5(d); S213b, S5.4.3(d); S209, S4.3(g))

Test Order of Operations:

A. Six (6) new buckle/tongue assemblies are tested for “as received” Partial Engagement (12.B.3.1.1). From the six:

B. Three are exposed for Corrosion Resistance (12.B.3.1.2) and three are exposed for Temperature Resistance (12.B.3.1.3).

C. After exposures in B., the six assemblies are then tested for Buckle Latch and Partial Engagement (12.B.3.4).

NOTE: Buckles with plastic components in either tongue or latch mechanism are not evaluated for partial engagement. A metal-to-metal buckle shall be examined to determine whether partial engagement is possible by means of any technique representative of actual use. If possible, the partial engagement test shall be conducted. If it is possible to insert a tongue in the inverted position, both positions must be evaluated for partial engagement.

12.B.3.1.1 AS RECEIVED PARTIAL ENGAGEMENT

Anchor buckle in a rigid fixture. Manually insert tongue completely into buckle, release buckle and withdraw tongue only enough to induce partial engagement. Attach a cable and weight (22 N (4.9 lb.) total), to the tongue. In the case of a two-tongue buckle design, attach the weight to each tongue separately such that the force is equally distributed to both tongues. The alignment of buckle, tongue, and the weight must be parallel. Release the weight support slowly to allow the weight to be applied to the tongue in a direction parallel and away from the buckle. The weight must remove the tongue from the buckle in order to meet the “partial engagement release force” requirement. Measure the time required for the weight to remove the tongue from the buckle to within ± 3 seconds up to a maximum time of 60 seconds, ending the test. Perform the test 3 times on each of 3 assemblies and record the pass/fail results on each assembly. Repeat the tests with the tongue in an inverted position, as applicable. Record the results on the appropriate data sheet.

<u>Only</u> when directed by the COR, the buckle shall be tested again using the test procedure defined below in the following paragraph. The purpose of the additional test is to obtain an average partial engagement release force.

Anchor buckle in some manner. Attach tongue to a force gauge by a flexible means such that the alignment of buckle, tongue, and gauge can be made parallel. Manually insert tongue completely into buckle and withdraw only enough to induce partial engagement. Remove tongue from buckle with force gauge and record the highest force reading as the “partial engagement release force.” Perform three readings per assembly. The average of the three readings will be used to determine the partial engagement release force. Repeat tests with tongue in inverted position as applicable. Record the results on the appropriate data sheet.

12.B.3.1.2 CORROSION RESISTANCE (S213, S5.4.2; S213b, S5.4.2; S209, S4.3(a))

After 12.B.3.1.1, subject three of the six buckle/tongue specimens to the salt spray test, according to ASTM B117-73, for a period consisting of 24 hours, + 0, - 0.25 hour of salt spray exposure followed by 1 hour, + 0, - 0.25 hour of drying. Each specimen among a set of three components shall be oriented differently in the salt spray chamber. Buckles must be unlatched. The position of the specimens in the salt spray chamber during the test shall be such that the following conditions are met: the specimens shall be supported or suspended between 15º and 30º from the vertical, based upon the dominant surface being tested. The specimens shall not be allowed to contact each other or any other surface. Each specimen shall be placed so as to permit free settling of fog on all specimens. Salt solution from one specimen shall not be allowed to drip on any other specimen.

The pH shall be recorded at the time of the start of testing. During the test, the pH and temperature in the salt spray chamber shall be continuously and permanently recorded, and the test condition records specified in Section 13 of ASTM B117-73 shall be maintained.

After the test, follow Steps 1-3 below to wash the components thoroughly with water to remove the salt. After washing, follow Step 4 below to allow the specimens to dry for 24 hours under standard laboratory environmental conditions as given in this procedure.

(1) Place component under running water at 38 ºC (100 ºF) ± 5 ºC (9 ºF).

(2) Thoroughly wash components while holding under running water. Rub exposed surfaces and edges of the components lightly with fingers to remove salt from the surfaces. (See the diagrams for steps 1-4, below, which illustrate the proper washing method)

(3) Turn component over and repeat Step # 2.

(4) After thoroughly washing and before evaluation, allow components to dry for 24 hours under standard laboratory conditions as stated in B.2.1.

Evaluation for corrosion: The hardware shall be free of ferrous or nonferrous corrosion that may be transferred, either directly or indirectly by means of webbing, to the restraint system's occupant, or his/her clothing when the assembly is worn. Examine the hardware for such corrosion and, where present, photograph and record the results on the appropriate data sheet. Failure to meet the corrosion requirements must be reported to the COR within 1 hour of the findings.

12.B.3.1.3 TEMPERATURE RESISTANCE (S213, S5.4.2; S213b, S5.4.2; S209, S4.3(b))

After 12.B.3.1.1, subject three buckle/tongue specimens not subjected to 12.B.3.1.2 to the accelerated service conditions test in accordance with ASTM D756-78, Procedure IV, omitting the weight and dimension measurements. Unlatch buckles, and condition the specimens as indicated in ASTM D756-78, Section 5, prior to and at the end of the test.

The hardware specimens shall not warp or otherwise deteriorate to cause the buckle or other assembly to operate improperly. Examine the specimens for such deterioration and, where present, photograph and record the results on the appropriate data sheet.

The three hardware specimens used in this test shall also be tested according to applicable hardware tests outlined in this procedure.

12.B.3.1.4 BUCKLE LATCH AND PARTIAL ENGAGEMENT FOLLOWING CORROSION RESISTANCE (B.3.1.2) AND TEMPERATURE RESISTANCE (B.3.1.3)

Following the corrosion resistance and temperature resistance tests, the six buckles (3 for the corrosion test and 3 for the temperature test) shall be tested for Buckle Latch per 12.B.3.1.4.1, and Partial Engagement per 12.B.3.1.4.2.

12.B.3.1.4.1 BUCKLE LATCH

Manually latch and unlatch six buckle assemblies (3 for the corrosion test and 3 for the temperature test) ten (10) times each.

Then, mount the six buckles on a compressive cycling fixture. The fixture is such that one cycle will completely move a buckle's release mechanism through its full range of motion and induces a force of 133 N (29.9 lb.) ± 13 N (2.9 lb.) at the travel limit of the mechanism. Operate the fixture at a rate of 30 cpm for a total of 200 cycles. Visually and functionally evaluate buckle assemblies following cycling and then perform the partial engagement test as specified in 12.B.3.6.2.2.

12.B.3.1.4.2 PARTIAL ENGAGEMENT

Perform partial engagement as per 12.B.3.1.1.

12.B.3.2 BUCKLE RELEASE ACCESS (S213, S5.4.3.5(c); S213b, S5.4.3.5(c); S209, S4.3(d)(2))

Follow the procedure given below for the appropriate buckle design and record the results on the appropriate data sheet.

A. PUSHBUTTON BUCKLES

Measure the linear dimensions of the surface designed for applying the release force and calculate the area of this surface to the nearest 0.3 square cm (0.05 square inch). This surface shall have a minimum area of 3.9 square cm (0.6 square inch), with a minimum linear dimension of 10 mm (0.4 inch).

B. LEVER-RELEASE BUCKLES

Insert a cylinder 10 mm (0.4 inch) ± 0.5 mm (0.02 inch) in diameter and 38 mm (1.5 inches) ± 0.5 mm (0.02 inch) long in the actuation portion of the buckle release. The buckle shall permit insertion of this cylinder to at least the midpoint of the cylinder along the cylinder's entire length.

C. OTHER BUCKLE DESIGNS

Attempt to actuate the buckle release using two adult fingers. The buckle shall have adequate access for two or more adult fingers.

12.B.3.3 ADJUSTMENT FORCE (S213, S5.4.2; S213b, S5.4.2; S209, S4.3(a)(2), S4.3(e), S5.2(e))

Test three sets of adjustment hardware and webbing for the force necessary to decrease the effective length of the assembly. The hardware previously used for the Corrosion Resistance of Temperature Resistance tests shall also be used for this test. With no load on the anchor end of the webbing, draw the webbing through the adjustment device at a rate of 508 mm per minute (mpm) (20 inches per minute (ipm)) ± 50 mpm (2 ipm). Pre-cycle the webbing 10 times in the above manner, and then measure the maximum force to the nearest 1 N (0.1 kg or .22 pound) after the first 25 mm (1.0 inch) of webbing movement. The force required to decrease the effective length of this assembly shall not exceed 49 N (5 kg or 11 lb). Record the results on the appropriate data sheet.

12.B.3.4 TILT-LOCK ADJUSTMENT (S213, S5.4.2; S213b, S5.4.2; S209, S4.3(a)(2), S4.3(f), S5.2(f))

If the adjustment device is of a "tilt-lock" design, test three such devices for lock angle. The hardware previously used for the Corrosion Resistance or Temperature Resistance tests shall also be used for this test. Orient the base of the adjustment mechanism and the anchor-end of the webbing in planes normal to each other. Draw the webbing through the adjustment mechanism in a direction to increase belt length at a rate of 508 mm (20 inches) ± 50 mm (2 inches) per minute while the plane of the base is slowly rotated in a direction to lock the webbing. When the webbing locks, stop the rotation, but continue pulling on the webbing until there is a resistance of at least 9.1 kg (20 lb.). Measure the angle between the anchor-end of the webbing and the base of the adjustment mechanism to the nearest degree. The lock angle shall be not less than 30 degrees. Record the results on the appropriate data sheet.

12.C INSPECTION OF PHYSICAL FEATURES

12.C.1 LABELING (S213, S5.3, S5.5; S213b, S5.3, S5.5)

Inspect the labels attached to the CRS and compare them with the requirements of FMVSS 213, S5.3 and S5.5. Record the results on the appropriate data sheets.

For each recommended installation mode, check whether certain required labels are visible after the child restraint is installed for each mode. Record the results on the appropriate data sheets.

Take clear, legible photographs of all labels on the CRS to show availability, legibility, and location. Include these photographs as part of the test report.

12.C.2 INSTALLATION INSTRUCTIONS (S213, S5.6; S213b, S5.6)

Review the manufacturer's instructions for installation and use of the CRS to verify that they include the information specified by S213, S5.6. Record the results on the appropriate data sheet.

Verify that storage provisions are available for these instructions on the child restraint itself. Record the results on the appropriate data sheets.

12.C.3 REGISTRATION FORMS (S213, S5.8; S213b, S5.8)

Review the manufacturer’s electronic and attached registration forms to verify that they include the information specified by S213, S5.8. Record the results on the appropriate data sheet.

Verify that the attached registration form is attached to any surface of the restraint that contacts the dummy when the dummy is positioned in the system in accordance with S213, S6.1.2. Record the results on the appropriate data sheets.

12.C.4 INSTALLATION (S213, S5.3; S213b, S5.3)

Each add-on CRS shall be capable of meeting the requirements of FMVSS No. 213 or 213b, including the applicable dynamic test requirements (S6.1), when installed solely by each of the means indicated in Table 1 or Table 4, respectively, below, for the particular type of CRS.

Verify that the add-on CRS does not have a means for attaching the restraint to the vehicle seat cushion or the vehicle seat back (except for components designed to attached to a child restraint anchorage system) and that there are no components (except for belts) that are to be inserted between the vehicle seat cushion and vehicle seat back. Record the results on the appropriate data sheets.

For a harness labeled per S5.3.1(b)(1) through S5.3.1(b)(3) and Figure 5 (below), verify it is capable of meeting the installation requirements of FMVSS No. 213 or 213b with a seat back mount. Record the results on the appropriate data sheets.

For an add-on CRS that is not a belt-positioning seat, verify that the CRS meets the installation requirements of FMVSS No. 213 when installed:

- with a Type I seat belt assembly (lap belt); and
- with a Type I seat belt assembly (lap belt) and tether that is supplied with the CRS.

For an add-on CRS that is not a belt-positioning seat, verify that the CRS meets the installation requirements of FMVSS No. 213b when installed:

- with a Type II seat belt assembly (lap and shoulder belt); and
- with a Type II seat belt assembly (lap and shoulder belt) and tether that is supplied with the CRS.

In the case of an add-on rear-facing CRS with a detachable base, only the detachable base is required to have the components that enables the restraint to be securely fastened to the anchorages of the child restraint anchorage system specified in FMVSS No. 225.

Record the results on the appropriate data sheets.

For a belt-positioning seat, verify that the CRS meets the installation requirements of FMVSS No. 213 or 213b when installed:

- with a Type II seat belt assembly (lap and shoulder belt).

Record the results on the appropriate data sheets.

For an add-on CRS that is not a harness, car bed, nor belt-positioning seat, verify that the CRS can meet the requirements of FMVSS No. 213 or 213b when installed:

- with a child restraint anchorage system.

In the case of an add-on rear-facing CRS with a detachable base, only the detachable base is required to have the components that enables the restraint to be securely fastened to the anchorages of the child restraint anchorage system specified in FMVSS No. 225.

Record the results on the appropriate data sheets.

For a car bed, verify the CRS can be installed on a vehicle seat so that the car bed's longitudinal axis is perpendicular to a vertical longitudinal plane through the longitudinal axis of the vehicle. Indicate compliance.

Record any difficulties encountered during installation on the appropriate data sheet.

TABLE 1. REQUIRED MEANS OF CERTIFICATION per S5.3.2 of FMVSS No. 213

	Lap Belt	*Lap Belt w/Tether*	*Lower Anchors*	*Lap & Shoulder Belt*	*Seat back Mount*
Harnesses labeled per S5.3.1(b)(1)-(3) and Fig. 12					*X*
Other Harnesses		X			
Car Beds	*X*				
Rear-Facing Restraints	*X*		*X*		
Belt-Positioning Seats				*X*	
All Other Child Restraints*	*X*	*X*	*X*		

*Per 213 S5(f), each CRS that is equipped with internal harness or other components to restrain the child need not meet this standard when attached to the lower anchors of the child restraint anchorage system if the sum of the weight of the CRS (in pounds) and the average weight of child represented by the test dummy (see Table 2), exceeds 65 lb.

TABLE 2. AVERAGE WEIGHT OF CHILD REPRESENTED BY TEST DUMMIES

Test Dummy	Average weight of child represented by test dummy (lb.)
12-month-old infant dummy	22
3-year-old dummy	31
6-year-old dummy	45
6-year-old weighted child test dummy	62

In addition to the requirements of FMVSS No. 213, each add-on CRS subject to FMVSS No. 213a shall be capable of meeting the requirements of 213a when installed solely by each of the means indicated in Table 3 for the particular type of CRS.

FMVSS No. 213a applies to add-on CRSs that are either recommended for use by children in a weight range that includes weights up to 18 kilograms (40 pounds) regardless of height, or by children in a height range that includes heights up to 1100 millimeters regardless of weight, except for car beds and harnesses. Therefore, a CRS that recommends a minimum weight of 18 kilograms (40 pounds) or greater and a minimum height of 1100 millimeters or greater is not subject to FMVSS No. 213a.

TABLE 3. MEANS OF INSTALLATION FOR SIDE IMPACT TESTING AND CERTIFICATION[7]
per S5.1.6 of FMVSS No. 213a

(Effective: June 30, 2025; or at time of early compliance)

	Lap & Shoulder Belt	*Lap & Shoulder Belt w/Tether (if provided)*	*Lower Anchors*	*Lower Anchors w/Tether (if provided)*
Rear-Facing Restraints*	*X*		*X*	
Forward-Facing Restraints		*X*		*X*

* Per 213a S6.1.2(a)(3), Rear-facing infant carriers (CRS) with a detachable base shall only be tested with the base installed.

[7] NOTE: Certification is the sole responsibility of the CRS manufacturer. Neither NHTSA nor independent test laboratories certify motor vehicle equipment.

TABLE 4. MEANS OF INSTALLATION FOR FRONTAL IMPACT TESTING AND CERTIFICATION[8] per S5.3.2 of FMVSS No. 213b

(Effective: December 05, 2026; or at time of early compliance

	Lap Belt w/Tether	*Lap & Shoulder Belt*	*Lap & Shoulder Belt w/Tether*	*Lower Anchors*	*Lower Anchors w/Tether*	*Seat back Mount*
School bus child restraint systems						*X*
Harnesses labeled per S5.3.1(b)(1)-(3) and Fig. 12	*X*					
Car Beds		*X*				
Rear-Facing Restraints		*X*		*X*		
Belt-Positioning Seats		*X*				
All Other Child Restraints*		*X*	*X*	*X*	*X*	

*Per 213b S5(f), each CRS that is equipped with harness or other internal components to restrain the child need not meet this standard when attached to the lower anchors of the child restraint anchorage system if the sum of the weight of the CRS (in pounds) and the average weight of child represented by the test dummy (see Table 2), exceeds 65 lb.

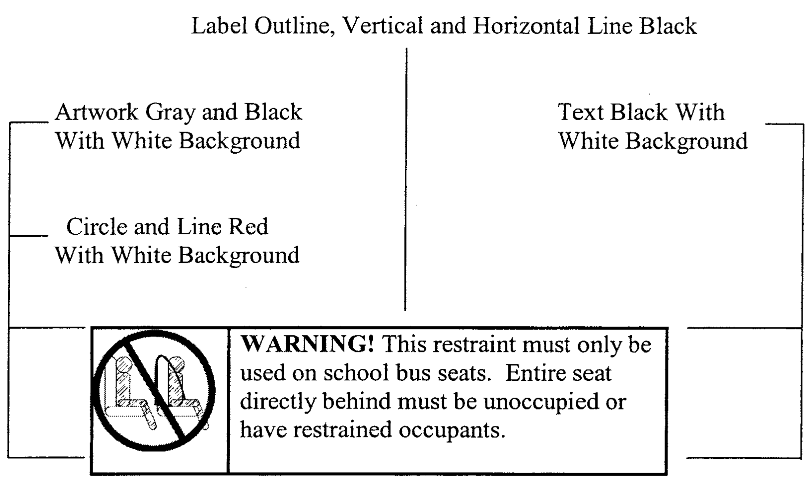


FIGURE 5. LABEL ON HARNESS THAT ATTACHES TO SCHOOL BUS SEAT BACK

[8] NOTE: Certification is the sole responsibility of the CRS manufacturer. Neither NHTSA nor independent test laboratories certify motor vehicle equipment.

12.C.5 MINIMUM HEAD SUPPORT SURFACE (S213, S5.2.1; S213b, S5.2.1)

This section does not apply to car beds or to forward-facing child restraints whose seating surface, when installed on the FISA, is low enough that the target points on either side of the appropriate dummy's head, when properly positioned in the restraint, is below the top of the FISA or vehicle seat (in the case of a built-in restraint). Indicate exemption, if appropriate, on the appropriate data sheet.

Other CRSs shall have a minimum back height, as specified in Table 5, based on the manufacturer's recommended maximum weight for children using the restraint.

TABLE 5. S5.2.1.1(a) REQUIREMENTS FOR BACK HEIGHT

MANUFACTURER's RECOMMENDED WEIGHT	MINIMUM BACK HEIGHT
Not more than 18 kg (40 lb.)	500 mm (19.7 inches)
More than 18 kg (40 lb.)	560 mm (22.0 inches)

Measure the height of the restraint back surface along the vertical centerline from the seating surface to the top of the back surface. The padding on the seating surface may be depressed by the weight of the appropriate dummy in the seated position. Record the results on the appropriate data sheet.

The width of the back surface, at the height specified in Table 5, above, shall be at least 203 mm (8 inches), or at least 152 mm (6 inches) if side wings at least 102 mm (4 inches) deep are also provided. Measure the depth of these side wings, if any, along a line perpendicular to the restraint back surface at the appropriate height from the seating surface as specified above. Record the results on the appropriate data sheet.

Measure the widest part of the back surface at the height specified in Table 5 and at the forward plane made by the center of gravity targets located on each side of the dummy head of the appropriate size dummy when seated in the restraint as shown in Figure 6. However, the 6-year-old and 10-year-old child dummies are not used to determine applicability of or compliance with S5.2.1.1.

In the case of a built-in child restraint, measure the height of the seat back as noted Table 5. If the system includes a head rest also measure the seat height including the head rest in the fully down position. Record the results on the appropriate data sheet.

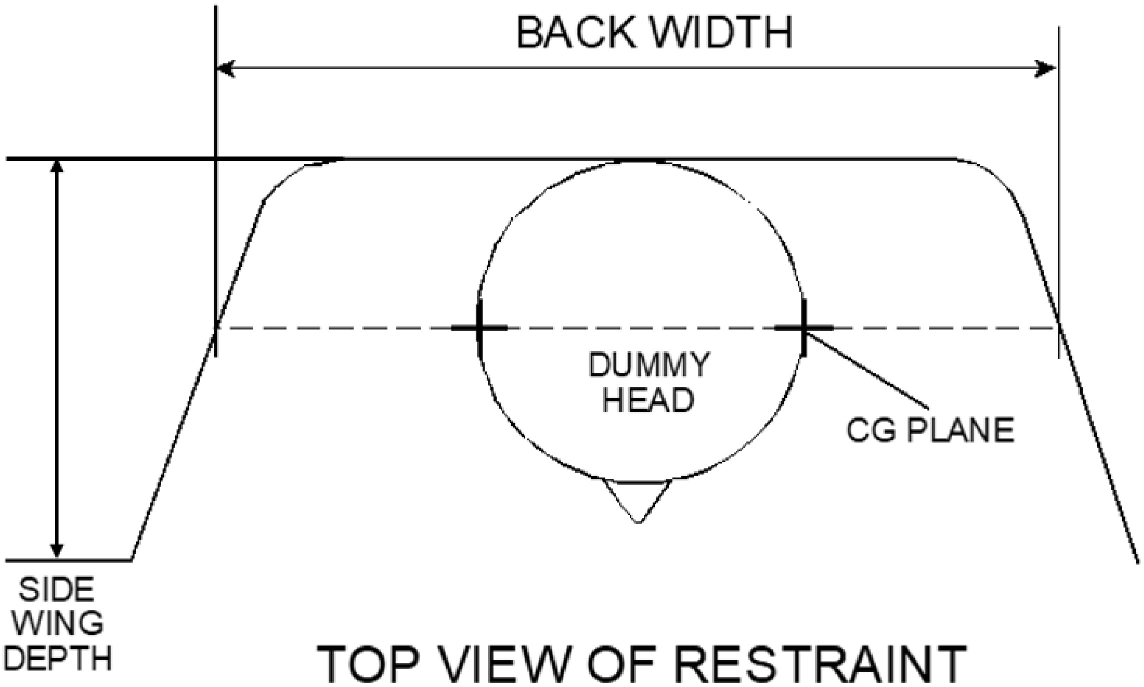


FIGURE 6. SEAT BACK WIDTH MEASUREMENT

12.C.6 BELT RESTRAINT (S213, S5.4.3; S213b, S5.4.3)

12.C.6.1 SNUG FIT OF BELTS (S213, S5.4.3.1; S213b, S5.4.3.1)

Each belt that is designed to restrain a child in the CRS shall be adjustable to snugly fit any properly positioned child whose height and weight are within the ranges recommended by the manufacturer. Using the appropriate dummy, fasten and adjust the system's harness to fit properly around the dummy. If there is insufficient webbing to do so, the restraint system fails. There is currently no test criterion for "snug fit" at the lower end of the size range. Questionable cases should be discussed with the COR and indicated under **REMARKS** on the appropriate data sheet for further evaluation by the COR.

12.C.6.2 DIRECT RESTRAINT BELTS (S213, S5.4.3.2; S213b, S5.4.3.2)

Except for belt-positioning seats, each belt that is part of a CRS and that is designed to restrain a child using the CRS, and to attach the system to the vehicle, and each Type I and lap portion of a Type II vehicle belt that is used to attach the system to the vehicle shall, when tested in accordance with S6.1, impose no loads on the child that result from the mass of the system, or from the mass of the seat back of the FISA.

To evaluate this requirement, verify whether the following conditions are true:

1. The belt in question contacts the dummy for the purpose of restraint and attaches the child restraint to the vehicle, and

2. the child restraint includes any rigid structure between the dummy and the back of the FISA, and

3. the child restraint can move relative to the belt system.

If ALL THREE conditions are true, the restraint FAILS.

If any one condition is NOT true, the restraint PASSES. Record the results on the appropriate data sheet.

12.C.6.3 SEATING SYSTEM BELTS AND SHIELDS (S213, S5.4.3.3; S213b, S5.4.3.3)

These requirements apply to CRSs that are designed for use by a child in a seated position and that include belts designed to restrain the child, with the specific exception of child harnesses. Also excluded are infant restraint systems that are designed to place the child in a rear-facing, semi-recumbent position instead of a seated position, and that are recommended only for children up to (less than or equal to) 10 kg (22 lb).

For applicable CRS, the following restraining systems shall be provided:

A. UPPER TORSO

Either belts passing over each shoulder of the child or a fixed or movable surface that complies with S5.2.2.1(c).

B. LOWER TORSO

Either a lap belt assembly (making an angle between 45° and 90° with the child restraint seating surface at lap belt anchorage point) or a fixed or movable surface that complies with S5.2.2.1(c).

C. CROTCH RESTRAINT

For CRSs recommended for children over 10 kg (22 lb.), either a crotch belt connectable to the lower torso restraint or a fixed or movable surface that complies with S5.2.2.1(c).

Verify the existence of the above systems and record the results on the appropriate data sheets.

12.C.6.4 HARNESSES (S213, S5.4.3.4; S213b, S5.4.3.4)

For harnesses, the following restraining systems shall be provided:

1. Upper Torso -- Belts passing over each shoulder of the child, and

2. Lower Torso -- Lap and crotch belts, and

3. A means to prevent any properly restrained child, whose height is within the range recommended by the manufacturer, from standing on the vehicle seat.

Verify the existence of the above systems and record the results on the appropriate data sheets.

12.C.7 TORSO IMPACT PROTECTION (S213, S5.2.2; S213b, S5.2.2)

12.C.7.1 SHOULDER AND TORSO DEPTH

These requirements do not apply to car beds. For other CRSs, the following surface area and curvature requirements apply. Remove padding for all curvature determinations, noting any difficulties on the appropriate data sheet.

For measurements that refer to dummy "shoulder height" or "torso depth," use the dimensions for the appropriate dummy specified in Table 6, based on the manufacturer's recommended maximum weight for children using the restraint. These values are only provided for reference purposes to permit an evaluation of the requirements of S5.2.2.1(a) and S5.2.2.1(b):

TABLE 6. SHOULDER HEIGHT AND TORSO DEPTH OF REPRESENTATIVE DUMMIES

MAXIMUM WEIGHT	DUMMY	SHOULDER HEIGHT	TORSO DEPTH
Under 10 kg (22 lb.)	12-month-old	307 mm (12.1 inches)	109 mm (4.3 inches)
10 kg (22 lb.) or more	3-year-old	368 mm (14.5 inches)	133 mm (5.25 inches)

12.C.7.2 BACK SUPPORT SURFACE (S213, S5.2.2.1(a); S213b, S5.2.2.1(a))

The surface provided for the support of the child's back shall be flat or concave and have a continuous surface area of not less than 548 square cm (85 square inches). The area to be considered is the entire width of the restraint back surface below a height above the seating surface indicated above as "shoulder height" for the appropriate dummy. Measure this area and record the results on the appropriate data sheet.

12.C.7.3 SIDE SUPPORT SURFACE (S213, S5.2.2.1(b); S213b, S5.2.2.1(b))

Each surface provided for support of the sides of the child's torso shall be flat or concave and have a continuous surface of not less than 155 square cm (24 square inches) for systems recommended for children weighing 9 kg (20 lb.) or more, or 310 square cm (48 square inches) for systems recommended for children weighing less than 9 kg (20 lb.). "Torso" is defined as "the portion of the body of a seated anthropomorphic test dummy, excluding the thighs that lie between the top of the CRS seating surface and the top of the shoulders of the test dummy." The measured side support surface area must be:

- **BELOW** a line perpendicular to the restraint back surface at a height above the seating surface indicated above as "shoulder height" for the appropriate dummy, and

- **REARWARD** of a line perpendicular to the seating surface at a distance forward of the restraint back surface indicated above as "torso depth" for the appropriate dummy.

Measure this area and record the results on the appropriate data sheet.

12.C.7.4 FORWARD RESTRAINING SURFACE (S213, S5.2.2.1(c); S213b, S5.2.2.1(c))

Each horizontal cross section of each surface designed to restrain forward movement of the child's torso shall be flat or concave, and each vertical longitudinal cross section shall be flat or convex with a radius of curvature of the underlying structure of not less than 51 mm (2 inches).

12.C.7.5 FORWARD FIXED/MOVABLE SURFACES (S213, S5.2.2.2; S213b, S5.2.2.2)

For forward-facing CRSs, there shall be no fixed or movable surface directly in front of the appropriate test dummy, when properly positioned in the restraint, and intersected by a horizontal line parallel to the Seat Orientation Reference Line (SORL) and passing through any portion of that dummy, except for surfaces that restrain the dummy when tested according to frontal impact dynamic test Configuration II (S213, S6.1.2(a)2). If such a surface exists, the COR shall be contacted for further instructions. The COR may recommend conducting dynamic tests with S6 of FMVSS No. 213 or deferring evaluation. If no such surface exists, the system complies. Indicate PASS, FAIL, or DEFERRED on the appropriate data sheet.

12.C.8 PROTRUSION LIMITATION (S213, S5.2.4; S213b, S5.2.4)

Any protrusion, padded or unpadded, on a rigid structure, other than belts or belt hardware, that is contactable by any part of the appropriate dummy head or torso during the dynamic impact test shall have a height above the immediately adjacent restraint system surface of not more than 9.525 mm (0.375 inch) and no exposed edge with a radius of less than 6.35 mm (0.25 inch). The areas to be considered include those identified in the section on Torso Impact Protection (C.6) with the addition of the surfaces directly forward of the dummy or directly rearward of the dummy and above its shoulders for restraints recommended for children weighing 10 kg (22 lb.) or more. This requirement does not apply to child harnesses consisting primarily of flexible material such as straps, webbing, or similar material.

Remove any padding in the applicable areas to make the measurements, and record the maximum values encountered on the data sheet.

12.C.9 ATTACHMENT TO CHILD RESTRAINT ANCHORAGE SYSTEM (S213, S5.9; S213b, S5.9)

Add-on CRS shall have components permanently attached to the CRS that enable the restraint to be securely fastened to the lower anchorages of the child restraint anchorage system specified in FMVSS No. 225.

Car beds, harnesses, and belt-positioning seats are not required to have components that enable the restraint to be securely fastened to the lower anchorages of the child restraint anchorage system specified in FMVSS No. 225.

In the case of rear-facing child restraints with detachable bases, only the detachable base is required to have the components that enables the restraint to be securely fastened to the anchorages of the child restraint anchorage system specified in FMVSS No. 225.

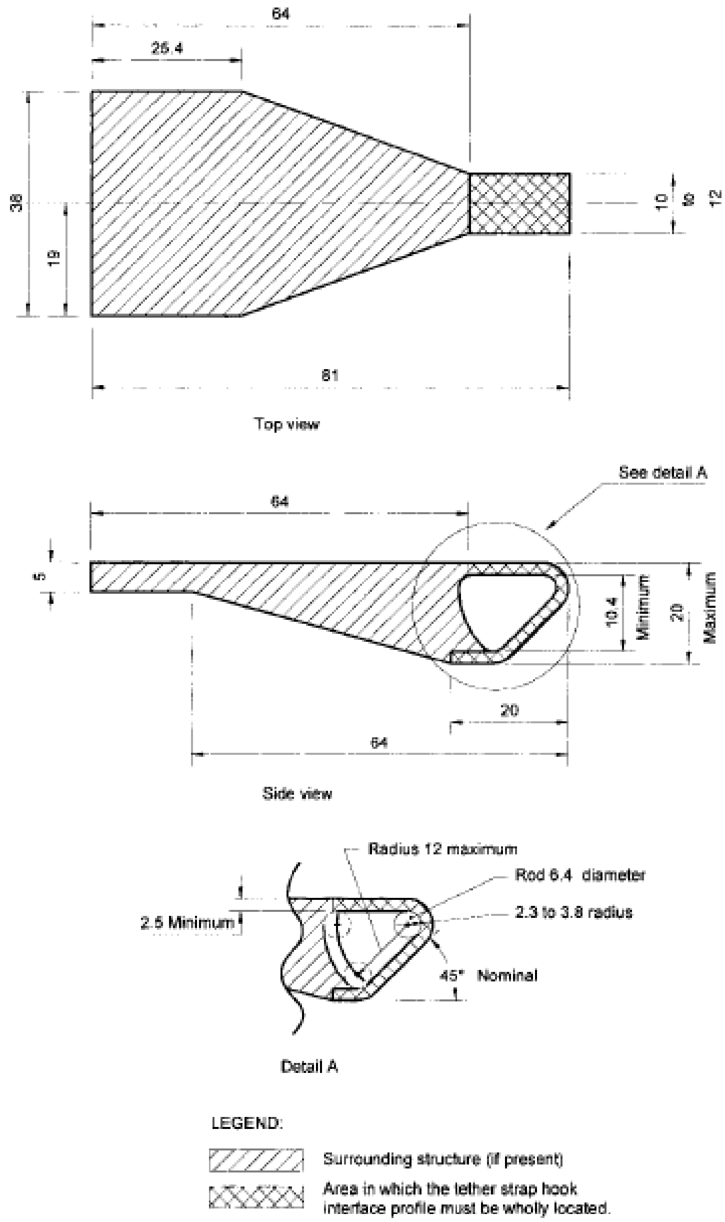
The lower anchorage components must be attached such that they can only be removed by use of a tool, such as a screwdriver.

In the case of each CRS that has components for attaching the CRS to a tether anchorage, those components shall include a tether hook that conforms to the configuration and geometry specified in Figure 7.

CRS components, including but not limited to belt webbing, for attaching the CRS to a tether anchorage or a child restraint anchorage system shall be adjustable so that the child restraint can be tightly attached to the vehicle.

Each CRS with components that enable the CRS to be securely fastened to the lower anchorages of a child restraint anchorage system, other than a system with hooks for attaching to the lower anchorages, shall provide either an indication when each attachment to the lower anchorages becomes fully latched or attached, or a visual indication that all attachments to the lower anchorages are fully latched or attached. Visual indications shall be detectable under normal daylight lighting conditions.

Inspect the restraint system for the applicable requirements and indicate the results on the appropriate data sheet.



Notes

1. Dimensions in mm, except where otherwise indicated
2. Drawing not to scale

FIGURE 7. INTERFACE PROFILE OF TETHER HOOK

12.D. FRONTAL IMPACT DYNAMIC TEST CONDITIONS AND PROCEDURES (S213, S6)

Test a new specimen of the CRS according to the procedures below in each possible test configuration directed by the COR. Test configuration includes installation direction seat back position, tether usage, etc. Record the installation modes to be tested using the convention listed in the Test Configuration Codes Table (see Table 21) as well as the test configuration to be used on the appropriate data sheet.

12.D.1 FRONTAL IMPACT DYNAMIC TEST EQUIPMENT (per FMVSS No. 213)

12.D.1.1 TEST CONDITIONS AND DEVICES (S213, S6.1.1)

A. FRONTAL IMPACT SLED ASSEMBLY

The test device used to evaluate the dynamic performance of the add-on child restraint is the frontal impact seat assembly (FISA) securely attached to a dynamic test platform or impact sled. The FISA is described in Drawing Package NHTSA Standard Seat Assembly FMVSS No. 213, No. NHTSA-213-2003, dated June 3, 2003. The orientation should simulate a vehicle frontal impact. The FISA has three seating positions. The forward direction of the FISA is defined by the Seat Orientation Reference Line (SORL), which is the horizontal line through point Z as illustrated in Figures 8 and 9. Additionally, belt anchor points and forward dummy excursion limits for dynamic compliance tests using seat belts are illustrated in Figures 8 and 9.

Figures 9 and 11 illustrate the locations of the child restraint anchorage system and forward excursion limits for systems tested using the child restraint anchorage system applicable to add-on CRSs other than car beds, harnesses, or belt-positioning booster seats.

The FISA is covered by a seat cushion. The seat cushion is constructed of elastic-backed automotive vinyl on the upper surface, which is in contact with the child restraint, backed by a thin layer of nylon-impregnated vinyl. The nylon-impregnated vinyl extends around the top of seam of the cover and is cross-stitched to the automotive vinyl on the seating surface.

The test device for built-in CRSs is either the specific vehicle shell or the specific vehicle.

B. SPECIFIC VEHICLE SHELL

1) The specific vehicle shell, if selected for testing, is mounted on a dynamic test platform so that the longitudinal center line of the shell is parallel to the direction of the test platform travel and so that movement between the base of the vehicle shell and the platform is prevented. Adjustable vehicle seats are in the adjustment position midway between the forward-most and rearmost positions,

and if separately adjustable in a vertical direction, are at the lowest position. If an adjustment position does not exist midway between the forward-most and rearmost position, the closest adjustment position to the rear of the midpoint is used. Adjustable vehicle seat backs are in the manufacturer's nominal design riding position. If such a position is not specified, the vehicle seat back is positioned so that the longitudinal centerline of the child test dummy's neck is vertical, and if an instrumented test dummy is used, the accelerometer surfaces in the dummy's head and thorax, as positioned in the vehicle, are horizontal. If the vehicle seat is equipped with adjustable head restraints, each is adjusted to its highest adjustment position.

2) The dynamic test platform is instrumented with an accelerometer and data processing system having a frequency response of 60 Hz channel class as specified in Society of Automotive Engineers Recommended Practice J211 (1995) "Instrumentation for Impact Tests." The accelerometer sensitive axis is parallel to the direction of test platform travel.

C. SPECIFIC VEHICLE

For built-in CRSs, an alternate test device is the specific vehicle into which the built-in system is fabricated. The following test conditions apply to this alternate test device.

1) The vehicle is loaded to its unloaded vehicle weight plus its rated cargo and luggage capacity weight, secured in the luggage area, plus the appropriate child test dummy and, at the vehicle manufacturer's option, an anthropomorphic test dummy which conforms to the requirements of subpart B or subpart E of part 572 of this title for a 50th percentile adult male dummy placed in the front outboard seating position. If the built-in CRS is installed at one of the seating positions otherwise requiring the placement of a part 572 test dummy, then in the frontal barrier crash specified in (c), the appropriate child test dummy shall be substituted for the part 572 adult dummy, but only at that vehicle seating position. The fuel tank is filled to any level from 90 to 95 percent of capacity.

2) Adjustable vehicle seats are in the adjustment position midway between the forward-most and rearmost position, and if separately adjustable in a vehicle direction, are at the lowest position. If an adjustment position does not exist midway between the forward-most and rearmost positions, the closest adjustment position to the rear of the midpoint is used.

3) Adjustable vehicle seat backs are in the manufacturer's nominal design riding position. If a nominal position is not specified, the vehicle seat back is positioned so that the longitudinal center line of the child test dummy's neck is vertical, and if an anthropomorphic test dummy is used, the accelerometer surfaces in the test dummy's head and thorax, as positioned in the vehicle, are horizontal. If the vehicle is equipped with adjustable head restraints, each is adjusted to its highest

adjustment position.

4) Movable vehicle windows and vents are, at the manufacturer's option, placed in the fully closed position.

5) Convertibles and open-body type vehicles have the top, if any, in place in the closed passenger compartment configuration.

6) Doors are fully closed and latched but not locked.

D. FISA FOAM

Before conducting a frontal impact dynamic test, measure the force-deflection characteristics of all four foam inserts used in the FISA. Using the test methodology and apparatus described in ASTM Standard D1564-71 "Standard Method of Testing Flexible Cellular Materials-Slab Urethane Foam," determine the load required to produce a 25% compression of the foam thickness. To be suitable for use in compliance testing, the foam inserts shall compress 25% under the following load limits:

51 mm (2-inch) thick foam:	20.4 to 24.9 kg (45 to 55 lb.)
102 mm (4-inch) thick foam:	9.5 to 12.2 kg (21 to 27 lb.)

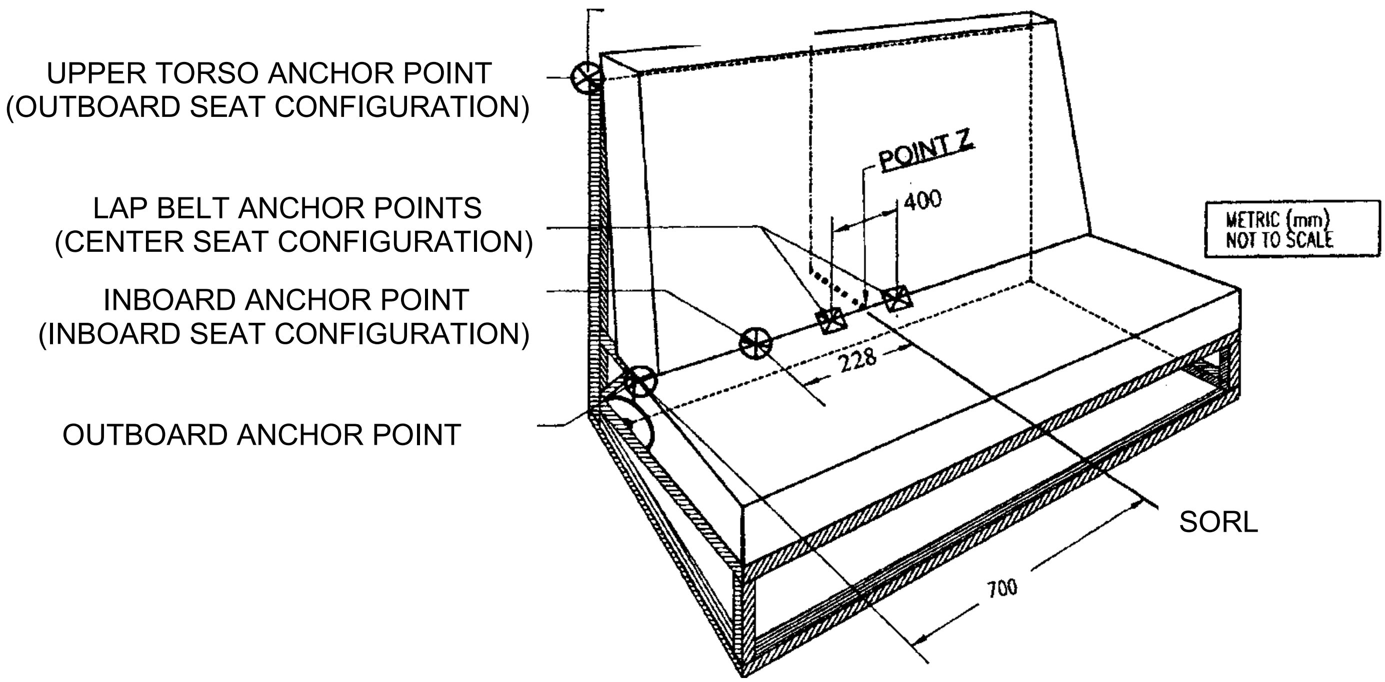
If a foam insert has already been used in a frontal impact dynamic test, allow a minimum of twelve hours recovery time before measuring the force-deflection characteristics. Also inspect each used foam insert for damage or permanent deformation, and either repair it or discard it if it is beyond repair.

E. FISA RIGID ROD

A cold-rolled 1045 steel rigid rod (drawing number 2003HA200, part number 28) runs through the pivot blocks in the Y direction on the test bench and allows the seat back of the test bench to rotate forwards and backwards. This rigid rod shall be replaced after each test.

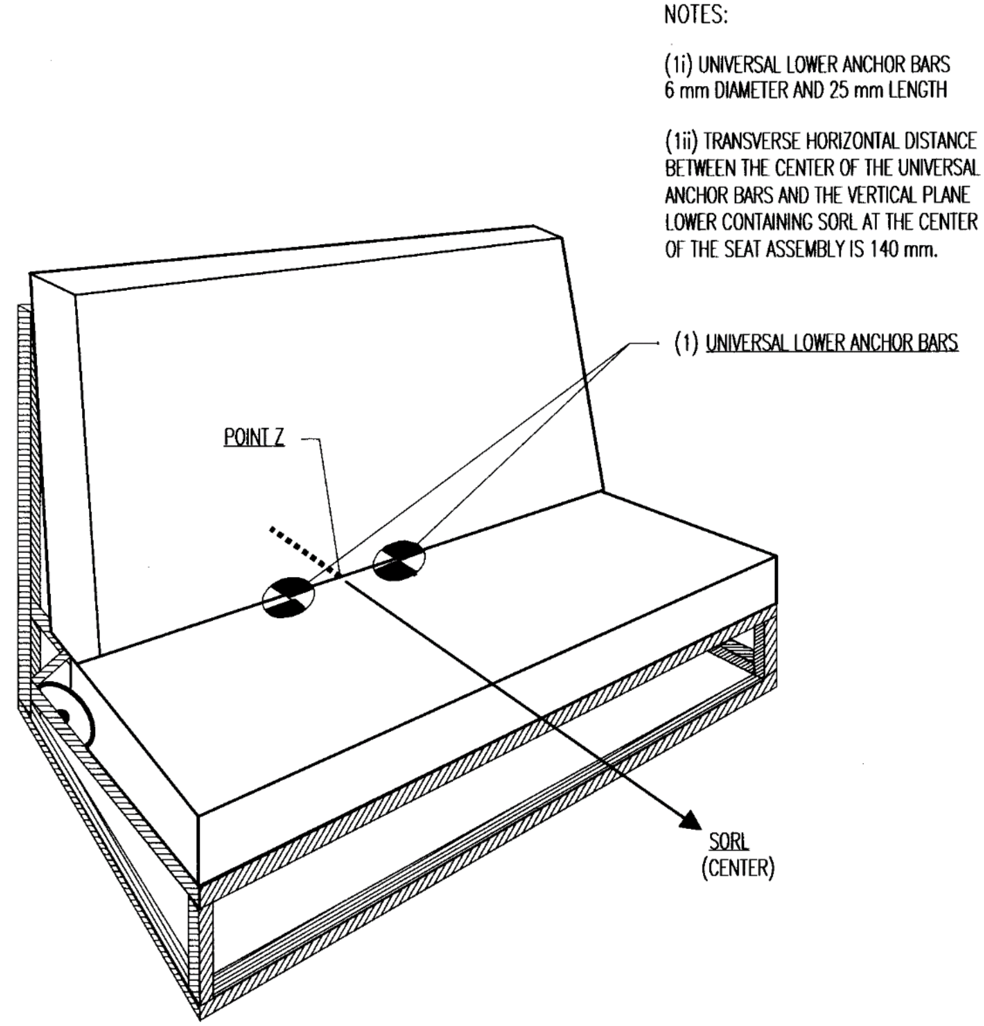
F. TYPE I AND TYPE II BELT WEBBING

The webbing used for both the Type I and Type II belts shall comply with FMVSS No. 209, *Seat belt assemblies*. A new belt is used for each test performed.



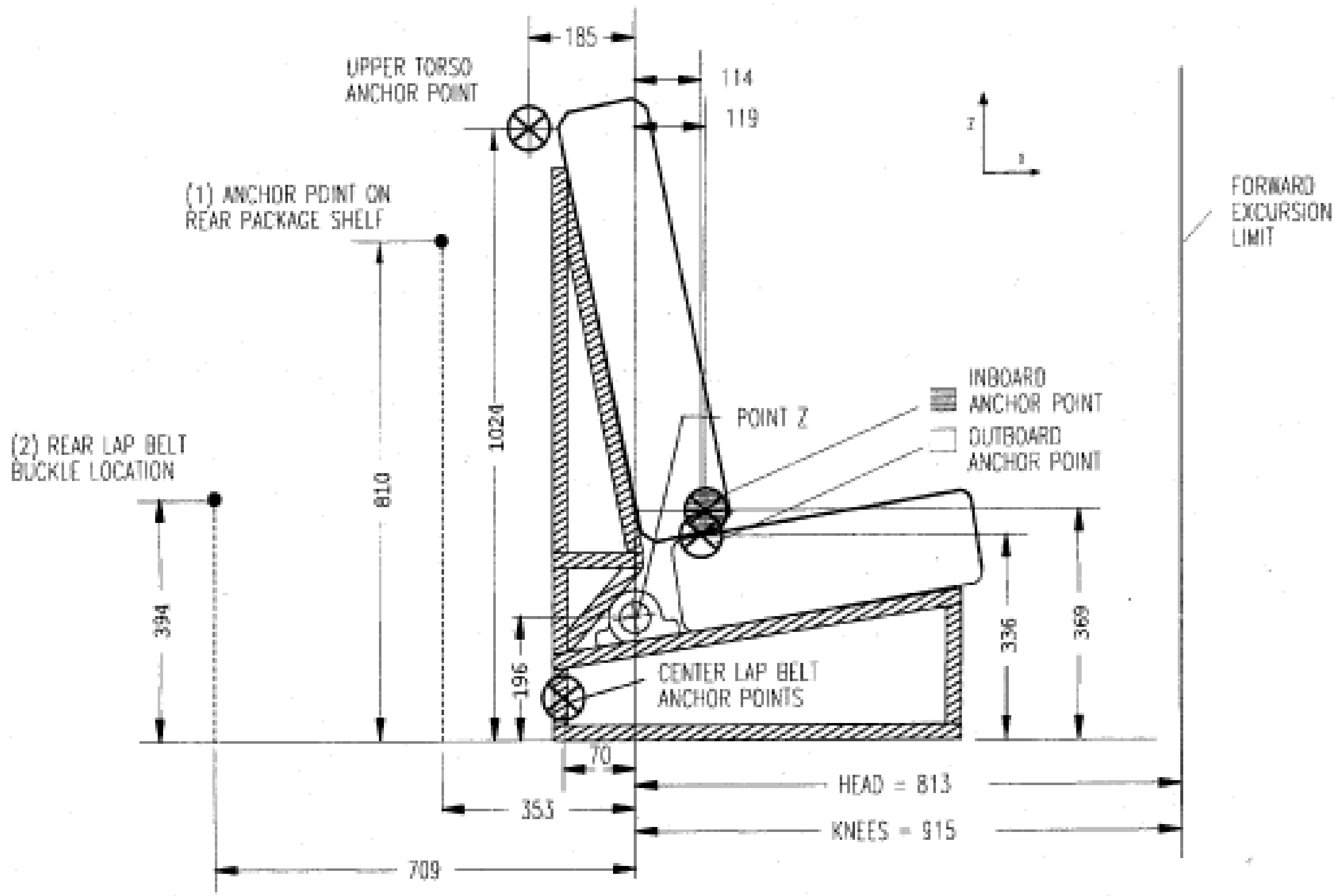
NOTES:
(1) Lap belt anchor points are symmetrically located with respect to the center SORL.
(2) Maximum distance from the seat bight to the end of the buckle is 175 mm.
(3) Outboard anchor point located 700 mm from the center SORL.

FIGURE 8. SORL AND BELT ANCHORAGE POINT LOCATIONS ON THE FRONTAL IMPACT SEAT ASSEMBLY



SEAT ORIENTATION REFERENCE LINE AND LOCATION OF UNIVERSAL CHILD RESTRAINT ANCHORAGE SYSTEM ON THE STANDARD SEAT ASSEMBLY

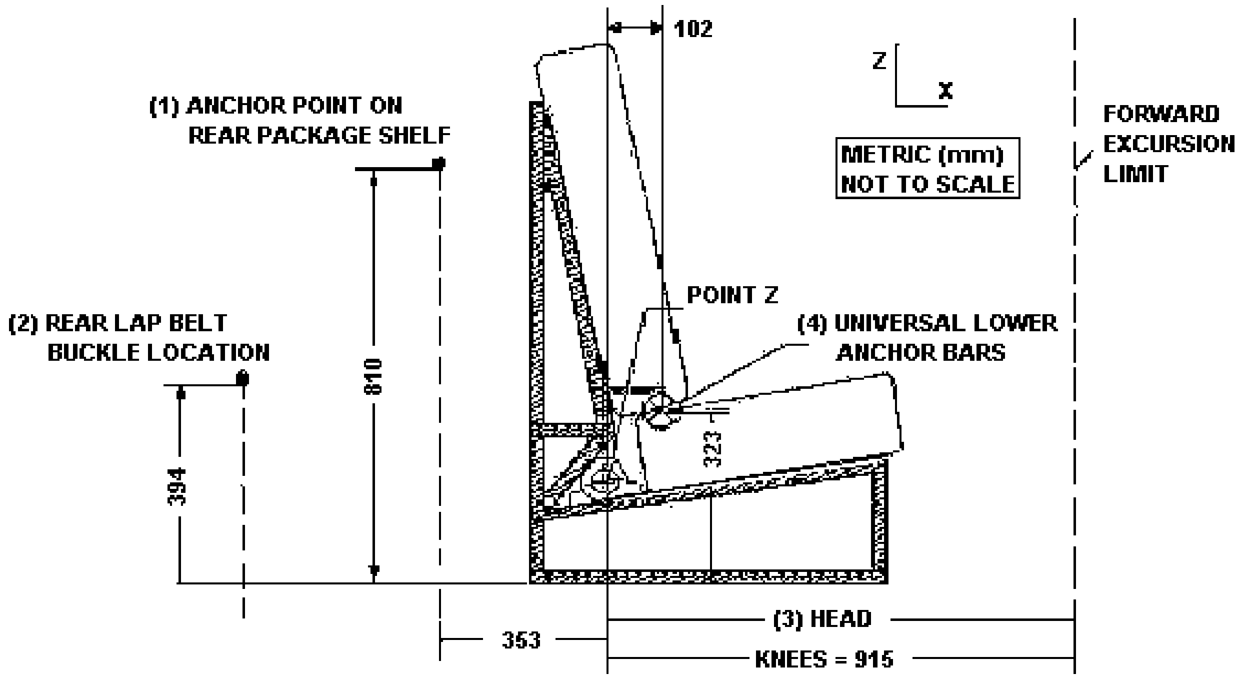
FIGURE 9. SORL AND LOCATION OF CHILD RESTRAINT ANCHORAGE SYSTEM ON THE FRONTAL IMPACT SEAT ASSEMBLY



NOTES:
(1) Anchor Point on Rear Package Shelf Located 544 mm Right or Left of the Center SORL as shown in Fig. 1A
(2) Rear Lap Belt Buckle Located 178 mm Right or Left of the Center SORL as shown in Fig. 1A

METRIC (mm)
NOT TO SCALE

FIGURE 10. LOCATIONS OF BELT ANCHORAGE POINTS AND FORWARD EXCURSION LIMIT ON THE FRONTAL IMPACT SEAT ASSEMBLY



NOTES:

(1) ANCHOR POINT ON REAR PACKAGE SHELF LOCATED 544 mm RIGHT OR LEFT OF THE CENTER SORLS AS SHOWN IN FIGURE 15a.

(2) REAR LAP BELT BUCKL LOCATED 178 mm RIGHT OR LEFT OF THE CENTER SORL AS SHOWN IN FIGURE 15a.

(3) HEAD EXCURSION LIMIT IS: (i) 720 mm WITH TETHER ATTACHED AND (ii) 813 mm WITH TETHER UNATTACHED.

(4) UNIVERSALE LOWER ANCHORAGE BARS LOCATED 102 mm FORWARD OF POINT Z AND 323 mm UPWARD FROM FLOOR.

FIGURE 11. LOCATION OF CHILD RESTRAINT ANCHORAGE SYSTEM AND FORWARD EXCURSION LIMITS FOR THE FRONTAL IMPACT SEAT ASSEMBLY

12.D.1.2 INSTRUMENTATION

A. TRANSDUCERS (S213, S5.1.2, S6.1.1, S7.1)

The following transducers are required:

(1) Accelerometer for monitoring impact sled deceleration. Accelerometer type and class as required to adequately measure an acceleration response as specified in Figures 12 and 13.

(2) Six accelerometers are required for mounting, three each in the head and thorax of the 3-year-old and 6-year-old unweighted dummies. Three accelerometers are required for mounting in the chest of the 10-year-old dummy. Each axis of the accelerometers shall meet the following minimum performance requirements:

Mounting frequency response:	± 5%, 0 to 2000 Hz
Maximum damping:	0.005 of critical, nominal
Transverse sensitivity:	5% maximum
Linearity and hysteresis:	± 3% of reading, maximum
Dynamic range:	± 500 g, minimum
Type and Class:	Refer to dummy test procedures

(3) Seat belt webbing load cells to monitor belt preload during seat installation. This item is not required if an equivalent belt tension measurement device is utilized to determine the preload on the Type I and Type II seat belt assembly.

(4) Velocity transducer or integration of the sled accelerometer to determine speed of frontal impact dynamic test.

(5) Force transducer to monitor the load applied to the dummy sling during the Buckle Release Tests described in this procedure.

(6) Force transducer to measure buckle release force.

B. PLAYBACK AND RECORDING EQUIPMENT

Equipment shall be provided that has the following capabilities:

(1) Have a minimum capability of 8 data channels for measuring the following during the frontal impact dynamic test:

6 - Dummy accelerations
1 - Sled acceleration
1 - Sled velocity

(2) Provide a permanent record of all data channels during dynamic impact.

12.D.2 SYSTEMS CHECK

Before beginning a series of CRS compliance tests, conduct one trial test to determine that all systems are functioning properly. In particular:

(1) Ensure the test velocities and acceleration conditions given in this procedure are met.

(2) When applicable, conduct the trial test with an instrumented dummy to assure correct operation of transducers, signal conditioning, and record/playback equipment.

(3) Review high-speed video coverage of the test setup and timing of the camera operation.

(4) Ensure accurate calibrations of the high-speed video field of view are available in the plane of motion of the CRS.

12.D.3 FRONTAL IMPACT DYNAMIC TEST CONDITIONS

12.D.3.1 ENVIRONMENTAL CONDITIONS (S213, S6.1.1(d))

The frontal impact dynamic test shall be performed under the following environmental conditions unless agreed to by the COR:

Temperature	20.6°C (69°F) to 22.2°C (72°F)
Relative Humidity	10% to 70%

12.D.3.2 FRONTAL IMPACT SPEED (S213, S6.1.1)

Configuration I tests shall be conducted at a velocity change of 48 km/h, + 0, - 3.2 km/h (30 mph, + 0, - 2 mph), or for the specific vehicle test with the deceleration produced in a 48 km/h frontal barrier crash.

Configuration II tests shall be conducted at a velocity change of 32 km/h, + 0, - 3.2 km/h (20 mph, + 0, - 2 mph), or for the specific vehicle test with the deceleration produced in a 32 km/h frontal barrier crash.

The test facility must establish a target impact speed, which, with all equipment and instrumentation accuracies considered, ensures that the actual speed is within the tolerance band. The target speed should be the maximum possible and still meet the required criteria. The target speed must be reported to the COR prior to starting the testing program.

12.D.3.3 FRONTAL IMPACT ACCELERATION (S213, S6.1.1)

The impact sled acceleration function envelopes shown in Figures 12 and 13 are defined by the coordinates in Tables 7 and 8.

TABLE 7. TEST CONFIGURATION I ACCELERATION FUNCTION ENVELOPE

UPPER LIMIT		LOWER LIMIT	
TIME (msec)	ACCELERATION (G's)	TIME (msec)	ACCELERATION (G's)
0	3	4	0
10	25	13	19
52	25	46	19
90	0	75	0

TABLE 8. TEST CONFIGURATION II ACCELERATION FUNCTION ENVELOPE

TIME (msec)	UPPER LIMIT ACCEL. (G's)	LOWER LIMIT ACCEL. (G's)
0	0.0	-2.0
9.5	14.0	9.4
14	17.0	13.5
20	17.7	14.0
32	16.5	12.5
40	14.8	11.0
44	15.3	11.5
50	15.0	11.5
60	12.0	9.0
66	9.0	6.0
72	5.0	2.0
76	0.0	-2.0

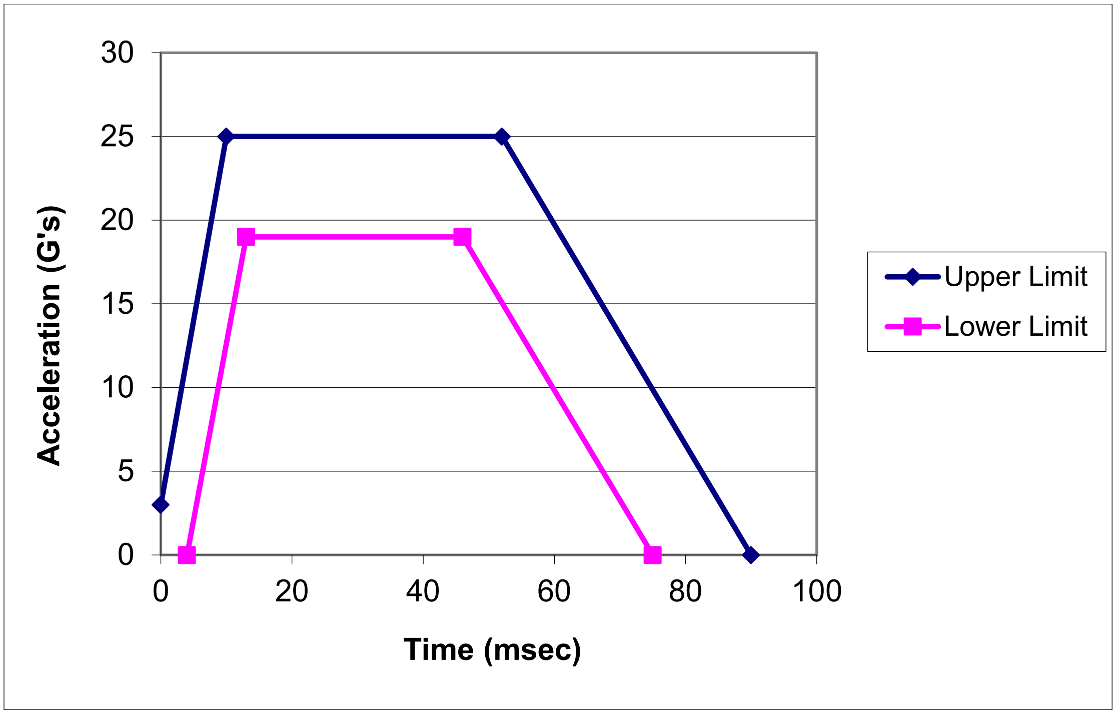


FIGURE 12. CONFIGURATION I ACCELERATION FUNCTION CURVE ACCELERATION FUNCTION FOR ΔV = 48 km/h (30 mph)

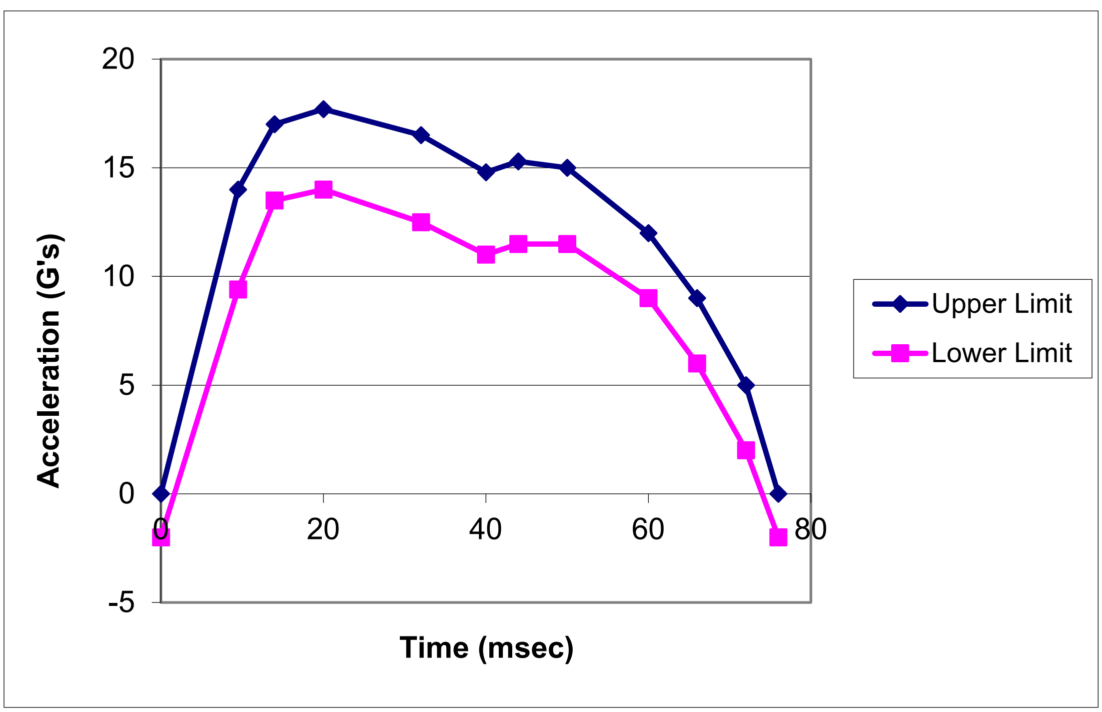


FIGURE 13. CONFIGURATION II ACCELERATION FUNCTION CURVE ACCELERATION FUNCTION FOR ΔV = 32 km/h (20 mph)

12.D.4 DUMMY PREPARATION

12.D.4.1 DUMMY SELECTION (S213, S6.1.2.3, S7.1.2)

A child restraint that is recommended for children having a specific weight (regardless of height) or height (regardless of weight) shall comply with requirements when tested using all/each of the applicable test dummies specified, according to Table 9.

For the purpose of OVSC compliance test contract requirements, work with the COR to determine which ATD(s) to use according to the Table 9 below by comparing manufacturer's label and/or written instructions concerning occupant weight and height. If the range specified by the manufacturer includes any weight or height within the ranges specified, the seat may be tested using the dummy applicable to that weight or height range.

Test a new specimen of the CRS with the appropriate test dummy in each possible combination of installation mode, adjustment position, and required test mode or as directed by the COR. On the appropriate data sheet, record the particular test dummy and test configuration tested using the convention listed in Table 21.

TABLE 9. DUMMY SELECTION BY WEIGHT OR HEIGHT (S7.1.2)

WEIGHT	HEIGHT	DUMM(IES)
≤ 5 kg (11 lb.)	≤ 650 mm (26 in)	Newborn Part 572(K)
> 5 kg (11 lb.) and ≤ 10 kg (22 lb.)	> 650 mm (26 in) and ≤ 750 mm (29.5 in)	Newborn Part 572(K) and 12-Month-Old Part 572(R)
> 10 kg (22 lb.) and ≤ 13.6 kg (30 lb.)	> 750 mm (29.5 in) and ≤ 870 mm (34 in)	12-Month-Old Part 572(R)*
> 13.6 kg (30 lb.) and ≤ 18.2 kg (40 lb.)	> 870 mm (34 in) and ≤ 1100 mm (43 in)	3-Year-Old Part 572(P)
> 18.2 kg (40 lb.) and ≤ 22.7 kg (50 lb.)	> 1100 mm (43 in) and ≤ 1250 mm (49 in)	6-Year-Old Part 572(I) (Hybrid II)[9] or 6-Year-Old Part 572(N) (Hybrid III)**
> 22.7 kg (50 lb.) and ≤ 30 kg (65 lb.)	> 1100 mm (43 in) and ≤ 1250 mm (49 in)	[6-Year-Old Part 572(I)(Hybrid II) or 6-Year-Old Part 572(N)(Hybrid III)**] and 6-Year-Old Part 572(S)(weighted Hybrid III)
> 30 kg (65 lb.)	> 1250 mm (49 in)	10-Year-Old Part 572(T) (Hybrid III)***

*The 12-month-old dummy is not tested in a forward-facing CRS.
**Child restraint manufacturer’s option to use 6-year-old HII until December 5, 2026 per 88 FR 84514.
***No HIC measured with 10-year-old HIII.

[9] Testing with the Hybrid-II 6-year-old dummy (Part 572I) will sunset on December 5, 2026.

12.D.4.2 PRETEST CONDITIONING AND CALIBRATION REQUIREMENTS

NEWBORN INFANT DUMMY (S213, S9)

Prior to testing, condition the newborn infant dummy at any ambient temperature from 19°C to 25.5°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

12-MONTH-OLD DUMMY (S213, S9)

Calibrate the 12-month-old dummy according to the requirements of 49 CFR Part 572, Subpart R as described in TP-572-R-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or excursion score (subject to COR's discretion),
- after 30 tests, OR
- if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 12-month-old dummy at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

3-YEAR-OLD DUMMY (S213, S9)

Calibrate the 3-year-old dummy according to the requirements of 49 CFR Part 572, Subpart P as described in TP-572-P-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or excursion score (subject to COR's discretion),
- after 30 tests, OR
- if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 3-year-old dummy at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

6-YEAR-OLD DUMMY (UNWEIGHTED AND WEIGHTED) (S213, S9)

Calibrate the 6-year-old dummy according to the requirements of 49 CFR Part 572, Subpart I (Hybrid II) as described in TP-572-I-00 or 49 CFR Part 572, Subpart N (Hybrid III) as described in TP-572-N-00. Calibrate the 6-year-old weighted dummy according to the requirements of 49 CFR Part 572, Subpart S as described in TP-572-S-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or excursion score (subject to COR’s discretion),
- after 30 tests, OR
- if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 6-year-old dummy (unweighted and weighted) at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

10-YEAR-OLD DUMMY (S213, S9)

Calibrate the 10-year-old dummy according to the requirements of 49 CFR Part 572, Subpart T (Hybrid III) as described in TP-572-T-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or excursion score (subject to COR’s discretion),
- after 30 tests, OR
- if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 10-year-old dummy at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

12.D.4.3 DUMMY INSTRUMENTATION (per FMVSS No. 213)

NEWBORN INFANT DUMMY

No instrumentation is installed in the newborn infant dummy.

12-MONTH-OLD DUMMY

Three uniaxial accelerometers in the dummy’s head and three uniaxial accelerometers in the dummy’s thorax are used to instrument the 12-month-old dummy per the requirements of 49 CFR Part 572, Subpart R.

3-YEAR-OLD DUMMY

Three uniaxial accelerometers in the dummy’s head and three uniaxial accelerometers in the dummy’s thorax are used to instrument the 3-year-old dummy per the requirements of 49 CFR Part 572, Subpart P.

6-YEAR-OLD DUMMY (UNWEIGHTED)

Three uniaxial accelerometers in the dummy's head and three uniaxial accelerometers in the dummy's thorax are used to instrument the 6-year-old dummy per the requirements of 49 CFR Part 572, Subpart I (Hybrid II) or 49 CFR Part 572, Subpart N (Hybrid III).

6-YEAR-OLD DUMMY (WEIGHTED)

No instrumentation is installed in the weighted 6-year-old dummy.

10-YEAR-OLD DUMMY

Three uniaxial accelerometers in the dummy's thorax are used to instrument the 10-year-old dummy per the requirements of 49 CFR Part 572, Subpart T.

12.D.4.4 DUMMY CLOTHING (S213, S9)

NEWBORN INFANT DUMMY (S213, S9.1(a))

The newborn infant dummy is tested unclothed.

12-MONTH-OLD DUMMY (S213, S9.1(c), S9.2)

The dummy is clothed in a cotton-polyester based tight fitting sweatshirt with long sleeves and ankle long pants whose combined weight is not more than 0.25 kg (0.55 lb.).

3-YEAR-OLD DUMMY (S213, S9.1(e), S9.2)

The 3-year-old dummy is clothed in cotton-polyester-based tight-fitting shirt with long sleeves and ankle-length pants whose combined weight is not more than 0.25 kg (0.55 lb.). The 3-year-old dummy shall wear children's size 8 canvas oxford style sneakers weighing not more than 0.26 kg each. Shirt sleeve may be cut off at the elbows to improve the visibility of the dummy head during maximum excursion.

6-YEAR-OLD DUMMY (UNWEIGHTED AND WEIGHTED) (S213, S9.1(d) and (f), S9.2)

The 6-year-old dummy is clothed in thermal knit, waffle-weave polyester and cotton underwear or equivalent, a size 5 short-sleeved shirt, having a mass no more than 0.090 kg, and size 4 pair of long pants having a mass no more than 0.090 kg (0.2 lb.), cut off just far enough above the knee to allow the knee target be visible. The Hybrid II 6-year-old dummy shall wear size 13M sneakers weighing not more than 0.45 kg each. The Hybrid III 6-year-old unweighted and weighted dummies shall wear children's size 13 M canvas oxford style sneakers weighing not more than 0.43 kg each.

10-YEAR-OLD DUMMY (S213, S9.1(f), S9.2)

The 10-year-old dummy is clothed in a form fitting cotton stretch above-the-elbow sleeved shirt having a mass no more than 0.14 kg (0.30 lb.), above-the-knees pants having a mass no more than 0.14 kg (0.30 lb.), and youth size 3 sneakers weighing not more than 0.6 kg each.

LAUNDERING DUMMY CLOTHES

Machine-wash the clothing, other than the shoes, in 71°C (160°F) to 82°C (180°F) water, and machine-dry at 43°C (110°F) to 54°C (130°F) approximately 30 minutes.

12.D.4.5 DUMMY TARGETING

12-MONTH-OLD DUMMY

Photographic targets are required to identify the head center of gravity of the 12-month-old dummy, which is located on either side of the dummy head at the head accelerometer mounting block bolt. Adhesive backed paper or fabric targets with a pattern that facilitates identifying and tracking the head center of gravity in the high-speed videos are recommended. The knee pivot-points are defined by the centers of the knee pivot bolts and are used for maximum forward knee excursion measurements.

3-YEAR-OLD, 6-YEAR-OLD, AND 10-YEAR-OLD DUMMIES

Photographic targets are required to identify the head center of gravity and the pivot points of the knees of the 3-year-old, 6-year-old, and 10-year-old dummies. Adhesive backed paper or fabric targets having a pattern that facilitates identifying and tracking of the head and knee reference points in the high-speed videos are recommended. The head center of gravity is identified by the head center of gravity reference pin, which protrudes from each side of the head. Note that the head center of gravity target is not used for maximum forward excursion measurements. It may be used, however, along with a second target placed on the head to facilitate determination of maximum head/torso angle. The knee pivot-points are defined by the centers of the knee pivot bolts and are used for maximum forward excursion measurements.

12.D.4.6 LAP SHIELD AND PELVIS POSITIONING PAD PREPARATION (S213, S10.2.3)

(A) Lap Shield

Cut a piece of translucent silicone rubber 3 mm ± 0.5 mm thick (50A durometer) to the dimensions specified in Figure 17.

(B) Pelvis Positioning Pad

Cut a pad having the dimensions 125 x 95 x 20 mm (± 2 mm tolerance in each of the three dimensions) from a piece of closed cell (Type 2 according to ASTM D-1056-07) foam or rubber material having the following specifications: compression resistance between 9 to 17 psi in a compression-deflection test specified in ASTM D-1056-07 and a density of 7 to 12.5 lb./ft^3.

12.D.5 PREIMPACT BUCKLE RELEASE TEST (S213, S5.4.3.5, S6.2)

At the COR's discretion, before conducting the dynamic testing of either the built-in or add-on CRS, remove the buckle from the restraint system and place on a hard, flat horizontal surface. Each belt end of the buckle shall be pre-loaded in the following manner:

(A) The anchor end of the buckle shall be loaded with a 9 N (2 lb.) force in the direction away from the buckle.

a. In the case of buckles designed to secure a single latch plate, the belt latch plate end of the buckle shall be pre-loaded with a 9 N (2 lb.) force in the direction away from the buckle.

b. In the case of buckles designed to secure two or more latch plates, the belt latch plate ends of the buckle shall be loaded equally so that the total load is 9 N (2 lb.), in the direction away from the buckle.

(B) For pushbutton-release buckles, the release force shall be applied by a conical surface (cone angle not exceeding 90 degrees).

a. For pushbutton-release mechanisms with a fixed edge (referred to in Figure 18 as "hinged button"), the release force shall be applied at the centerline of the button, 3mm away from the movable edge directly opposite the fixed edge, and in the direction that produces maximum releasing effect.

b. For pushbutton-release mechanisms with no fixed edge (referred to in Figure 18 as "floating button"), the release force shall be applied at the center of the release mechanism in the direction that produces the maximum releasing effect.

(C) For all other buckle release mechanisms, the force shall be applied on the centerline of the buckle lever or finger tab in the direction that produces the maximum releasing effect. Measure the force required to release the buckle. Figure 18 illustrates the loading for the different buckles and the point where the release force should be applied, and Figure 20 illustrates the conical surface used to apply the release force to pushbutton-release buckles.

(D) For CRSs that have buckles integral to the seat, the entire seat may be placed on its back on a flat surface with the 9 N (2 lb.) force applied to the belts away from the buckle as described above, and the release force of the buckle determined with the appropriate release gauge.

(E) For buckle assemblies that are attached to a crotch belt where the crotch belt cannot be removed and re-installed as originally found, the buckle assembly can be handheld while the test gauge release force is applied. Place the restraint on its back, following the procedure above keep the buckle assembly in the orientation described and apply the force sufficient to release the buckle.

Record the results in the appropriate data sheets.

12.D.6 RESTRAINT SETUP

This section describes the procedure to be followed for installing the CRS on the FISA and for installing the dummy in the CRS for frontal impact dynamic testing.

12.D.6.1 CHILD RESTRAINT SYSTEM INSTALLATION

Activate the built-in child restraint or attach the add-on child restraint to the FISA as described below:

A. TEST CONFIGURATION I

Work with the COR to determine which test configurations to perform. Install the CRS on the FISA in accordance with the manufacturer's labeling and printed instructions provided with the system. Set up the test based on the following conditions:

(A) For an add-on CRS (other than a belt-positioning seat):

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using the standard lap belt.

(3) Attach the tether strap, if one is provided, to the tether anchorage.

(4) No supplemental devices (subject to COR's discretion; may include load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

(B) For an add-on CRS (other than a harness, backless booster, belt-positioning seat, and a restraint designed for use by physically handicapped children):

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using the standard lap belt.

(3) Attach the tether strap, if one is provided, to the tether anchorage.

(4) No supplemental devices (subject to COR's discretion; may include load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

-OR-

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using only the lower anchorages of the child restraint anchorage system.

(3) Do not attach the tether strap, if one is provided.

(4) Rear-facing CRS with a detachable base may be installed with the lower anchor components located on the detachable base.[10]

(5) No other supplemental devices (subject to COR's discretion; may include load legs, pool noodles, etc.) are permitted to install the CRS.

(C) For a backless CRS (other than child harness) with a top anchorage strap, and a restraint designed for use by physically handicapped children:

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using the standard lap belt.

(3) No tether strap is used.

(4) No supplemental devices (subject to COR's discretion; may include load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

[10] S5.9(a) of FMVSS No. 213

(D) For harnesses that bear the label shown in Figure 5 that meet S5.3.1(b)(1) through S5.3.1(b)(3) of FMVSS No. 213:

(1) Attach the harness in accordance with the manufacturer's instructions provided with the system pursuant to S5.6.1.

i. i.e., the seat back mount is used.

(E) For an add-on belt-positioning seat:

(1) Install the CRS at either outboard seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secured the CRS to the FISA using only the standard vehicle lap and shoulder belt

(3) Do not attach the tether, if one is provided.

(4) No supplemental devices (subject to COR's discretion; may include load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

(F) For a built-in CRS:

(1) Activate the restraint in the specific vehicle shell or the specific vehicle, in accordance with the manufacturer's instructions.

B. TEST CONFIGURATION II

In the case of each add-on CRS, which is equipped with a fixed or movable surface that restrains the dummy, or a backless CRS with a top anchorage strap, install the add-on CRS at the center seating position of the FISA using only the Type I lap belt to secure the system to the FISA.

In the case of each built-in CRS, which is equipped with a fixed or movable surface or a built-in booster seat with a top anchorage strap, activate the system in the specific vehicle shell or the specific vehicle in accordance with the manufacturer's instructions provided.

12.D.6.2 BELT ADJUSTMENT

A. CHILD RESTRAINT PELVIC AND SHOULDER BELTS (S213, S6.1.2(d)(1)(i))

Determine shoulder harness slot position and buckle harness position by seating the dummy into the child restraint. Review the manufacturer's instructions provided with the child restraint for recommended shoulder and buckle harness positions.

Generally, rear facing child restraints will use a shoulder harness position equal or lower than, and closest to, the shoulder height of the child perpendicular to the CRS seat back and forward-facing child restraints will use a shoulder harness position equal or higher than, and closest to, the shoulder height of the child perpendicular to the CRS seat back. Notify the COR if the manufacturer's instructions deviate from the general harness positioning. Typically, the buckle harness position is the position closest to the child but not under their body. NHTSA reserves the right to determine the appropriate harness positions. Make note of the harness position used for testing on the appropriate data sheet using one of the following methods:

(i) Seats with multiple discrete slots- Count from the lowest seat back slot to the highest, and the crotch strap position is counted from the closest to the seat back outward. The position should be described as "Slot X, counted from the bottom" or "Slot Y, counted from the seat back outward".

(ii) Seats with adjustable harnesses- Adjust the shoulder harness to be nearly equal to the shoulder height of the ATD. Describe the position as, "The shoulder harness was adjusted to match the shoulder height of the ATD."

In child restraints, other than belt-positioning seats, place the appropriate size dummy in the child restraint for testing. Tighten the child restraint belts until a 9 N (2 lb.) force applied to the webbing at the top of each dummy shoulder and to the pelvic webbing 50 mm (2 inches) on either side of the torso midsagittal plane pulls the webbing 7 mm (1/3 inch) from the dummy. Use the webbing tension pull device shown in Figure 14 to perform this evaluation.

B. CHILD RESTRAINT ATTACHMENT BELTS

Add-On Systems Other Than Belt-Positioning Seats (S213, S6.1.2(d)(1)(ii))

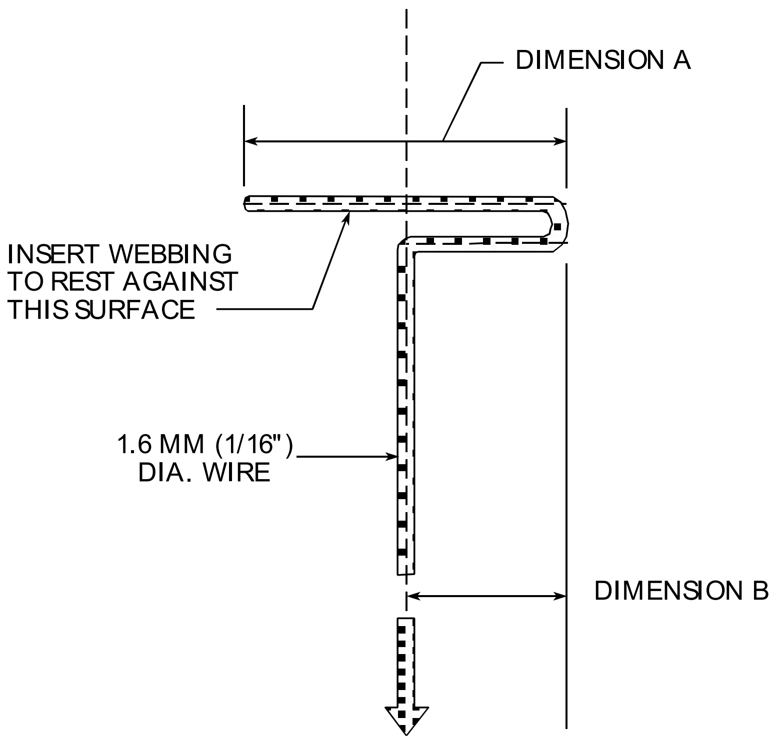
Tighten all belts used to attach the CRS to the FISA after installation of the appropriate size dummy. It is recommended that a belt-tensioning gauge be used to apply the initial tension. For all Type I and the lap portion of Type II belt systems, apply the initial tension at the junction of the seat back and seat bottom on the FISA.

Tighten all Type I belt systems and any provided additional anchorage belt (tether), that are used to attach an add-on child restraint to the FISA to a tension of not less than 53.5 N (12 lb.) and not more than 67 N (15 lb.), as measured by a load cell used on the webbing portion of the belt.
Tighten all belt systems used to attach the restraint to the tether anchorage and the child restraint anchorage system on the FISA to a tension of not less than 53.5N (12 lb.) and not more than 67 N (15 lb.), as measured by a load cell used on the webbing portion of the belt.

Add-On Belt-Positioning Seats (S213, S6.1.2(d)(2))

Tighten the lap and shoulder portions of the Type II belt system used to directly restrain the dummy in add-on and built-in CRSs to a tension of not less than 9 N (2 lb.) and not more than 18 N (4 lb.). For the shoulder portion of all Type II belt systems, apply the initial tension at a point close to the D-ring between the belt anchorage and the D-ring. Otherwise, apply the initial tension at the closest point to the CRS that permits installation of the gauge on the belt system.

NOTE: There are no tension requirements for an Emergency Locking Retractor system on a built-in restraint system.



DIRECTION OF PULL

DIMENSION A - WIDTH OF WEBBING PLUS 3 MM (1/8")
DIMENSION B - 1/2 OF DIMENSION A

FIGURE 14. WEBBING TENSION PULL DEVICE

12.D.6.3 RESTRAINT TARGETING

Rear-facing restraints, depending on their design, require the use of targets visible to the high-speed video camera to allow determination of compliance with occupant excursion and back support angle requirements. A target identifying the forward-most and top-most point on the restraint is necessary if that point is not visible from the side.

If a surface parallel to the back support surface is not externally visible, targets identifying that surface may be necessary for determining its maximum deviation from vertical. An alternate method for defining the seat back plane is to determine the angular relationship between an externally visible surface and the actual back support surface prior to the frontal impact dynamic test.

If the back support surface is curved, a target that identifies the top of the dummy's shoulder, defined in this procedure, is placed on the surface to be observed. The angle determination will then be made using a tangent to the surface at the "shoulder height" point.

Do not modify the restraint in any manner that will affect its structure or performance to achieve the targeting requirement. The use of adhesive-backed paper or fabric photographic targets is recommended for this application.

12.D.6.4 DUMMY INSTALLATION – CAR BEDS (S213, S10.1)

In the case of an add-on car bed, place the test dummy in the car bed in the supine position with its midsagittal plane perpendicular to the center SORL of the FISA.

In the case of a built-in car bed, place the test dummy in the car bed perpendicular to the longitudinal axis of the specific vehicle shell or the specific vehicle.

Position the dummy within the car bed in accordance with the instructions for child positioning that the car bed manufacturer provided with the car bed in accordance with S5.6.

12.D.6.5 DUMMY INSTALLATION - RESTRAINTS OTHER THAN CAR BEDS (S213, S10.2)

A. NEWBORN AND 12-MONTH-OLD DUMMY (S213, S10.2.1)

Position the test dummy according to the instructions for child positioning that the manufacturer provided with the system while conforming to the following.

When testing forward-facing CRSs, hold the 12-month-old test dummy torso upright until it contacts the system’s design seating surface then place the 12-month-old test dummy in the seated position within the system with the midsagittal plane of the dummy head:

(1) Coincident with the center SORL of the FISA, in the case of the add-on CRS, or

(2) Vertical and parallel to the longitudinal centerline of the specific vehicle shell or the specific vehicle, in the case of a built-in CRS.

When testing rear-facing CRSs, place the newborn or 12-month-old dummy in the CRS so that the back of the dummy torso contacts the back support surface of the system.

(A) For a CRS which is equipped with a fixed or movable surface, and which is being tested under the conditions of test configuration II, do not attach any of the child restraint belts unless they are an integral part of the fixed or movable surface.

(B) For all other CRSs and for a CRS with a fixed or movable surface which is being tested under the conditions of Test Configuration I, attach all appropriate child restraint belts and tighten them as specified in S6.1.2.

(C) Attach all appropriate vehicle belts and tighten them as specified in S6.1.2.

Position each movable surface in accordance with the instruction that the manufacturer provided under S5.6.1 or S5.6.2. If the dummy's head does not remain in the proper position, it shall be taped against the front of the seat back surface of the system by means of a single thickness of 6 mm (1/4 inch) wide paper masking tape placed across the center of the dummy's face.

When testing forward-facing CRSs, extend the arms of the 12-month-old test dummy as far as possible in the upward vertical direction. Extend the legs of the 12-month-old dummy as far as possible in the forward horizontal direction, with the dummy feet perpendicular to the centerline of the lower legs. Using a flat surface with an area of 2580 mm^2 (4 in^2), apply a force of 178 N (40 lb.), perpendicular to:

(1) The plane of the back of the FISA, in the case of an add-on system, or

(2) The back of the vehicle seat in the specific vehicle shell or the specific vehicle, in the case of a built-in system.

Apply the force first against the dummy crotch and then at the dummy thorax in the midsagittal plane of the dummy.

(A) For a CRS with a fixed or movable surface, that restrains the dummy, which is being tested under the conditions of test configuration II, do not attach any of the child restraint belts unless they are an integral part of the fixed or movable surface.

(B) For all other CRSs and for a CRS with a fixed or movable surface, which is being tested under the conditions of test configuration I, attach all appropriate child restraint belts and tighten them as specified in S6.1.2.

(C) Attach all appropriate vehicle belts and tighten them as specified in S6.1.2.

(D) Position each movable surface in accordance with the instructions that the manufacturer provided.

After attaching and tightening appropriate belts, rotate each arm from the vertical position downward toward the dummy's lower body until the arm contacts a surface of the CRS or the FISA in the case of an add-on CRS, or the specific vehicle shell or the specific vehicle, in the case of a built-in CRS. Ensure that no arm is restrained from movement in other than the downward direction, by any part of the system or the belts used to anchor the system to the FISA, the specific shell, or the specific vehicle. If necessary, position the limbs so that their placement does not inhibit torso or head movement when the dynamic sled test is conducted.

When testing rear-facing child restraints, extend the dummy's arms vertically upwards and then rotate each arm downward toward the dummy's lower body until the arm contacts a surface of the CRS or the FISA in the case of an add-on CRS, or the specific vehicle shell or the specific vehicle, in the case of a built-in CRS. Ensure that no arm is restrained from movement in other than the downward direction, by any part of the system or the belts used to anchor the system to the FISA, the specific shell, or the specific vehicle.

B. OTHER DUMMIES GENERALLY (S213, S10.2.2)

When using the 3-year-old, the 6-year-old HII, and the 6-year-old weighted dummies, use the following dummy positioning procedures. In addition, when using the 6-year-old HIII and the 10-year-old dummies in CRSs other than belt-positioning seats, use the following dummy positioning procedures.

Position the test dummy according to the instructions for child positioning that the restraint manufacturer provided with the system, while conforming to the following:

(1) Hold the test dummy torso upright until it contacts the system's design seating surface then place the test dummy in the seated position within the system with the midsagittal plane of the test dummy head—

(A) Coincident with the center SORL of the FISA, in the case of the add-on CRS, or

(B) Vertical and parallel to the longitudinal centerline of the specific vehicle, in the case of a built-in CRS.

(2) Extend the arms of the test dummy as far as possible in the upward vertical direction. Extend the legs of the dummy as far as possible in the forward horizontal direction, with the dummy feet perpendicular to the centerline of the lower legs.

(3) Using a flat square surface with an area of 2580 square millimeters (4 square inches), apply a force of 178 N (40 lb.), perpendicular to:

(A) The plane of the back of the FISA, in the case of an add-on system, or

(B) The back of the vehicle seat in the specific vehicle shell or the specific vehicle, in the case of a built-in system,

First against the dummy crotch and then at the dummy thorax in the midsagittal plane of the dummy. For a CRS with a fixed or movable surface, which is being tested under the conditions of test configuration II, do not attach any of the child restraint belts unless they are an integral part of the fixed or movable surface. For all other CRSs and for a CRS with a fixed or movable surface, which is being tested under the conditions of test configuration I, attach all appropriate child restraint belts and tighten them as specified in S6.1.2. Attach all appropriate vehicle belts and tighten them as specified in S6.1.2.

(4) Position each movable surface in accordance with the instructions that the manufacturer provided.

(5) Rotate each dummy limb downwards in the plane parallel to the dummy's midsagittal plane until the limb contacts a surface of the CRS or the FISA, in the case of an add-on system, or the specific vehicle shell or specific vehicle, in the case of a built-in system, as appropriate. Position the limbs, if necessary, so that limb placement does not inhibit torso or head movement. Contact the COR if these procedures cannot be met.

When using the 6-year-old HIII and the 10-year-old dummies in belt-positioning seats, use the following dummy positioning procedures.

A) 6-year-old HIII Dummy Preparation, (S213, S10.2.3)

Apply double-sided tape to the surface of the lap shield. Align the top of the lap shield with the superior anterior edge of the pelvis skin. Attach the lap shield to the pelvis of the dummy.

Dress and prepare the dummy.

B) 10-year-old HIII Dummy Preparation (S213, S10.2.3)

(1) Set the dummy's neck angle at the Standard Procedure-16 setting, see Figure 15.

(2) Set the dummy's lumbar angle at the SP-12 setting, see Figure 16. This is done by aligning the notch on the lumbar adjustment bracket with the SP-12 notch on the lumbar attachment.

(3) Adjust the limb joints to 1-2 g while the torso is in the seated position.

(4) Apply double-sided tape to the surface of the lap shield, Align the top of the lap shield with the superior anterior edge of the pelvis skin. Attach the lap shield to the pelvis of the dummy.

(5) Apply double-sided tape to one side of a pelvis positioning pad. Center the long axis of the pad on the posterior of the pelvis with the top edge of the foam aligned with the superior edge of the pelvis skin. Attach the pelvis positioning pad to the dummy.

(6) Dress and prepare the dummy.

C. BELT-POSITIONING SEATS (S213, S6.1.2(a)(1)(ii))

A belt-positioning seat is attached at either outboard seating position of the FISA in accordance with the manufacturer's instructions using only the standard vehicle lap and shoulder belt and no tether (or any other supplemental device).

D. DUMMY POSITIONING (S213, S10.2.3(c))

Position the test dummy according to the instructions for child positioning that the restraint manufacturer provided with the system, while conforming to the following:

(1) Position the dummy on the seat cushion of the belt-positioning seat such that the plane of the posterior pelvis is parallel to the plane of the seat back of the belt-positioning seat, FISA or vehicle seat back, but not touching. Pick up and move the dummy rearward, maintaining the parallel planes, until the pelvis positioning pad, if used, or the pelvis or back of the dummy and the back of the belt-positioning seat or the back of the FISA, are in minimal contact.

(2) Straighten and align the arm segments horizontally, then rotate the arms upward at the shoulder as far as possible without contacting the belt-positioning seat. Straighten and align the legs horizontally and extend the lower legs as far as possible in the forward horizontal direction, with the feet perpendicular to the centerline of the lower legs.

(3) Using a flat square surface with an area of 2580 square millimeters, apply a force of 178 N (40 lb.) first against the dummy crotch and then against the dummy thorax on the midsagittal plane of the dummy, perpendicular to:

(i) The plane of the back of the belt-positioning seat, in the case of a belt-positioning seat with a back, or,

(ii) The plane of the back of the FISA or vehicle seat, in the case of a backless belt-positioning seat or built-in booster.

(4) Rotate the arms of the dummy down so that they are perpendicular to the torso.

(5) Bend the knees until the back of the lower legs are in minimal contact with the belt-positioning seat, FISA or vehicle seat.

(6) Position the legs such that the outer edges of the knees are 180 ± 10 mm apart for the Hybrid III 6-year-old dummy and 220 ± 10 mm apart for the Hybrid III 10-year-old dummy.

(7) Position the feet such that the soles are perpendicular to the centerline of the lower legs.

(8) In the case of a belt-positioning seat with a back, adjust the dummy so that the shoulders are parallel to a line connecting the shoulder belt guides. This can be accomplished by leaning the torso such that the dummy's head and neck are centered on the backrest components of the belt-positioning seat. In the case of a backless child restraint, adjust the dummy's torso so that the head is as close to laterally level as possible.

(9) Attach the vehicle belts and tighten the lap and shoulder portions to a tension of not less than 9 N (2 lb.) and not more than 18 N (4 lb.).

(10) Check the leg, feet, thorax, and head positions and make any necessary adjustments to achieve the positions described in steps (5)- (8), above. Position the legs, if necessary, so that the leg placement does not inhibit thorax movement.

(11) Rotate each dummy arm downwards in the plane parallel to the dummy's midsagittal plane until the arm contacts a surface of the CRS or the FISA, in the case of an add-on system, or the specific vehicle shell or specific vehicle, in the case of a built-in system, as appropriate. Position the arms, if necessary, so that the arm placement does not inhibit torso or head movement. Contact the COR if these procedures cannot be met.

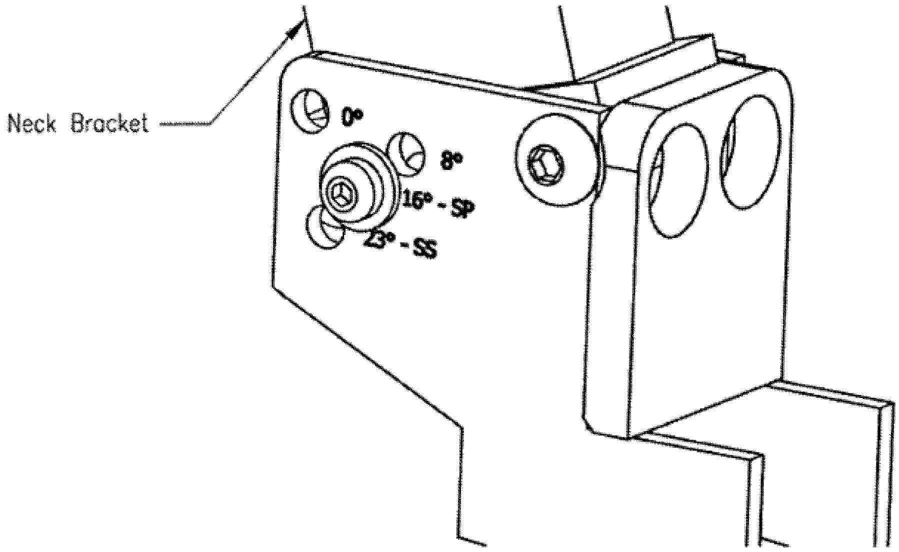


FIGURE 15. HIII-10C DUMMY NECK ANGLE SETTING IS SP-16 DEGREES

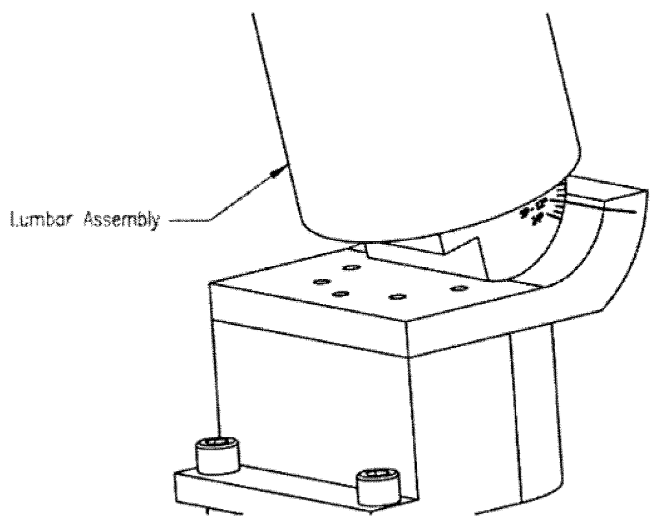


FIGURE 16. HIII-10C DUMMY LUMBAR ANGLE SETTING IS SP-12 DEGREES

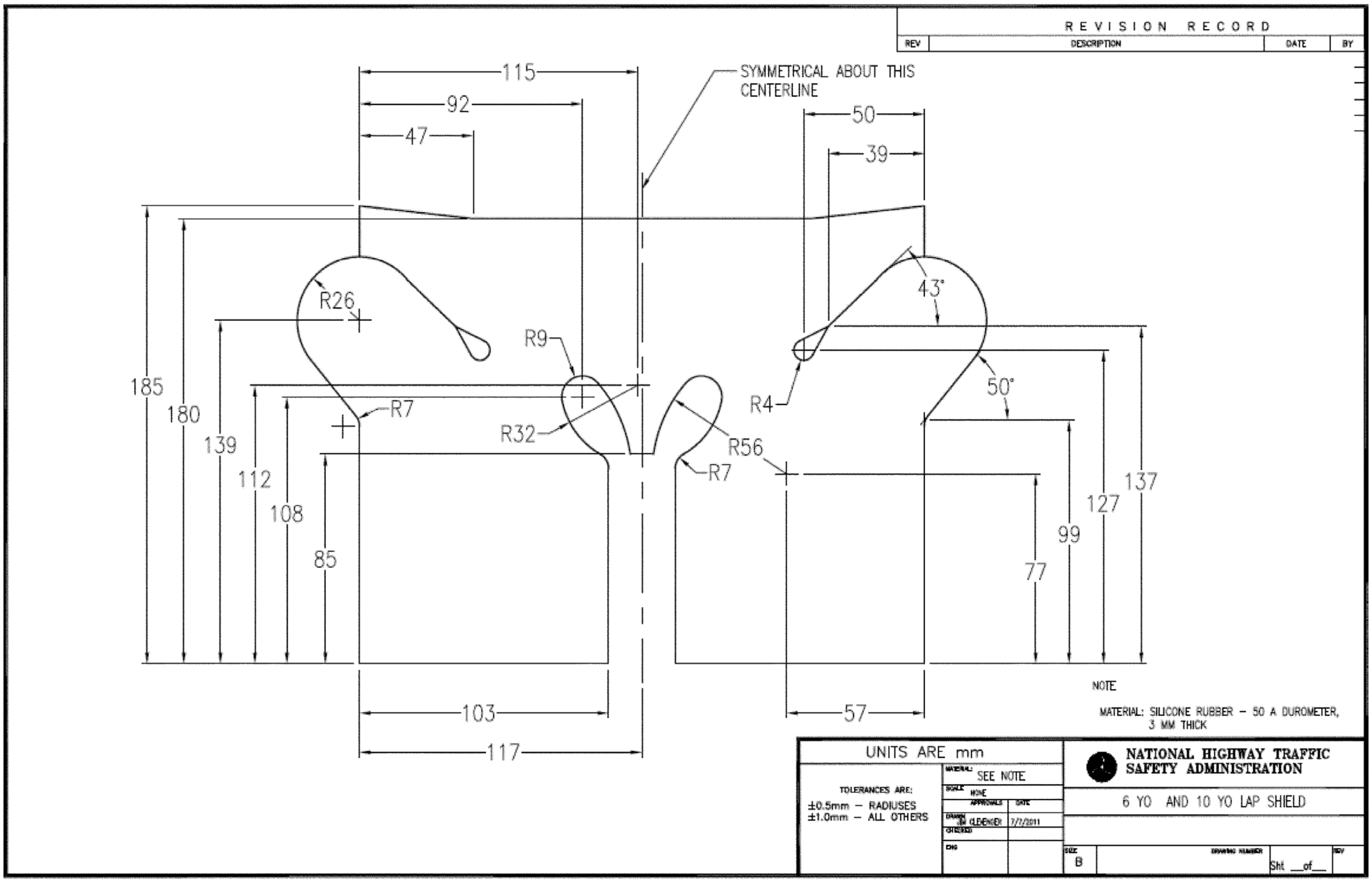


FIGURE 17. LAP SHIELD

12.D.6.6 DUMMY INSTALLATION - CAR BEDS (S213, S10.1)

Place the test dummy in the car bed in the supine position with its midsagittal plane perpendicular to the center SORL of the FISA, in the case of an add-on car bed, or perpendicular to the longitudinal axis of the specific vehicle shell or the specific vehicle, in the case of a built-in car bed. Position the dummy within the car bed in accordance with the instructions for child position that the car bed manufacturer provided with the car bed.

12.D.7 FRONTAL IMPACT DYNAMIC TEST (S213, S6.1.2(e))

Photograph the restraint setup to document the final pretest configuration. Include this documentation with the appropriate data sheet.

Before conducting the frontal impact dynamic test, ensure that:

(1) The restraint system and dummy are properly installed on the FISA, and all belts are adjusted and tensioned as required.

(2) Restraint and dummy targeting required to measure performance are properly installed.

(3) All required calibrations of instrumentation, transducers, and high-speed video camera field are completed and recorded.

(4) All parameters relating to the required impact acceleration and velocity have been correctly set.

(5) The environmental conditions are met.

When all pretest requirements are met, conduct the frontal impact dynamic test.

Immediately after the frontal impact dynamic test, photograph the restraint and dummy in their final posttest positions and configurations on the FISA or vehicle. Include this documentation with the appropriate data sheet. Provide, in addition, a plot of the sled/vehicle acceleration-time history for the test, showing its relationship to the acceleration-function envelope. Indicate on the appropriate data sheet the actual sled/vehicle velocity change for the test and the cumulative velocity change associated with acceleration deviations below the acceleration-function envelope. In the event of a noncompliance, a posttest calibration check of critically sensitive test equipment and instrumentation shall be performed at the discretion of the COR.

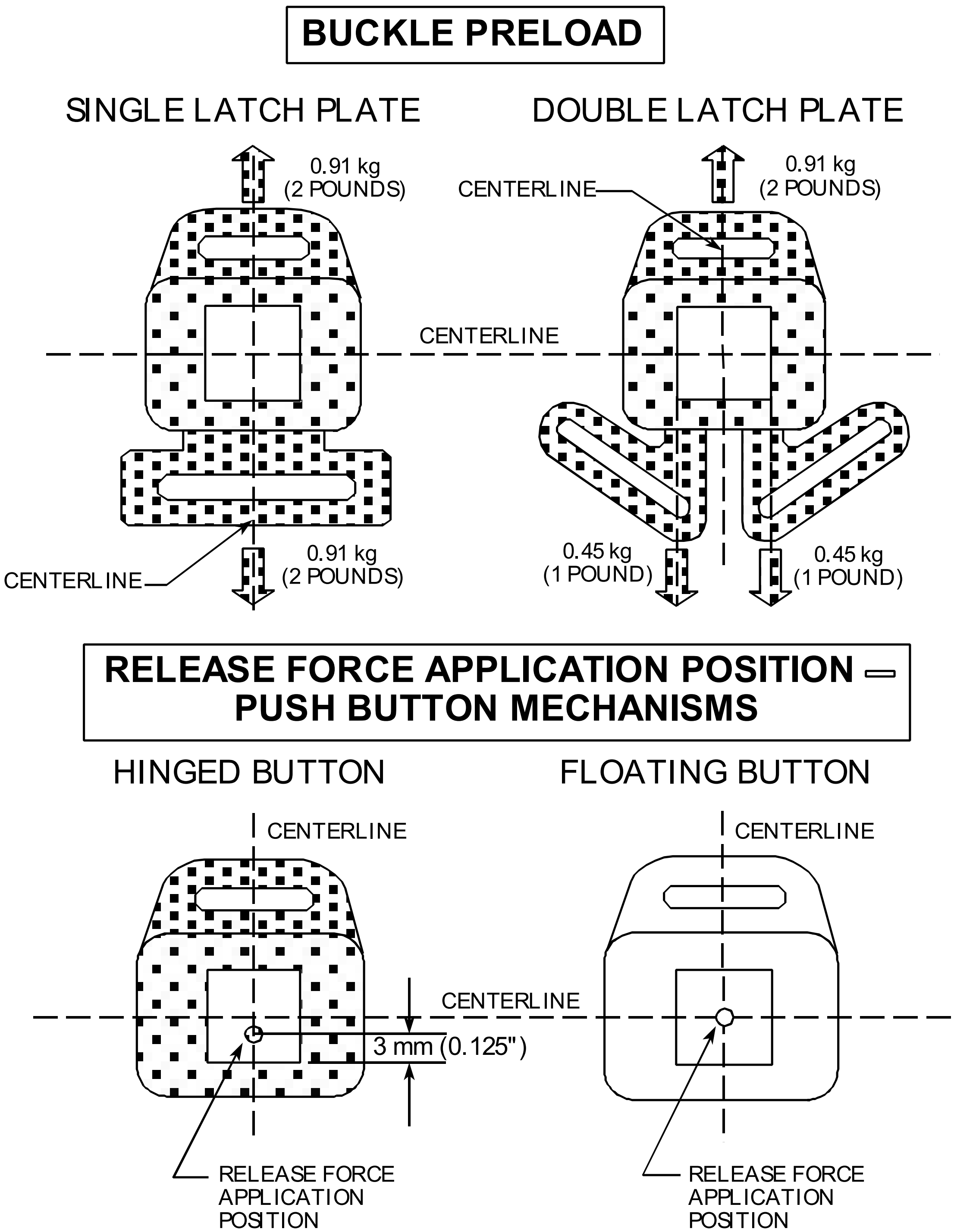


FIGURE 18. PRE-IMPACT BUCKLE RELEASE FORCE TEST SETUP

12.D.8 FRONTAL IMPACT PERFORMANCE REQUIREMENTS (S213, S5.1)

12.D.8.1 POST IMPACT BUCKLE RELEASE TEST (S213, S5.4.3.5, S6.2.3)

After completion of the testing specified in S6.1 and before the buckle is unlatched, tie a self-adjusting sling to each wrist and ankle of the test dummy in the manner illustrated in Figure 19.

Pull the sling tied to the dummy restrained in the CRS and apply a force whose magnitude is: 50 N (11 lb.) for a system tested with a newborn dummy; 90 N (20 lb.) for a system tested with a 12-month-old dummy; 200 N (45 lb.) for a system tested with a 3-year-old dummy; 270 N (61 lb.) for a system tested with a 6-year-old dummy; 350 N (79 lb.) for a system tested with a weighted 6-year-old dummy; or 437 N (98 lb.) for a system tested with a 10-year-old dummy. The force is applied in the manner illustrated in Figure 19 and as follows:

(A) Add-on Child Restraints. For an add-on child restraint other than a car bed, apply the specified force by pulling the sling horizontally and parallel to the SORL of the FISA. For a car bed, apply the force by pulling the sling vertically.

(B) Built-in Child Restraints. For a built-in child restraint other than a car bed, apply the force by pulling the sling parallel to the longitudinal centerline of the specific vehicle shell or the specific vehicle. In the case of a car bed, apply the force by pulling the sling vertically.

(C) Figure 19 illustrates a forward-facing restraint. For rear facing restraints, reverse the restraint so that it’s forward facing. Pull the sling according to the procedures for a forward-facing restraint.

While applying the force specified and using the device shown in Figure 20 for pushbutton-release buckles, apply the release force in the manner and location specified in S6.2.1, for that type of buckle. Measure the force required releasing the buckle and record in the appropriate data sheet.

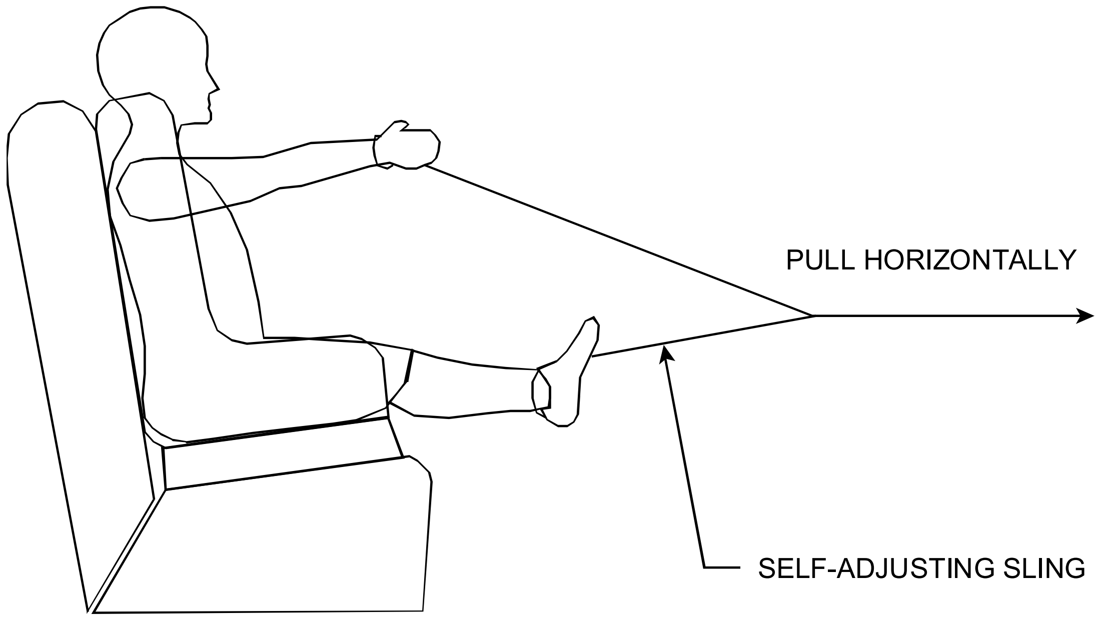


FIGURE 19. BUCKLE RELEASE TEST CONFIGURATION

12.D.8.2 RESTRAINT SYSTEM INTEGRITY (S213, S5.1.1)

After the frontal impact dynamic test, observe, measure, and record the results, including maximum protrusion values, on the appropriate data sheet. The CRS shall:

(1) Exhibit no complete separation of any load bearing structural element and no partial separation exposing either surfaces with a radius of less than 6 mm (0.25 inch) or surfaces with protrusions greater than 10 mm (0.375 inch) above the immediate adjacent surrounding contactable surface of any structural element of the system.

(2) If adjustable to different positions, remain in the same adjustment position during the testing as it was immediately before the testing except as noted below:

(A) A rear-facing CRS may have a means for repositioning the seating surface of the system that allows the system's occupant to move from a reclined position to an upright position and back to a reclined position during testing.

(B) No opening that is exposed and is larger than 6 mm (1/4 inch) before the testing shall become smaller during the testing as a result of the movement of the seating surface relative to the restraint system as a whole.

(3) If a forward-facing CRS, not allow the angle between the system's back support surface for the child and the system's seating surface to be less than 45 degrees at the completion of the test.

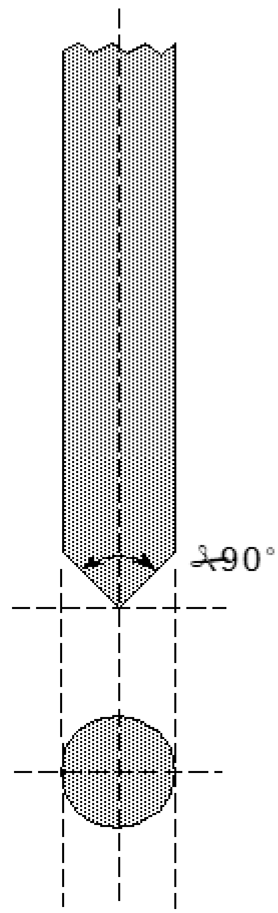


FIGURE 20. RELEASE FORCE APPLICATION DEVICE – PUSH BUTTON RELEASE BUCKLES

12.D.8.3 INJURY CRITERIA (S213, S5(d), S5.1.2)

Restraints tested with the 12-month-old, 3-year-old, or 6-year-old unweighted dummy shall be evaluated for injury potential as described in (1) and (2), below. Restraints tested with the 10-year-old dummy shall be evaluated for injury potential as described in (2) below, but not (1). Restraints tested with the 6-year-old weighted dummy shall not be evaluated for injury potential.

Record the results on the appropriate data sheet. The CRS shall:

(1) Limit the resultant acceleration at the location of the accelerometer mounted in the test dummy head as specified in 49 CFR Part 572, such that the expression for head injury criterion (HIC36):

$$HIC = \left[\frac{1}{(t_2 - t_1)}\int_{t_1}^{t_2} a dt\right]^{2.5} \langle t_2 - t_1 \rangle$$

shall not exceed 1,000, where *a* is the resultant acceleration expressed as a multiple of g (the acceleration of gravity), and t_1 and t_2, are any two moments during the impact which are separated by not more than a 36-millisecond time interval and where t_1 is less than t_2.

(2) Limit the resultant acceleration at the location of the accelerometer mounted in the test dummy upper thorax as specified in 49 CFR Part 572, to not more than 60g except for intervals whose cumulative duration is not more than 3 milliseconds.

12.D.8.4 OCCUPANT EXCURSION (S213, S5(d), S5.1.3, S5.1.4, S5.2.1.1(c))

By analysis of the high-speed video of the frontal impact dynamic test, or from an equivalent method approved by the COR, the dummy excursion must be within the following limits during the impact test. Tests conducted with a 6-year-old weighted dummy shall not be evaluated for occupant excursion.

CHILD RESTRAINT SYSTEMS OTHER THAN REAR-FACING CRS AND CAR BEDS

Each CRS, other than a rear-facing CRS or a car bed, shall retain the test dummy’s torso within the system.

FORWARD-FACING RESTRAINTS (S213, S5.1.3.1, S5.2.1.1(C))

(A) In the case of an add-on CRS, no portion of the test dummy’s head shall pass through a vertical, transverse plane that is 720 mm (28 inches) or 813 mm (32 inches) (as specified in D.5.1) forward of point Z on the FISA, measured along the center SORL (as illustrated in Figures 8 and 9), and neither knee pivot point shall pass through a vertical, transverse plane that is 915 mm (36 inches) forward of point Z on the FISA, measured along the center SORL.

(B) In the case of a built-in CRS, neither knee pivot point shall, at any time during the dynamic test, pass through a vertical, transverse plane that is 305 mm (12 inches) forward of the initial pre-test position of the respective knee pivot point, measured along a horizontal line that passes through the knee pivot point and is parallel to the vertical plane that passes through the vehicle's longitudinal centerline.

TABLE 10. FORWARD FACING RESTRAINTS EXCURSION LIMITS

When this type of CRS	is tested in accordance with	these excursion limits apply	NOTE: the CRS is attached in the manner described below, subject to certain conditions
Harnesses, backless boosters, special needs restraints	S6.1.2(a)(1)(i)(A)	Head 813 mm; Knee 915 mm	Lap belt and tether (if provided)
School bus harnesses	S6.1.2(a)(1)(i)(A)	Head 813 mm; Knee 915 mm	Seat back mount
Belt-positioning seats	S6.1.2(a)(1)(ii)	Head 813 mm; Knee 915 mm	Lap and shoulder belt; no tether
All other CRS	S6.1.2(a)(1)(i)(B)	Head 813 mm; Knee 915 mm	Lap belt; no tether
	S6.1.2(a)(1)(i)(D)	Head 813 mm; Knee 915 mm	Lower anchorages; no tether
	S6.1.2(a)(1)(i)(A)	Head 720 mm; Knee 915 mm	Lap belt and tether
	S6.1.2(a)(1)(i)(C)	Head 720 mm; Knee 915 mm	Lower anchorages and tether

Record the results of the video analysis, including maximum excursions and angles observed, on the appropriate data sheet.

REAR-FACING RESTRAINTS (S213, S5.1.3.2, S5.1.4, S5.2.1.1(C))

For each rear-facing CRS, record the results of the video analysis, including maximum angles observed, on the appropriate data sheet: all portions of the test dummy's torso shall be retained within the system and neither of the target points on either side of the dummy's head and on the transverse axis passing through the center of mass of the dummy's head and perpendicular to the head's midsagittal plane, shall pass through the transverse orthogonal planes whose intersection contains the forward-most and top-most points on the CRS surfaces (illustrated in Figure 21).

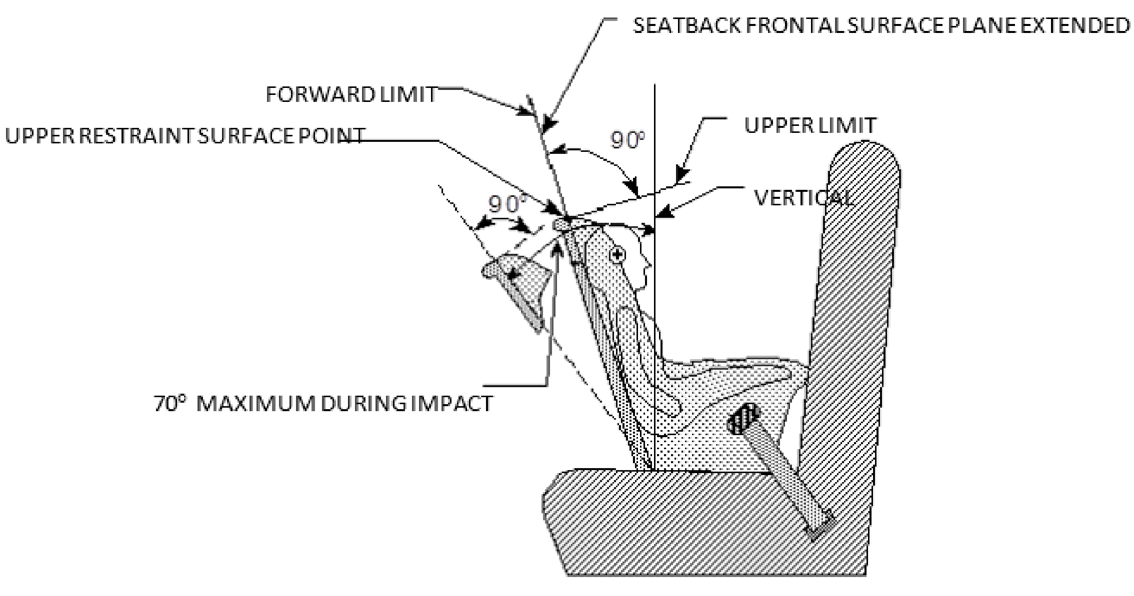
Record the results of the video analysis, including maximum angles observed, on the appropriate data sheet.

CAR BEDS (S213, S5.1.3.3)

In the case of car beds, all portions of the test dummy's head and torso shall be retained within the confines of the car bed. Record the results on the appropriate data sheet.

BACK SUPPORT ANGLE (S213, S5.1.4)

When a rear-facing CRS is tested in accordance with S6.1, the angle between the system's back support surface for the child and the vertical shall not exceed 70 degrees. Record the results on the appropriate data sheet.



NOTE: Limits illustrated move during dynamic testing

FIGURE 21. REAR FACING CRS FORWARD AND UPPER HEAD EXCURSION LIMITS

12.E 213a SIDE IMPACT DYNAMIC TEST CONDITIONS AND PROCEDURES (213a, S6)

As directed by the COR, test a new specimen of the CRS according to the procedures below in each possible combination of installation mode, adjustment position, and proper use/"misuse" mode. Record the combination to be tested as well as the test configuration to be used on the appropriate data sheet.

12.E.1 SIDE IMPACT DYNAMIC TEST EQUIPMENT (213a, S6.1)

12.E.1.1 TEST CONDITIONS AND DEVICES (213a, S6.1.1(a))

The test device used to evaluate the side impact dynamic performance is a side impact seat assembly (SISA) consisting of a simulated vehicle rear seat, with one seating position, and a simulated door assembly as described in Drawing Package, "NHTSA Child Side Impact Sled," dated December 2021. The simulated door assembly is rigidly attached to the floor of the SISA, and the simulated vehicle rear seat is mounted on rails to allow it to move relative to the floor of the SISA in the direction perpendicular to the seat orientation reference line (SORL). The SISA is mounted on a dynamic test platform so that the SORL of the seat is 10 (± 1) degrees from the perpendicular direction of the test platform travel. The SISA is rotated to replicate a side impact on a near-side CRS. The overall set-up of the FMVSS No. 213 side impact dynamic test is shown in Figure 22.

Figure 22 also illustrates the locations of the child restraint anchorage system for systems tested using the child restraint anchorage system applicable to add-on CRSs other than belt-positioning booster seats.

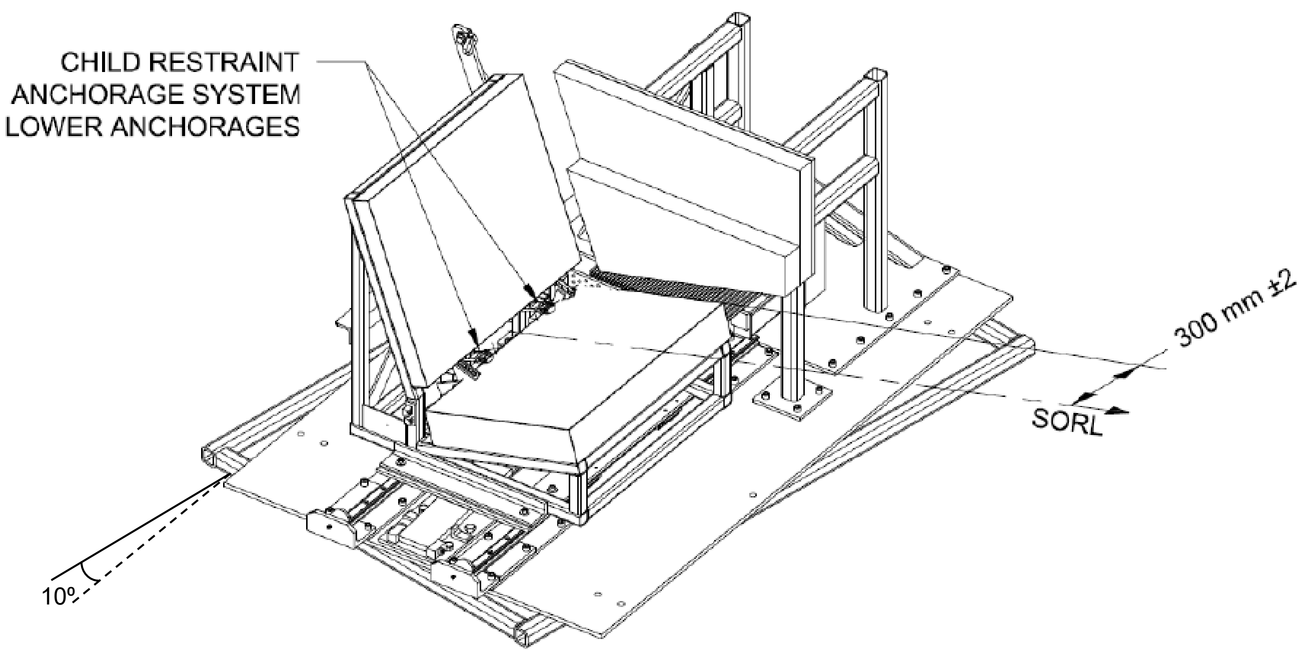


FIGURE 22. SIDE IMPACT SEAT ASSEMBLY

SISA SEAT FOAM CUSHIONS

Before conducting a side impact dynamic test, measure the force-deflection characteristics of the seat pan and seat back polyurethane foam cushions used in the SISA seat. Using the test methodology and apparatus described in ASTM Standard D3574-11 “Standard Method of Testing Flexible Cellular Materials-Slab Urethane Foam,” determine the load required to produce a 25%, 50%, and 65% (± 1%) compression of the foam thickness. These loads shall be recorded and made available to the COR, if requested. The 25% and 65% compression loads shall be used only as reference. To be suitable for use in compliance testing, the foam inserts shall compress 50% under the following load limits, at the center of the insert, regardless of other factors:

51 mm (2-inch) thick foam:	255 to 345 N (57.3 to 77.6 lb.)
102 mm (4-inch) thick foam:	374 to 506 N (84.1 to 113.8 lb.)

NHTSA Research has shown that best practices for foam indentation force deflection (IFD) response include storing the foam cushion in a temperature and humidity-controlled environment for at least 24 hours prior to conducting a test. If foam is continuously used, best practice is that under this contract, the foam shall be stored in an enclosed temperature and humidity-controlled chamber whenever the cushions are not being used for dynamic testing or undergoing force-deflection calibration. [11] The enclosed chamber shall meet the following environmental conditions:

Temperature	18.3°C (65°F) to 23.9°C (75°F) [12]
Relative Humidity	50% to 60%[12]

If a foam cushion has already been used in a side impact dynamic test, allow a minimum of twenty-four hours recovery time in the enclosed temperature and humidity-controlled chamber before measuring the force-deflection characteristics. Inspect each used foam cushion for damage or permanent deformation, and replace any cushion judged to be defective. Spray glue adhesive may be used to mend small cuts or tears of less than 1 inch in length.

Seat Pan Cushion for Child Frontal/Side Impact Sled drawing 3021-233
Seat Back Cushion for Child Frontal/Side Impact Sled drawing 3021-248

SISA SEAT CUSHION COVERS

The SISA seat foam cushions are to have seat cushion covers. The seat cushion covers are constructed of polyacrylate fiber fabric with a weight of 9.0 oz. per square yard and a breaking strength of 285 lb. in the warp direction (threading that runs parallel

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[11] Foam cushions that meet the IFD requirements are valid for testing even if they have not been conditioned under the recommended best practices.
[12] Louden, A. E., & Wetli, A. E. (2021, June). *Evaluation of foam specifications for the proposed FMVSS No. 213 test bench* (Report No. DOT HS 813 129). National Highway Traffic Safety Administration.

to the y-axis of the SISA (see Figure 33) when the cushion is installed on the SISA) and 180 lb. in the fill direction (threading that runs perpendicular to the y-axis of the SISA when the cushion is installed on the SISA), or equivalent. The contractor has the option to cover the seat cushions using either the folding method or covers that have been fashioned with zippers. A light shade of orange or blue is recommended for best contrast between the CRS and SISA. Two sheets of 120-grit sandpaper may be adhered, with use of spray adhesive, to the seat pan and seat back surface that contacts the seat cushion to keep the cushions in place.[13] (Figure 23)

Seat Pan Cushion Cover for Child Frontal/Side Impact Sled drawing 3021-234
Seat Back Cushion Cover for Child Frontal/Side Impact Sled drawing 3021-249

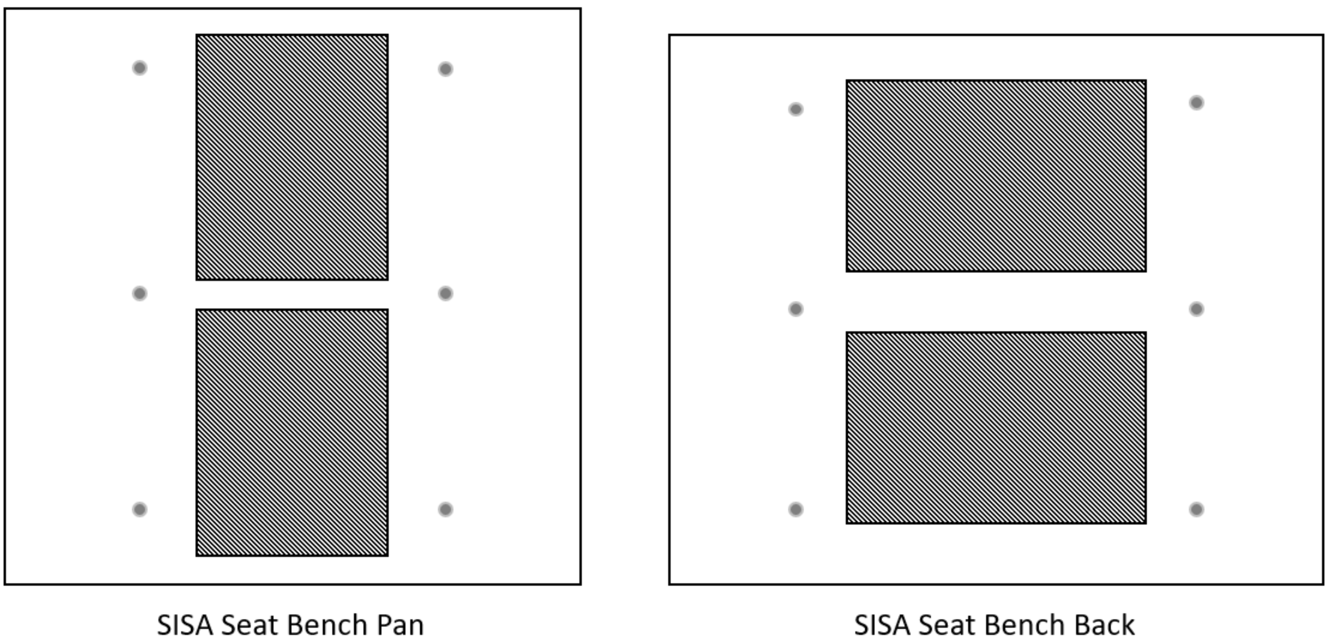


FIGURE 23. TWO PIECES OF SANDPAPER ADHERED TO THE SEAT PAN and BACK

Maintain a gap measurement of 69 mm ± 5 mm between the seat back and seat bottom cushions when the cushions are installed on the SISA. The seat cushion covers shall contact the CRS when installed on the SISA.

One set of seat cushion covers may be used repeatedly, for multiple tests. The seat cushion covers shall be maintained and inspected between tests. Damaged covers that are torn or no longer properly secure the seat cushion shall be disposed of.

[13] Seat pan and seat back sandpaper is not required by FMVSS No. 213a. The adhesive sandpaper is a recommendation based on lessons learned by NHTSA research testing.

A. SISA SEAT COVER FOLDING METHOD

If the folding method is used to cover the seat cushions, then the cushions shall be covered such that the warp direction is parallel to the y-axis of the SISA (see Figure 33) when the cushion is installed on the SISA. The dimensions for the seat cushion covers shall meet the following requirements:

Seat pan: 1,080 x 1,270 mm (42.5 x 50 in)[14]
Seat back: 1,118 x 1,118 mm (44 x 44 in)[14]

Center the seat cushion on the seat cushion cover material. Place the seat pan plate on the seat cushion so that it is centered with approximately 25mm (1 in.) of cushion foam exposed on each side of the seat pan. For a seat cushion that is comprised of two pieces that have been glued together, orient the glued side so that it is positioned at the top of the seatback.

Stretch the cushion cover over the seat pan bolts and mark the fabric at the location of the bolts. Use a soldering iron to burn through the cover material at the marked locations. Install size 1 grommets at each of the hole locations. Place the grommet holes of the fabric over the bolts on the seat pan and adhere the edge of the fabric to the seat pan using 3-inch preservation tape, or equivalent. (Figure 24)

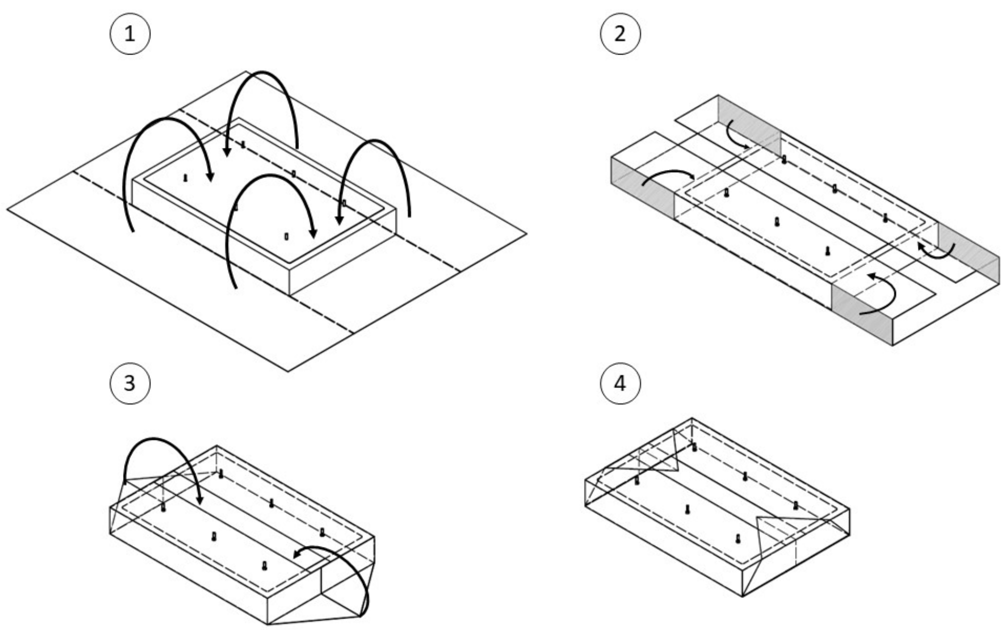


FIGURE 24. SEAT COVER FOLDING STEPS

[14] Cushion cover dimensions are marked such that the first dimension corresponds with the direction of fill, and the second dimension corresponds with the direction of warp.

B. SISA SEAT ZIPPER COVERS

If the zipper covers are used to cover the seat cushions, then zipper covers shall be fashioned such that the warp direction is parallel to the y-axis of the SISA (see Figure 33) when the cushion is installed on the SISA. The dimensions for the seat cushion covers shall meet the drawings in Figure 25, below. Place the seat pan plate in the cover so that it is approximately centered with the seat cover and cushion. Use a soldering iron to burn through the cover material at the seat pan plate bolt locations. Install size 1 grommets at each of the hole locations.

For a seat cushion that is comprised of two pieces that have been glued together, orient the glued side so that it is positioned at the top of the seatback.

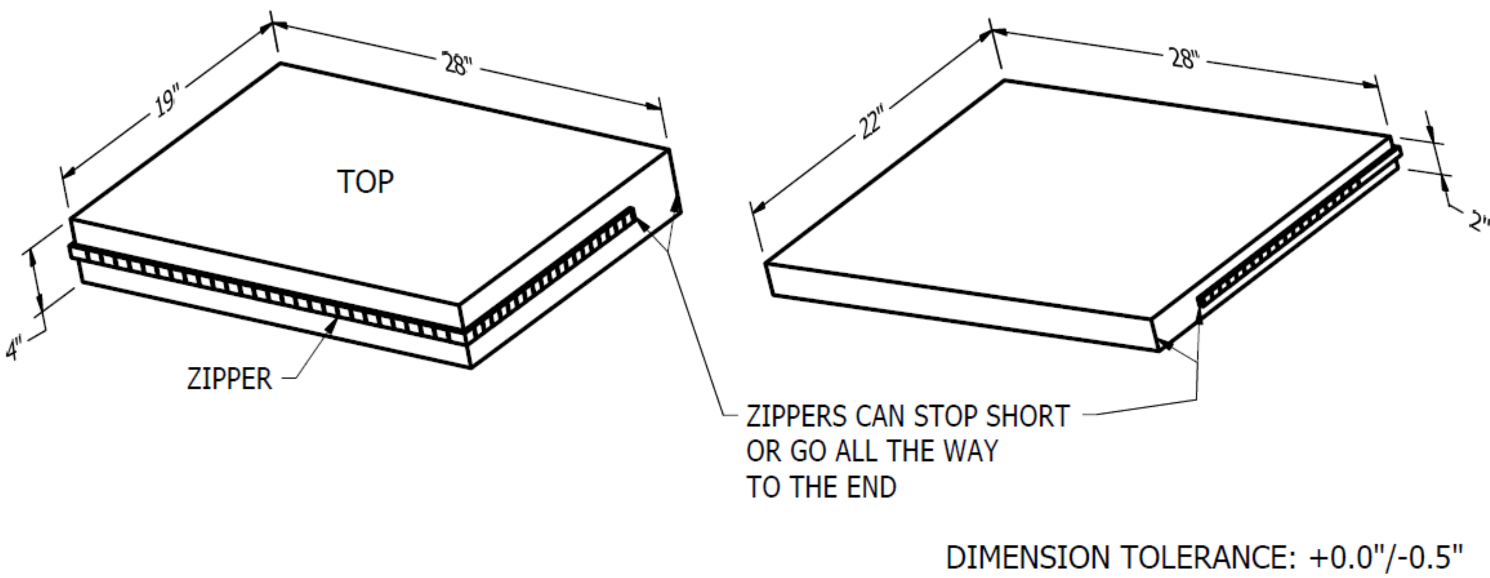


FIGURE 25. SEAT PAN (LEFT) AND BACK (RIGHT) CUSHION COVERS WITH ZIPPERS

DOOR AND ARMREST FOAM

Unless otherwise agreed to by the COR, a new set of door foams should be installed to the door impact fixture for every test.[15] The door foams should be attached to one another by spray adhesive and then mounted to the steel door fixture plate with duct tape (Figures 28 and 29). An additional steel plate may be mounted to the base of the of the steel door fixture, see Figure 26. This plate is centered, and plug welded to the bottom of the door fixture and will facilitate positioning the door foam on the door impact fixture.

Impactor Door Foam for Child Side Impact Sled drawing 2921-501
Impactor Armrest Foam for Child Side Impact Sled drawing 2921-502

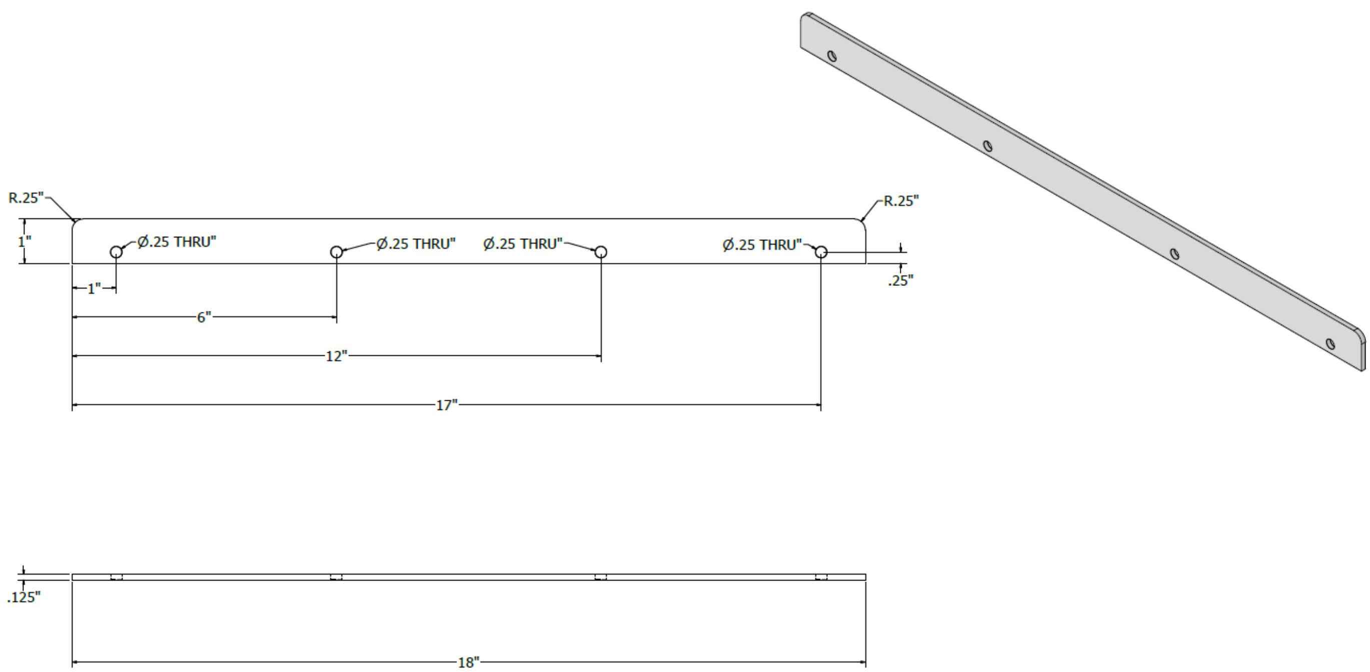


FIGURE 26. IMPACT DOOR FOAM LEDGE

ALUMINUM HONEYCOMB

For every test, install a new piece of aluminum honeycomb (Figure 27) to the honeycomb shelf under the door structure. Adjust the honeycomb height, width, and specifications so that the SISA acceleration is any acceleration within the corridors specified in Tables 12 and 13 and Figures 34 and 35. The dimensions of the aluminum honeycomb shown in Figure 27 are for reference only based on the sled design used by NHTSA research.

[15] This is not required by the FMVSS No. 213a. Replacing the door foams each test is a recommendation based on lessons learned during NHTSA research testing.

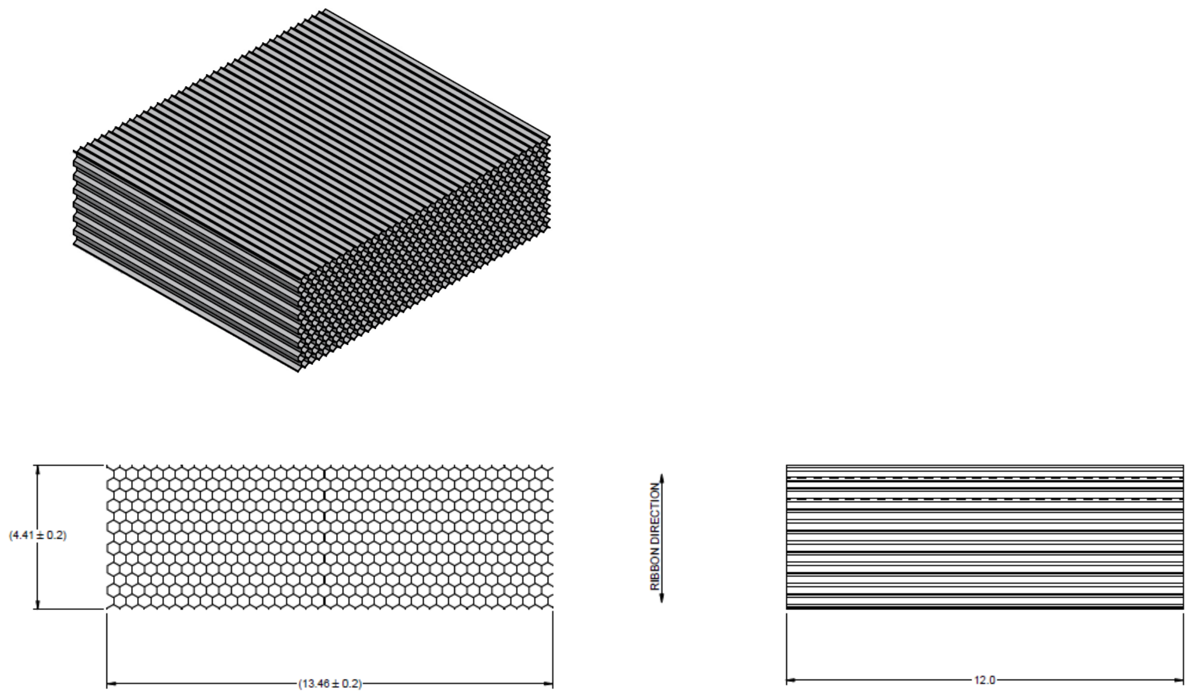


FIGURE 27. ALUMINUM HONEYCOMB

(DIMENSIONS FOR REFERENCE ONLY)

The installation of the aluminum honeycomb shall be performed in a manner that maintains the honeycomb in a level position without sagging or shifting during the dynamic test. The method used to secure the honeycomb shall not disrupt the interaction between the SISA sliding seat and door fixture (Figures 28 and 29) such that the pulse remains in the corridor.

Because Standard 213a and the drawing package are silent with respect to the method for supporting the honeycomb, no method is prohibited as long as the seat acceleration and relative velocity pulses remain in the corridor. OVSC recommends either using a single strip of duct tape across the front face of the honeycomb to the impactor stop assembly shelf for securing the aluminum honeycomb; or, as shown in Figures 30 and 31, utilizing threaded rods to secure the aluminum honeycomb.

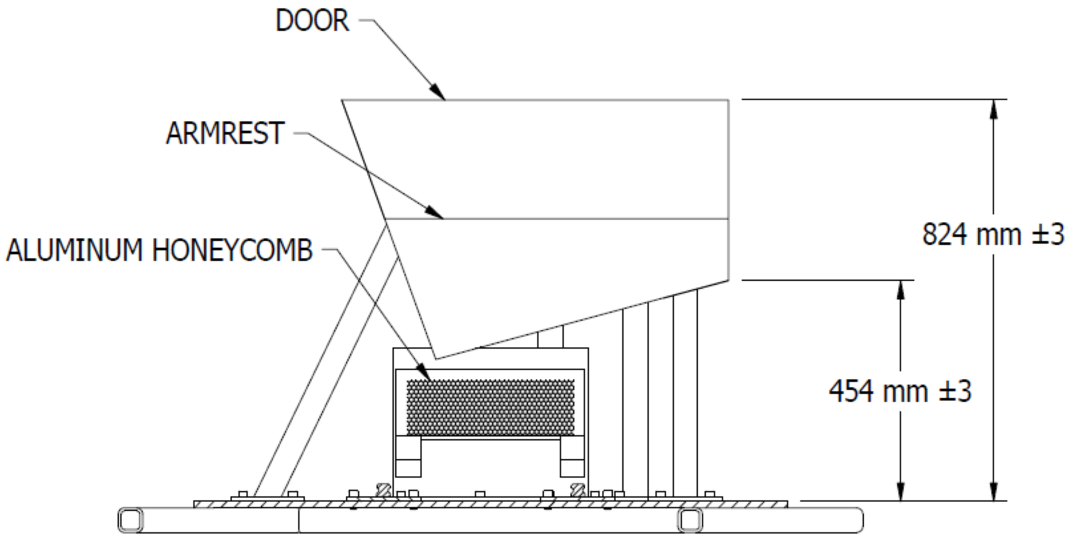


FIGURE 28. SISA DOOR PANEL VIEW

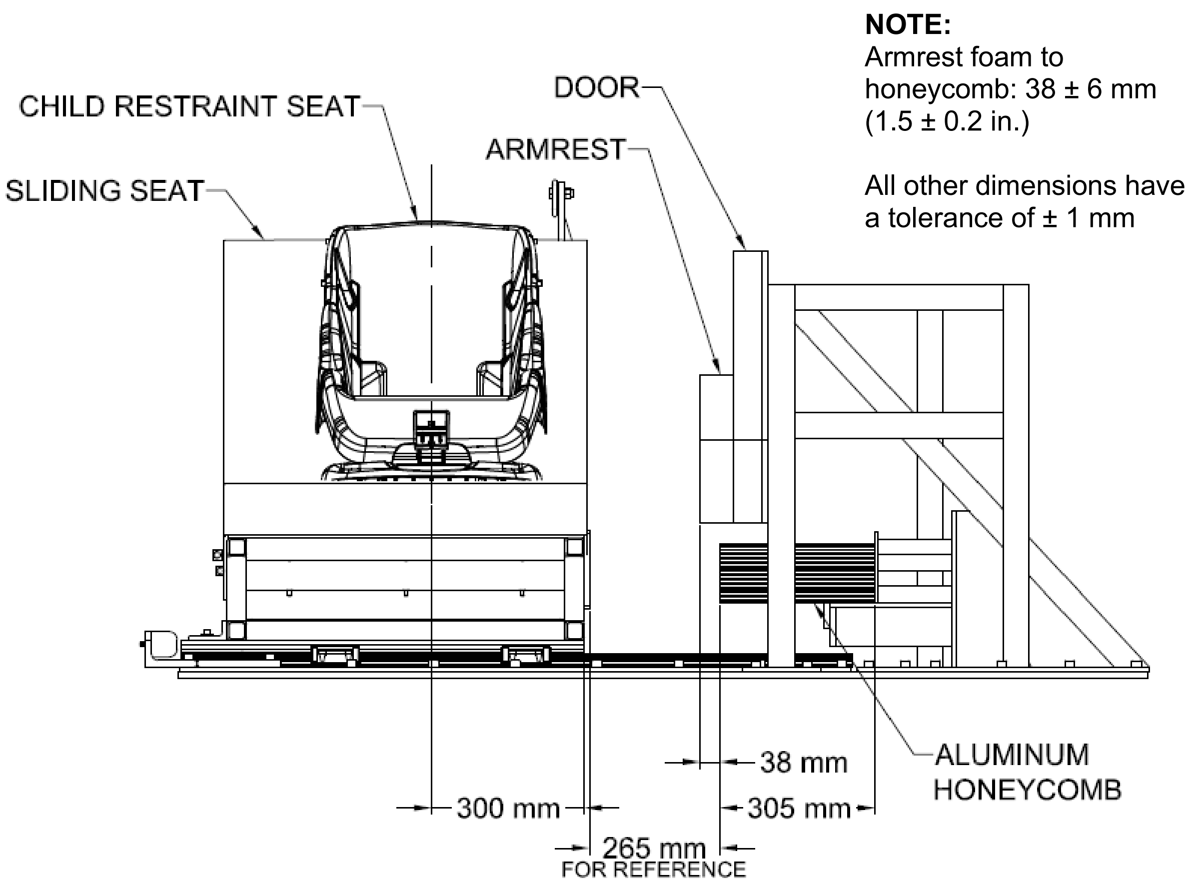


FIGURE 29. SISA FRONTAL VIEW[16]

(WITH SAMPLE CRS INSTALLED)

[16] Dimensions are applicable to acceleration sleds.

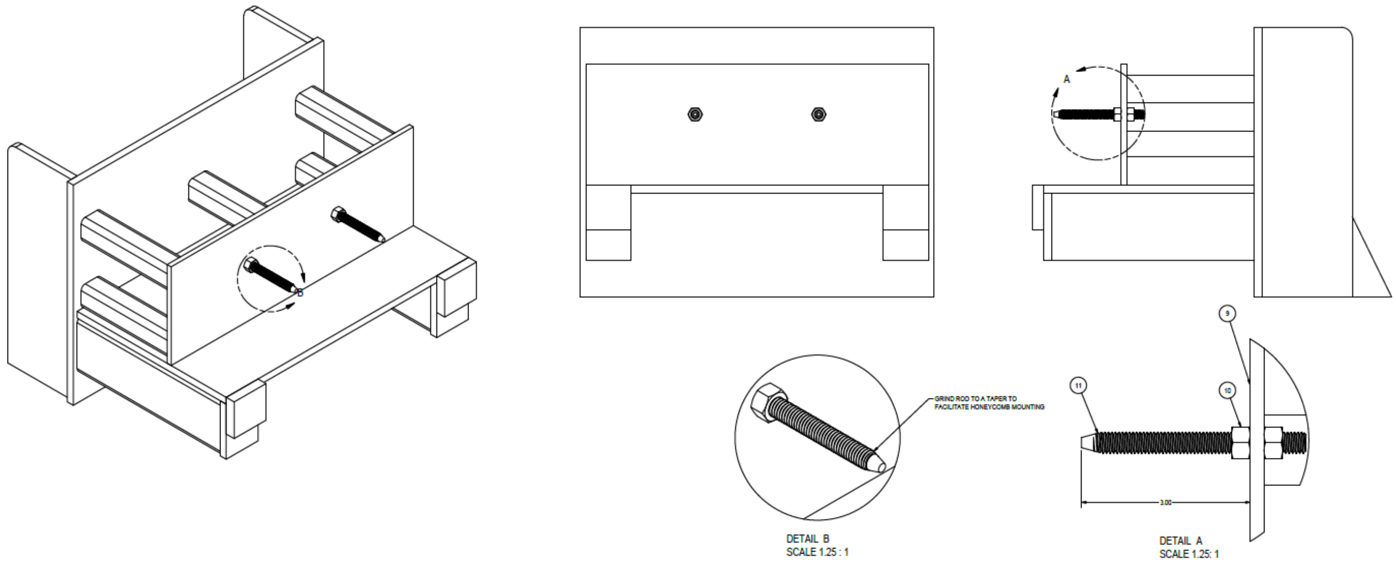


FIGURE 30. EXAMPLE METHOD USED TO INSTALL HONEYCOMB

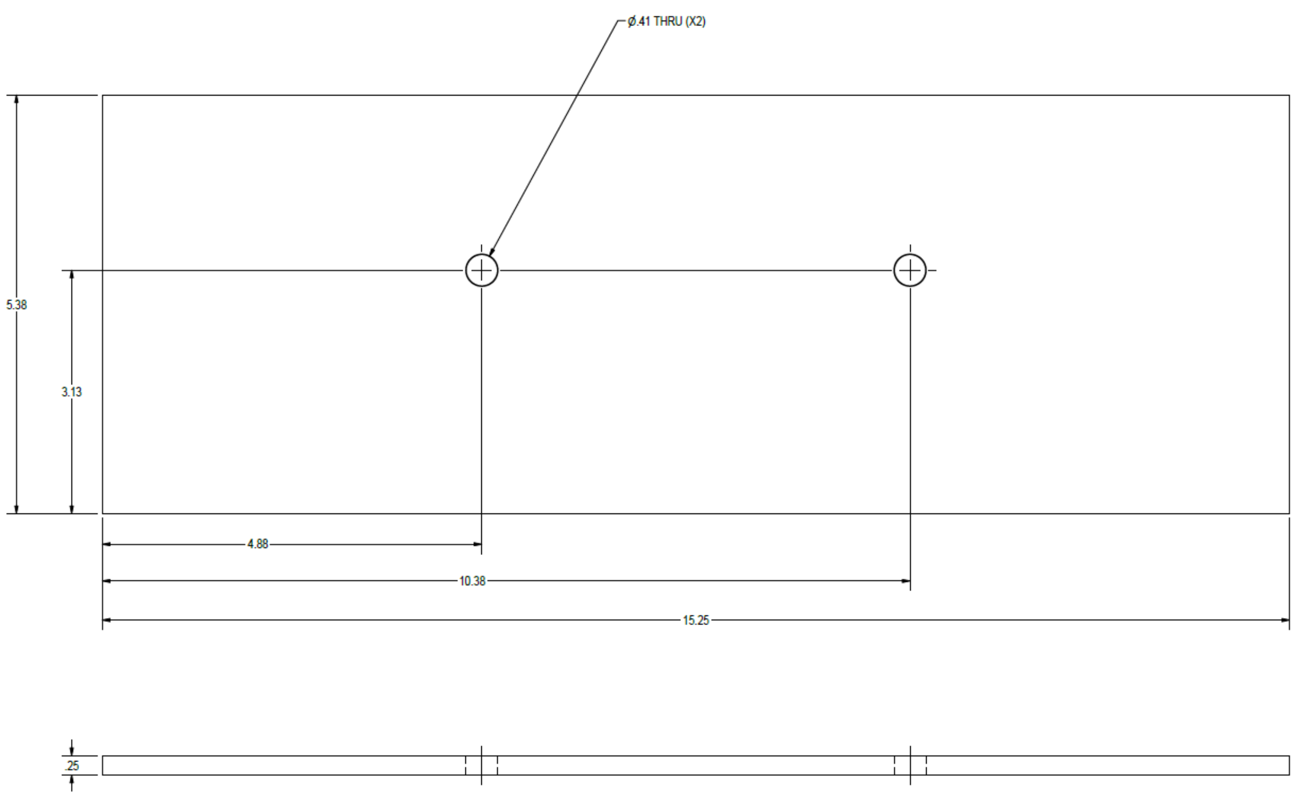


FIGURE 31. EXAMPLE METHOD - DIMENSIONS OF FIGURE 30 (in.)

213a HIGHSPEED IMAGE COLLECTION

Four high-speed cameras (minimum 1000 fps) shall be set-up in the following locations[17] to record SISA, CRS, and occupant kinematics during the side impact dynamic test (Figure 32). Cameras 2 and 4 shall be mounted such that the camera's imaging sensor is positioned at the angle and location specified in Table 11. The contractor shall select a camera lens that provides a clear, focused, high-resolution image for their camera model. Contact the COR for example photos to demonstrate the field of view.

1. Overhead Wide: This view shall include the entire sliding seat, CRS, and door fixture. The impact of the sliding seat into the door shall be in focus and the entire event visible.

2. Armrest View: This view shall be focused on the point of impact between the armrest foam and the sliding seat. The view shall be focused on the point when the sliding seat contacts the armrest and door foam.

3. Front View of Dummy: This view shall include the entire sliding seat, front view of the CRS, the armrest foam, door foam, and the honeycomb. The area of sliding seat and door fixture contact shall be focused to clearly see the event.

4. Door View for RF CRS: This view shall include the entire top of the door foam. The camera shall look from the rear to the front in line with the door foam, so that in the event head contact occurs, it is visible.

TABLE 11. 213a HIGHSPEED CAMERA POSITIONS

Camera	Camera Angle (± 1°)	X	Y	Z
		mm (± 2) from Z-point		
#2 Armrest View	10°	1290	920	-664
#4 Door View for RF CRS	40°	-360	1012	-837

[17] OVSC is collecting data and may define precise locations for highspeed cameras.

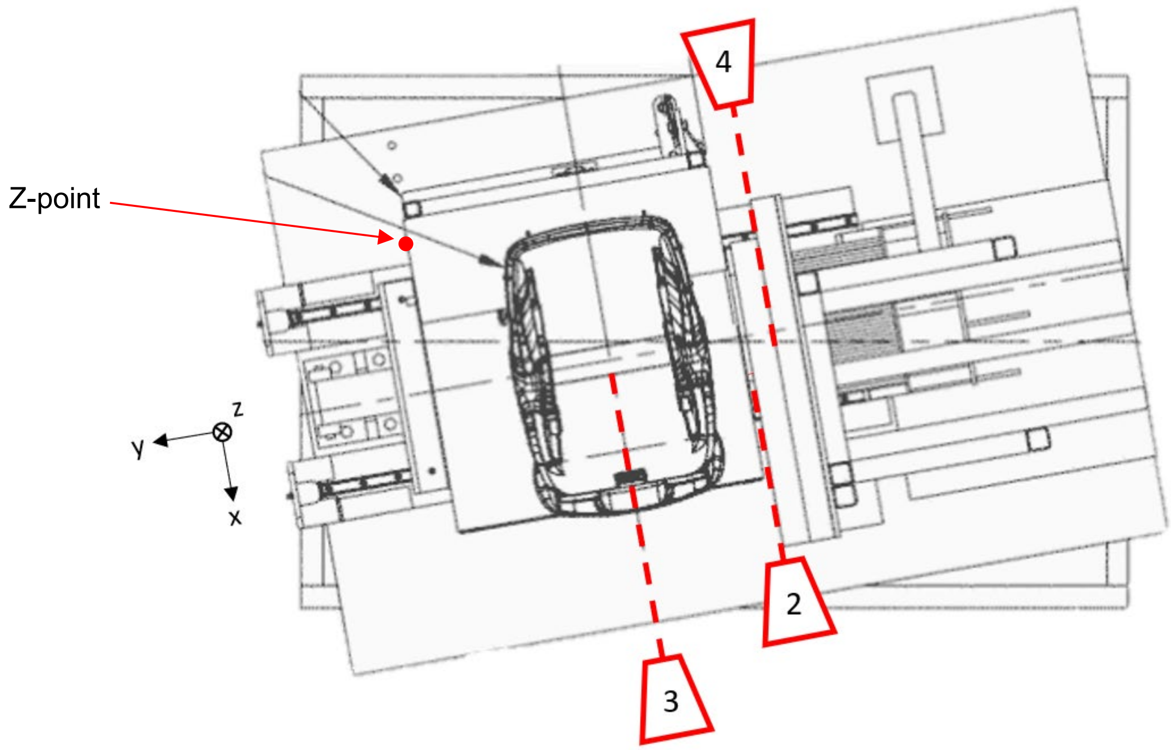


FIGURE 32. 213a HIGHSPEED CAMERA LOCATIONS[18]

12.E.1.2 INSTRUMENTATION

TRANSDUCERS (S213a, S5.1.2, S6.1.1, S7.1)

The following transducers are required:

(1) Two accelerometers, one primary and one redundant, for monitoring sliding seat bench acceleration. Accelerometer type and class as specified below, is required to adequately measure an acceleration response as specified in Figure 34. These accelerometers shall be mounted on the right rear support leg of the sliding seat (with respect to the SORL) at the locations specified as "G" in Figure 33. NHTSA is finalizing its selection of one of these two accelerometers:

Accelerometer model:	726CH-2K
Mounting frequency response:	± 5%, 0 to 5000 Hz
Transverse sensitivity:	3% maximum
Dynamic range:	± 2000 g, maximum
Sample Rate:	20 kHz
Type and Class:	60

[18] See drawing number 2921-900 of NHTSA Standard Seat Assembly; FMVSS No. 213a- Side impact No. NHTSA-213a-2021 (dated December 2021) for Z-point dimensions.

Accelerometer model:	726CH-2KTZ
Mounting frequency response:	± 5%, 0 to 5000 Hz
Transverse sensitivity:	1% maximum
Dynamic range:	± 2000 g, maximum
Sample Rate:	20 kHz
Type and Class:	60

(2) An accelerometer for monitoring sled acceleration and door impact deceleration mounted directly to the sled carriage. Accelerometer type and class as specified below, is required to adequately measure the relative response between the sliding seat and door as specified in Figure 35. NHTSA is finalizing its selection of one of these two accelerometers:

Accelerometer model:	726CH-2K
Mounting frequency response:	± 5%, 0 to 5000 Hz
Transverse sensitivity:	3% maximum
Dynamic range:	± 2000 g, maximum
Sample Rate:	20 kHz
Type and Class:	60

Accelerometer model:	726CH-2KTZ
Mounting frequency response:	± 5%, 0 to 5000 Hz
Transverse sensitivity:	1% maximum
Dynamic range:	± 2000 g, maximum
Sample Rate:	20 kHz
Type and Class:	60

(3) Three accelerometers are required for mounting in the head of the Q3s 3-year-old dummy. Accelerometer type and class as specified in the Part 572 Subpart W, Q3s Three-Year-Old Child Side Impact Dummy drawing package. Each axis of the accelerometers shall meet the following minimum performance requirements:

Mounted resonance frequency:	± 5%, 22,000 Hz, minimum
Maximum damping:	0.005 of critical, nominal
Transverse sensitivity:	± 1% maximum
Linearity and hysteresis:	± 2% of reading, maximum
Dynamic range:	± 2000 g
Type and Class:	1000

(4) One Infrared Telescoping Rod for Assessment of Chest Compression (IR-TRACC) as specified in the Part 572 Subpart W, Q3s Three-Year-Old Child Side Impact Dummy drawing package is required for mounting in the thorax of the Q3s 3-year-old dummy. The IR-TRACC should be mounted facing the oncoming impact direction of the sled door assembly.

Linearity:	2% F.S., maximum
Max extension error:	2% F.S., maximum
Displacement range:	65 mm, maximum
Type and Class:	600

(5) Integration of the sled and seat accelerometers to determine the speeds of the side impact dynamic test.

(6) Force transducer to monitor the load applied to the dummy sling during the Buckle Release Tests described in this procedure.

(7) Force transducer to measure buckle release force.

(8) SISA contact switch sensor between the SISA sliding seat and honeycomb crush core material to determine T_0 of the seat acceleration.

Other instrumentation, as needed:

(1) Seat belt webbing load cells to monitor belt preload during seat installation. This item is not required if an equivalent belt tension measurement device is utilized to such as the three-prong belt tension gauge.

(2) Head contact sensor between the CRABI 12-month-old dummy head and SISA door foam.

(3) Vertical laser line for CRS and ATD installation.

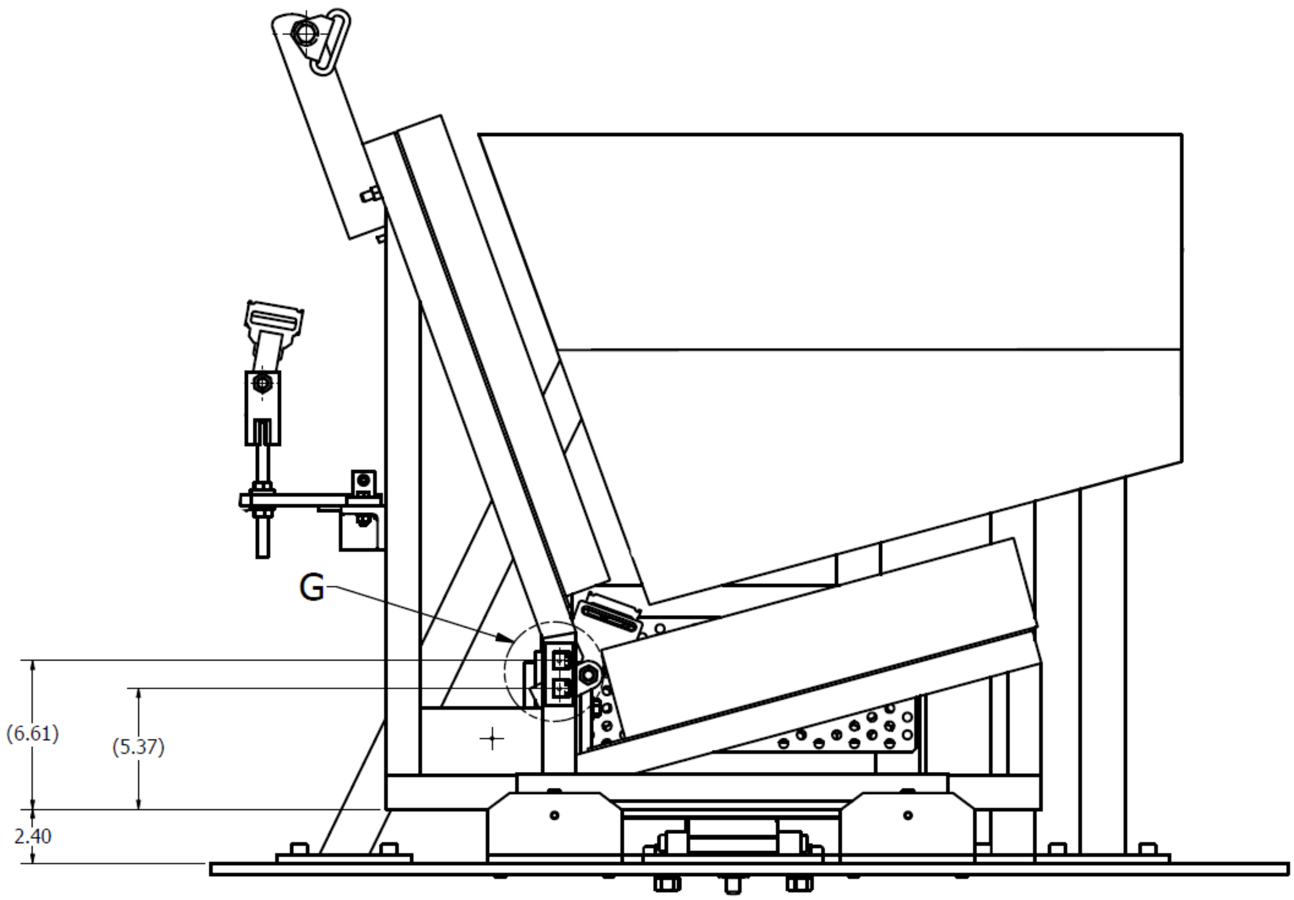


FIGURE 33. SEAT BENCH ACCELEROMETER MOUNTING LOCATIONS[19] (in.)

PLAYBACK AND RECORDING EQUIPMENT

Equipment shall be provided that has the following capabilities:

(1) Have a minimum capability of 9 data channels for measuring the following during the side impact dynamic test:

3 – Q3s head accelerations
1 – Q3s thorax deflection
1 – Primary Sliding Seat acceleration
1 – Redundant Sliding Seat acceleration
1 – Sled acceleration
1 – Seat to Honeycomb contact
1 – CRABI head to door contact

(2) Provide a record of all data channels during dynamic impact.

[19] The upper seat bench accelerometer shall be recorded as the primary.

12.E.1.3 BELT WEBBING

The webbing used for Type II belt CRS installations shall comply with FMVSS No. 209, S*eat belt assemblies*. Given the range of elongation that 209-compliant belt webbing could be, OVSC requests laboratories procure webbing having an elongation of 8 ± 2%. A light shade of ivory, silver, or blue is recommended for best contrast between the CRS and SISA cushion covers. A new belt is used for each test performed.

12.E.2 SYSTEMS CHECK

Prior to the dynamic testing, check the bearings of the side impact sled assembly for frictional performance. Complete this performance test after every 10 dynamic tests or within 24 hours of a side impact dynamic test, or as needed, to help ensure the sled meets the test corridors.

1. If installed, clamp the optional anti-rebound fixture down so that it does not interact with the sliding seat.
2. Using a force gauge, conduct a push test at the lower seat frame of the sliding seat, before the CRS is installed, and record the value.
3. Next, use the force gauge to conduct a pull test at the lower seat frame of the sliding seat, before the CRS is installed, and record the value.
4. If either force is above 15 lb (66.7 N), lube the bearings through the zerk fittings with high performance grease.
5. Conduct an additional push/pull test on the sliding seat after the tracks are greased.
6. Record the values and repeat the frictional performance check until the force required to push or pull the sliding seat is below 15 lb (66.7 N).

Additionally, best practice suggests conducting one trial test to determine that all systems are functioning properly. In particular:

(1) Ensure the test velocities and acceleration conditions given in this procedure are met.

(2) When applicable, conduct the trial test with an instrumented dummy to assure correct operation of transducers, signal conditioning, and record/playback equipment.

(3) Review high-speed video coverage of the test setup and timing of the camera operation.

(4) Ensure accurate calibrations of the high-speed video field of view are available in the plane of motion of the CRS.

Figure 29 illustrates the dimensions that must be maintained for each side impact dynamic test. Check these dimensions before every test to ensure that neither the sliding seat nor CRS has moved during the setup process. Maintain a spacing between the door foam and honeycomb at 38 ± 6 mm (1.5 ± 0.2 in.). Maintain a spacing between the honeycomb face and the honeycomb impact plate at 265 ± 1 mm (10.4 ± 0.04 in.). The other dimensions shown shall be maintained with a tolerance of ± 1 mm.

12.E.3 SIDE IMPACT DYNAMIC TEST CONDITIONS

12.E.3.1 ENVIRONMENTAL CONDITIONS (S213a, S6.1.1(d))

Perform all side impact dynamic testing under the following environmental conditions unless otherwise agreed to by the COR:

Temperature	20.6°C (69°F) to 22.2°C (72°F)
Relative Humidity	10% to 70%

12.E.3.2 SIDE IMPACT SPEED (213a, S6.1.1(b))

Accelerate the test platform to achieve a relative velocity of 31.3 ± 0.64 km/h (19.4 ± 0.4 mph) in the direction perpendicular to the SORL between the SISA sliding seat and the door assembly at the time they come in contact (time = T_0).

The SISA sliding seat acceleration must be within the corridor shown in Table 12 and Figure 34. This is measured by the accelerometer mounted on the rear leg of the SISA sliding seat.

The change in relative velocity, perpendicular to the SORL, between the SISA sliding seat and the main sled buck must be within the corridor shown in Table 13 and Figure 35. The calculation for the relative velocity (V_R) is:

$$V_R = [V_{SISA} - (V_{SB} * \cos(10))] * (-1)$$

where V_{SB} is the main sled buck velocity and V_{SISA} is the SISA sliding seat velocity, both velocities are filtered at CFC 180.[20]

The test platform velocity in the direction perpendicular to the SORL during the time of interaction of the door with the CRS is no lower than 2.5 km/h less than its velocity at time = T_0.

[20] See Appendix B for additional data processing instructions.

The test facility must establish a target impact speed, which, with all equipment and instrumentation accuracies considered, ensures that the actual speed is within the tolerance band. The target speed should be the maximum possible and still meet the required criteria. The target speed must be reported to the COR prior to starting the testing program.

12.E.3.3 SIDE IMPACT ACCELERATION (S213a, S6.1.1(b))

The side impact dynamic test corridors shown in Figures 34 and 35 are defined by the coordinates in Tables 12 and 13. This corridor may be shifted such that the SISA acceleration pulse fits within the corridor limits. See Appendix B for additional information.

TABLE 12. SISA SLIDING SEAT ACCELERATION LIMITS

UPPER LIMIT		LOWER LIMIT	
TIME (msec)	ACCELERATION (G's)	TIME (msec)	ACCELERATION (G's)
0	0.5	2	0
6	25.5	13	18.5
44	25.5	40	18.5
58	0	48	0

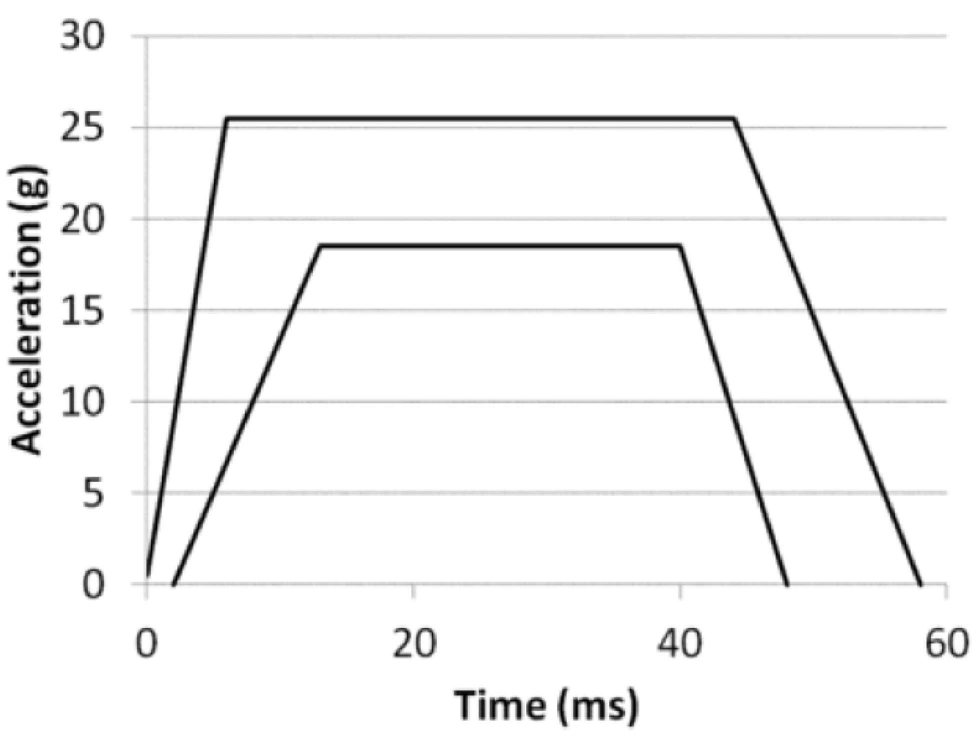


FIGURE 34. SISA SLIDING SEAT ACCELERATION CORRIDOR

TABLE 13. SISA SLIDING SEAT AND SLED BUCK RELATIVE VELOCITY CORRIDOR

UPPER BOUNDARY		LOWER BOUNDARY	
TIME (msec)	VELOCITY (km/h)	TIME (msec)	VELOCITY (km/h)
0	31.94	0	30.66
4	31.94	3	30.66
41	5	38	0

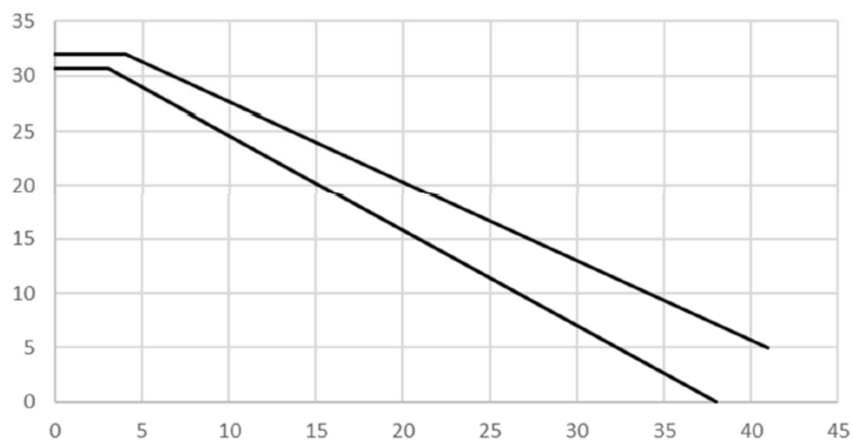


FIGURE 35. SISA SLIDING SEAT AND DOOR FIXTURE RELATIVE VELOCITY CORRIDOR

12.E.4 DUMMY PREPARATION

12.E.4.1 DUMMY SELECTION (S213a, S7.1)

The Anthropomorphic Test Devices (ATDs) used in the side impact dynamic testing will be the 12-month-old CRABI (CRABI 12 MO) and the Q-series side impact three-year-old (Q3s), in both forward-facing[21] (FF) and rear-facing (RF) configurations.

Prior to compliance testing, ATDs must be qualified in accordance with the applicable qualification procedure: CRABI 12-month-old per CFR Title 49, Part 572, Subpart R and Q3s 3-year-old per CFR Title 49, Part 572, Subpart W.

A child restraint that is recommended for children having a specific weight (regardless of height) or height (regardless of weight) shall comply with requirements when tested using all/each of the applicable test dummies specified, according to Table 14.

For the purpose of OVSC compliance test contract requirements, work with the COR to determine which ATD(s) to use according to the Table 14 below by comparing manufacturer's label and/or written instructions concerning occupant weight and height.

[21] Forward-facing testing of the 12-month-old CRABI ATD will sunset on December 5, 2026.

If the range specified by the manufacturer includes any weight or height within the ranges specified, the seat may be tested using the dummy applicable to that weight or height range.

Test a new specimen of the CRS with the appropriate test dummy in each possible combination of installation mode, adjustment position, and required test mode or as directed by the COR. On the appropriate data sheet, record the particular test dummy and test configuration tested using the convention listed in Table 21.

TABLE 14. DUMMY SELECTION BY WEIGHT OR HEIGHT (S213a, S7.1)

CRS SPECIFIED FOR USE BY CHILDREN HAVING A WEIGHT ANYWHERE IN THIS RANGE	CRS SPECIFIED FOR USE BY CHILDREN HAVING A HEIGHT ANYWHERE IN THIS RANGE	MAY BE TESTED TO THE SIDE IMPACT STANDARD WITH THIS TEST DUMMY
> 5 kg (11 lb.) and ≤ 13.6 kg (30 lb.)	> 650 mm (26 in.) and ≤ 870 mm (34 in.)	CRABI 12-Month-Old Part 572(R)
> 13.6 kg (30 lb.) and < 18 kg (40 lb.)	> 870 mm (34 in.) and ≤ 1100 mm (43 in.)	Q3s 3-Year-Old Part 572(W)

12.E.4.2 PRETEST CONDITIONING AND CALILBRATION REQUIREMENTS

12-MONTH-OLD DUMMY

Calibrate the 12-month-old dummy according to the requirements of 49 CFR Part 572, Subpart R as described in TP-572-R-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure (subject to COR's discretion),
- after 30 tests,
- or if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 12-month-old dummy at any ambient temperature from 20.6°C to 22.2°C (69°F to 72°F) and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

Dummy limb joints are set at 1G, barely restraining the weight of the limb when it is extended horizontally. The force needed to move a limb segment is not to exceed 2G throughout the range of limb motion. Reference the Procedures for Assembly, Disassembly, and Inspection (PADI) of the CRABI 12-month-old Crash Test Dummy for additional assembly procedures.

Q3s 3-YEAR-OLD DUMMY

Calibrate the Q3s 3-year-old dummy according to the requirements of 49 CFR Part 572, Subpart W as described in TP-572-W-00.
Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury score (subject to COR's discretion),
- after 30 tests,
- or if the dummy has not been used in any dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the Q3s 3-year-old dummy at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

Align the shoulder ball retainer ring so that the portion of the retainer ring with only one threaded screw hole between the detent track is at the top of the shoulder cup. See Figure 36.

FIGURE 36. Q3s SHOULDER BALL RETAINER RING

Dummy limb joints are set at 1G, barely restraining the weight of the limb when it is extended horizontally. The force needed to move a limb segment is not to exceed 2G throughout the range of limb motion.

Orient the upper and lower arms so that they are extended horizontally. Tighten the three shoulder screws (Figure 37) in the order specified (1, 2, 3) so that the torque in the shoulder joint is sufficient to support the weight of the arm. The arm should fall slowly with a vertical tap to the arm near the hand. If the arm does not fall, loosen the shoulder screws, slightly adjusting, until the arm falls slowly. If the arm falls too quickly, tighten each screw, checking for the proper 1G joint setting after each screw is adjusted. Repeat the procedure of tapping at the hand and adjusting each shoulder screw in succession until the 1G torque requirement is met.

The shoulder detent is established to maintain a 25-degree angle between the thorax and the arm. Therefore, the ball plunger should be maintained.

Dress the dummy in the Q3s suit (drawing 020-8001). Check that the 1G force needed to move the arms is still met. If additional tensioning is needed, orient the upper and lower arms vertically at the sides of the dummy's torso. Tighten the three shoulder screws (Figure 37) so that the torque in the shoulder joint is sufficient to support the weight of the arm when it is extended horizontally.

Ensure that the dummy's abdomen is properly positioned in the dummy torso.

Reference the PADI of the Q3s Child Side Impact Crash Test Dummy for additional assembly procedures.

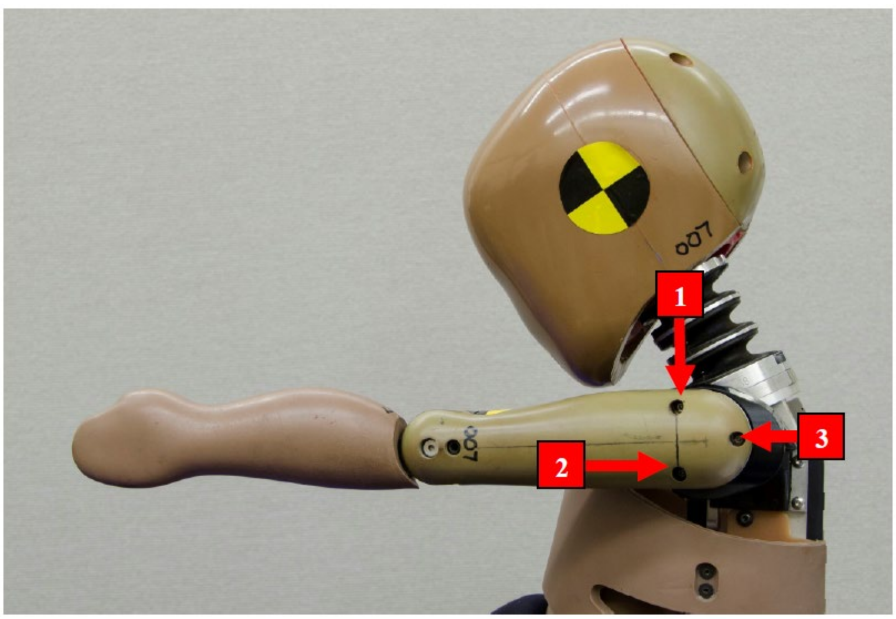


FIGURE 37. Q3s SHOULDER TENSIONING

12.E.4.3 DUMMY INSTRUMENTATION

12-MONTH-OLD DUMMY

For compliance testing, one head contact sensor between the SISA door fixture and the surface of the dummy's head on the impact side of the dummy may be used to measure direct contact of the head to any part of the SISA. Chalk or grease paint, applied to the dummy's head prior to testing, may also be used to visually measure head contact.

Q3s 3-YEAR-OLD DUMMY

For compliance testing, three uniaxial accelerometers in the dummy's head and an IR-TRACC installed on the impact side of the dummy's thorax are used to instrument the Q3s 3-year-old dummy per the requirements of 49 CFR Part 572, Subpart W.

12.E.4.4 DUMMY CLOTHING (S213a. S8.1)

12-MONTH-OLD DUMMY (S213a, S8.1(a))

The dummy is clothed in a cotton-polyester based tight fitting sweatshirt with long sleeves and ankle long pants whose combined weight is not more than 0.25 kg (0.55 lb.).

Q3s 3-YEAR-OLD DUMMY (S213a, S8.1(b))

The Q3s 3-year-old dummy is clothed in the Q3s suit (drawing 020-8001). No additional clothing or shoes are placed on the dummy. Ensure that the dummy's clothing is not bunched-up in the dummy's joints prior to testing.

12.E.4.5 DUMMY TARGETING

Photographic targets are required to identify the head center of gravity, which is located on top of and on either side of the dummy's head at the head accelerometer interception point (drawing 020-1220). Adhesive backed paper or fabric targets with a pattern that facilitates identifying and tracking the head center of gravity in the high-speed videos are recommended.

12.E.5 PREIMPACT BUCKLE RELEASE TEST (S213a, S5.1.5, S6.2)

At the COR's discretion, before conducting the dynamic testing of the CRS, remove the buckle from the restraint system and place on a hard, flat horizontal surface. Each belt end of the buckle is pre-loaded in the following manner:

(A) The anchor end of the buckle is loaded with a 9 N (2 lb.) force in the direction away from the buckle.

a. In the case of buckles designed to secure a single latch plate, the belt latch plate end of the buckle is pre-loaded with a 9 N (2 lb.) force in the direction away from the buckle.

b. In the case of buckles designed to secure two or more latch plates, the belt latch plate ends of the buckle are loaded equally so that the total load is 9 N (2 lb.), in the direction away from the buckle.

(B) For pushbutton-release buckles, the release force is applied by a conical surface (cone angle not exceeding 90 degrees).

a. For pushbutton-release mechanisms with a fixed edge (referred to in Figure 18 as “hinged button”), the release force is applied at the centerline of the button, 3mm away from the movable edge directly opposite the fixed edge, and in the direction that produces maximum releasing effect.

b. For pushbutton-release mechanisms with no fixed edge (referred to in Figure 18 as “floating button”), the release force is applied at the center of the release mechanism in the direction that produces the maximum releasing effect.

(C) For all other buckle release mechanisms, the force is applied on the centerline of the buckle lever or finger tab in the direction that produces the maximum releasing effect. Measure the force required to release the buckle. Figure 18 illustrates the loading for the different buckles and the point where the release force should be applied, and Figure 20 illustrates the conical surface used to apply the release force to pushbutton-release buckles.

(D) For CRSs that have buckles integral to the seat, the entire seat may be placed on its back on a flat surface with the 9 N (2 lb.) force applied to the belts away from the buckle as described above, and the release force of the buckle determined with the appropriate release gauge.

(E) For buckle assemblies that are attached to a crotch belt where the crotch belt cannot be removed and re-installed as originally found, the buckle assembly can be handheld while the test gauge release force is applied. Place the restraint on its back and, following the procedure above, keep the buckle assembly in the orientation described and apply the force sufficient to release the buckle.

Record the results in the appropriate data sheets.

12.E.6 RESTRAINT SETUP

This section describes the procedure to be followed for installing the CRS on the SISA and for installing the dummy in the CRS for side impact dynamic testing.

12.E.6.1 CHILD RESTRAINT SYSTEM INSTALLATION (S213a, S6.1.2)

Prior to each test, use the belt anchorage gap gauge to check that the belt anchorages on the SISA have not deformed and continue to meet the specifications in the drawing package. Figure 38, below, illustrates a tool that may be utilized to check the belt anchorages for testing. If the D-ring or inboard lap belt anchor section of the gauge fits within the belt path of its corresponding anchor, then that belt anchorage shall be considered deformed. Replace all deformed anchorages prior to performing the dynamic test.

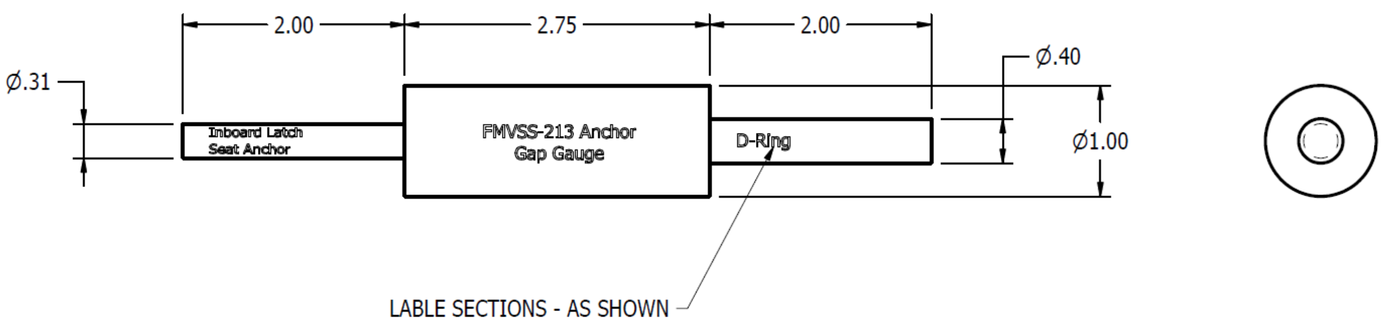


FIGURE 38. BELT ANCHORAGE GAP GAUGE (in.)

Using a vertical laser line, place the add-on child restraint on the SISA sliding seat so that the center of the child restraint is positioned 300 ± 1 mm (11.8 ± 0.04 in.) from the impact side of the SISA sliding seat edge. The restraint should sit flat on the SISA sliding seat bottom and make contact with the SISA seat back. Work with the COR to determine which test configurations to perform. Follow the manufacturer's instructions provided with the CRS to properly level and install the CRS by any one of the means as described below:

(1) For installations using child restraint anchorage system attachments, forward-facing CRSs:

i) Install the child restraint using the child restraint anchorage system in accordance with the manufacturer's provided instructions.

ii) Attach the tether strap, if provided, to the tether anchorage on the SISA.

iii) No supplemental device shall be used to install the restraint.

iv) Tighten the lower anchorage belts to any tension between 53.5 and 67 Newtons (12 to 15 lb).

v) Tighten the belt of the top tether strap to any tension between 45 and 53.5 Newtons (10 to 12 lb).

(2) For installations using child restraint anchorage system attachments, rear-facing CRSs:

i) Install the CRS using only the lower anchorages in accordance with the manufacturer's instructions provided with the restraint.

ii) No tether strap is used.

iii) No supplemental device is used to install the child restraint.

iv) Tighten the lower anchorage belts to any tension between 53.5 and 67 Newtons (12 to 15 lb).

If the rear-facing restraint is an infant carrier system with a detachable base, it shall only be installed using the included base.

(3) For installations using the Type II belt system, both forward and rear-facing CRSs:

i) If the CRS has rigid lower anchors that cannot be stowed, remove the lower anchor assembly from the SISA prior to the installation of the CRS.

ii) Install the system using the Type II belt system in accordance with the manufacturer's instructions provided with the CRS.

iii) For forward-facing restraints, attach the top tether strap, if provided, to the top tether anchorage on the SISA.

iv) No supplemental device may be used to install the child restraint.

v) Tighten the Type II belt used to attach the restraint to the SISA sliding seat to any tension between 53.5 and 67 Newtons (12 to 15 lb).

vi) For forward-facing restraints, tighten the top tether belt to any tension between 45 and 53.5 Newtons (10 to 12 lb).

12.E.6.2 DUMMY INSTALLATION

12-MONTH-OLD CRABI (S213a, S9.1)

Place and position the dummy in the CRS in accordance with the manufacturer's instructions provided with the CRS.

(1) When installing the 12-month-old dummy in a rear-facing child restraint:

i) Place the dummy in the restraint system so that the back of the dummy torso contacts the back support surface of the system and the bottom of the dummy contacts the bottom seating surface of the system.

ii) Position the test dummy so that the midsagittal plane of the test dummy's head is centered in line with the vertical laser line[22] that is centered at 300 ± 1 mm (11.8 ± 0.04 in.) from the impact side of the SISA sliding seat edge.

iii) Attach all appropriate child restraint harness belts used to restrain the child within the system. Use a belt tension measurement device as a three-prong gauge to tighten the child restraint harness to any tension between 9 and 18 Newtons (2 to 4 lb).

iv) Check that all belts used to attach the CRS to the SISA sliding seat are tightened to the appropriate tensions.

v) Extend the dummy's arms vertically upwards, above the head if possible, and then rotate each arm downward towards the dummy's lower body until the arm contacts a surface of the child restraint or SISA.

vi) Ensure that neither arm is restrained from movement, in any direction other than the downward direction, by any part of the CRS or the belts used to anchor the restraint system to the SISA sliding seat.

vii) If necessary, position the limbs so that the limb placement does not inhibit torso or head movement during the dynamic test.

viii) OPTIONAL – At the discretion of the COR, paint the head of the ATD with contrasting chalk or grease paint to visually observe the dummy's head interaction with the SISA, CRS, or door fixture.

ix) Re-check that the final tensions of the attachment belts are within the allowable limits.

[22] Best practice suggests use of the vertical laser line, but it is not required by FMVSS No. 213a.

(2) When installing the 12-month-old dummy in a forward-facing child restraint:

i) Place the dummy in the restraint system so that the back of the dummy torso contacts the back support surface of the child restraint and the bottom of the dummy contacts the bottom surface of the restraint. Ensure the dummy is centered laterally in the CRS.

ii) Position the test dummy so that the midsagittal plane of the test dummy's head is centered in line with the vertical laser line[23] that is centered at 300 ± 1 mm (11.8 ± 0.04 in.) from the impact side of the SISA sliding seat edge.

iii) Extend the arms of the dummy as far as possible in the upward direction, above the head if possible.

iv) Extend the legs of the dummy as far as possible in the forward horizontal direction.

v) Using a flat square surface with an area of 2580 square millimeters (4 square inches), apply a force of 178 N (40 lb.), perpendicular to the plane of the back of the SISA, first against the dummy crotch and then at the dummy thorax in the midsagittal plane of the dummy.

vi) Attach all appropriate child restraint harness belts used to restrain the child within the system. Use a belt tension measurement device as the three-prong gauge to tighten the child restraint harness to any tension between 9 and 18 Newtons (2 to 4 lb).

vii) Check that all belts used to attach the CRS to the SISA sliding seat are tightened to the appropriate tensions.

viii) Rotate each dummy limb downwards in the plane parallel to the dummy's midsagittal plane until the limb contacts a surface of the CRS or the SISA.

ix) If necessary, position the limbs so that the limb placement does not inhibit torso or head movement during the dynamic test.

x) OPTIONAL – At the discretion of the COR, paint the head of the ATD with contrasting chalk or grease paint to visually observe the dummy's head interaction with the SISA, CRS, or door fixture.

xi) Re-check that the final tensions of the attachment belts are within the allowable limits.

[23] Best practice suggests use of the vertical laser line, but it is not required by FMVSS No. 213a.

Q3s 3-YEAR-OLD (S213a, S9.2)

Place and position the dummy in the CRS in accordance with the manufacturer's instructions provided with the CRS. Make sure all cable routing is gathered on the opposite side of the impact during the test.

(1) When installing the Q3s 3-year-old dummy in a rear-facing CRS:

i) Hold the dummy torso upright and place the dummy in the CRS until the back of the dummy torso contacts the restraint's designed seating surface and the bottom of the dummy contacts the bottom seating surface of the system.

ii) Position the test dummy so that the midsagittal plane of the test dummy's head is centered in line with the vertical laser line[24] that is centered at 300 ± 1 mm (11.8 ± 0.04 in.) from the impact side of the SISA sliding seat edge.

iii) Extend the arms of the test dummy as far as possible, above the head, if possible, in the upward vertical direction.

iv) Extend the legs of the dummy as far as possible in the forward horizontal direction.

Note: Do not remove Q3s knee-stop bolts without consent from the COR.

v) Attach all the appropriate child restraint belts used to restrain the child within the system:

a. If the CRS has a fixed or movable surface, position each movable surface in accordance with the manufacturer's instructions provided with the child restraint.

b. If the child dummy is to be installed with the internal harness, attach the child restraint belts used to restrain the child within the CRS and tighten them to any tension between 9 and 18 Newtons (2 to 4 lb). Use a belt tension measurement device as a reference tool to properly tighten the child restraint harness.

vi) Rotate each of the dummy's legs downwards in the plane parallel to the dummy's body until the limb contacts a surface of the child restraint or SISA.

vii) Rotate each of the dummy's upper arms downward in the plane parallel to the dummy's midsagittal plane until the arm is engaged in the shoulder

[24] Best practice suggests use of the vertical laser line, but it is not required by FMVSS No. 213a.

detent that positions the arm at an angle of 25-degrees with respect to the thorax.

viii) Rotate each of the dummy's forearms downwards until the limb contacts a surface of the child restraint or SISA.

ix) If necessary, position the limbs so that the limb placement does not inhibit torso or head movement during the dynamic test.

x) Check that all belts used to attach the CRS to the SISA sliding seat are tightened to the appropriate tensions.

xi) Re-check that the final tensions of the harness attachment belts are within the allowable limits.

(2) When installing the Q3s 3-year-old dummy in a forward-facing CRS:

i) Hold the dummy torso upright and place the dummy in the CRS until the back of the dummy torso contacts the restraint's designed seating surface and the bottom of the dummy contacts the bottom seating surface of the system.

ii) Position the test dummy so that the midsagittal plane of the test dummy's head is centered in line with the vertical laser line[25] that is centered at 300 ± 1 mm (11.8 ± 0.08 in.) from the impact side of the SISA sliding seat edge.

iii) Extend the arms of the test dummy as far as possible, above the head, if possible, in the upward vertical direction.

iv) Extend the legs of the dummy as far as possible in the forward horizontal direction.

v) Attach all the appropriate child restraint belts used to restrain the child within the system:

a. If the CRS has a fixed or movable surface, position each movable surface in accordance with the manufacturer's instructions provided with the child restraint.

b. If the child dummy is to be installed with the internal harness, attach the child restraint belts used to restrain the child within the CRS and tighten them to any tension between 9 and 18 Newtons (2 to 4 lb). Use a belt tension measurement device as a reference tool to properly tighten the child restraint harness.

[25] Best practice suggests use of the vertical laser line but, is not required by FMVSS No. 213a.

c. If the child dummy is to be restrained with the seat belt for belt-positioning seats, route and buckle the Type II belts used to restrain the child within the CRS between 9 and 18 Newtons (2 to 4 lb).

vi) Rotate each of the dummy’s legs downward until the limb contacts a surface of the child restraint or SISA.

vii) Rotate each of the dummy’s upper arms downward in the plane parallel to the dummy’s midsagittal plane until the arm is engaged in the shoulder detent that positions the arm at an angle of 25-degrees with respect to the thorax.

viii) Rotate each of the dummy’s forearms downward until the limb contacts a surface of the child restraint or SISA.

ix) If necessary, position the limbs so that the limb placement does not inhibit torso or head movement during the dynamic test.

x) Check that all belts used to attach the CRS to the SISA sliding seat are tightened to the appropriate tensions.

xi) Re-check that the final tensions of the attachment belts are within the allowable limits.

TABLE 15. CRS INSTALLATION BELT TENSIONS

	Lower Anchor Belt	Top Tether	3-Point Seat Belt	Internal Harness & 3-Point Belt-Positioning Booster Belt
Tension	53.5-67 N (12-15 lb)	45-53.5 N (10-12 lb)	53.5-67 N (12-15 lb)	9-18N (2-4 lb)

12.E.7 SIDE IMPACT DYNAMIC TEST

Before conducting the side impact dynamic test, check the following pretest requirements:

(1) The environmental conditions are met.

(2) All parameters relating to the required impact acceleration and velocity have been correctly set.

(3) All required calibrations of instrumentation, transducers, and high-speed video camera field are completed and recorded.

(4) Restraint and required targeting are properly installed.

(5) The restraint system and dummy are properly installed on the SISA, and all belts are adjusted and tensioned as required.

When all pretest requirements are met:

(1) Photograph the restraint setup to document the final pretest configuration. Include this documentation with the appropriate data sheet.

(2) Add appropriate signage with CRS, ATD, test number and date, and pre-test information to the test apparatus and sign boards.

(3) Take photographs of the set-up, CRS, ATD, and door. The following pictures should be taken before testing:

i. Wide front view
ii. Tight front view on sliding seat and door fixture
iii. SISA seat left side view
iv. Rear view
v. SISA seat right side view
vi. Overhead view
vii. Up close of ATD
viii. View of honeycomb

Once all pretest requirements are met and photographs of the test setup are taken, conduct the side impact dynamic test.

12.E.8 SIDE IMPACT PERFORMANCE REQUIREMENTS (S213a, S5.1)

Immediately after the side impact dynamic test:

(1) Photograph the restraint and dummy in their final post-test positions and configurations on the SISA sliding seat.

(2) Add appropriate signage with CRS, ATD, test number and date, and pre- or post-test information to the test apparatus and sign boards.

(3) Take photographs of the CRS, ATD, and door. The following pictures should be taken after testing:

i. Wide front view
ii. Tight front view on sliding seat and door fixture
iii. SISA seat left side view
iv. Rear view
v. SISA seat right side view
vi. Overhead view
vii. Up close of ATD
viii. View of honeycomb
ix. If the 12C’s head contacted either the CRS or intruding door.
x. Additional photos to document failures or results that need further review

Include this documentation with the appropriate data sheet. Provide, in addition, a plot of the sliding seat acceleration-time history for the test, showing its relationship to the acceleration-function envelope. Indicate on the appropriate data sheet the relative velocity change for the test and the cumulative velocity change associated with acceleration deviations below the acceleration-function envelope.

In the event of a test failure, a posttest calibration check of critically sensitive test equipment and instrumentation shall be performed, at the discretion of the COR.

12.E.8.1 POST IMPACT BUCKLE RELEASE TEST (S213a, S5.1.5, S6.2)

After completion of the testing specified in S6.1 of Standard 213a and before the buckle is unlatched, tie a self-adjusting sling to each wrist and ankle of the test dummy in the manner illustrated in Figure 19.

Pull the sling tied to the dummy restrained in the CRS and apply a force whose magnitude is: 90 N (20 lb.) for a system tested with a 12-month-old dummy and 200 N (45 lb.) for a system tested with a 3-year-old dummy. The force is applied by pulling the sling horizontally and parallel to the SORL of the SISA sliding seat in the manner illustrated in Figure 19.

While applying the force specified and using the device shown in Figure 20 for pushbutton-release buckles, apply the release force in the manner and location specified in S6.2.1 of FMVSS No. 213, for that type of buckle. Measure the force required releasing the buckle and record in the appropriate data sheet.

12.E.8.2 RESTRAINT SYSTEM INTEGRITY (S213a, S5.1.1)

Observe, measure, and record the results of the side impact dynamic test on the appropriate data sheet.

Specifically check for the following and note any test failures if the CRS does not meet the following requirements:

(1) Exhibit no complete separation of any load bearing structural element and no partial separation exposing either surfaces with a radius of less than 6 mm (0.24 inch) or surfaces with protrusions greater than 9 mm (0.35 inch) above the immediate adjacent surrounding contactable surface of any structural element of the system.

(2) Remain in the same adjustment positions during the testing as it was immediately before the testing, except as noted below:

(A) A rear-facing CRS may have a means for repositioning the seating surface of the system that allows the system's occupant to move from a reclined position to an upright position and back to a reclined position during testing.

(B) No opening that is exposed and is larger than 6 mm (0.24 inch) before the testing shall become smaller during the testing as a result of the movement of the seating surface relative to the restraint system as a whole.

(3) If a forward-facing CRS, not allow the angle between the system's back support surface for the child and the system's seating surface to be less than 45 degrees at the completion of the test.

12.E.8.3 INJURY CRITERIA (S213a, S5.1.2)

Evaluate restraints tested with the 3-year-old for injury potential. For compliance, the CRS shall:

(1) Limit the resultant acceleration at the location of the accelerometer mounted in the test dummy head as specified in 49 CFR, Part 572, such that the expression for head injury criterion (HIC15):

$$HIC = \left[\frac{1}{(t_2 - t_1)}\int_{t_1}^{t_2} a_r dt\right]^{2.5} \langle t_2 - t_{1)} \rangle$$

shall not exceed 570, where a_r is the resultant acceleration expressed as a multiple of g (the acceleration of gravity), and t_1 and t_2, are any two moments during the impact which are separated by not more than a 15-millisecond time interval and where t_1 is less than t_2.

(2) Limit the maximum chest compression from the output of the thoracic IR-TRACC. The maximum chest compression at any time during the side impact dynamic test shall not exceed 23 millimeters.

Record the results on the appropriate data sheet.

12.E.8.4 OCCUPANT CONTAINMENT (S213a, S5.1.3)

Identify, by analysis, if any of the contact methods, i,e., the head contact sensor, the high-speed video of the side impact dynamic test, or the optional chalk markings, indicate contact between the head and the SISA or door structure. The CRS shall retain the 12-month-old CRABI test dummy's head such that there is no direct contact of the head to any part of the SISA or door structure.

12.F 213b FRONTAL DYNAMIC TEST CONDITIONS AND PROCEDURES (213b, S6)

Test a new specimen of the CRS according to the procedures below in each possible combination of installation mode, adjustment position, and proper use/"misuse" mode or as directed by the COR. Record the combination to be tested using the convention listed in the Test Configuration Codes Table (see Table 21) as well as the test configuration to be used on the appropriate data sheet.

12.F.1 213b FRONTAL IMPACT DYNAMIC TEST EQUIPMENT (213b, S6.1)

12.F.1.1 TEST CONDITIONS AND DEVICES (213b, S6.1.1(a))

A. FRONTAL IMPACT SLED ASSEMBLY

The test device used to evaluate the dynamic performance of the add-on child restraint is the 213b Frontal impact seat assembly (213b FISA) consisting of a simulated vehicle rear seat, with one seating position securely attached to a dynamic test platform or impact sled. The 213b FISA is described in Drawing Package NHTSA Standard Seat Assembly FMVSS No. 213, No. NHTSA-213-2021, dated March 2023. The seating orientation should simulate a vehicle frontal impact. The forward direction of the 213b FISA is defined by the Seat Orientation Reference Line (SORL), which is the horizontal line through point Z as illustrated in Figures 39 and 40. Additionally, belt anchor points, child restraint anchorage system points, and forward dummy excursion limits for dynamic compliance tests are illustrated in Figures 41 and 42.

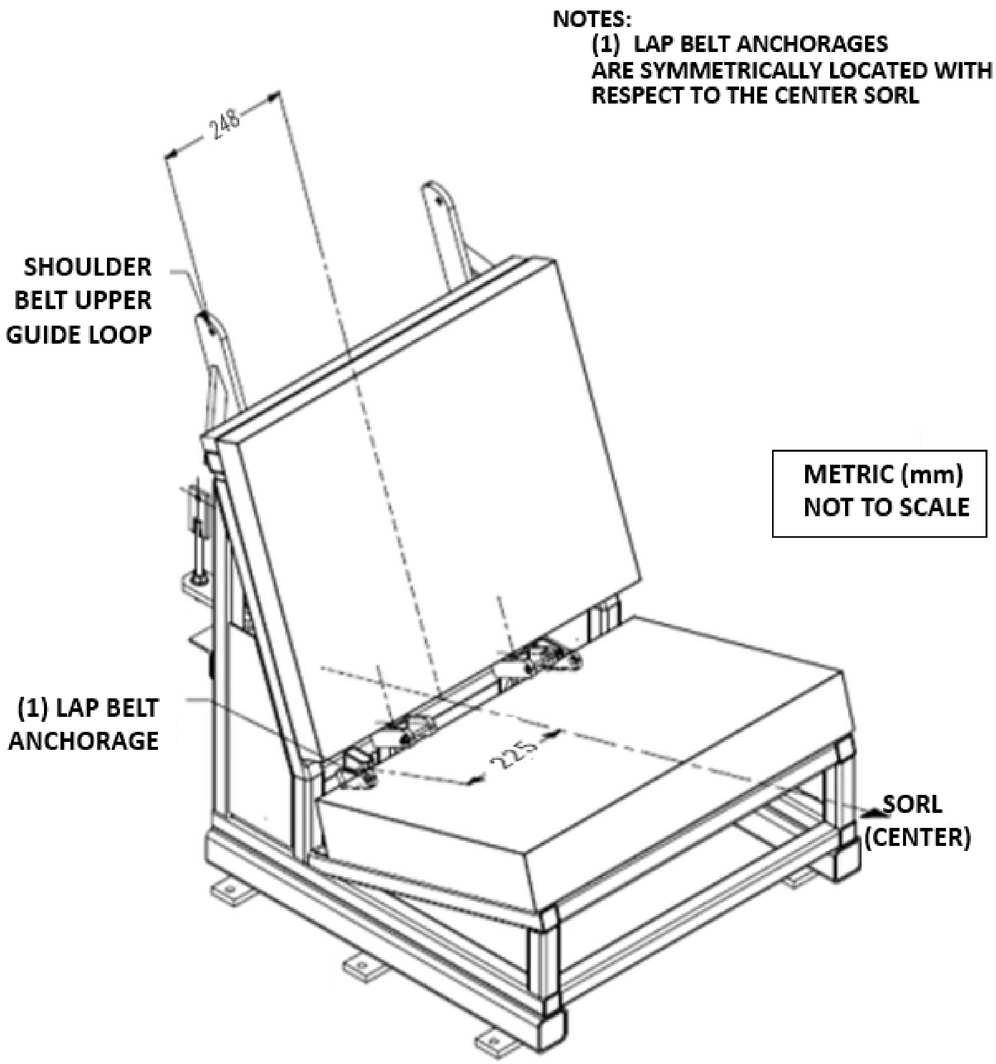


FIGURE 39. SORL AND SEAT BELT ANCHORAGE POINT LOCATIONS ON THE 213b FISA

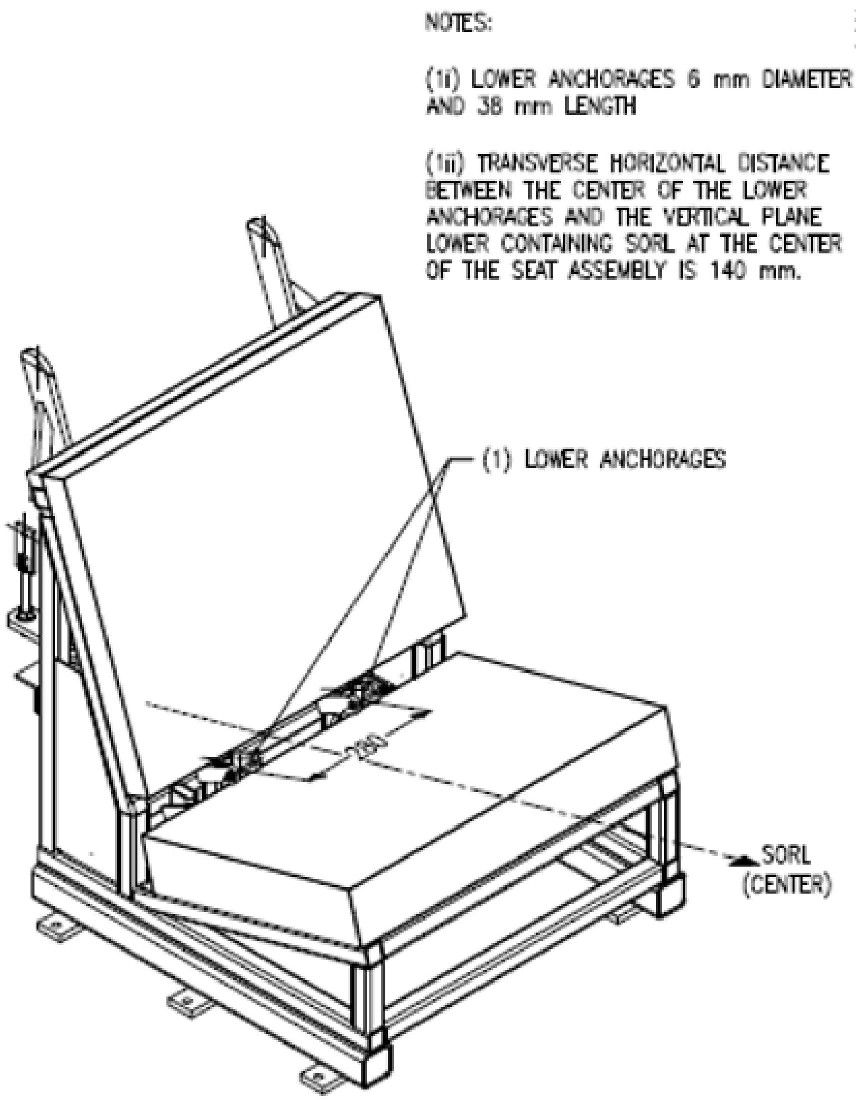
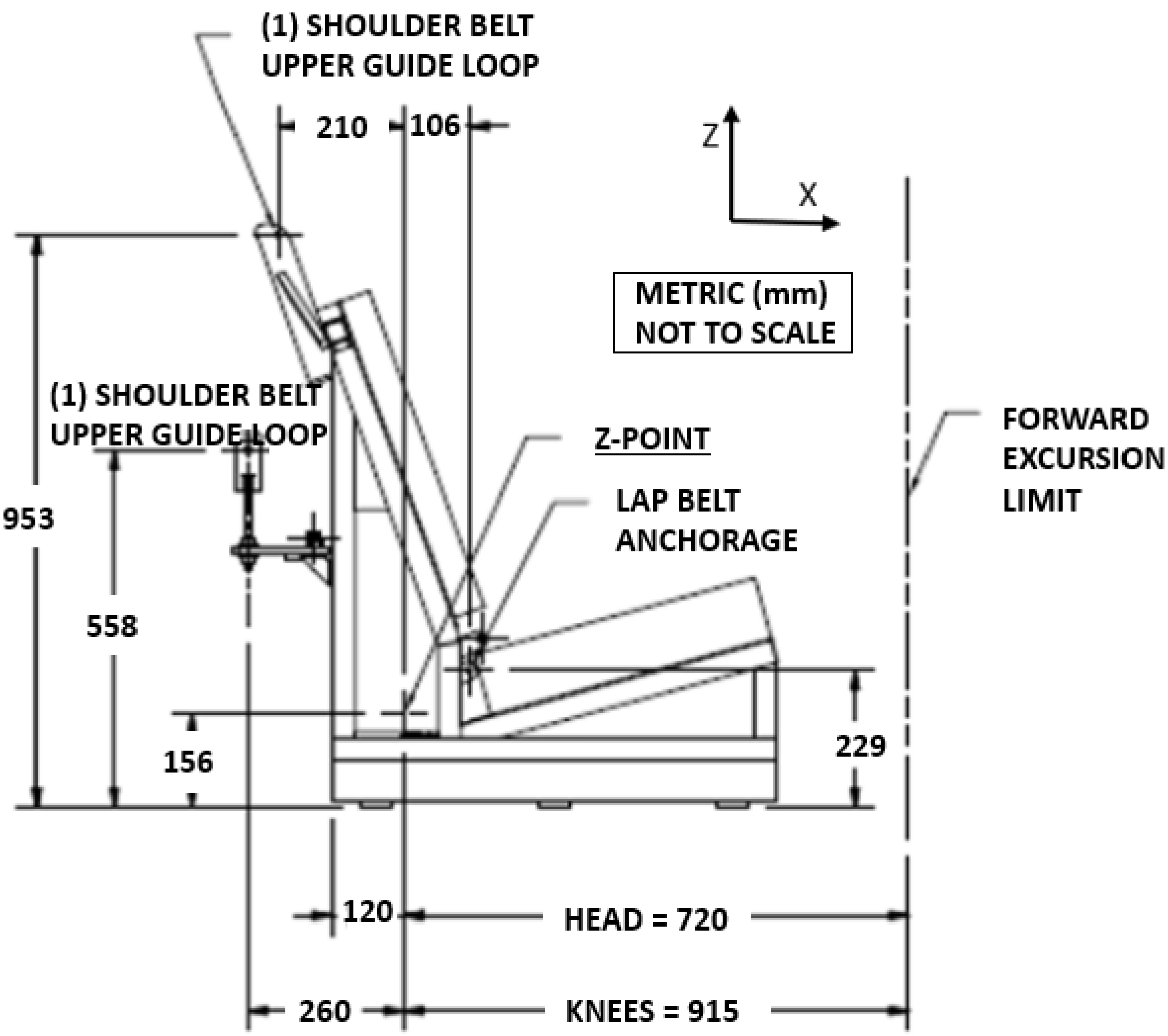
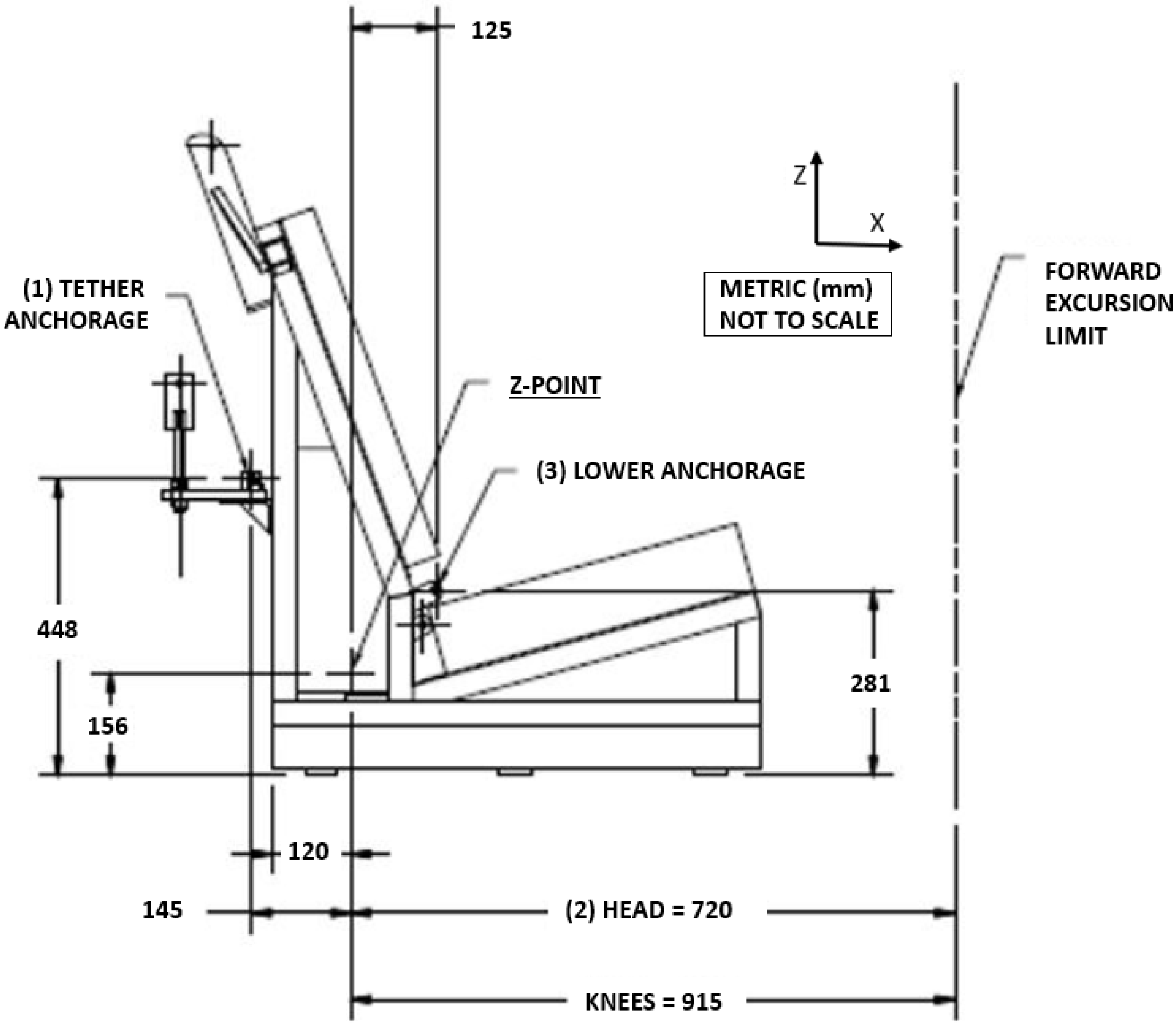


FIGURE 40. SORL AND LOCATION OF THE LOWER ANCHORAGES OF THE CHILD RESTRAINT ANCHORAGE SYSTEM ON THE 213b FISA



NOTES:
(1) SHOULDER BELT UPPER AND LOWER GUIDE LOOPS ARE LOCATED 248 mm RIGHT AND LEFT OF THE CENTER SORL AS SHOW IN FIGURE 1A

FIGURE 41. LOCATION OF SHOULDER BELT UPPER AND LOWER GUIDE LOOPS AND FORWARD EXCURSION LIMITS ON THE 213b FISA



NOTES:
(1) TETHER ANCHORAGE LOCATED ON CENTER SORL
(2) HEAD EXCURSION LIMIT IS (i) 720 mm WITH TETHER ATTACHED AND (ii) 813 mm WITH TETHER UNATTACHED
(3) LOWER ANCHORAGES LOCATED 125 mm FORWARD OF Z POINT AND 281 mm UPWARD FROM FLOOR

FIGURE 42. LOCATION OF THE CHILD RESTRAINT ANCHORAGES AND FORWARD EXCURSION LIMITS ON THE 213b FISA

213b FISA SEAT FOAM CUSHIONS

Before conducting a frontal impact dynamic test, measure the force-deflection characteristics of the seat pan and seat back polyurethane foam cushions used in the 213b FISA seat. Using the test methodology and apparatus described in ASTM Standard D3574-11 “Standard Method of Testing Flexible Cellular Materials-Slab Urethane Foam,” determine the load required to produce a 25%, 50%, and 65% (± 1%) compression of the foam thickness. These loads shall be recorded and made available to the COR, if requested. The 25% and 65% compression loads shall be used only as reference. To be suitable for use in compliance testing, the foam inserts shall compress 50% under the following load limits, at the center of the insert, regardless of other factors:

51 mm (2-inch) thick foam:	255 to 345 N (57.3 to 77.6 lb.)
102 mm (4-inch) thick foam:	374 to 506 N (84.1 to 113.8 lb.)

NHTSA Research has shown that best practices for foam IFD response include storing the foam cushion in a temperature and humidity-controlled environment for at least 24 hours prior to conducting a test. If foam is continuously used, best practice is that under this contract, the foam shall be stored in an enclosed temperature and humidity-controlled chamber whenever the cushions are not being used for dynamic testing or undergoing force-deflection calibration.[26] The enclosed chamber shall meet the following environmental conditions:

Temperature	18.3°C (65°F) to 23.9°C (75°F) [27]
Relative Humidity	50% to 60%[27]

If a foam cushion has already been used in a dynamic test, allow a minimum of twenty-four hours recovery time in the enclosed temperature and humidity-controlled chamber before measuring the force-deflection characteristics. Inspect each used foam cushion for damage or permanent deformation, and replace any cushion judged to be defective. Spray glue adhesive may be used to mend small cuts or tears of less than 1 inch in length.

Seat Pan Cushion for Child Frontal/Side Impact Sled drawing 3021-233
Seat Back Cushion for Child Frontal/Side Impact Sled drawing 3021-248

213b FISA SEAT CUSHION COVERS

The 213b FISA seat foam cushions have seat cushion covers. The seat cushion covers are constructed of polyacrylate fiber fabric with a weight of 9.0 oz. per square yard and a breaking strength of 285 lb. in the warp direction (threading that runs parallel to the y-

[26] Foam cushions that meet the IFD requirements are valid for testing even if they have not been conditioned under the recommended best practices.
[27] Louden, A. E., & Wetli, A. E. (2021, June). *Evaluation of foam specifications for the proposed FMVSS No. 213 test bench* (Report No. DOT HS 813 129). National Highway Traffic Safety Administration.

axis of the FISA (see Figure 49) when the cushion is installed on the FISA) and 180 lb. in the fill direction (threading that runs perpendicular to the y-axis of the FISA when the cushion is installed on the FISA), or equivalent. The contractor has the option to cover the seat cushions using either the wrapping method or covers that have been fashioned with zippers. A light shade of orange or blue is recommended for best contrast between the CRS and the 213b FISA. Two sheets of 120-grit sandpaper may be adhered, with use of spray adhesive, to the seat bench pan and seat bench back surface that contacts the seat cushion to keep the cushions in place.[28] (Figure 43)

Seat Pan Cushion Cover for Child Frontal/Side Impact Sled drawing 3021-234
Seat Back Cushion Cover for Child Frontal/Side Impact Sled drawing 3021-249

The seat foams shall be wrapped in this cushion cover and installed on both the seat bench back and seat bench pan. The cushions shall be wrapped such that the warp direction is aligned from left to right, when the cushion is installed on the FISA.

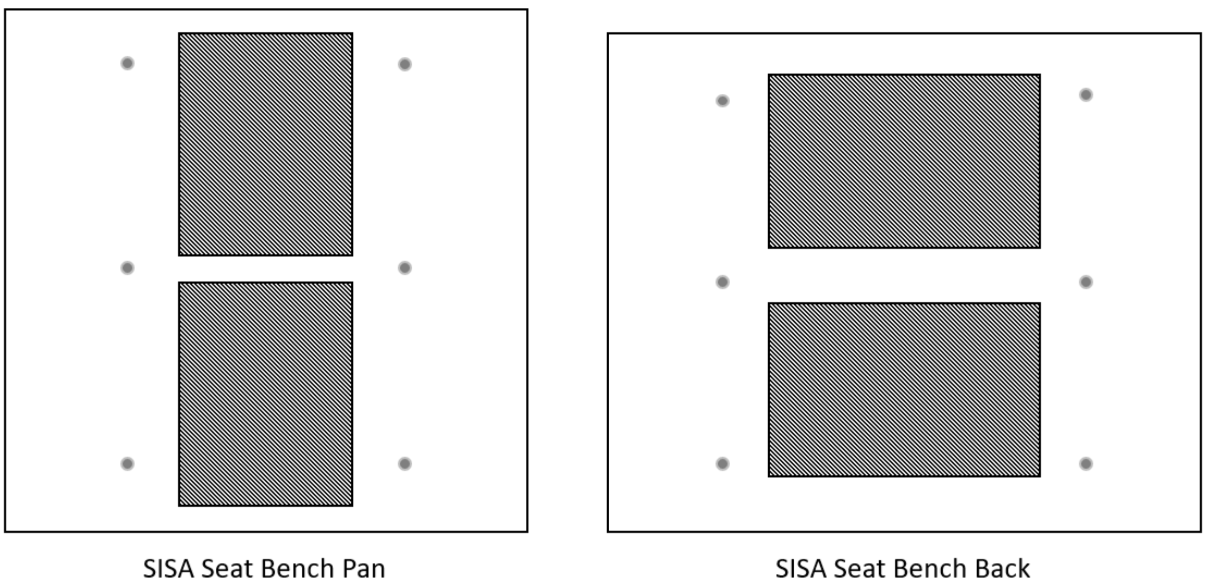


FIGURE 43. TWO PIECES OF SANDPAPER ADHERED TO THE SEAT PAN and BACK

Maintain a gap measurement of 69 mm ± 5 mm between the seat back and seat bottom cushions when the cushions are installed on the FISA. The seat cushion covers shall contact the CRS when installed on the FISA.

One set of seat cushion covers may be used repeatedly, for multiple tests. The seat cushion covers shall be maintained and inspected between tests. Damaged covers that are torn or no longer properly secure the seat cushion shall be disposed of.

[28] Seat pan and seat back sandpaper is not required by FMVSS No. 213b. The adhesive sandpaper is a recommendation based on lessons learned by NHTSA research testing.

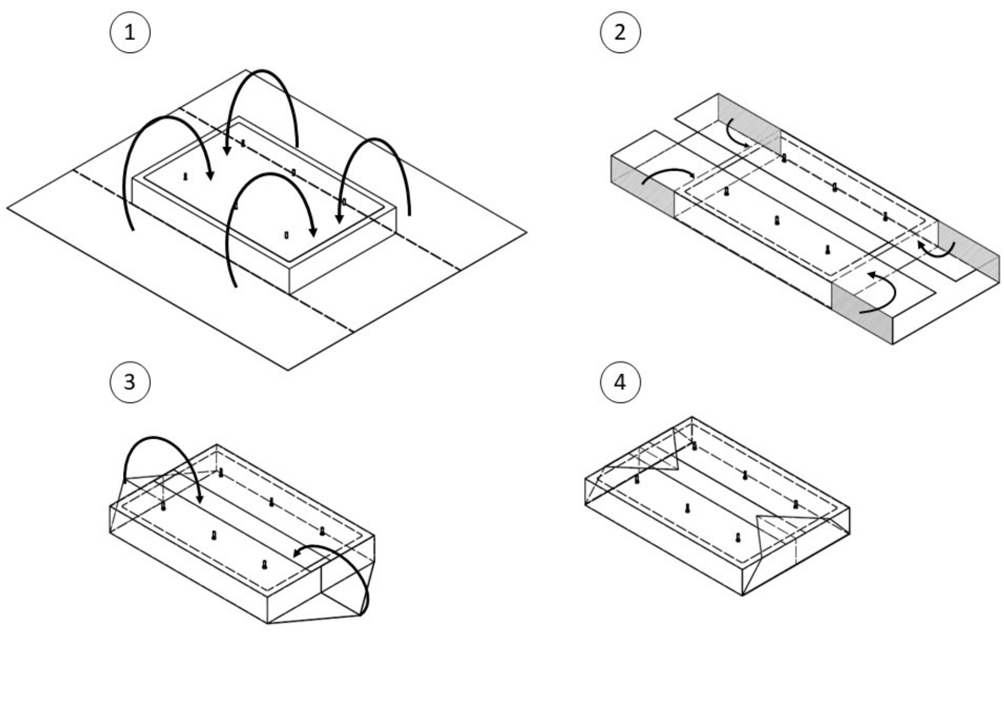
A. FISA SEAT COVER FOLDING METHOD

If the folding method is used to cover the seat cushions, then the cushions shall be covered such that the warp direction is parallel to the y-axis of the FISA (see Figure 49) when the cushion is installed on the FISA. The dimensions for the seat cushion covers shall meet the following requirements:

> Seat pan: 1,080 x 1,270 mm (42.5 x 50 in)[29]
> Seat back: 1,118 x 1,118 mm (44 x 44 in)[29]

Center the seat cushion on the seat cushion cover material. Place the seat pan plate on the seat cushion so that it is centered with approximately 25 mm (1 in.) of cushion foam exposed on each side of the seat pan. For a seat cushion that is comprised of two pieces that have been glued together, orient the glued side so that it is positioned at the top of the seatback.

Stretch the cushion cover over the seat pan bolts and mark the fabric at the location of the bolts. Use a soldering iron to burn through the cover material at the marked locations. Install size 1 grommets at each of the hole locations. Place the grommet holes of the fabric over the bolts on the seat pan and adhere the edge of the fabric to the seat pan using 3-inch preservation tape or equivalent. (Figure 45)



[29] Cushion cover dimensions are marked such that the material filling is the first dimension, and the warp of the material is the second dimension.

FIGURE 44. SEAT COVER WRAPPING STEPS

B. FISA SEAT ZIPPER COVERS

If the zipper covers are used to cover the seat cushions, then zipper covers shall be fashioned such that the warp direction is parallel to the y-axis of the FISA (see Figure 47) when the cushion is installed on the FISA. The dimensions for the seat cushion covers shall meet the drawings in Figure 45, below. Place the seat pan plate in the cover so that it is approximately centered with the seat cover and cushion. Use a soldering iron to burn through the cover material at the seat pan plate bolt locations. Install size 1 grommets at each of the hole locations.

For a seat cushion that is comprised of two pieces that have been glued together, orient the glued side so that it is positioned at the top of the seatback.

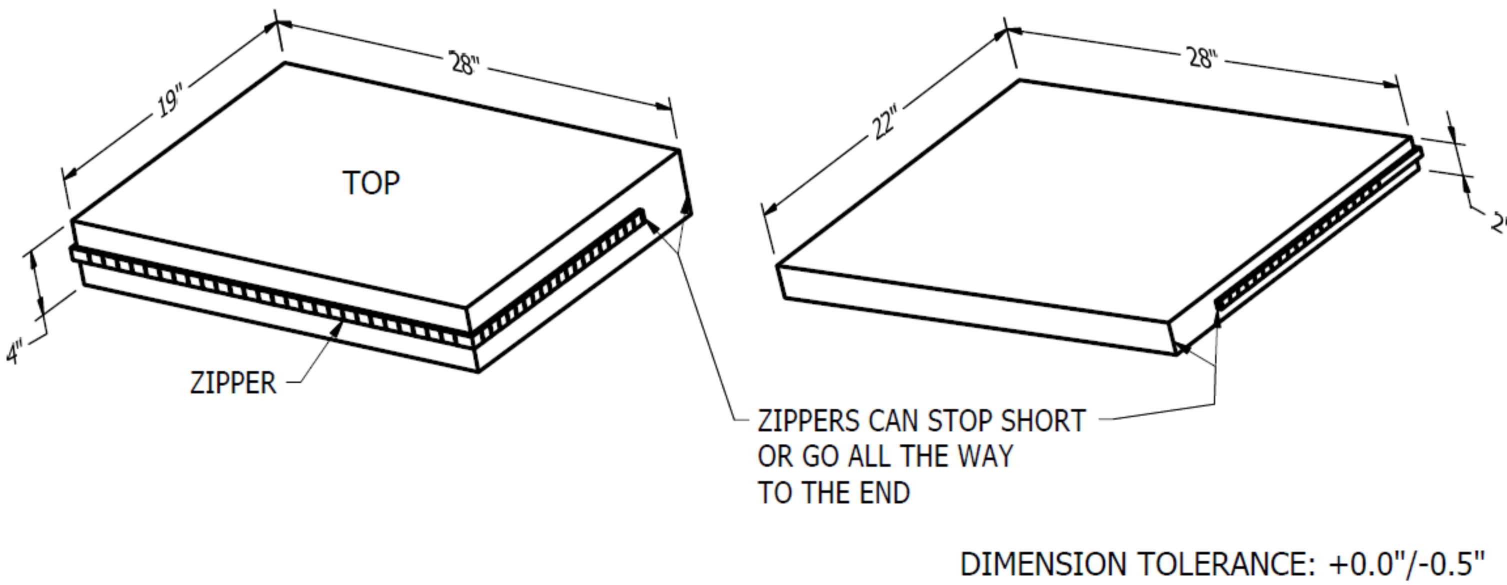


FIGURE 45. SEAT PAN (LEFT) AND BACK (RIGHT) CUSHION COVERS WITH ZIPPERS

213b FISA ATD HEAD PROTECTION DEVICE (ATDHPD)

The ATDHPD may be attached to the 213b FISA before conducting a frontal impact dynamic test with a backless belt-positioning seat to prevent potential damage that may occur to the dummy's head during the rebounding. At the discretion of the COR, OVSC may elect not to use the ARDHPD.

ATD Head Protection Device (ATDHPD) drawing 3021-280
Head Protection Device Foam drawing 3021-285
Head Protection Device Cover drawing 3021-286

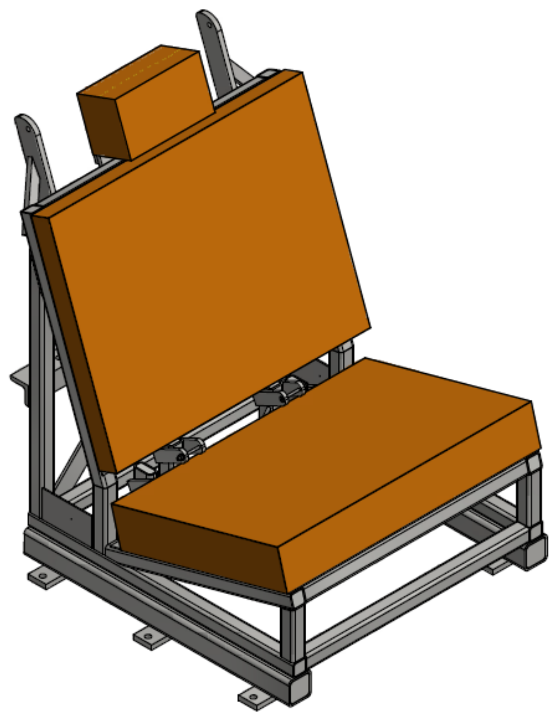


FIGURE 46. 213b FISA PREPARED FOR A BACKLESS BPB SEAT

213b HIGHSPEED IMAGE COLLECTION

Five highspeed cameras (minimum 1000 fps) shall be set-up in the following locations[30] to record 213b FISA, CRS, and occupant kinematics during the dynamic test (Figure 47):

1. Overhead Wide View: This camera shall include an overhead view of the entire test fixture and CRS for the full dynamic test event.

2. Head Excursion View: This camera shall be used to record head excursion for forward-facing CRS and back angle for rearward-facing CRS. This camera shall

[30] OVSC is collecting data and may define precise locations for high-speed cameras.

be mounted to the test platform so that the camera's photo sensor is centered at a location 720 mm forward of the 213b FISA Z-point for a forward-facing CRS tested with tether (Camera 2) or at a location 813 mm forward of the Z-point for a forward-facing CRS tested without tether (Camera 2'). The view shall be focused on a target placed at either 720 mm or 813 mm forward of the FISA Z-point. Camera view at location 2' shall be used to measure back angle for rearward-facing CRS tests.

3. Knee Excursion View: This camera shall be used to record knee excursion for forward-facing CRS. This camera shall be mounted to the test platform at a location 915 mm forward of the 213b FISA Z-point. The view shall be focused on a target placed at 915 mm forward of the FISA Z-point.

4. Right Side View: This camera shall provide an overall view of the CRS on the 213b FISA for the entire test event. This camera view shall be focused on the CRS and test dummy when installed on the 213b FISA.

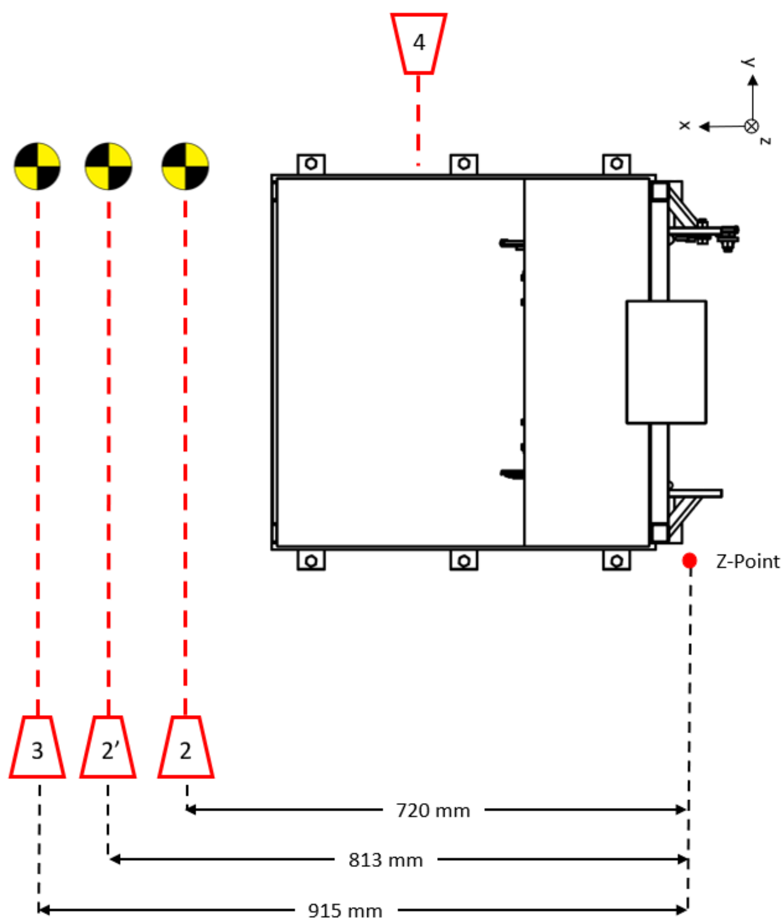


FIGURE 47. 213b HIGHSPEED CAMERA LOCATIONS[31]

[31] See drawing number 3021-1000 of NHTSA Standard Seat Assembly; FMVSS No. 213b, No. NHTSA-213-2021 (dated March 2023) for Z-point dimensions.

B. SPECIFIC VEHICLE SHELL

1) The specific vehicle shell, if selected for testing, is mounted on a dynamic test platform so that the longitudinal center line of the shell is parallel to the direction of the test platform travel and so that movement between the base of the vehicle shell and the platform is prevented.

   Adjustable vehicle seats are in the adjustment position midway between the forwardmost and rearmost positions, and if separately adjustable in a vertical direction, are at the lowest position. If an adjustment position does not exist midway between the forwardmost and rearmost position, the closest adjustment position to the rear of the midpoint is used.

   Adjustable vehicle seat backs are in the manufacturer's nominal design riding position. If such a position is not specified, the vehicle seat back is positioned so that the longitudinal centerline of the child test dummy's neck is vertical, and if an instrumented test dummy is used, the accelerometer surfaces in the dummy's head and thorax, as positioned in the vehicle, are horizontal.

   If the vehicle seat is equipped with adjustable head restraints, each is adjusted to its highest adjustment position.

2) The dynamic test platform is instrumented with an accelerometer and data processing system having a frequency response of 60 Hz channel class as specified in Society of Automotive Engineers Recommended Practice J211/1 (1995) "Instrumentation for Impact Tests." The accelerometer sensitive axis is parallel to the direction of test platform travel.

C. SPECIFIC VEHICLE

For built-in CRSs, an alternate test device is the specific vehicle into which the built-in system is fabricated. The following test conditions apply to this alternate test device.

1) The vehicle is loaded to its unloaded vehicle weight plus its rated cargo and luggage capacity weight, secured in the luggage area, plus the appropriate child test dummy and, at the vehicle manufacturer's option, a test dummy which conforms to the requirements of subpart B or subpart E of part 572 of this title for a 50th percentile adult male dummy placed in the front outboard seating position.

   A. If the built-in CRS is installed at one of the seating positions otherwise requiring the placement of a part 572 test dummy, then in the frontal barrier crash specified in (c), the appropriate child test dummy shall be substituted for the part 572 adult dummy, but only at that vehicle seating position.

   B. The fuel tank is filled to any level from 90 to 95 percent of capacity.

2) Adjustable vehicle seats are in the adjustment position midway between the forward-most and rearmost position, and if separately adjustable in a vehicle direction, are at the lowest position.

   A. If an adjustment position does not exist midway between the forward-most and rearmost positions, the closest adjustment position to the rear of the midpoint is used.

3) Adjustable vehicle seat backs are in the manufacturer's nominal design riding position.

   A. If a nominal position is not specified, the vehicle seat back is positioned so that the longitudinal center line of the child test dummy's neck is vertical, and if an anthropomorphic test dummy is used, the accelerometer surfaces in the test dummy's head and thorax, as positioned in the vehicle, are horizontal.

   B. If the vehicle is equipped with adjustable head restraints, each is adjusted to its highest adjustment position.

4) Movable vehicle windows and vents are, at the manufacturer's option, placed in the fully closed position.

5) Convertibles and open-body type vehicles have the top, if any, in place in the closed passenger compartment configuration.

6) Doors are fully closed and latched but not locked.

12.F.1.2 INSTRUMENTATION

TRANSDUCERS (S213b, S5.1.2, S6.1.1, S7.1)

The following transducers are required:

(1) An accelerometer for monitoring sled acceleration mounted directly to the sled carriage. Accelerometer type and class as required to adequately measure the acceleration response as specified in Figures 48 and 49. NHTSA is finalizing its selection of one of these two accelerometers:

Accelerometer model:	726CH-2K
Mounting frequency response:	± 5%, 0 to 5000 Hz
Transverse sensitivity:	3% maximum
Dynamic range:	± 2000 g, maximum
Sample Rate:	20 kHz
Type and Class:	60

Accelerometer model:	726CH-2KTZ
Mounting frequency response:	± 5%, 0 to 5000 Hz
Transverse sensitivity:	1% maximum
Dynamic range:	± 2000 g, maximum
Sample Rate:	20 kHz
Type and Class:	60

(2) Six accelerometers are required for mounting, three each in the head and thorax of the 12-month-old, 3-year-old, and 6-year-old unweighted dummies. Three accelerometers are required for mounting in the chest of the 10-year-old dummy. Each axis of the accelerometers shall meet the following minimum performance requirements:

Mounting frequency response:	± 5%, 0 to 2000 Hz
Maximum damping:	0.005 of critical, nominal
Transverse sensitivity:	5% maximum
Linearity and hysteresis:	± 3% of reading, maximum
Dynamic range:	± 500 g, minimum
Type and Class:	Refer to dummy test procedures

(3) Integration of the sled accelerometers to determine the speeds of the dynamic test.

(4) Force transducer to monitor the load applied to the dummy sling during the Buckle Release Tests described in this procedure.

(5) Force transducer to measure buckle release force.

Other instrumentation, as needed:

(1) Seat belt webbing load cells to monitor belt preload during seat installation. This item is not required if an equivalent belt tension measurement device is utilized to such as the three-prong belt tension gauge.

(2) Vertical laser line for CRS and ATD installation.

PLAYBACK AND RECORDING EQUIPMENT

Equipment shall be provided that has the following capabilities:

(1) Have a minimum capability of 8 data channels for measuring the following during the dynamic test:

3 – ATD head accelerations
3 – ATD thorax accelerations
1 – Sled acceleration
1 – Sled Velocity

(2) Provide a permanent record of all data channels during dynamic impact.

12.F.1.3 BELT WEBBING

The webbing used for Type II belt installations shall comply with FMVSS No. 209, S*eat belt assemblies*. Given the range of elongation that 209-compliant belt webbing could be, OVSC requests laboratories procure webbing having an elongation of 8 ± 2%. A light shade of ivory, silver, or blue is recommended for best contrast between the CRS and the 213b FISA. A new belt is used for each test performed.

12.F.2 SYSTEMS CHECK

Best practice suggests conducting one trial test before beginning a series of CRS compliance tests, to determine that all systems are functioning properly. In particular:

(1) Ensure the test velocities and acceleration conditions given in this procedure are met.

(2) When applicable, conduct the trial test with an instrumented dummy to assure correct operation of transducers, signal conditioning, and record/playback equipment.

(3) Review high-speed video coverage of the test setup and timing of the camera operation.

(4) Ensure accurate calibrations of the high-speed video field of view are available in the plane of motion of the CRS.

12.F.3 213b FRONTAL IMPACT DYNAMIC TEST CONDITIONS

12.F.3.1 ENVIRONMENTAL CONDITIONS (S213b, S6.1.1(d))

The 213b Frontal impact dynamic test shall be performed under the following environmental conditions unless agreed to by the COR:

Temperature	20.6°C (69°F) to 22.2°C (72°F)
Relative Humidity	10% to 70%

12.F.3.2 213b FRONTAL IMPACT SPEED (S213b, S6.1.1)

Configuration I tests shall be conducted at a velocity change of 48 km/h, + 0, - 3.2 km/h (30 mph, + 0, - 2 mph), or for the specific vehicle test with the deceleration produced in a 48 km/h frontal barrier crash.

Configuration II tests shall be conducted at a velocity change of 32 km/h, + 0, - 3.2 km/h (20 mph, + 0, - 2 mph), or for the specific vehicle test with the deceleration produced in a 32 km/h frontal barrier crash.

The test facility must establish a target impact speed, which, with all equipment and instrumentation accuracies considered, ensures that the actual speed is within the tolerance band. The target speed should be the maximum possible and still meet the required criteria. The target speed must be reported to the COR prior to starting the testing program.

12.F.3.3 213b FRONTAL IMPACT ACCELERATION (S213b, S6.1.1)

The impact sled acceleration envelopes for test configurations I and II, shown in Figures 48 and 49, are defined by the function envelope coordinates in Tables 16 and 17.

TABLE 16. TEST CONFIGURATION I ACCELERATION FUNCTION ENVELOPE

UPPER LIMIT		LOWER LIMIT	
TIME (msec)	ACCELERATION (G's)	TIME (msec)	ACCELERATION (G's)
0	3	4	0
10	25	13	19
52	25	46	19
90	0	75	0

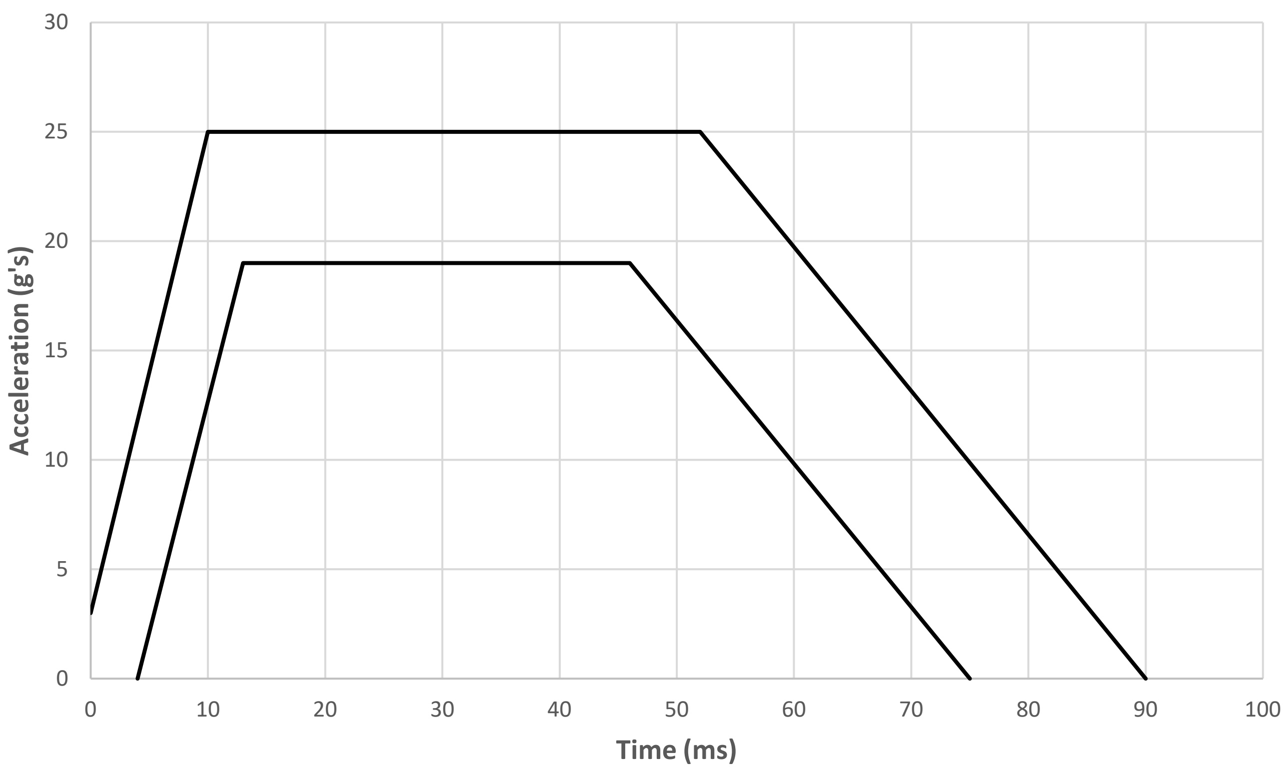


FIGURE 48. 213b FRONTAL TEST CONFIGURATION I ACCELERATION CORRIDOR

TABLE 17. 213b FRONTAL TEST CONFIGURATION II ACCELERATION FUNCTION ENVELOPE

TIME (msec)	UPPER LIMIT ACCEL. (G's)	LOWER LIMIT ACCEL. (G's)
0	0.0	-2.0
9.5	14.0	9.4
14	17.0	13.5
20	17.7	14.0
32	16.5	12.5
40	14.8	11.0
44	15.3	11.5
50	15.0	11.5
60	12.0	9.0
66	9.0	6.0
72	5.0	2.0
76	0.0	-2.0

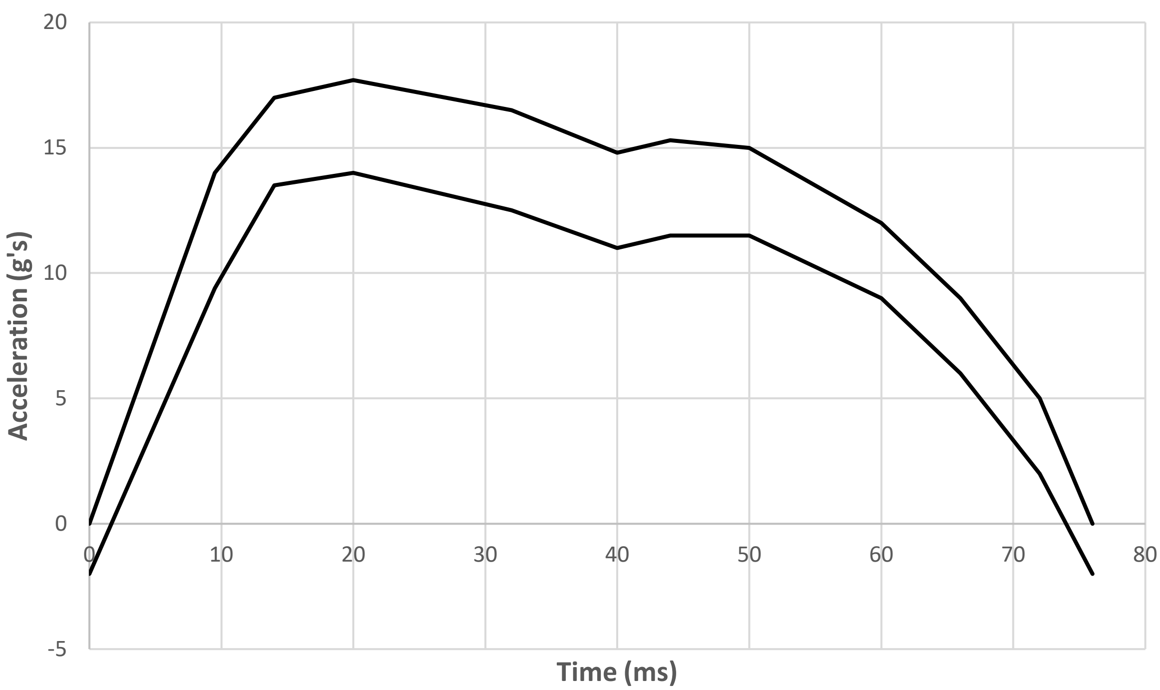


FIGURE 49. 213b FRONTAL TEST CONFIGURATION II ACCELERATION CORRIDOR

12.F.4 DUMMY PREPARATION

12.F.4.1 213b FRONTAL DUMMY SELECTION (S213b, S6.1.2.3, S7.1.2)

The Anthropomorphic Test Devices (ATDs) used in the 213b frontal impact dynamic testing will be:

(A) The newborn infant (CAMI) and 12-month-old CRABI (CRABI 12 MO) in rear-facing (RF) configurations.

(B) The Hybrid III 6-year-old, weighted Hybrid III 6-year-old, and Hybrid III 10-year-old in forward-facing (FF) configurations.

(C) The Hybrid III 3-year-old in both RF and FF configurations.

Prior to compliance testing, ATDs must be qualified in accordance with the applicable qualification procedure:

CRABI 12-month-old per CFR Title 49, Part 572, Subpart R
Hybrid III 3-year-old per CFR Title 49, Part 572, Subpart P
Hybrid III 6-year-old per CFR Title 49, Part 572, Subpart N
Weighted Hybrid III 6-year-old per CFR Title 49, Part 572, Subpart S
Hybrid III 10-year-old per CFR Title 49, Part 572, Subpart T

A child restraint that is recommended for children having a specific weight (regardless of height) or height (regardless of weight) shall comply with requirements when tested using all/each of the applicable test dummies specified, according to Table 18.

For the purpose of OVSC compliance test contract requirements, work with the COR to determine which ATD(s) to use according to the Table 18 below by comparing manufacturer's label and/or written instructions concerning occupant weight and height. If the range specified by the manufacturer includes any weight or height within the ranges specified, the seat may be tested using the dummy applicable to that weight or height range.

Test a new specimen of the CRS with the appropriate test dummy in each possible combination of installation mode, adjustment position, and required test mode or as directed by the COR. On the appropriate data sheet, record the particular test dummy and test configuration tested using the convention listed in Table 21.

TABLE 18. 213b FRONTAL DUMMY SELECTION BY WEIGHT OR HEIGHT (S7.1.2)

WEIGHT	HEIGHT	DUMM(IES)
≤ 5 kg (11 lb.)	≤ 650 mm (26 in)	Newborn Part 572(K)
> 5 kg (11 lb.) and ≤ 10 kg (22 lb.)	> 650 mm (26 in) and ≤ 750 mm (30 in)	Newborn Part 572(K) and 12-Month-Old Part 572(R)
> 10 kg (22 lb.) and ≤ 13.6 kg (30 lb.)	> 750 mm (30 in) and ≤ 870 mm (34 in)	12-Month-Old Part 572(R)*
> 13.6 kg (30 lb.) and ≤ 18.2 kg (40 lb.)	> 870 mm (34 in) and ≤ 1100 mm (43 in)	3-Year-Old Part 572(P)
> 18.2 kg (40 lb.) and ≤ 22.7 kg (50 lb.)	> 1100 mm (43 in) and ≤ 1250 mm (49 in)	6-Year-Old Part 572(N) (Hybrid III)
> 22.7 kg (50 lb.) and ≤ 30 kg (65 lb.)	> 1100 mm (43 in) and ≤ 1250 mm (49 in)	6-Year-Old Part 572(N)(Hybrid III)] and 6-Year-Old Part 572(S)(weighted Hybrid III)
> 30 kg (65 lb.)	> 1250 mm (49 in)	10-Year-Old Part 572(T) (Hybrid III)**

*The 12-month-old dummy is not tested forward facing.
**No HIC measured with 10-year-old HIII.

12.F.4.2 213b FRONTAL IMPACT PRETEST CONDITIONING

NEWBORN INFANT DUMMY (S213b, S9)

Prior to testing, condition the newborn infant dummy at any ambient temperature from 19°C to 25.5°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

12-MONTH-OLD DUMMY (S213b, S9)

Calibrate the 12-month-old dummy according to the requirements of 49 CFR Part 572, Subpart R as described in TP-572-R-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or back angle score (subject to COR's discretion),
- after 30 tests,
- or if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 12-month-old dummy at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

3-YEAR-OLD DUMMY (S213b, S9)

Calibrate the 3-year-old dummy according to the requirements of 49 CFR Part 572, Subpart P as described in TP-572-P-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or excursion score (subject to COR's discretion),
- after 30 tests,
- or if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 3-year-old dummy at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

6-YEAR-OLD DUMMY (UNWEIGHTED AND WEIGHTED) (S213b, S9)

Calibrate the 6-year-old dummy according to the requirements of 49 CFR Part 572, Subpart N as described in TP-572-N-00. Calibrate the 6-year-old weighted dummy according to the requirements of 49 CFR Part 572, Subpart S as described in TP-572-S-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or excursion score (subject to COR's discretion),
- after 30 tests,
- or if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 6-year-old dummy (unweighted and weighted) at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

10-YEAR-OLD DUMMY (S213b, S9)

Calibrate the 10-year-old dummy according to the requirements of 49 CFR Part 572, Subpart T as described in TP-572-T-00. Calibrations are performed accordingly:

- prior to the start of the compliance test program,
- after a dynamic test failure involving a high injury or excursion score (subject to COR's discretion),
- after 30 tests,
- or if the dummy has not been used in a dynamic sled test during the prior thirty calendar days.

Prior to testing, condition the 10-year-old dummy at any ambient temperature from 20.6°C to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

12.F.4.3 DUMMY INSTRUMENTATION

NEWBORN INFANT DUMMY

No instrumentation is installed in the newborn infant dummy.

12-MONTH-OLD DUMMY

Three uniaxial accelerometers in the dummy's head and three uniaxial accelerometers in the dummy's thorax are used to instrument the 12-month-old dummy per the requirements of 49 CFR Part 572, Subpart R.

3-YEAR-OLD DUMMY

Three uniaxial accelerometers in the dummy's head and three uniaxial accelerometers in the dummy's thorax are used to instrument the 3-year-old dummy per the requirements of 49 CFR Part 572, Subpart P.

6-YEAR-OLD DUMMY (UNWEIGHTED)

Three uniaxial accelerometers in the dummy's head and three uniaxial accelerometers in the dummy's thorax are used to instrument the 6-year-old dummy per the requirements of 49 CFR Part 572, Subpart N.

10-YEAR-OLD DUMMY

Three uniaxial accelerometers in the dummy's thorax are used to instrument the 10-year-old dummy per the requirements of 49 CFR Part 572, Subpart T.

12.F.4.4 DUMMY CLOTHING (S213b, S9)

NEWBORN INFANT DUMMY (S213, S9.1(a))

The newborn infant dummy is tested unclothed.

12-MONTH-OLD DUMMY (S213b, S9.1(c), S9.2)

The dummy is clothed in a cotton-polyester based tight fitting sweatshirt with long sleeves and ankle long pants whose combined weight is not more than 0.25 kg (0.55 lb.).

3-YEAR-OLD DUMMY (S213b, S9.1(e), S9.2)

The 3-year-old dummy is clothed in cotton-polyester-based tight-fitting shirt with long sleeves and ankle-length pants whose combined weight is not more than 0.25 kg (0.55 lb.). The 3-year-old dummy shall wear children's size 8 canvas oxford style sneakers weighing not more than 0.26 kg each. Shirt sleeve may be cut off at the elbows to improve the visibility of the dummy head during maximum excursion.

6-YEAR-OLD DUMMY (S213b, S9.1(d) and (f), S9.2)

The 6-year-old dummy is clothed in thermal knit, waffle-weave polyester and cotton underwear or equivalent, a size 5 short-sleeved shirt, having a mass no more than 0.090 kg, and size 4 pair of long pants having a mass no more than 0.090 kg (0.2 lb.). The dummy shall wear children's size 13 M canvas oxford style sneakers weighing not more than 0.43 kg each.

10-YEAR-OLD DUMMY (S213b, S9.1(f), S9.2)

The 10-year-old dummy is clothed in a form fitting cotton stretch above-the-elbow sleeved shirt having a mass no more than 0.14 kg (0.30 lb.), above-the-knees pants having a mass no more than 0.14 kg (0.30 lb.), and youth size 3 sneakers weighing not more than 0.6 kg each.

LAUNDERING DUMMY CLOTHES

Machine-wash the clothing, other than the shoes, in 71°C (160°F) to 82°C (180°F) water, and machine-dry at 43°C (110°F) to 54°C (130°F) approximately 30 minutes.

12.F.4.5 DUMMY TARGETING

12-MONTH-OLD DUMMY

Photographic targets are required to identify the head center of gravity of the 12-month-old dummy, which is located on either side of the dummy head at the head accelerometer mounting block bolt. Adhesive backed paper or fabric targets with a pattern that facilitates identifying and tracking the head center of gravity in the high-speed videos are recommended.

3-YEAR-OLD, 6-YEAR-OLD, AND 10-YEAR-OLD DUMMIES

Photographic targets are required to identify the head center of gravity and the pivot points of the knees of the 3-year-old, 6-year-old, and 10-year-old dummies. Adhesive backed paper or fabric targets having a pattern that facilitates identifying and tracking of the head and knee reference points in the high-speed videos are recommended. The head center of gravity is identified by the head center of gravity reference pin, which protrudes from each side of the head. Note that the head center of gravity target is not used for maximum forward excursion measurements. It may be used, however, along with a second target placed on the head to facilitate determination of maximum head/torso angle. The knee pivot-points are defined by the centers of the knee pivot bolts and are used for maximum forward excursion measurements.

12.F.4.6 LAP SHIELD AND PELVIS POSITIONING PAD PREPARATION (S213b, S10.2.3)

LAP SHIELD

Cut a piece of translucent silicone rubber 3 mm ± 0.5 mm thick (50A durometer) to the dimensions specified in Figure 17.

PELVIS POSITIONING PAD

Cut a pad having the dimensions 125 x 95 x 20 mm (± 2 mm tolerance in each of the three dimensions) from a piece of closed cell (Type 2 according to ASTM D-1056-07) foam or rubber material having the following specifications:

Compression resistance between 9 to 17 psi in a compression-deflection test specified in ASTM D-1056-07 and a density of 7 to 12.5 lb./ft^3.

12.F.5 PREIMPACT BUCKLE RELEASE TEST (S213b, S5.1.5, S6.2)

At the COR's discretion, before conducting the dynamic testing of the CRS, remove the buckle from the restraint system and place on a hard, flat horizontal surface. Each belt end of the buckle is pre-loaded in the following manner:

(A) The anchor end of the buckle is loaded with a 9 N (2 lb.) force in the direction away from the buckle.

   a. In the case of buckles designed to secure a single latch plate, the belt latch plate end of the buckle is pre-loaded with a 9 N (2 lb.) force in the direction away from the buckle.

   b. In the case of buckles designed to secure two or more latch plates, the belt latch plate ends of the buckle are loaded equally so that the total load is 9 N (2 lb.), in the direction away from the buckle.

(B) For pushbutton-release buckles, the release force is applied by a conical surface (cone angle not exceeding 90 degrees).

   a. For pushbutton-release mechanisms with a fixed edge (referred to in Figure 50 as "hinged button"), the release force is applied at the centerline of the button, 3 mm away from the movable edge directly opposite the fixed, or “hinged,” edge, and in the direction that produces maximum releasing effect.

b. For pushbutton-release mechanisms with no fixed edge (referred to in Figure 50 as “floating button”), the release force is applied at the center of the release mechanism in the direction that produces the maximum releasing effect.

(C) For all other buckle release mechanisms, the force shall be applied on the centerline of the buckle lever or finger tab in the direction that produces the maximum releasing effect. Measure the force required to release the buckle. Figure 50 illustrates the loading for the different buckles and the point where the release force should be applied, and Figure 56 illustrates the conical surface used to apply the release force to pushbutton-release buckles.

(D) For CRSs that have buckles integral to the seat, the entire seat may be placed on its back on a flat surface with the 9 N (2 lb.) force applied to the belts away from the buckle as described above, and the release force of the buckle determined with the appropriate release gauge.

(E) For buckle assemblies that are attached to a crotch belt where the crotch belt cannot be removed and re-installed as originally found, the buckle assembly can be handheld while the test gauge release force is applied. Place the restraint on its back and, following the procedure above, keep the buckle assembly in the orientation described and apply the force sufficient to release the buckle.

Record the results in the appropriate data sheets.

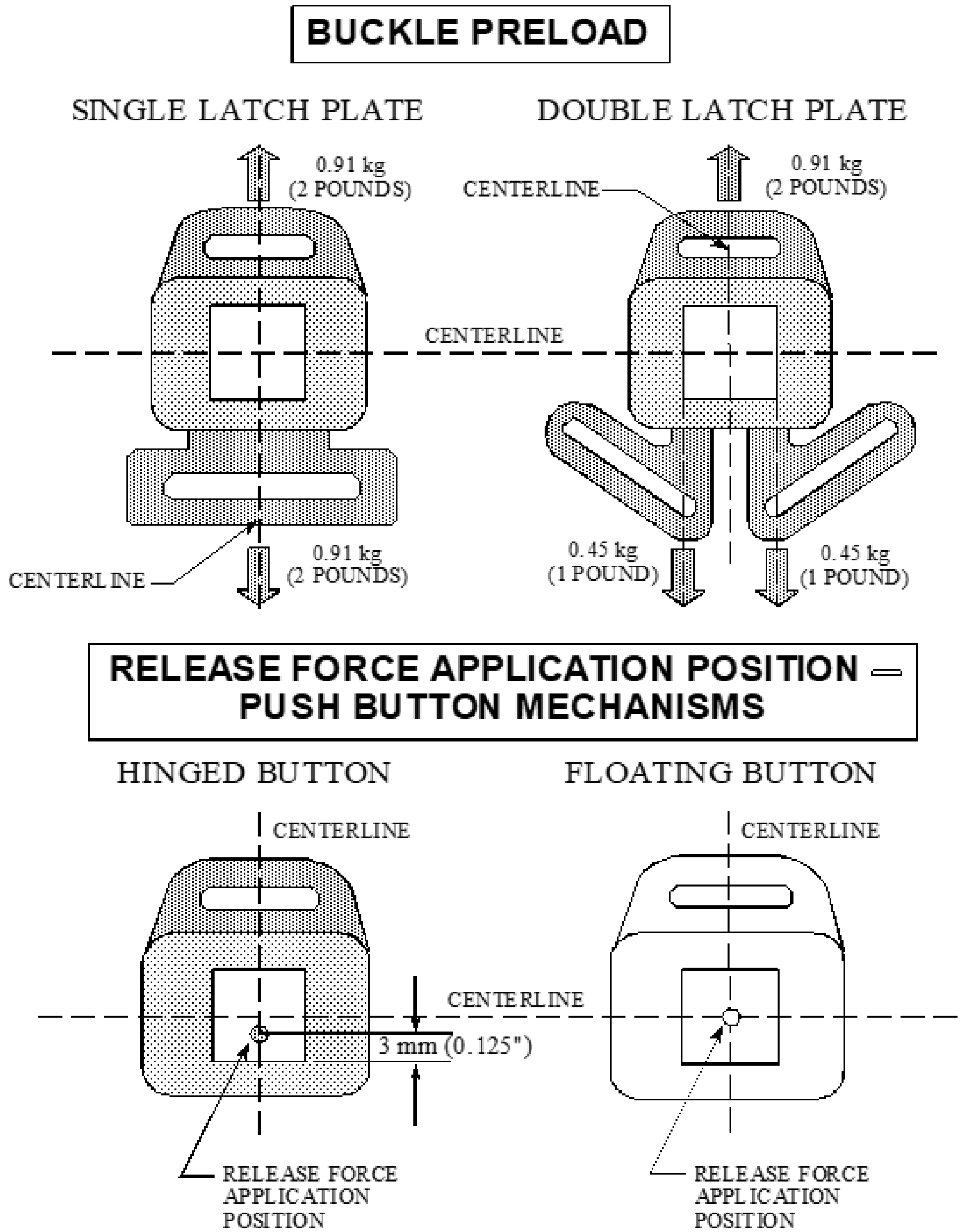


FIGURE 50. PRE-IMPACT BUCKLE RELEASE FORCE TEST SETUP

12.F.6 213b FRONTAL RESTRAINT SETUP

This section describes the procedure to be followed for installing the CRS on the 213b FISA and for installing the dummy in the CRS for frontal impact dynamic testing.

12.F.6.1 213b FRONTAL CHILD RESTRAINT SYSTEM INSTALLATION

Prior to each test, use the belt anchorage gap gauge to check that the FISA belt anchorages have not deformed and continue to meet the specifications in the drawing package. Figure 51, below, illustrates a tool that may be utilized to check the belt anchorages for testing. If the D-ring or inboard lap belt anchor section of the gauge fits within the belt path of its corresponding anchor, then that belt anchorage shall be considered deformed. Replace all deformed anchorages prior to performing the dynamic test.

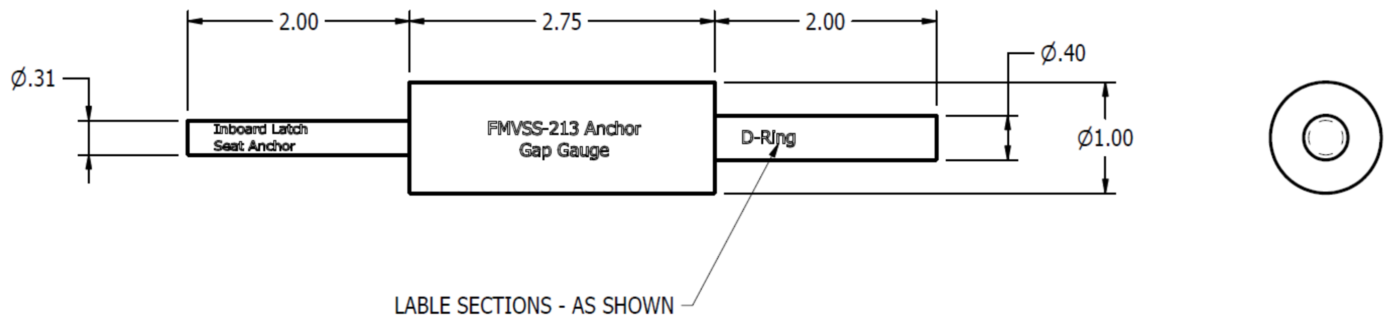


FIGURE 51. BELT ANCHORAGE GAP GAUGE (in.)

Place the add-on child restraint on the 213b FISA seat so that the center of the CRS is in the center of the 213b FISA. The restraint should sit flat on the 213b FISA seat bottom and make contact with the seat back. Work with the COR to determine which test configurations to perform. Follow the manufacturer's instructions provided with the CRS to properly level and install the CRS by any one of the means as described below:

A. TEST CONFIGURATION I

Install the CRS on the FISA in accordance with the manufacturer's labeling and printed instructions provided with the system. Set up the test based on the following conditions:

(A) For an add-on CRS (other than a belt-positioning seat):

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using the standard lap and shoulder belt.

(3) The tether strap, if one is provided, is attached to the tether anchorage.

(4) No supplemental devices (at the discretion of the COR; including but not limited to load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

(B) For an add-on CRS (other than a harness, backless booster, belt-positioning seat, and a restraint designed for use by physically handicapped children):

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using the standard lap and shoulder belt.

i. If the CRS has rigid lower anchors that cannot be stowed, remove the lower anchor attachment screws from the FISA LATCH assembly (drawing 3021-750) prior to the installation of the CRS.

(3) The tether strap, if one is provided, is attached to the tether anchorage.

(4) No supplemental devices (at the discretion of the COR; including but not limited to load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

-OR-

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using only the lower anchorages of the child restraint anchorage system.

(3) No tether strap is used.

(4) Rear-facing CRS with a detachable base may be installed with the lower anchor components located on the detachable base.[32]

(5) No other supplemental devices (at the discretion of the COR; including but not limited to load legs, pool noodles, etc.) are permitted to install the CRS.

[32] S5.9(a) of FMVSS No. 213b

(C) For a backless CRS (other than child harness) with a top anchorage strap, and a restraint designed for use by physically handicapped children:

(1) Install the CRS at the center seating position of the FISA in accordance with the manufacturer's instructions.

(2) Secure the CRS to the FISA using the standard lap belt.

i. If the CRS has rigid lower anchors that cannot be stowed, remove the lower anchor attachment screws from the FISA LATCH assembly (drawing 3021-750) prior to the installation of the CRS.

(3) No tether strap is used.

(4) No supplemental devices (at the discretion of the COR; including but not limited to load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

(D) For harnesses that bear the label shown in Figure 5 that meet S5.3.1(b)(1) through S5.3.1(b)(3) of FMVSS No. 213:

(1) Attach the harness in accordance with the manufacturer's instructions provided with the system pursuant to S5.6.1.

i. i.e., the seat back mount is used.

(E) For an add-on belt-positioning seat:

(1) Install the CRS on the FISA in accordance with the manufacturer's instructions.

(2) Secured the CRS to the FISA using only the standard vehicle lap and shoulder belt and no tether.

(3) No supplemental devices (at the discretion of the COR; including but not limited to load legs, pool noodles, detachable bases, etc.) are permitted to install the CRS.

(F) For a built-in CRS:

(1) Activate the restraint in the specific vehicle shell or the specific vehicle, in accordance with the manufacturer's instructions.

B. TEST CONFIGURATION II

In the case of each add-on CRS which is equipped with a fixed or movable surface or a backless CRS with a top anchorage strap, install the add-on CRS at the center seating position of the 213b FISA using only the Type I lap belt or the Type II lap and shoulder belt to secure the system to the 213b FISA. Or at NHTSA's option, only the lower anchorages of the CRS. Do not attach the top tether.

In the case of each built-in CRS, which is equipped with a fixed or movable surface or a built-in booster seat with a top anchorage strap, activate the system in the specific vehicle shell or the specific vehicle in accordance with the manufacturer's instructions provided.

12.F.6.2 BELT ADJUSTMENT

A. CHILD RESTRAINT PELVIC AND SHOULDER BELTS (S213b, S6.1.2(d)(1)(i))

Determine shoulder harness slot position and buckle harness position by seating the dummy into the child restraint. Review the manufacturer's instructions provided with the child restraint of recommended shoulder and buckle harness positions. Generally, rear facing child restraints will use a shoulder harness position equal or lower than, and closest to, the shoulder height of the child and forward-facing child restraints will use a shoulder harness position equal or higher than, and closest to, the shoulder height of the child.

Typically, the buckle harness position is the position closest to the child but not under their body. NHTSA reserves the right to determine the appropriate harness positions. Make note of the harness position used for testing on the appropriate data sheet using one of the following methods:

(i) Seats with multiple discrete slots- Count from the lowest seat back slot to the highest, and the crotch strap position is counted from the closest to the seat back outward. The position should be described as "Slot X, counted from the bottom" or "Slot Y, counted from the seat back outward".

(ii) Seats with adjustable harnesses- Adjust the shoulder harness to be nearly equal to the shoulder height of the ATD. Describe the position as, "The shoulder harness was adjusted to match the shoulder height of the ATD."

In child restraints, other than belt-positioning seats, place the appropriate size dummy in the child restraint for testing. Tighten the child restraint belts to a tension between 9 N (2 lb.) and 18 N (4 lb.) at the top of each dummy shoulder and to the pelvic webbing.

B. CHILD RESTRAINT ATTACHMENT BELTS

Add-On Systems Other Than Belt-Positioning Seats (S213b, S6.1.2(d)(1)(ii))

A. Tighten all belts used to restrain the CRS to the 213b FISA or built-in restraint after installation of the appropriate size dummy.

B. All Type II belt systems, that are used to attach an add-on child restraint to the 213b FISA:

   1. Tighten to a tension of not less than 53.5 N (12 lb.) and not more than 67 N (15 lb.), as measured by a 3-prong tension gauge used on the webbing portion of the belt.

   2. Tighten any provided additional anchorage belt (top tether) to a tension of not less than 45 N (10 lb.) and not more than 53.5 N (12 lb.).

C. All belt systems used to attach the restraint to the tether anchorage and the child restraint anchorage system on the FISA:

   1. Tighten the belts of the lower anchorage attachments to a tension of not less than 53.5N (12 lb.) and not more than 67 N (15 lb.), as measured by a 3-prong tension gauge.

   2. Tighten the belt of the top tether attachment to a tension of not less than 45 N (10 lb.) and not more than 53.5 N (12 lb.).

Add-On Belt-Positioning Seats (S213b, S6.1.2(d)(2), S6.1.2(d)(3))

1. Tighten the lap and shoulder portions of the Type II belt system used to directly restrain the dummy in add-on and built-in CRSs to a tension of not less than 9 N (2 lb.) and not more than 18 N (4 lb.), as measured by a 3-prong belt tension gauge.

2. For the shoulder portion of all Type II belt systems, apply the initial tension at a point close to the D-ring between the belt anchorage and the D-ring. Otherwise, apply the initial tension at the closest point to the CRS that permits installation of the gauge on the belt system.

For a built-in CRS, if provided, shoulder and pelvic belts that directly restrain the dummy are adjusted as follows:

1. Tighten the belt system used to restrain the child within the CRS to any tension of not less than 9 N (2 lb.) and not more than 18 N (4 lb.) on the webbing at the top of each dummy shoulder and pelvic region.

TABLE 19. CRS INSTALLATION BELT TENSIONS

	Lower Anchor Belt	Top Tether	3-Point Seat Belt for CRSs	Internal Harness & 3-Point Belt-Positioning Booster Belt
Tension	53.5-67 N (12-15 lb.)	45-53.5 N (10-12 lb.)	53.5-67 N (12-15 lb.)	9-18N (2-4 lb.)

12.F.6.3 RESTRAINT TARGETING

Rear-facing restraints, depending on their design, require the use of targets visible to the high-speed video camera to allow determination of compliance with occupant excursion and back support angle requirements. A target identifying the forward-most and top-most point on the restraint is necessary if that point is not visible from the side.

If a surface parallel to the back support surface is not externally visible, targets identifying that surface may be necessary for determining its maximum deviation from vertical. An alternate method for defining the seat back plane is to determine the angular relationship between an externally visible surface and the actual back support surface prior to the frontal impact dynamic test.

If the back support surface is curved, a target that identifies the top of the dummy's shoulder, defined in this procedure, is placed on the surface to be observed. The angle determination will then be made using a tangent to the surface at the "shoulder height" point.

Do not modify the restraint in any manner that will affect its structure or performance to achieve the targeting requirement. The use of adhesive-backed paper or fabric photographic targets is recommended for this application.

12.F.6.4 DUMMY INSTALLATION – CAR BEDS (S213b, S10.1)

In the case of an add-on car bed, place the test dummy in the car bed in the supine position with its midsagittal plane perpendicular to the center SORL of the 213b FISA.

In the case of a built-in car bed, place the test dummy in the car bed perpendicular to the longitudinal axis of the specific vehicle shell or the specific vehicle.

Position the dummy within the car bed in accordance with the instructions for child positioning that the car bed manufacturer provided with the car bed in accordance with S5.6.

12.F.6.5 DUMMY INSTALLATION - RESTRAINTS OTHER THAN CAR BEDS (S213b, S10.2)

A. NEWBORN DUMMY AND 12-MONTH-OLD DUMMY (S213, S10.2.1)

For rear-facing CRS and for a CRS with a fixed or movable surface being tested under the conditions of test configuration I:

1. Position the CRS on the 213b FISA according to the included instructions provided by the manufacturer.

2. Attach all appropriate child restraint lower anchor belts or all appropriate vehicle belts and tighten them as specified in TP section 12.F.6.4.

3. If the CRS has a fixed or movable surface, position each movable surface in accordance with the provided instructions.

4. Position the test dummy in the CRS according to the provided instructions such that the back of the dummy torso contacts the back support surface of the CRS.

5. After attaching and tightening the belts used to restraint the dummy, extend the dummy's arms vertically upwards and then rotate each arm downward toward the dummy's lower body until the arm contacts a surface of the CRS or the 213b FISA in the case of an add-on CRS, or the specific vehicle shell or the specific vehicle, in the case of a built-in CRS.

6. Ensure that no arm is restrained from movement in other than the downward direction, by any part of the CRS or the belts used to anchor the system to the 213b FISA, the specific shell, or the specific vehicle.

7. If necessary, position the limbs so that their placement does not inhibit torso or head movement when the dynamic sled test is conducted.

8. If the dummy's head does not remain in the proper position, tape the head against the front of the seat back surface of the CRS using a single thickness of 6 mm (1/4 inch) wide paper masking tape placed across the center of the dummy's face.

For a rear-facing CRS being tested under the conditions of test configuration II:

1. For a CRS which is equipped with a fixed or movable surface: do not attach any of the child restraint belts unless they are an integral part of the fixed or movable surface.

2. Position the test dummy in the CRS according to the provided instructions such that the back of the dummy torso contacts the back support surface of the CRS.

3. After attaching and tightening the belts used to restraint the dummy, extend the dummy's arms vertically upwards and then rotate each arm downward toward the dummy's lower body until the arm contacts a surface of the CRS or the 213b FISA in the case of an add-on CRS, or the specific vehicle shell or the specific vehicle, in the case of a built-in CRS.

4. Ensure that no arm is restrained from movement in other than the downward direction, by any part of the CRS or the belts used to anchor the system to the 213b FISA, the specific shell, or the specific vehicle.

5. If necessary, position the limbs so that their placement does not inhibit torso or head movement when the dynamic sled test is conducted.

6. If the dummy's head does not remain in the proper position, tape the head against the front of the seat back surface of the CRS using a single thickness of 6 mm (1/4 inch) wide paper masking tape placed across the center of the dummy's face.

B. OTHER DUMMIES GENERALLY (S213b, S10.2.2)

When using the 3-year-old, the 6-year-old HIII, and the 6-year-old weighted dummies in forward-facing CRSs other than belt-positioning seats, use the following dummy positioning procedures:

1. Position the test dummy according to the instructions for child positioning that the restraint manufacturer provided with the CRS.

2. Holding the test dummy torso upright until it contacts the CRS's design seating surface, place the test dummy in the seated position within the CRS with the midsagittal plane of the test dummy head-

   a. Coincident with the center SORL of the 213b FISA, in the case of the add-on CRS, or

   b. Vertical and parallel to the longitudinal centerline of the specific vehicle, in the case of a built-in CRS.

3. Extend the arms of the test dummy as far as possible in the upward vertical direction. Extend the legs of the dummy as far as possible in the forward horizontal direction, with the dummy feet perpendicular to the centerline of the lower legs.

4. Using a flat square surface with an area of 2580 square millimeters (4 square inches), apply a force of 178 N (40 lb.), perpendicular to:

   a. The plane of the back of the 213b FISA, in the case of an add-on system, or the back of the vehicle seat in the specific vehicle shell or the specific vehicle, in the case of a built-in system,

b. First against the dummy crotch and then at the dummy thorax in the midsagittal plane of the dummy.

5. For a CRS with a fixed or movable surface, which is being tested under the conditions of test configuration II, do not attach any of the child restraint belts unless they are an integral part of the fixed or movable surface.

6. For all other CRSs and for a CRS with a fixed or movable surface, which is being tested under the conditions of test configuration I, attach all appropriate child restraint belts and tighten them as specified in TP section 12.F.6.4. Attach all appropriate vehicle belts and tighten them as specified in TP section 12.F.6.4.

7. Position each movable surface in accordance with the instructions that the manufacturer provided.

8. Rotate each dummy limb downwards in the plane parallel to the dummy's midsagittal plane until the limb contacts a surface of the CRS or the 213b FISA, in the case of an add-on system, or the specific vehicle shell or specific vehicle, in the case of a built-in system, as appropriate.

9. Position the limbs, if necessary, so that limb placement does not inhibit torso or head movement.

When using the 3-year-old HIII in a rear-facing CRS, use the following dummy positioning procedures:

1. Remove the knee-stop screws from the right and left knee to let the knees hyperextend.

2. Place the dummy in the CRS so that the back of the dummy torso contacts the back support surface of the system.

3. For a CRS equipped with a fixed or moveable surface that is being tested under the conditions of test configuration II, do not attach any of the CRS belts unless they are an integral part of the fixed or moveable surface.

4. For all other CRSs and for a CRS with a fixed or movable surface, which is being tested under the conditions of test configuration I, attach all appropriate child restraint belts and tighten them as specified in TP section 12.F.6.4. Attach all appropriate vehicle belts and tighten them as specified in TP section 12.F.6.4.

5. Position each movable surface in accordance with the manufacturer's instructions.

6. After attaching and tightening the belts used to restraint the dummy, extend the dummy's arms vertically upwards and then rotate each arm downward toward the dummy's lower body until the arm contacts a surface of the CRS or the 213b FISA in the case of an add-on CRS, or the specific vehicle shell or the specific vehicle, in the case of a built-in CRS.

7. Ensure that no arm is restrained from movement in other than the downward direction, by any part of the CRS or the belts used to anchor the system to the 213b FISA, the specific shell, or the specific vehicle.

8. If necessary, position the limbs so that their placement does not inhibit torso or head movement when the dynamic sled test is conducted.

C. BELT-POSITIONING SEATS (S213b, S6.1.2(a)(1)(ii), S10.2.3)

A belt-positioning seat is attached to the 213b FISA in accordance with the manufacturer's instructions using only the standard vehicle lap and shoulder belt and no tether (or any other supplemental device). The ATDHPD may be installed on the 213b FISA if the restraint is a backless belt-positioning seat.

When using the 6-year-old HIII, weighted 6-year-old Hybrid III, and the 10-year-old dummies in belt-positioning seats, use the following dummy positioning procedures.

A) 6-year-old HIII and weighted 6-year-old HIII Dummy Preparation

1. Adjust the limb joints to 1-2 g while the torso is in the seated position.

2. Apply double-sided tape to the surface of the lap shield. Align the top of the lap shield with the superior anterior edge of the pelvis skin. Attach the lap shield to the pelvis of the dummy.

3. Dress and prepare the dummy.

B) 10-year-old HIII Dummy Preparation

1. Set the dummy's neck angle at the Standard Procedure-16 setting, see Figure 52.

2. Set the dummy's lumbar angle at the SP-12 setting, see Figure 53. This is done by aligning the notch on the lumbar adjustment bracket with the SP-12 notch on the lumbar attachment.

3. Adjust the limb joints to 1-2 g while the torso is in the seated position.

4. Apply double-sided tape to the surface of the lap shield, Align the top of the lap shield with the superior anterior edge of the pelvis skin. Attach the lap shield to the pelvis of the dummy.

5. Apply double-sided tape to one side of a pelvis positioning pad. Center the long axis of the pad on the posterior of the pelvis with the top edge of the foam aligned with the superior edge of the pelvis skin. Attach the pelvis positioning pad to the dummy.

6. Dress and prepare the dummy.

Position the test dummy in the belt-positioning seat according to the manufacturer's instructions provided with the system, while conforming to the following:

1. Position the dummy on the seat cushion of the belt-positioning seat such that the plane of the posterior pelvis is parallel to the plane of the seat back of the belt-positioning seat, 213b FISA or vehicle seat back, but not touching. Pick up and move the dummy rearward, maintaining the parallel planes, until the pelvis positioning pad, if used, or the pelvis or back of the dummy and the back of the belt-positioning seat or the back of the 213b FISA are in minimal contact.

2. Straighten and align the arm segments horizontally, then rotate the arms upward at the shoulder as far as possible without contacting the belt-positioning seat. Straighten and align the legs horizontally and extend the lower legs as far as possible in the forward horizontal direction, with the feet perpendicular to the centerline of the lower legs.

3. Using a flat square surface with an area of 2580 square millimeters, apply a force of 178 N (40 lb.) first against the dummy crotch and then against the dummy thorax on the midsagittal plane of the dummy, perpendicular to:

   (i) The plane of the back of the belt-positioning seat, in the case of a belt-positioning seat with a back, or,

   (ii) The plane of the back of the 213b FISA or vehicle seat, in the case of a backless belt-positioning seat or built-in booster.

4. Rotate the arms of the dummy down so that they are perpendicular to the torso.

5. Bend the knees until the back of the lower legs are in minimal contact with the belt-positioning seat, FISA or vehicle seat.

6. Position the legs such that the outer edges of the knees are 180 ± 10 mm apart for the Hybrid III 6-year-old dummy and 220 ± 10 mm apart for the Hybrid III 10-year-old dummy.

7. Position the feet such that the soles are perpendicular to the centerline of the lower legs.

8. In the case of a belt-positioning seat with a back, adjust the dummy so that the shoulders are parallel to a line connecting the shoulder belt guides. This can be accomplished by leaning the torso such that the dummy’s head and neck are centered on the backrest components of the belt-positioning seat. In the case of a backless child restraint, adjust the dummy’s torso so that the head is as close to laterally level as possible.

9. Attach the vehicle belts and tighten the lap and shoulder portions to a tension of not less than 9 N (2 lb.) and not more than 18 N (4 lb.).

10. Check the leg, feet, thorax, and head positions and make any necessary adjustments to achieve the positions described in steps (5)-(8), above. Position the legs, if necessary, so that the leg placement does not inhibit thorax movement.

11. Rotate each dummy arm downwards in the plane parallel to the dummy’s midsagittal plane until the arm contacts a surface of the CRS or the FISA, in the case of an add-on system, or the specific vehicle shell or specific vehicle, in the case of a built-in system, as appropriate. Position the arms, if necessary, so that the arm placement does not inhibit torso or head movement.

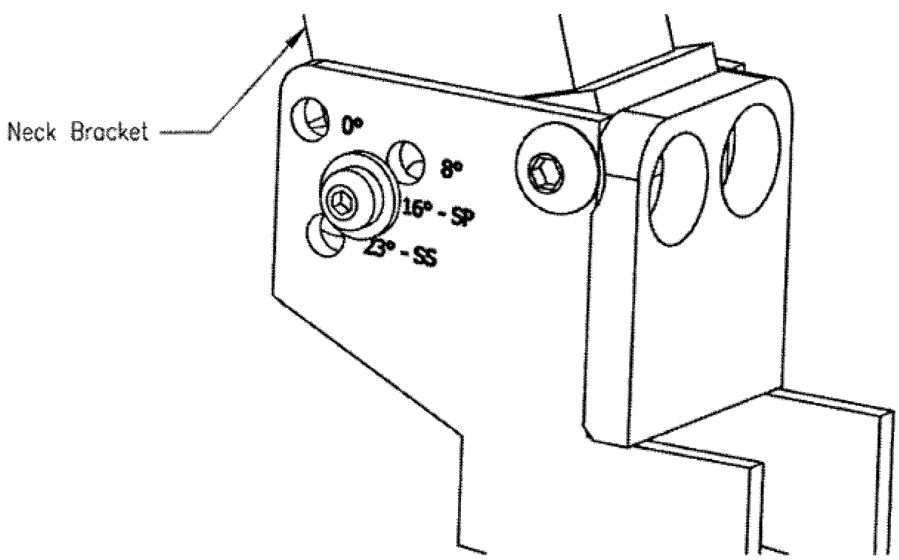


FIGURE 52. HIII-10C DUMMY NECK ANGLE SETTING IS SP-16 DEGREES

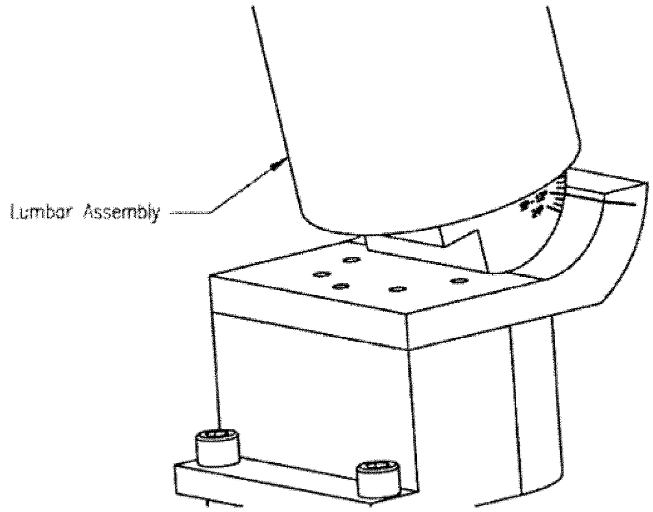


FIGURE 53. HIII-10C DUMMY LUMBAR ANGLE SETTING IS SP-12 DEGREES

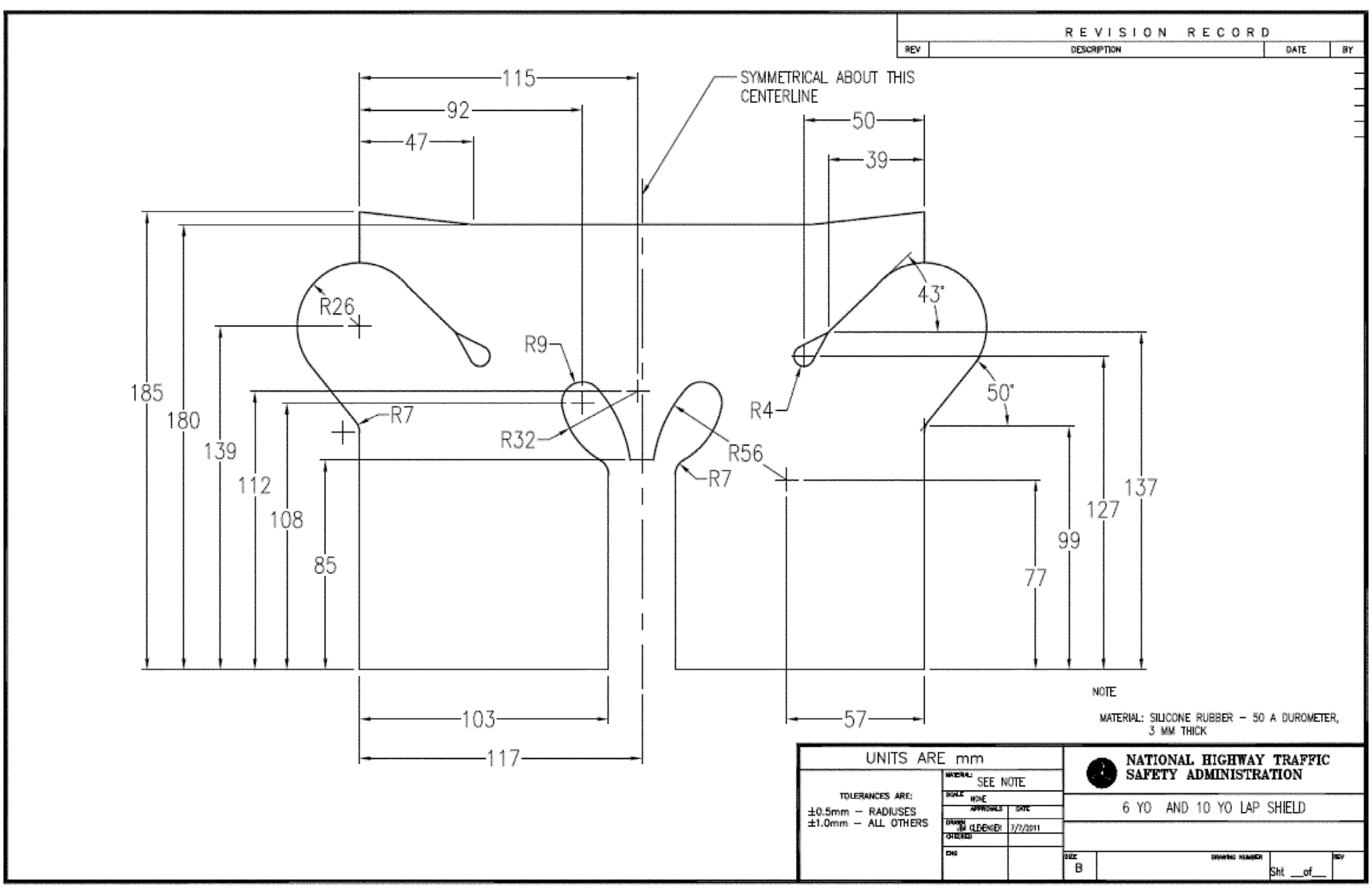


FIGURE 54. LAP SHIELD

12.F.7 FRONTAL IMPACT DYNAMIC TEST (S213b, S6.1.2(e))

Before conducting the 213b Frontal impact dynamic test, ensure that the following pretest requirements are met:

(1) The environmental conditions are met.

(2) All parameters relating to the required impact acceleration and velocity have been correctly set.

(3) All required calibrations of instrumentation, transducers, and high-speed video camera field are completed and recorded.

(4) Restraint and required targeting are properly installed.

(5) The restraint system and dummy are properly installed on the FISA, and all belts are adjusted and tensioned as required.

When all pretest requirements are met:

(1) Photograph the restraint setup to document the final pretest configuration. Include this documentation with the appropriate data sheet.

(2) Add appropriate signage with CRS, ATD, test number and date, and pre-test information to the test apparatus and sign boards.

(3) Take photographs of the set-up, CRS and ATD. The following pictures should be taken before testing:

i. Right side view
ii. Right 45º view
iii. Front view
iv. Left 45º view
v. Left side view
vi. Overhead view
vii. Up close of ATD

Once all pretest requirements are met and photographs of the test setup are taken, conduct the frontal impact dynamic test.

12.F.8 FRONTAL IMPACT PERFORMANCE REQUIREMENTS (S213b, S5.1)

Immediately after the 213b Frontal dynamic test:

(1) Photograph the restraint and dummy in their final post-test positions and configurations on the 213b FISA seat.

(2) Add appropriate signage with CRS, ATD, test number and date, and pre- or post-test information to the test apparatus and sign boards.

(3) Take photographs of the CRS and ATD. The following pictures should be taken after testing:

i. Right side view
ii. Right 45º view
iii. Front view
iv. Left 45º view
v. Left side view
vi. Overhead view
vii. Up close of ATD
viii. Additional photos to document failures or results that need further review

Include this documentation with the appropriate data sheet. Provide, in addition, a plot of the seat acceleration-time history for the test, showing its relationship to the acceleration-function envelope.

In the event of a test failure, a posttest calibration check of critically sensitive test equipment and instrumentation shall be required at the discretion of the COR.

12.F.8.1 POST IMPACT BUCKLE RELEASE TEST (S213b, S5.1.5, S6.2)

After completion of the testing specified in S6.1 of Standard 213b and before the buckle is unlatched, tie a self-adjusting sling to each wrist and ankle of the test dummy in the manner illustrated in Figure 55.

Pull the sling tied to the dummy restrained in the CRS and apply a force whose magnitude is:

50 N (11 lb.) for a CRS tested with a newborn infant dummy
90 N (20 lb.) for a CRS tested with a 12-month-old dummy
200 N (45 lb.) for a CRS tested with a 3-year-old dummy
270 N (61 lb.) for a CRS tested with the 6-year-old dummy
350 N (79 lb.) for a CRS tested with the weighted 6-year-old dummy
437 N (98 lb.) for a CRS tested with the 10-year-old dummy

The force is applied by pulling the sling horizontally and parallel to the SORL of the FISA seat in the manner illustrated in Figure 55.

(A) Add-on Child Restraints. For an add-on child restraint other than a car bed, apply the specified force by pulling the sling horizontally and parallel to the SORL of the FISA. For a car bed, apply the force by pulling the sling vertically.

(B) Built-in Child Restraints. For a built-in child restraint other than a car bed, apply the force by pulling the sling parallel to the longitudinal centerline of the specific vehicle shell or the specific vehicle. In the case of a car bed, apply the force by pulling the sling vertically.

(C) Figure 55 illustrates a forward-facing restraint. For rear facing restraints, reverse the restraint so that it's forward facing. Pull the sling according to the procedures for a forward-facing restraint.

While applying the force specified and using the device shown in Figure 56 for pushbutton-release buckles, apply the release force in the manner and location specified in S6.2.1 of FMVSS No. 213b, for that type of buckle. Measure the force required releasing the buckle and record in the appropriate data sheet.

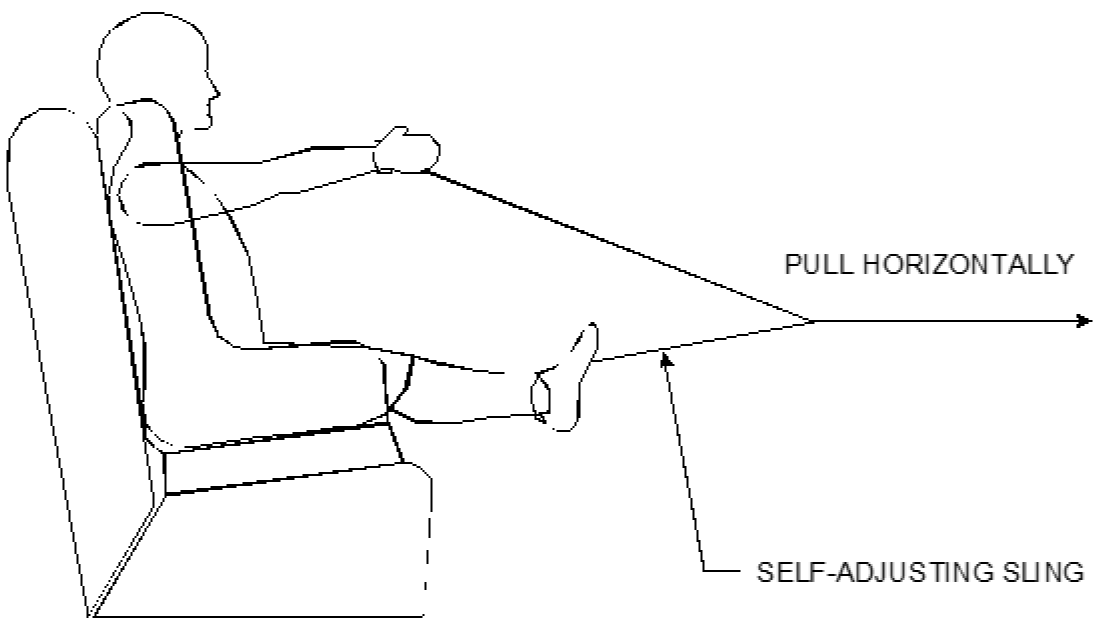


FIGURE 55. BUCKLE RELEASE TEST CONFIGURATION

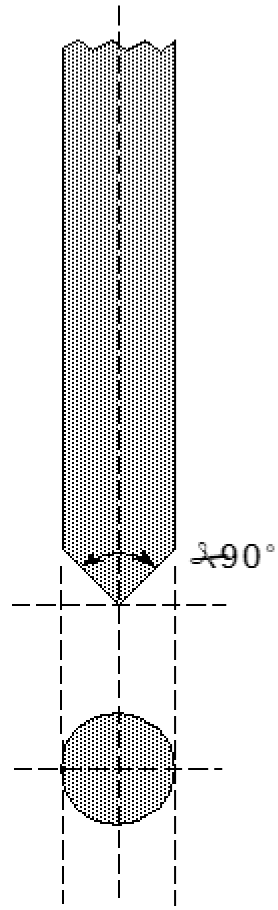


FIGURE 56. RELEASE FORCE APPLICATION DEVICE – PUSH BUTTON RELEASE BUCKLES

12.F.8.2 RESTRAINT SYSTEM INTEGRITY (S213b, S5.1.1)

After the frontal impact dynamic test, observe, measure, and record the results, including maximum protrusion values, on the appropriate data sheet.

Specifically check for the following and note any test failures if the CRS does not meet the following requirements:

(1) Exhibit no complete separation of any load bearing structural element and no partial separation exposing either surfaces with a radius of less than 6 mm (0.25 inch) or surfaces with protrusions greater than 10 mm (0.375 inch) above the immediate adjacent surrounding contactable surface of any structural element of the system.

(2) If adjustable to different positions, remain in the same adjustment position during the testing as it was immediately before the testing except as noted below:

   (A) A rear-facing CRS may have a means for repositioning the seating surface of the system that allows the system’s occupant to move from a reclined position to an upright position and back to a reclined position during testing.

   (B) No opening that is exposed and is larger than 6 mm (1/4 inch) before the testing shall become smaller during the testing as a result of the movement of the seating surface relative to the restraint system as a whole.

(3) If a forward-facing CRS, not allow the angle between the system's back support surface for the child and the system's seating surface to be less than 45 degrees at the completion of the test.

12.F.8.3 INJURY CRITERIA (S213b, S5(d), S5.1.2)

Restraints tested with the 12-month-old, 3-year-old, or 6-year-old unweighted dummy shall be evaluated for injury potential. Restraints tested with the 10-year-old dummy shall be evaluated for injury potential as described in (2) below, but not (1). Restraints tested with the 6-year-old weighted dummy shall not be evaluated for injury potential. Belt-positioning CRS tested with the 6-year-old dummy shall be truncated at 175 ms.

The CRS shall:

(1) Limit the resultant acceleration at the location of the accelerometer mounted in the test dummy head as specified in 49 CFR, Part 572, such that the expression for head injury criterion (HIC36):

$$HIC = \left[\frac{1}{(t_2 - t_1)}\int_{t_1}^{t_2} a dt\right]^{2.5} \langle t_2 - t_1 \rangle$$

shall not exceed 1,000, where *a* is the resultant acceleration expressed as a multiple of g (the acceleration of gravity), and t_1 and t_2, are any two moments during the impact which are separated by not more than a 36-millisecond time interval and where t_1 is less than t_2.

(2) Limit the resultant acceleration at the location of the accelerometer mounted in the test dummy upper thorax as specified in 49 CFR, Part 572, to not more than 60 g's except for intervals whose cumulative duration is not more than 3 milliseconds.

Record the results on the appropriate data sheet.

12.F.8.4 OCCUPANT EXCURSION (S213b, S5(d), S5.1.3, S5.1.4, S5.2.1.1(c))

By analysis of the high-speed video of the frontal impact dynamic test, or from an equivalent method approved by the COR, the dummy excursion must be within the following limits during the impact test. Restraints tested with a 6-year-old weighted dummy shall not be evaluated for occupant excursion.

CHILD RESTRAINT SYSTEMS OTHER THAN REAR-FACING CRS AND CAR BEDS

Each CRS, other than a rear-facing CRS or a car bed, shall retain the test dummy’s torso within the system.

FORWARD-FACING RESTRAINTS (S213b, S5.1.3.1, S5.2.1.1(C))

(A) In the case of an add-on CRS, no portion of the test dummy’s head shall pass through a vertical, transverse plane that is 720 mm (28 inches) or 813 mm (32 inches) (as specified in D.5.1) forward of point Z on the 213b FISA, measured along the center SORL (as illustrated in Figures 39 and 40), and neither knee pivot point shall pass through a vertical, transverse plane that is 915 mm (36 inches) forward of point Z on the 213b FISA, measured along the center SORL.

(B) In the case of a built-in CRS, neither knee pivot point shall, at any time during the dynamic test, pass through a vertical, transverse plane that is 305 mm (12 inches) forward of the initial pre-test position of the respective knee pivot point, measured along a horizontal line that passes through the knee pivot point and is parallel to the vertical plane that passes through the vehicle’s longitudinal centerline.

TABLE 20. 213b FRONTAL FORWARD FACING RESTRAINTS EXCURSION LIMITS

When this type of CRS	is tested in accordance with	these excursion limits apply	NOTE: the CRS is attached in the manner described below, subject to certain conditions
Harnesses and special needs restraints	S6.1.2(a)(1)(i)(A)	Head 813 mm; Knee 915 mm	Lap belt with tether (if provided)
School bus CRS	S6.1.2(a)(1)(i)(A)	Head 813 mm; Knee 915 mm	Seat back mount or seat back and seat pan mounts.
Belt-positioning booster seats	S6.1.2(a)(1)(ii)	Head 813 mm; Knee 915 mm	Lap and shoulder belt; no tether
CRS other than harnesses, special needs restraints, school bus CRS, or BPB seats	S6.1.2(a)(1)(i)(B)	Head 813 mm; Knee 915 mm	Lap and shoulder belt; no tether Lower anchorages; no tether
CRS other than harnesses, special needs restraints, or school bus CRS	S6.1.2(a)(1)(i)(A) S6.1.2(a)(1)(i)(C)	Head 720 mm; Knee 915 mm	Lap and shoulder belt; with tether (if provided) Lower anchorages; with tether (if provided)
CRS equipped with fixed or movable surface that has belts that are not an integral part of the fixed or moveable surface	S6.1.2(a)(2)	Head 813 mm; Knee 915 mm	Lap and shoulder belt; no tether Lower anchorages; no tether

Record the results of the video analysis, including maximum excursions and angles observed, on the appropriate data sheet.

REAR-FACING RESTRAINTS (S213b, S5.1.3.2, S5.1.4, S5.2.1.1(C))

For each rear-facing CRS, record the results of the video analysis, including maximum angles observed, on the appropriate data sheet:

All portions of the test dummy's torso shall be retained within the system and neither of the target points on either side of the dummy's head and on the transverse axis passing through the center of mass of the dummy's head and perpendicular to the head's midsagittal plane, shall pass through the transverse orthogonal planes whose intersection contains the forward-most and top-most points on the CRS surfaces (illustrated in Figure 57).

Record the results of the video analysis, including maximum angles observed, on the appropriate data sheet.

CAR BEDS (S213b, S5.1.3.3)

In the case of car beds, all portions of the test dummy's head and torso shall be retained within the confines of the car bed. Record the results on the appropriate data sheet.

BACK SUPPORT ANGLE (S213b, S5.1.4)

When a rear-facing CRS is tested in accordance with S6.1, the angle between the system's back support surface for the child and the vertical shall not exceed 70 degrees. Record the results on the appropriate data sheet.

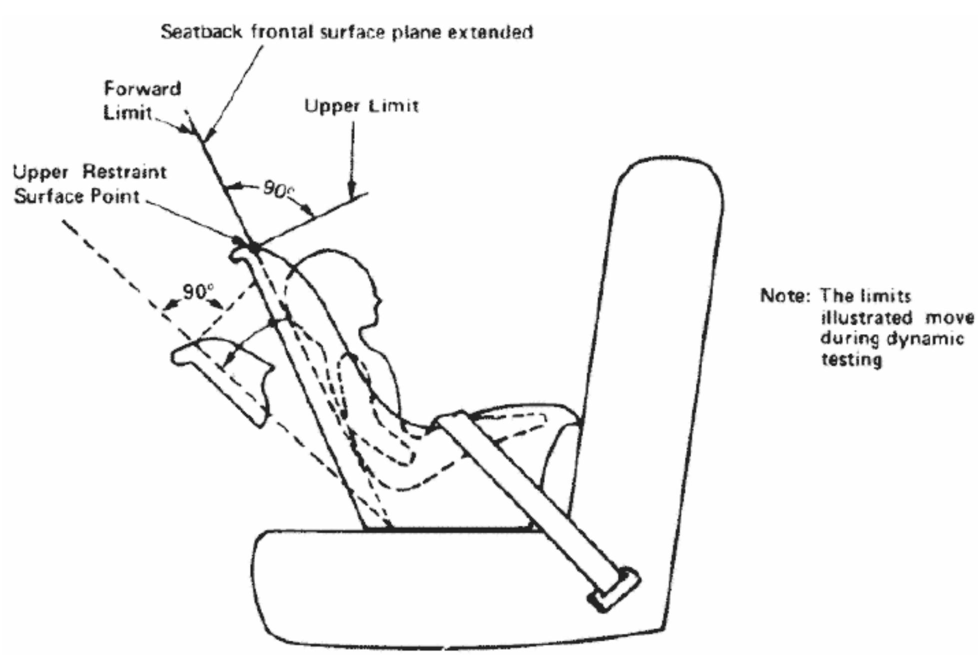


FIGURE 57. REAR FACING CRS FORWARD AND UPPER HEAD EXCURSION LIMITS

12.G. TESTING FOR AIRCRAFT USE (S213, S8; S213b, S8)

Test a CRS manufactured for use in aircraft according to the additional procedures below.

12.G.1 INSTALLATION INSTRUCTIONS (S213, S8.1; S213b, S8.1)

Review the manufacturer's printed instructions and install the CRS accordingly. Verify the requirements shown below and record the results in the appropriate data sheet(s):

Each CRS manufactured for use in aircraft:

a) Shall be accompanied by printed instructions
b) Printed instructions shall be in the English language
c) Printed instructions provide a step-by-step procedure, including diagrams, for
    i) installing the system in the aircraft passenger seat
    ii) securing the system to the aircraft seat,
    iii) positioning a child in the system when it is installed in aircraft,
    iv) adjusting the system to fit the child.

12.G.2 INVERSION TEST

This test uses a representative aircraft passenger seat assembly and a CRS manufactured for use in aircraft.

12.G.2.1 TEST DEVICE (S213, S8.2.1; S213b, S8.2.1)

Position and adjust a representative aircraft passenger seat so that its horizontal and vertical orientation and its seat back angle are in accordance with Figure 58, below.

In Figure 58, "A" represents a 51 mm (2 inch) to 76 mm (3 inch) thick polyurethane foam pad, 0.68 kg (1.5 lb.) to 0.91 kg (2.0 lb.) per cubic foot density, over 0.51 mm (0.020 inch) thick aluminum pan and covered by 340 grams (12 ounce) to 397 grams (14 ounce) marine canvas. The sheet aluminum pan is 508 mm (20 inches) wide and supported on each side by a rigid structure. The seat back is a rectangular frame covered with the aluminum sheet and weighing between 6 kg (14 lb.) and 7 kg (15 lb.), with a center of mass 330 mm (13 inches) to 406 mm (16 inches) above the seat pivot axis. The mass moment of inertia of the seat back about the seat pivot axis is between 1.378 and 1.553 kg-m^2 (195 and 220 ounce-inch-second^2). The seat back is free to fold forward about the pivot, but a stop prevents rearward motion. The passenger safety belt anchor points are spaced 533 mm (21 inches) to 559 mm (22 inches) apart and are located in line with the seat pivot axis.

12.G.2.2 RESTRAINT SYSTEM INSTALLATION IN AIRCRAFT PASSENGER SEAT (S213, S8.2.2; S213b, S8.2.2)

Attach the CRS to the representative aircraft passenger seat (Figure 58) using, at the manufacturer's option, any Federal Aviation Administration approved aircraft safety belt, according to the restraint manufacturer's instructions for attaching the restraint to an aircraft seat. No supplementary anchorage belts or tether straps may be attached; however, Federal Aviation Administration approved safety belt extensions may be used.

12.G.2.3 DUMMY SELECTION (S213, S8.2.3; S213b, S8.2.3)

Place the appropriate size dummy, per Table 18, in the child restraint as recommended by the manufacturer's instructions. Indicate the dummy used on the appropriate data sheet.

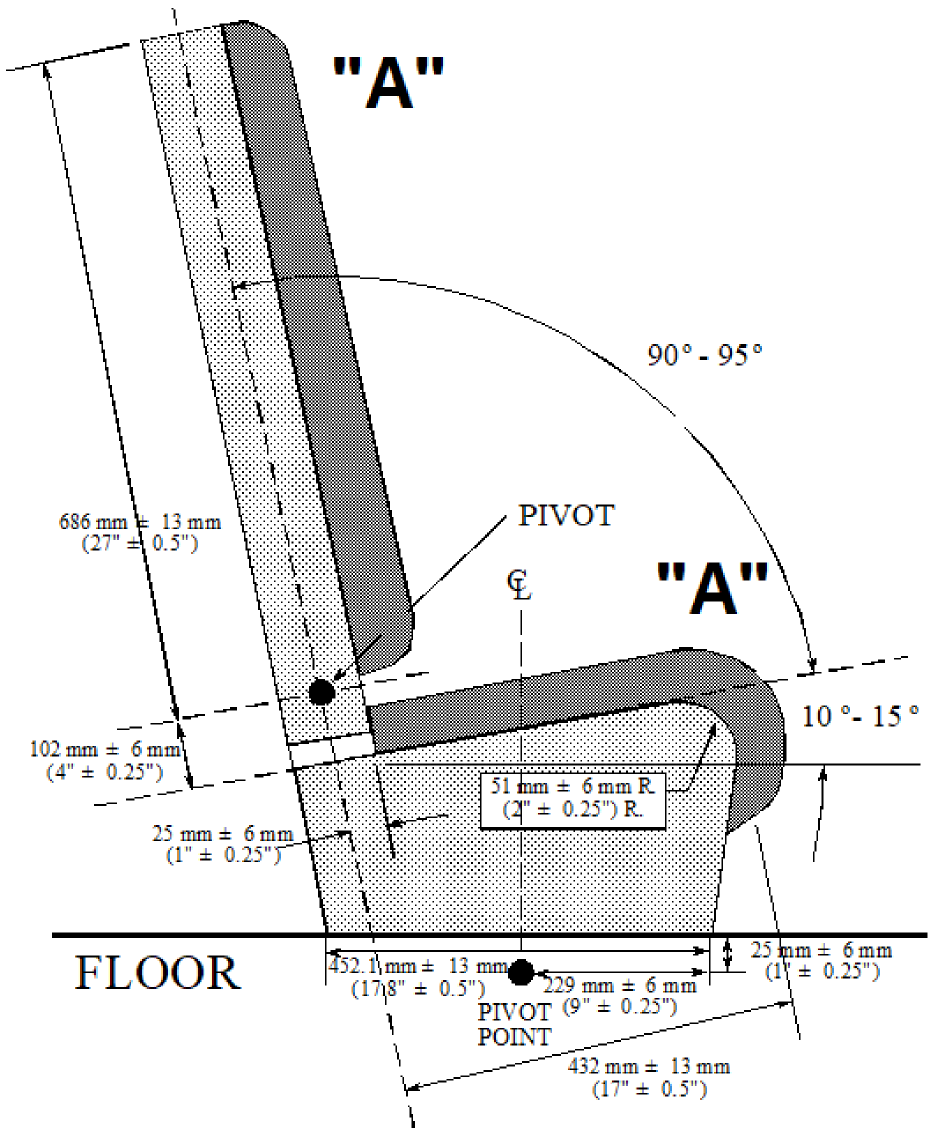


FIGURE 58. SIMULATED AIRCRAFT PASSENGER SEAT

12.G.2.4 BELT TENSION (S213, S8.2.4; S213b, S8.2.4)

Refer to Section 12.F.6.4 of this test procedure for adjusting the child restraint's shoulder and pelvic belts to the test dummy.

12.G.2.5 FORWARD ROTATION TEST (S213, S8.2.5; S213b, S8.2.5)

Rotate the combination of representative aircraft passenger seat, child restraint, and test dummy forward around a horizontal axis which is contained in the median transverse vertical plane of the seating surface portion of the aircraft seat and is located 25.4 mm (1 in) below the bottom of the seat frame, at a speed of 35 degrees to 45 degrees per second, to an angle of 180 degrees. The rotation shall be stopped when it reaches that angle, and the seat shall be held in this position for three seconds. The child restraint shall not fall out of the aircraft safety belt, nor shall the test dummy fall out of the child restraint at any time during the rotation or the three second period. The specified rate of rotation shall be attained in not less than one-half second, and not more than one second, and the rotating combination shall be brought to a stop in not less than one half second and not more than one second.

Indicate the results on the appropriate data sheet.

12.G.2.6 SIDEWAYS ROTATION TEST (S213, S8.2.6; S213b, S8.2.6)

Rotate the combination of the representative aircraft passenger seat, child restraint, and test dummy sideways around a horizontal axis which is contained in the median longitudinal vertical plane of the seating surface portion of the aircraft seat and is located 25.4 mm (1 in) below the bottom of the seat frame, at a speed of 35 degrees to 45 degrees per second, to an angle of 180 degrees. The rotation shall be stopped when it reaches that angle, and the seat shall be held in this position for three seconds. The child restraint shall not fall out of the aircraft safety belt, nor shall the test dummy fall out of the child restraint at any time during the rotation or the three second period. The specified rate of rotation shall be attained in not less than one half second and not more than one second, and the rotating combination shall be brought to a stop in not less than one half second and not more than one second.

Indicate the results on the appropriate data sheet.

13. POST TEST REQUIREMENTS

At the completion of each test, the contractor shall:

i) Confirm the test was valid
ii) Confirm there are no malfunctions of the test equipment and/or test items
iii) Re-verify all instrumentation is within calibration
iv) Check data sheets and photographs for completeness
v) Ensure data are recorded in all applicable data blocks on every compliance test data sheet.

14. REPORTS

14.1 MONTHLY STATUS REPORTS

The contractor shall submit, in accordance with the contract delivery schedule or as otherwise agreed to by the COR, a monthly Test Status Report and an Inventory Status Report to the COR. The Inventory Status Report shall be submitted until all CRSs are disposed of. Samples of the required Monthly Status Reports (for tests and inventory) are contained in the report forms section.

At the discretion of the COR, for FMVSS 213 child restraint <u>component</u> testing, the contractor shall submit a monthly test status report spreadsheet. The spreadsheet report shall contain dates for receipt of CRSs, associated webbing and manufacturer verification statements (where applicable). The report shall also include dates for initiating and completing all component tests such as for buckle, webbing, and material components. The report shall also include information on test results (passing and failing) along with estimated and actual test completion dates for the overall CRS. Comments shall include any problems or delays that the Contractor experienced during the reporting period that are related to the supplies and services required under this contract, and the specific action which the Contractor proposes to correct problems or delays identified.
A sample component test status spreadsheet is contained in the report forms section.

14.2 APPARENT TEST FAILURE NOTIFICATION

Any indication of a test failure shall be communicated by email to the COR within 24 hours with written notification sent within 48 hours (Saturdays and Sundays excluded). If the COR is unresponsive, the notification may be submitted to the ACOR. A Laboratory Notice of Test Failure (see report forms section) with a copy of the particular compliance test data sheet(s) and preliminary data plot(s), where applicable, shall be included. In the event of a test failure, a post-test calibration check of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration shall be at the COR's discretion and shall be performed without additional costs to the OVSC.

14.3 FINAL TEST REPORTS

14.3.1 COPIES

The Final Test Report format to be used by all contractors is specified below.

Contractors are required to submit one electronic copy (compatible with Microsoft Word format) of the Final Test Report in draft form within two weeks after the compliance test is conducted. The electronic copy of the draft test report shall be submitted to the COR via email or at the COR’s option, the DOT Secure Large File Transfer Solution (SLFTS) or another NHTSA authorized system for providing deliverables for acceptance.

Contractors are required to PROOFREAD all draft test reports before submitting them to the COR. The OVSC will not act as a test report quality control office for contractors. Reports containing a significant number of errors will be returned to the contractor for correction, and a "hold" will be placed on invoice payment for the particular test.

The contractor and the COR will then be able to discuss the details of both the test itself and the report content. Any changes noted by the COR shall be updated and submitted electronically (compatible with Adobe Acrobat format) as the Final Test Report.

Payment of contractor's invoices for completed compliance tests may be withheld until the Final Test Report is accepted by the COR. Contractors are requested to NOT submit an invoice for a test before the COR is provided a copy of the Final Test Report.

14.3.2 REQUIREMENTS FOR NHTSA FUNDED TEST REPORTS

The Final Test Report and associated documentation (including photographs and videos) is relied upon as the chronicle of the compliance test. The Final Test Report will be released to the public domain after the COR reviews the document to ensure that the document meets the contractual requirements. For these reasons, each Final Test Report must be a complete document capable of standing on its own. The opinions, findings, and conclusions expressed in the final test report are those of the author’s.

The contractor should use **detailed** descriptions of all compliance test events. Any events that are not directly associated with the standard but are of technical interest should also be included. The contractor should include as much **detail** as possible in the report.

In addition, dynamic sled test data shall be submitted, at the discretion of the COR, on either the DOT SLFTS or another NHTSA authorized system for submitting deliverables. Data and header files shall be in compliance with the format described in Appendix A which is specific to NHTSA’s Vehicle Crash Test Database and utilizes codes and fields described in NHTSA Test Reference Guide, Version 5, Volume I: Vehicle Tests and is in a well-organized and readily understandable format.

14.3.3 FIRST THREE PAGES

Instructions for the preparation of the first three pages of the final test report are provided for the purpose of standardization. A template of the test report in MS Word format is available from OVSC for standardization of the final reports.

A. FRONT COVER

The information required on the cover is as follows:

(1) FINAL REPORT NUMBER such as 213-YYZZZZZ-TEST, where –

213 is the FMVSS tested
YY is the Year determined by the COR
ZZZZZ is a Unique number determined by the COR

(2) Final Report Title and Subtitle such as

SAFETY COMPLIANCE TESTING FOR FMVSS No. 213 (or 213a, 213b, if applicable)
Child Restraint Systems

Subtitle: (choose applicable: Component, Inspection, Frontal Dynamic, 213b Frontal Dynamic, Side Impact Dynamic)

CRS MANUFACTURER AND MODEL NAME OF CRS
* * * * * * * * * * * * * * * * * *
Child Safety Corporation
200X CSC Super Safe
Model No. CSC 9X123, P/N 12345678

(3) Contractor's Name and Address such as

COMPLIANCE TESTING LABORATORIES, INC.
4335 West Dearborn Street
Detroit, Michigan 48090-1234

NOTE: US DOT TRISKELION SYMBOL WILL BE PLACED BETWEEN ITEMS (3) AND (4). DOT TRISKELION SYMBOL IS ONLY ALLOWED ON DOT FUNDED TEST REPORTS.

(4) Date of Final Report completion

(5) The words "FINAL REPORT"

(6) The sponsoring agency's name and address as follows:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NEF-220
1200 New Jersey Avenue, SE
Washington, DC 20590

B. FIRST PAGE AFTER FRONT COVER

A disclaimer statement and an acceptance signature block for the COR shall be provided as follows:

> This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By: ____

Approved By: ____

Approval Date: ____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: ____

Acceptance Date: ____

C. SECOND PAGE AFTER FRONT COVER

A completed Technical Report Documentation Page (Form DOT F1700.7) shall be completed for those items that are applicable with the other spaces left blank. Sample data for the applicable block numbers of the title page follows.

Block No. 1 -- REPORT NUMBER

213-YYZZZZZ-TEST

Block No. 2 -- GOVERNMENT ACCESSION NUMBER

Leave blank

Block No. 3 -- RECIPIENT'S CATALOG NUMBER

Leave blank

Block No. 4 -- TITLE AND SUBTITLE

SAFETY COMPLIANCE TESTING FOR FMVSS No. 213 (or 213a, 213b, if applicable)
Frontal Dynamic
CRS MANUFACTURER AND CRS MODEL NAME

Block No. 5 -- REPORT DATE

Month XX, 20XX

Block No. 6 -- PERFORMING ORGANIZATION CODE

COMPLIANCE TESTING LABORATORIES

Block No. 7 -- AUTHOR(S)

John Smith, Project Manager
Bill Doe, Project Engineer

Block No. 8 -- PERFORMING ORGANIZATION REPORT NUMBER

213-YYZZZZZ-TEST

Block No. 9 -- PERFORMING ORGANIZATION NAME AND ADDRESS

COMPLIANCE TESTING LABORATORIES, INC.

4335 West Dearborn Street
Detroit, Michigan 48090-1234

Block No. 10 -- WORK UNIT NUMBER

Leave blank

Block No. 11 -- CONTRACT OR GRANT NUMBER

93JJ9YYD000XXX

Block No. 12 -- SPONSORING AGENCY NAME AND ADDRESS

U.S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance
Mail Code: NEF-220
1200 New Jersey Avenue, SE
Washington, DC 20590

Block No. 13 -- TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Month. DD to Month. DD, 20XX

Block No. 14 -- SPONSORING AGENCY CODE

NEF-220

Block No. 15 -- SUPPLEMENTARY NOTES

Leave blank

Block No. 16 -- ABSTRACT

Compliance tests were conducted on CSC Super Safe child restraint systems in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-213-12 Test failures identified were as follows:

None (or if any, describe)

NOTE: Above wording must be shown with appropriate changes made for a particular compliance test. Any questions should be resolved with the COR.

Block No. 17 -- KEY WORDS

Compliance Testing
Frontal, 213b Frontal, Side Impact, Component, Aircraft, Visual Inspection (as appropriate)
Safety Engineering
FMVSS 213 (or 213b if applicable) and/or FMVSS 213a (as appropriate)

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Block No. 19 -- SECURITY CLASSIFICATION OF REPORT

Unclassified

Block No. 20 -- SECURITY CLASSIFICATION OF PAGE

Unclassified

Block No. 21 -- NUMBER OF PAGES

Add appropriate number

Block No. 22 – PRICE

Leave blank

14.3.4 TABLE OF CONTENTS

Final test report Table of Contents shall include the following sections (as appropriate), proceeded by section number, and followed by the corresponding page number:

Section 1- Purpose and Test Procedure
Section 2- Introduction and Summary
Section 3- Child Restraint System Identification
Section 4- Test Results Data Summary
Section 5- Data
    List applicable data sheets by title
Section 6- Notes and/or Deviations from FMVSS 213, 213a, 213b
Section 7- Test Configuration Codes
Section 8- Instrumentation Calibration
Section 9- Photographs

14.3.5 PURPOSE AND TEST PROCEDURE

Final test reports shall include the following:

PURPOSE

The purpose of the testing was to inform OVSC's enforcement program by means of audit testing a CRS. The data recorded in this report is the opinion of the test laboratory and may or may not be sufficient to ensure the CRS meets the requirements set by FMVSS No. 213 (213b if applicable) and/or FMVSS No. 213a. Therefore, the results of this testing are insufficient to serve as a basis of certification for a CRS.

TEST PROCEDURE

The "ABC Laboratories Test Procedure for FMVSS 213," submitted and approved by the Office of Vehicle Safety Compliance, National Highway Traffic Safety Administration, contains the specific procedures used to conduct this test. This procedure shall not be interpreted to be in conflict with any portion of FMVSS No. 213 and amendments in effect as noted in the applicable contract.

14.3.6 INTRODUCTION AND SUMMARY

Provide a brief summary of the testing conducted.

14.3.7 CHILD RESTRAINT SYSTEM IDENTIFICATION

For FMVSS Nos. 213, 213a, and 213b child restraint frontal and side impact testing, use the format shown in Data Sheet 1 to provide identification information for each of the test samples tested.

For FMVSS No. 213 child restraint <u>component</u> testing, components tested are identified by name and/or usage on the CRS, e.g., harness webbing.

14.3.8 DYNAMIC TEST RESULTS DATA SUMMARY

Provide a summary table including each item tested, sled test number, dummy and test mode used, installation method, HIC, Chest g, excursion and seat back angle, and an indication of pass or fail.

14.3.9 DATA

Include all completed Compliance Data Sheets in this section. Supplemental data sheets for labeling and printed instructions for proper use need only be included if requested by the COR. Multiple data sheets may be needed for a complete compliance test series. In that event, list the title of the data sheet in the table of contents, and under the title, indent and list each sheet by the test configuration code.

14.3.10 INTERPRETATIONS AND DEVIATIONS

Any interpretations and/or deviations from this Test Procedure shall be listed in this section of the Final Test Report.

14.3.11 TEST CONFIGURATION CODES

Include table describing OVSC's test configuration code system used throughout dynamic test reports (if applicable).

14.3.12 INSTRUMENTATION CALIBRATION

Include a list of test equipment by item description, manufacturer, model number, latest calibration date and due date at the time the test was conducted.

14.3.13 PHOTOGRAPHS

Include the photographs in accordance with Section 9 of this test procedure.

14.3.14 REPORTS FOR BUILT-IN CHILD RESTRAINT TESTS

The report template provided in this test procedure shall be modified to reflect built-in child restraint tests by adding the following information:

- The vehicle's model year, manufacturer, model, and address to the cover page of the test report, and elsewhere, as appropriate.

- The type of built-in child restraint to the cover sheet of the report and elsewhere as appropriate

15. DATA SHEETS

One sample of each Compliance Data Sheet is included in this section. More than one copy of a data sheet may be needed for a complete compliance test series.

Test data shall be recorded in standard engineering units, when applicable, on data sheets specifically prepared for this purpose, as shown in Section 15 of this procedure.

For each FMVSS requirement indicated on the data sheets, record PASS, FAIL, NA (not applicable), or SEE REMARKS in the space provided. Each failure should be explained under REMARKS.

Completed data sheets shall be included in the Final Test Report for each test required by the contract. In the case where the contract requires inspection of labels, instructions for proper use, and registration forms, the supplemental data sheets do not need to be included in the Final Test Report, unless requested by the COR, but shall be retained by the test lab.

Data sheets used to describe dynamic testing will identify test samples by report and model number or by report and item code. Item codes are used to describe the test sample in a succinct manner. Typically, item codes are four alpha numeric sequences as described below.

2312345-LC685BKKH-01-12CRFNLFR

report number

test configuration code

lab assigned code which describes the restraint's manufacturer and model

sample number

Table 21 explains the 9-character test configuration code which describes the dummy and restraint configuration for each unique dynamic test.

- Dummy Description describes the test dummy used in the dynamic test.
- Installation Direction is the direction that the restraint was facing when installed on the test bench in relation to the bench's x-direction.
- Detachable Base Usage Code B is used when rear-facing child restraints are installed on the test bench with a detachable base. Code N is used for restraints that do not have a detachable base or when the rear-facing child restraint does not utilize its detachable base in the test.
- Attachment Method describes the attachment used to install the CRS on the test bench.

- Tether Usage describes whether the tether was used when installing the CRS on the test bench.

- Seat Back Position describes the recline position of the CRS when installed on the test bench. In the case of forward and/or rear-facing child restraints, if the restraint meets the installation requirements set forth by the instruction manual and is in the most upright position the Code U applies. If the restraint must be repositioned into a more reclined position to meet the installation requirements, then Code R applies. In the case of restraints that do not have adjustable reclines but do have seat backs, such as backed booster seats and infant carriers without optional base, Code F applies. For child restraints that do not have seat backs, Code B applies. Code N applies to restraints that do not meet any of the configurations listed above, such as harnesses or carbeds.

For example, the test configuration code 12CRFN2FF indicates that the child restraint sled test was conducted using a 12-month-old CRABI dummy (12C) installed in the rear-facing (RF) direction with no base (N), the lap belt system (2), no tether (F), with a fixed back (F). An additional example, test configuration code 3H3FFNLTR indicates that the child restraint sled test was conducted using a 3-year-old Hybrid III dummy (3H3) installed in the forward-facing (FF) direction with no base (N), the lower anchor system (L), top tether (T), and in the reclined position (R).

TABLE 21.TEST CONFIGURATION CODES

Dummy Description	**NIN** – Newborn Infant
	12C – 12MO, CRABI
	3H3 – 3YO, Hybrid III
	Q3s – 3YO, Side Impact, Q-Series
	6H2 – 6YO, Hybrid II
	6H3 – 6YO, Hybrid III
	6W3 – 6YO, Weighted Hybrid III
	TH3 – 10YO, Hybrid III
Installation Direction	**RF** – Rear Facing
	FF – Forward Facing
	SF – Side Facing (applies to car beds)
Detachable Base Usage	**B** – Base Used with CRS
	N – All Other Configurations*
Attachment Method	**L** – Lower Anchors
	2 – Lap Belt
	3 – Lap & Shoulder Belt
	M – Seat Back Mount
Tether Usage	**T** – Tether
	F – Tether Free
Seat Back Position	**U** – Upright**
	R – Reclined**
	B – Backless
	F – Fixed Back***
	N – Not-Applicable****

* Applies to restraints that do not have a detachable base or when the rear-facing CRS does not utilize its detachable base in the test
** Applies to both Forward-Facing and Rear-Facing CRS which have seat backs that change position
*** Applies to CRSs which have seat backs that do not change position; examples include high-back belt-positioning booster seats and infant carriers installed without a base
**** Applies to harness systems and car beds

DATA SHEET 1
CHILD RESTRAINT SYSTEM IDENTIFICATION

Manufacturer:	
Place of Manufacture per S5.5.2(d):	
Model No.	
Group No.	

1	Item Code	
	Date of Manufacture	
	Sled Test No.	
2	Item Code	
	Date of Manufacture	
	Sled Test No.	
3	Item Code	
	Date of Manufacture	
	Sled Test No.	
4	Item Code	
	Date of Manufacture	
	Sled Test No.	
5	Item Code	
	Date of Manufacture	
	Sled Test No.	
6	Item Code	
	Date of Manufacture	
	Sled Test No.	

DATA SHEET 2
FRONTAL IMPACT DYNAMIC TEST RESULTS SUMMARY

FMVSS 213 (213b if applicable) Frontal Impact – Child Restraint System Brand / Model / Part Number											
Item Code	**Sled Test No.**	**Test Dummy***	**CRS Installation Direction****	**CRS Attachment Method*****	**CRS Tether Used Y/N**	**HIC (1000 max)**	**Chest g Clip (60 g max)**	**Head Excursion (720 mm max –or- 813 mm max w/o tether)**	**Knee Excursion (915 mm max)**	**Seat Back Angle (70 deg max)**	**Pass/ Fail**

*Test Dummy
- NIN – Newborn Infant
- 12C – 12-Month-Old CRABI
- 3H3 – Hybrid III 3-Year-Old
- 6H2 – Hybrid II 6-Year-Old
- 6H3 – Hybrid III 6-Year-Old
- 6W3 – Hybrid III 6-Year-Old, Weighted
- TH3 – Hybrid III 10-Year-Old

**CRS Installation Direction:
- RF- Rear facing
- FF- Forward facing
- SF- Side facing

***CRS Attachment Methods:
- L- Lower Anchors
- 2- Lap Belt
- 3- Lap and Shoulder Belt
- M- Seatback Mount

DATA SHEET 2- cont.
SIDE IMPACT DYNAMIC TEST RESULTS SUMMARY

FMVSS 213a Side Impact – Child Restraint System Brand / Model / Part Number									
Item Code	**Sled Test No.**	**Test Dummy***	**CRS Installation Direction****	**CRS Attachment Method*****	**CRS Tether Used Y/N**	**HIC (570 max)**	**Chest Deflection (23 mm max)**	**Head to Door Contact Y/N**	**Pass/ Fail**

*Test Dummy
- NIN – Newborn Infant
- 12C – 12-Month-Old CRABI
- 3H3 – Hybrid III 3-Year-Old
- 6H2 – Hybrid II 6-Year-Old
- 6H3 – Hybrid III 6-Year-Old
- 6W3 – Hybrid III 6-Year-Old, Weighted
- TH3 – Hybrid III 10-Year-Old

***CRS Attachment Methods:
- Lower Anchors
- Lap Belt
- Lap and Shoulder Belt
- Seatback Mount

**CRS Installation Direction:
- RF- Rear facing
- FF- Forward facing
- SF- Side facing

DATA SHEET 3

LABELING (S213, S5.3, S5.5)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

FMVSS 213, S5.3 and S5.5	Pass/Fail
The labels on the subject child restraint system were inspected and compared to the requirements of FMVSS No. 213 S5.3.1(b) and S5.5, as applicable.	

Remarks:

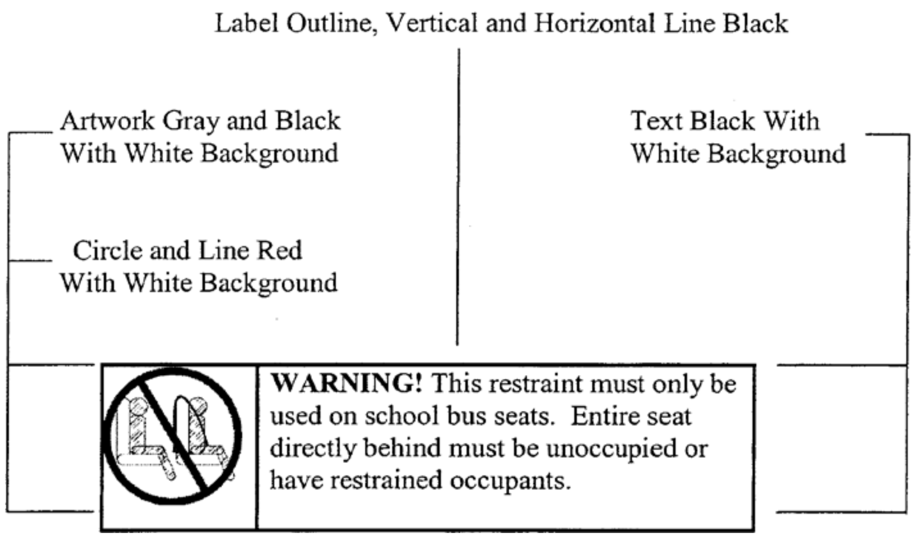
List any labeling failures by describing the applicable section of the standard and explaining what information is missing or incorrect.

Include the following statement with the correct Appendix identifier: “Photographs of the labels are included in Appendix _.”

DATA SHEET 3- supplement
LABELING (S213, S5.3, S5.5)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
	Harnesses manufactured for use on school bus seats	
S5.3.1(b)	This harness is manufactured for use on school bus seats and has a label that conforms in content to the figure below and to the requirements of S5.3.1(b)(1) through S5.3.1(b)(3). The label is permanently affixed to the part of the harness that attaches the system to a vehicle seat back. 	
S5.3.1(b)(1)	The label is plainly visible when installed and easily readable.	
S5.3.1(b)(2)	The message area is white with black text. The message area must be no less than 20 square centimeters.	
S5.3.1(b)(3)	The pictogram is gray and black with a red circle and slash on a white background. The pictogram is no less than 20 mm in diameter.	

Report No.: __________________ Model No.: __________________

Test Date: __________________

Section	Required Statement – or – Requirement	Pass/Fail
	All Child Restraints	
S5.5	Any labels or written instructions provided in addition to those required by this section do not: • obscure or confuse the meaning of the required information or • be otherwise misleading to the consumer.	
	Any labels or written instructions other than in the English language are an accurate translation of English labels or written instructions.	
	All Add-On Child Restraints	
S5.5.1	The add-on CRS is permanently labeled with the information specified in S5.5.2 (a) through (m).	
S5.5.2	The information specified in paragraphs (a) through (m) of this section is stated in the English language and lettered in letters and numbers that are not smaller than 10-point type.	
	Unless otherwise specified, the information is labeled on a white background with black text.	
	Unless written in all capitals, the information is stated in sentence capitalization.	
	The following information is included:	
S5.5.2(a)	The model name or number of the system.	
S5.5.2(b)	The manufacturer's name. A distributor's name may be used instead if the distributor assumes responsibility for all duties and liabilities imposed on the manufacturer with respect to the system by the National Traffic and Motor Vehicle Safety Act, as amended.	
S5.5.2(c)	The statement: "Manufactured in ________," inserting the month and year of manufacture.	
S5.5.2(d)	The place of manufacture (city and State, or foreign country). However, if the manufacturer uses the name of the distributor, then it shall state the location (city and State, or foreign country) of the principal offices of the distributor.	
S5.5.2(e)	The statement: "This child restraint system conforms to all applicable Federal motor vehicle safety standards."	

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(f)	Booster seats shall not be recommended for children whose weights are less than 13.6 kg.	
	For seats that can only be used as belt-positioning seats, manufacturers must include the maximum and minimum recommended height, but may delete the reference to weight.	
	One of the following statements, as appropriate, inserting the manufacturer's recommendations for the maximum weight of children who can safely occupy the system:	
S5.5.2(f)(1)	Use only with children who weigh ____ pounds (____ kg) or less and whose height is (*insert values in English and metric units; use of word ''mass'' in label is optional*) or less; or	
S5.5.2(f)(2)	Use only with children who weigh between ____ and ____ pounds (*insert appropriate English and metric values; use of word ''mass'' is optional*) and whose height is (*insert appropriate values in English and metric units*) or less and who are capable of sitting upright alone; or	
S5.5.2(f)(3)	Use only with children who weigh between ____ and ____ pounds (*insert appropriate English and metric values; use of word ''mass'' is optional)* and whose height is *(insert appropriate values in English and metric units*) or less.	
S5.5.2(f)(4)	Use only with children who weigh between ____ and ____ pounds (*insert appropriate English and metric values; use of word "mass" is optional*) and whose height is between ____ and ____ (*insert appropriate values in English and metric units*).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(g)(1)	A heading as specified in S5.5.2(k)(3)(i), with the statement WARNING! DEATH or SERIOUS INJURY can occur,'' capitalized as written and followed by bulleted statements in the following order:	
S5.5.2(g)(1)(i)	As appropriate, the statements required by the following sections will be bulleted and placed after the statement required by 5.5.2(g)(1) in the following order: 5.5.2(k)(1) or 5.5.2(k)(2), 5.5.2(f), 5.5.2(h), 5.5.2(j), and 5.5.2(i).	
S5.5.2(g)(1)(ii)	Secure this child restraint with the vehicle's child restraint anchorage system, if available, or with a vehicle belt. • For car beds, harnesses, and belt-positioning seats, the first part of the statement regarding attachment by the child restraint anchorage system is optional. • For belt-positioning seats, the second part of the statement regarding attachment by the vehicle belt does not apply.	
	CRSs equipped with internal harnesses to restrain the child and with components to attach to a child restraint anchorage system and for which the combined weight of the CRS and the maximum recommended child weight for use with internal harnesses exceeds 65 pounds, must be labeled with the following statement: "Do not use the lower anchors of the child restraint anchorage system (LATCH system) to attach this child restraint when restraining a child weighing more than * with the internal harnesses of the child restraint." [*insert a recommended weight value in English and metric units such that the sum of the recommended weight value and the weight of the CRS does not exceed 65 pounds (29.5 kg)]	
S5.5.2(g)(1)(iii)	Follow all instructions on this child restraint and in the written instructions located (insert storage location on the restraint for the manufacturer's installation instruction booklet or sheet).	
	The printed instruction's storage location is located on the CRS and not on a supplemental device, such as a detachable base.	
S5.5.2(g)(1)(iv)	Register your child restraint with the manufacturer.	
S5.5.2(g)(2)	At the manufacturer's option, the phrase ''DEATH or SERIOUS INJURY can occur'' in the heading can be on either a white or yellow background.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(g)(3)	More than one label may be used for the required bulleted statements. If multiple labels are used:	
	The labels are placed one above the other unless that arrangement is precluded by insufficient space or shape of the child restraint.	
	The mandated warnings must be in the correct order when read from top to bottom.	
	If there is insufficient space to place the labels one above the other, then the labels are placed side by side.	
	If the labels are side-by-side, then the mandated warnings appear top to bottom of the leftmost label, then top to bottom of the next label to its right, and so on.	
	There are no intervening labels and the required heading only appears on the first label in the sequence.	
S5.5.2(h)	In the case of each CRS that has belts designed to restrain children using them and which do not adjust automatically to fit the child; the statement: Snugly adjust the belts provided with this child restraint around your child.	
S5.5.2(i)(1)	For a booster seat that is recommended for use with either a vehicle's Type I or Type II seat belt assembly, one of the following statements, as appropriate:	
S5.5.2(i)(1)(i)	Use only the vehicle's lap and shoulder belt system when restraining the child in this booster seat; or	
S5.5.2(i)(1)(ii)	Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child in this seat.	

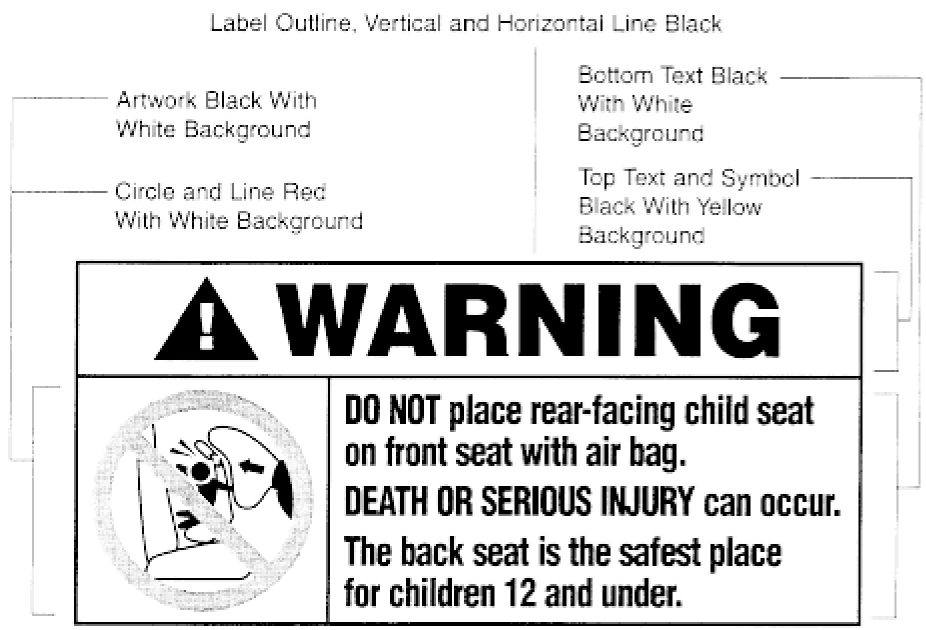
Report No.: ____________ Model No.: ____________

Test Date: ____________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(i)(2)(i)	Except as provided in paragraph (i)(2)(ii) of this section, for a booster seat which is recommended for use with both a vehicle's Type I and Type II seat belt assemblies, the following statement: Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child with the (insert description of the system element provided to restrain forward movement of the child's torso when used with a lap belt (e.g., shield)), and only the vehicle's lap and shoulder belt system when using the booster without the (insert above description).	
S5.5.2(i)(2)(ii)	A booster seat which is recommended for use with both a vehicle's Type I and Type II seat belt assemblies is not subject to S5.5.2(i)(2)(i) if, when the booster is used with the shield or similar component, the booster will cause the shoulder belt to be located in a position other than in front of the child when the booster is installed. However, such a booster shall be <u>labeled with a warning to use the booster with the vehicle's lap and shoulder belt system when using the booster without a shield.</u>	
S5.5.2(j)	In the case of each CRS equipped with a top anchorage strap, the statement: Secure the top anchorage strap provided with this child restraint.	
S5.5.2(k)(1)	In the case of each rear-facing CRS that is designed for infants only, the statement: Use only in a rear- facing position when using it in the vehicle.	
S5.5.2(k)(2)	In the case of a CRS that is designed to be used rearward-facing for infants and forward-facing for older children, the statement: Use only in a rear-facing position when using it with an infant weighing less than (insert a recommended weight that is not less than 20 pounds).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(k)(3)	Except as provided in (k)(4) of this section, each CRS that can be used in a rear-facing position shall have a label that conforms in content to Airbag Warning Figure (below) and to the requirements of S5.5.2(k)(3)(i) through S5.5.2(k)(3)(iii) permanently affixed to the outer surface of the cushion or padding in or adjacent to the area where a child's head would rest, so that the label is plainly visible and easily readable. The text reads: "WARNING. DO NOT place rear-facing child seat on front seat with air bag. DEATH OR SERIOUS INJURY can occur. The back seat is the safest place for children 12 and under." **AIR BAG WARNING LABEL**  **AIRBAG WARNING FIGURE**	
S5.5.2(k)(3)(i)	The heading area is yellow with the word ''warning'' and the alert symbol in black.	
S5.5.2(k)(3)(ii)	The message area is white with black text. The message area is no less than 30 square cm.	
S5.5.2(k)(3)(iii)	The pictogram is black with a red circle and slash on a white background. The pictogram is no less than 30 mm in diameter.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(k)(4)	If a CRS is equipped with a device that deactivates the passenger-side air bag in a vehicle when and only when the child restraint is installed in the vehicle and provides a signal, for at least 60 seconds after deactivation, that the air bag is deactivated, the label specified in the Airbag Warning Figure (above) may include the phrase ‘‘unless air bag is off’’ after ‘‘on front seat with air bag.’’	
S5.5.2(l)	An installation diagram showing the CRS installed in:	
S5.5.2(l)(1)	A seating position equipped with a continuous-loop lap/shoulder belt;	
S5.5.2(l)(2)	A seating position equipped with only a lap belt, as specified in the manufacturer’s instructions; and	
S5.5.2(l)(3)	A seating position equipped with a child restraint anchorage system.	
S5.5.2(l)(3)(A)	If the weight of the CRS and maximum child weight recommended is greater than 65 lb., and the diagram includes the statement “Do not install by this method for a child weighing more than *” Note: Complete Data Sheet 6 if this requirement applies.	

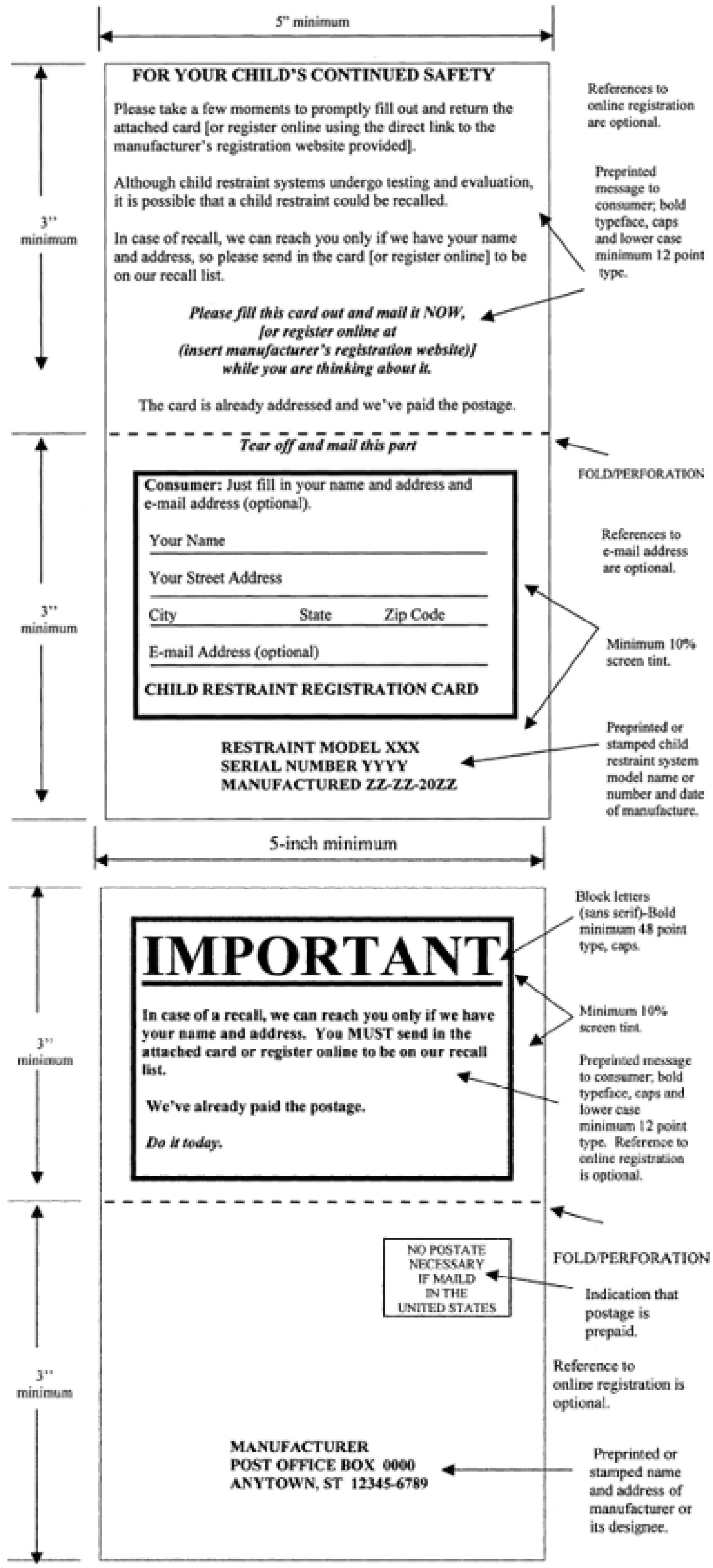


FIGURE 59. REGISTRATION CARD

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(m)	One of the following statements, inserting an address and a U.S. telephone number. If a manufacturer opts to provide a Web site on the registration card as permitted in Figure 59 (above), the manufacturer must include the statement in part (ii):	
S5.5.2(m)(i)	(i) “Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional) and the restraint's model number and manufacturing date to (insert address) or call (insert a U.S. telephone number). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov. ”	
S5.5.2(m)(ii)	(ii) “Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available [preceding four words are optional], and the restraint's model number and manufacturing date to (insert address) or call (insert a U.S. telephone number) or register online at (insert Web site for electronic registration form). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov. ”	

	Restraints Certified for Use in Aircraft	
S5.5.2(n)	CRSs (other than belt-positioning seats, harnesses, and backless CRSs) may be certified as complying with the provisions of S8.	
	CRSs that are so certified are labeled with the statement “This Restraint is Certified for Use in Motor Vehicles and Aircraft.”	
	Belt-positioning seats, harnesses, and backless CRSs are labeled with the statement “This Restraint is Not Certified for Use in Aircraft.”	
	The statement required by this paragraph is in red lettering and is placed after the certification statement required by S5.5.2(e).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
	All Add-On Child Restraints	
S5.5.3	The information specified in S5.5.2(f) through (l) is located on the add-on CRS so that it is visible when the system is installed as specified in S5.6.1, except that for child restraints with a detachable base, the installation diagrams specified in S5.5.2(l) are visible only when the base alone is installed.	
	All Built-in Child Restraints	
S5.5.4(a)	Each built-in CRS other than a factory-installed built-in restraint is permanently labeled with the information specified in S5.5.5 (a) through (l).	
	The information specified in S5.5.5(a) through (j) and in S5.5.5(l) is visible when the system is activated for use.	
S5.5.4(b)	Each factory-installed built-in child restraint is permanently labeled with the information specified in S5.5.5(f) through (j) and S5.5.5(l), so that the information is visible when the restraint is activated for use.	
	The information is included in the vehicle owner's manual.	
S5.5.5	The information specified in paragraphs (a) through (l) of this section that is required by S5.5.4 is in English and lettered in letters and numbers using a not smaller than 10-point type.	
	Unless specified otherwise, the information is labeled on a white background with black text.	
	Unless written in all capitals, the information is stated in sentence capitalization.	
S5.5.5(a)	The model name or number of the system.	
S5.5.5(b)	The manufacturer's name. A distributor's or dealer's name may be used instead if the distributor or dealer assumes responsibility for all duties and liabilities imposed on the manufacturer with respect to the system by the National Traffic and Motor Vehicle Safety Act, as amended.	
S5.5.5(c)	The statement: “Manufactured in____,” inserting the month and year of manufacture.	
S5.5.5(d)	The place of manufacture (city and State, or foreign country). However, if the manufacturer uses the name of the distributor or dealer, then it shall state the location (city and State, or foreign country) of the principal offices of the distributor or dealer.	
S5.5.5(e)	The statement: “This child restraint system conforms to all applicable Federal motor vehicle safety standards.”	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.5(f)	One of the following statements, inserting the manufacturer's recommendations for the maximum weight of children who can safely occupy the system.	
	Booster seats are not recommended for children whose weights are less than 18 kg (40 lb).	
	For CRS that can only be used as belt-positioning seats, manufacturers must include the maximum and minimum recommended height, but may delete the reference to weight:	
S5.5.5(f)(1)	Use only with children who weigh___pounds (___kg) or less and whose height is (insert values in English and metric units; use of word “mass” in label is optional) or less; or	
S5.5.5(f)(2)	Use only with children who weigh between__ and___pounds (___and __ kg) and whose height is (insert appropriate values in English and metric units; use of word “mass” in label is optional) or less and who are capable of sitting upright alone; or	
S5.5.5(f)(3)	Use only with children who weigh between__ and___pounds (___and___kg) and whose height is (insert appropriate values in English and metric units; use of word “mass” in label is optional) or less; or	
S5.5.5(f)(4)	Use only with children who weigh between__ and___pounds (insert appropriate English and metric values; use of word “mass” is optional) and whose height is between__ and __ (insert appropriate values in English and metric units).	

Report No.: ____________ Model No.: ____________

Test Date: ____________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.5(g)	The heading and statement specified in paragraph (1), and if appropriate, the statements in paragraph (2) and (3). If used, the statements in paragraphs (2) and (3) shall be bulleted and follow the bulleted statement required by paragraph (1) after the heading.	
S5.5.5(g)(1)	A heading as specified in S5.5.2(k)(3)(i), with the statement "WARNING! DEATH or SERIOUS INJURY can occur," capitalized as written and followed by the bulleted statement: Follow all instructions on the child restraint and in the vehicle's owner's manual.	
	At the manufacturer's option, the phrase "DEATH or SERIOUS INJURY can occur" in the heading is on either a white or yellow background.	
S5.5.5(g)(2)	In the case of each built-in CRS which is not intended for use in motor vehicles in certain adjustment positions or under certain circumstances, an appropriate statement of the manufacturer's restrictions regarding those positions or circumstances.	
S5.5.5(g)(3)	As appropriate, the statements required by the following sections will be bulleted and placed after the statement required by 5.5.5(g)(1) in the following order: 5.5.5(g)(2), 5.5.5(f), S5.5.5(h) and S5.5.5(i).	
S5.5.5(h)	In the case of each built-in CRS that has belts designed to restrain children using them and which do not adjust automatically to fit the child: Snugly adjust the belts provided with this child restraint around your child.	
S5.5.5(i)	In the case of each built-in child restraint which can be used in a rear-facing position, the following statement: Place an infant in a rear-facing position in this child restraint.	
S5.5.5(j)	A diagram or diagrams showing the fully activated CRS in infant and/or child configurations.	

Report No.: ___________________ Model No.: ____________________

Test Date: ___________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.5(k)	One of the following statements, inserting an address and a U.S. telephone number. If a manufacturer opts to provide a Web site on the registration card as permitted in Figure 59, the manufacturer must include the statement in part (ii):	
S5.5.5(k)(i)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert a U.S. telephone number). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov. "	
S5.5.5(k)(ii)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert telephone number) or register online at (insert Web site for electronic registration form). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov. "	
S5.5.5(l)	In the case of a built-in belt-positioning seat that uses either the vehicle's Type I or Type II belt systems or both, a statement describing the manufacturer's recommendations for the maximum height and weight of children who can safely occupy the system and how the booster should be used (e.g., with or without shield) with the different vehicle belt systems.	

FOR CRS MANUFACTURED ON OR AFTER DECEMBER 5, 2026

DATA SHEET 3b LABELING
(S213b, S5.3, S5.5)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

FMVSS 213b, S5.3 and S5.5	Pass/Fail
The labels on the subject child restraint system were inspected and compared to the requirements of FMVSS No. 213b S5.3 and S5.5, as applicable.	

Remarks:

List any labeling failures by describing the applicable section of the standard and explaining what information is missing or incorrect.

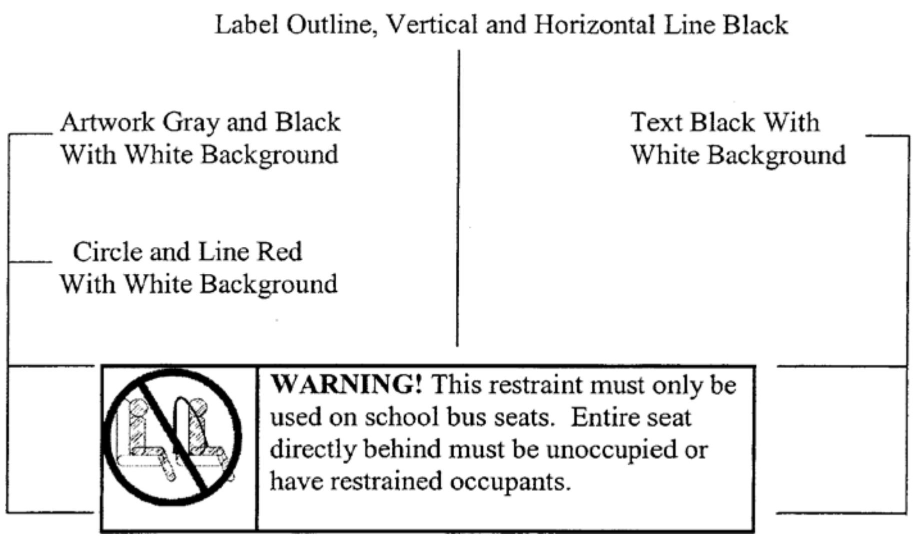
Include the following statement with the correct Appendix identifier: "Photographs of the labels are included in Appendix _."

DATA SHEET 3b- supplement

LABELING (S213b, S5.3, S5.5)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

<table>
<tr><th>Section</th><th>Required Statement – or – Requirement</th><th>Pass/Fail</th></tr>
<tr><td></td><td>Harnesses manufactured for use on school bus seats</td><td></td></tr>
<tr><td>S5.3.1(b)</td><td>Harnesses manufactured for use on school bus seats must meet S5.3.1(a) unless a label that conforms in content to the figure below and to the requirements of S5.3.1(b)(1) through S5.3.1(b)(3) is permanently affixed to the part of the harness that attaches the system to a vehicle seat back.

</td><td></td></tr>
<tr><td>S5.3.1(b)(1)</td><td>The label is plainly visible when installed and easily readable.</td><td></td></tr>
<tr><td rowspan="2">S5.3.1(b)(2)</td><td>The message area is white with black text.</td><td></td></tr>
<tr><td>The message area is no less than 20 square centimeters.</td><td></td></tr>
<tr><td rowspan="2">S5.3.1(b)(3)</td><td>The pictogram is gray and black with a red circle and slash on a white background.</td><td></td></tr>
<tr><td>The pictogram is no less than 20 mm in diameter.</td><td></td></tr>
</table>

Report No.: ________________ Model No.: ________________

Test Date: ________________

Section	Required Statement – or – Requirement	Pass/Fail
	All Child Restraints	
S5.5	Any labels or written instructions provided in addition to those required by this section do not: • obscure or confuse the meaning of the required information or • be otherwise misleading to the consumer.	
	Any labels or written instructions other than in the English language are an accurate translation of English labels or written instructions.	
	All Add-On Child Restraints	
S5.5.1	Each add-on CRS is permanently labeled with the information specified in S5.5.2 (a) through (m).	
S5.5.2	The information specified in paragraphs (a) through (m) of this section are stated in the English language and lettered in letters and numbers that are not smaller than 10-point type.	
	Unless otherwise specified, the information is labeled on a white background with black text.	
	Unless written in all capitals, the information is stated in sentence capitalization.	
	The following information is included:	
S5.5.2(a)	The model name or number of the system.	
S5.5.2(b)	The manufacturer's name. A distributor's name may be used instead if the distributor assumes responsibility for all duties and liabilities imposed on the manufacturer with respect to the system by the National Traffic and Motor Vehicle Safety Act, as amended.	
S5.5.2(c)	The statement: "Manufactured in ________," inserting the month and year of manufacture.	
S5.5.2(d)	The place of manufacture (city and State, or foreign country). However, if the manufacturer uses the name of the distributor, then it shall state the location (city and State, or foreign country) of the principal offices of the distributor.	
S5.5.2(e)	The statement: "This child restraint system conforms to all applicable Federal motor vehicle safety standards."	

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(f)	Statements or a combination of statements and pictograms specifying the manufacturer's recommendations for the weight and height ranges (in English and metric units) of children who can safely occupy the system in each applicable mode (rear-facing, forward-facing, booster).	
	Manufacturers do recommend that child restraint systems with internal harnesses be used forward-facing with children of weights less than 12 kg (26.5 lb).	
	Manufacturers do not recommend that booster seats be used by children of weights less than 18.4 kg (40 lb).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(g)(1)	A heading as specified in S5.5.2(k)(3)(i), with the statement WARNING! DEATH or SERIOUS INJURY can occur,'' capitalized as written and followed by bulleted statements in the following order:	
S5.5.2(g)(1)(i)	As appropriate, the statements required by the following sections will be bulleted and placed after the statement required by 5.5.2(g)(1) in the following order: 5.5.2(k)(1), 5.5.2(h), 5.5.2(j), and 5.5.2(i).	
S5.5.2(g)(1)(ii)	Secure this child restraint with the vehicle's child restraint anchorage system, if available, or with a vehicle belt. • For car beds, harnesses, and belt-positioning seats, the first part of the statement regarding attachment by the child restraint anchorage system is optional. • For belt-positioning seats, the second part of the statement regarding attachment by the vehicle belt does not apply.	
	CRSs equipped with internal harnesses to restrain the child and with components to attach to a child restraint anchorage system and for which the combined weight of the CRS and the maximum recommended child weight for use with internal harnesses exceeds 65 pounds, are labeled with the following statement: "Do not use the lower anchors of the child restraint anchorage system (LATCH system) to attach this child restraint when restraining a child weighing more than * with the internal harnesses of the child restraint." [* insert a recommended weight value in English and metric units such that the sum of the recommended weight value and the weight of the CRS does not exceed 65 pounds (29.5 kg)]	
S5.5.2(g)(1)(iii)	Follow all instructions on this child restraint and in the written instructions located (insert storage location on the restraint for the manufacturer's installation instruction booklet or sheet).	
	The printed instruction's storage location is located on the CRS and not on a supplemental device (if one exists), such as a detachable base.	
S5.5.2(g)(1)(iv)	Register your child restraint with the manufacturer.	
S5.5.2(g)(2)	At the manufacturer's option, the phrase ''DEATH or SERIOUS INJURY can occur'' in the heading can be on either a white or yellow background.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(g)(3)	More than one label may be used for the required bulleted statements. If multiple labels are used:	
	The labels are placed one above the other unless that arrangement is precluded by insufficient space or shape of the child restraint.	
	The mandated warnings must be in the correct order when read from top to bottom.	
	If there is insufficient space to place the labels one above the other, then the labels are placed side by side.	
	If the labels are side-by-side, then the mandated warnings appear top to bottom of the leftmost label, then top to bottom of the next label to its right, and so on.	
	There are no intervening labels and the required heading only appears on the first label in the sequence.	
S5.5.2(h)	In the case of each CRS that has belts designed to restrain children using them and which do not adjust automatically to fit the child; the statement: Snugly adjust the belts provided with this child restraint around your child.	
S5.5.2(i)(1)	For a booster seat that is recommended for use with either a vehicle's Type I or Type II seat belt assembly, one of the following statements, as appropriate:	
S5.5.2(i)(1)(i)	Use only the vehicle's lap and shoulder belt system when restraining the child in this booster seat; or	
S5.5.2(i)(1)(ii)	Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child in this seat.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(i)(2)(i)	Except as provided in paragraph (i)(2)(ii) of this section, for a booster seat which is recommended for use with both a vehicle's Type I and Type II seat belt assemblies, the following statement: Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child with the (insert description of the system element provided to restrain forward movement of the child's torso when used with a lap belt (e.g., shield)), and only the vehicle's lap and shoulder belt system when using the booster without the (insert above description).	
S5.5.2(i)(2)(ii)	A booster seat which is recommended for use with both a vehicle's Type I and Type II seat belt assemblies is not subject to S5.5.2(i)(2)(i) if, when the booster is used with the shield or similar component, the booster will cause the shoulder belt to be located in a position other than in front of the child when the booster is installed. However, such a booster shall be <u>labeled with a warning to use the booster with the vehicle's lap and shoulder belt system when using the booster without a shield.</u>	
S5.5.2(j)	In the case of each CRS equipped with a top anchorage strap, the statement: Secure the tether strap provided with this child restraint.	
S5.5.2(k)(1)	In the case of each rear-facing CRS that is designed for infants only, the statement: Use only in a rear- facing position when using it in the vehicle.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(k)(3)	Except as provided in (k)(4) of this section, each CRS that can be used in a rear-facing position shall have a label that conforms in content to Airbag Warning Figure (below) and to the requirements of S5.5.2(k)(3)(i) through S5.5.2(k)(3)(iii) permanently affixed to the outer surface of the cushion or padding in or adjacent to the area where a child's head would rest, so that the label is plainly visible and easily readable. The text reads: "WARNING. DO NOT place rear-facing child seat on front seat with air bag. DEATH OR SERIOUS INJURY can occur. The back seat is the safest place for children 12 and under." **AIR BAG WARNING LABEL**  **AIRBAG WARNING FIGURE**	
S5.5.2(k)(3)(i)	The heading area is yellow with the word ''warning'' and the alert symbol in black.	
S5.5.2(k)(3)(ii)	The message area is white with black text. The message area is no less than 30 square cm.	
S5.5.2(k)(3)(iii)	The pictogram is black with a red circle and slash on a white background. The pictogram is no less than 30 mm in diameter.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(k)(4)	If a CRS is equipped with a device that deactivates the passenger-side air bag in a vehicle when and only when the child restraint is installed in the vehicle and provides a signal, for at least 60 seconds after deactivation, that the air bag is deactivated, the label specified in the Airbag Warning Figure (above) may include the phrase ‘‘unless air bag is off’’ after ‘‘on front seat with air bag.’’	
S5.5.2(l)	An installation diagram showing the CRS installed in:	
S5.5.2(l)(1)	A seating position equipped with a continuous-loop lap/shoulder belt;	
S5.5.2(l)(3)	A seating position equipped with a child restraint anchorage system.	
S5.5.2(l)(3)(i)	The sum of the weight of the CRS and maximum child weight recommended is greater than 65 lb., and the diagram includes the statement “Do not install by this method for a child weighing more than *” Note: Complete Data Sheet 6 if this requirement applies.	

Model No.: ____________________

Report No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.2(m)	Statements informing the owner of the importance of registering the child restraint system for recall purposes and instructing the owner how to register the child restraint system at least by both mail and telephone, providing a U.S. telephone number.	
	The following statement must be provided: "For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to www.NHTSA.gov."	

	Restraints Certified for Use in Aircraft	
S5.5.2(n)	CRSs (other than belt-positioning seats, harnesses, and backless CRSs) may be certified as complying with the provisions of S8.	
	CRSs that are certified to S8 are labeled with the statement "This Restraint is Certified for Use in Motor Vehicles and Aircraft."	
	Belt-positioning seats, harnesses and backless CRSs are labeled with the statement "This Restraint is Not Certified for Use in Aircraft."	
	The required statement is in red lettering and is placed after the certification statement required by S5.5.2(e).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
	All Add-On Child Restraints	
S5.5.3	The information specified in S5.5.2(f) through (l) is located on the add-on CRS so that it is visible when the system is installed as specified in S5.6.1, except that for child restraints with a detachable base, the installation diagrams specified in S5.5.2(l) are required to be visible only when the base alone is installed.	
	All Built-in Child Restraints	
S5.5.4(a)	Each built-in CRS other than a factory-installed built-in restraint is permanently labeled with the information specified in S5.5.5(a) through (l).	
	The information specified in S5.5.5(a) through (j) and in S5.5.5(l) is visible when the system is activated for use.	
S5.5.4(b)	Each factory-installed built-in child restraint is permanently labeled with the information specified in S5.5.5(f) through (j) and S5.5.5(l), so that the information is visible when the restraint is activated for use.	
	The information is included in the vehicle owner's manual.	
S5.5.5	The information specified in paragraphs (a) through (l) of this section that is required by S5.5.4 is in English and lettered in letters and numbers using a not smaller than 10-point type.	
	Unless specified otherwise, the information is labeled on a white background with black text.	
	Unless written in all capitals, the information is stated in sentence capitalization	
S5.5.5(a)	The model name or number of the system.	
S5.5.5(b)	The manufacturer's name. A distributor's or dealer's name may be used instead if the distributor or dealer assumes responsibility for all duties and liabilities imposed on the manufacturer with respect to the system by the National Traffic and Motor Vehicle Safety Act, as amended.	
S5.5.5(c)	The statement: “Manufactured in____,” inserting the month and year of manufacture.	

S5.5.5(d)	The place of manufacture (city and State, or foreign country). However, if the manufacturer uses the name of the distributor or dealer, then it shall state the location (city and State, or foreign country) of the principal offices of the distributor or dealer.	
S5.5.5(e)	The statement: “This child restraint system conforms to all applicable Federal motor vehicle safety standards.”	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.5(f)	The CRS has statements or a combination of statements and pictograms specifying the manufacturer's recommendations for the weight and height ranges (in English and metric units) of children who can safely occupy the system in each applicable mode (rear-facing, forward-facing, booster).	
	Forward-facing child restraint systems with internal harnesses are not recommended for children of weights less than 12 kg (26.5 lb).	
	Booster seats are not recommended for children of weights less than 18.4 kg (40 lb).	

Report No.: ___________________ Model No.: ____________________

Test Date: ___________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.5(g)	(The heading and statement specified in paragraph (1), and if appropriate, the statements in paragraph (2) and (3). If used, the statements in paragraphs (2) and (3) shall be bulleted and follow the bulleted statement required by paragraph (1) after the heading.	
S5.5.5(g)(1)	A heading as specified in S5.5.2(k)(3)(i), with the statement "WARNING! DEATH or SERIOUS INJURY can occur," capitalized as written and followed by the bulleted statement: Follow all instructions on the child restraint and in the vehicle's owner's manual.	
	At the manufacturer's option, the phrase "DEATH or SERIOUS INJURY can occur" in the heading is on either a white or yellow background.	
S5.5.5(g)(2)	In the case of each built-in CRS which is not intended for use in motor vehicles in certain adjustment positions or under certain circumstances, an appropriate statement of the manufacturer's restrictions regarding those positions or circumstances.	
S5.5.5(g)(3)	As appropriate, the statements required by the following sections will be bulleted and placed after the statement required by 5.5.5(g)(1) in the following order: 5.5.5(g)(2), 5.5.5(f), S5.5.5(h) and S5.5.5(i).	
S5.5.5(h)	In the case of each built-in CRS that has belts designed to restrain children using them and which do not adjust automatically to fit the child: Snugly adjust the belts provided with this child restraint around your child.	
S5.5.5(i)	In the case of each built-in child restraint which can be used in a rear-facing position, the following statement: Place an infant in a rear-facing position in this child restraint.	
S5.5.5(j)	A diagram or diagrams showing the fully activated CRS in infant and/or child configurations.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.5.5(k)	One of the following statements, inserting an address and a U.S. telephone number.	
	If a manufacturer opts to provide a Web site on the registration card as permitted in Figure 59, the manufacturer must include the statement in part (ii):	
S5.5.5(k)(i)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert a U.S. telephone number). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov. "	
S5.5.5(k)(ii)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert telephone number) or register online at (insert Web site for electronic registration form). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov. "	
S5.5.5(l)	In the case of a built-in belt-positioning seat that uses either the vehicle's Type I or Type II belt systems or both, a statement describing the manufacturer's recommendations for the maximum height and weight of children who can safely occupy the system and how the booster should be used (e.g., with or without shield) with the different vehicle belt systems.	

DATA SHEET 4
PRINTED INSTRUCTIONS FOR PROPER USE (S213, S5.6)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

FMVSS 213, S5.6	Pass/Fail
The printed instructions accompanying the subject child restraint system were inspected and compared to the requirements of FMVSS No. 213 S5.6, as applicable.	

Remarks:

List any failures by describing the applicable section of the standard and explaining what information is missing or incorrect.

DATA SHEET 4- supplement
PRINTED INSTRUCTIONS FOR PROPER USE (S213, S5.6)

Report No.: ____________________ Model No.: ____________________
Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
	All Child Restraint Systems	
S5.6	Printed Instructions for Proper Use. Any labels or written instructions provided in addition to those required by this section do not obscure or confuse the meaning of the required information or be otherwise misleading to the consumer.	
	Any labels or written instructions other than in the English language are an accurate translation of English labels or written instructions.	
	Unless written in all capitals, the information required by S5.6.1 through S5.6.3 is stated in sentence capitalization.	
	Add-On Child Restraint Systems	
S5.6.1	Add-on CRSs. Each add-on CRS is accompanied by printed installation instructions in English that provide a step-by-step procedure, including diagrams, for installing the system in motor vehicles, securing the system in the vehicles, positioning a child in the system, and adjusting the system to fit the child.	
	For each CRS that has components for attaching to a tether anchorage or a child restraint anchorage system, the installation instructions include a step-by-step procedure, including diagrams, for properly attaching to that anchorage or system.	
S5.6.1.1	In a vehicle with rear designated seating positions, the instructions alert vehicle owners that, according to accident statistics, children are safer when properly restrained in the rear seating positions than in the front seating positions.	
S5.6.1.2	The instructions specify in general terms the types of vehicles, the types of seating positions, and the types of vehicle safety belts with which the add-on CRS can or cannot be used.	
S5.6.1.3	The instructions explain the primary consequences of not following the warnings required to be labeled on the CRS in accordance with S5.5.2 (g) through (k).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.1.4	The instructions for each car bed explain that the car bed should position in such a way that the child's head is near the center of the vehicle.	
S5.6.1.5	The instructions state that add-on CRSs should be securely belted to the vehicle, even when they are not occupied, since in a crash an unsecured CRS may injure other occupants.	
S5.6.1.6	Each add-on CRS has a location on the restraint for storing the manufacturer's instructions.	
	This storage location is located on the CRS and not on a supplemental device, such as a detachable base.	
S5.6.1.7	CRSs manufactured before December 5, 2024, have one of the following statements, inserting an address and a U.S. telephone number. If a manufacturer opts to provide a Web site on the registration card as permitted in Figure 59, the manufacturer must include the statement in part (ii):	
S5.6.1.7(i)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert a U.S. telephone number). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov. "	
S5.6.1.7(ii)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert telephone number) or register online at (insert Web site for electronic registration form). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888- 327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov."	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.1.8	In the case of each CRS that can be used in a position so that it is facing the rear of the vehicle, the instructions provide a warning against using rear-facing restraints at seating positions equipped with air bags, and explain the reasons for, and consequences of not following the warning.	
	The instructions also include a statement that owners of vehicles with front passenger side air bags should refer to their vehicle owner's manual for child restraint installation instructions.	
S5.6.1.9	In the case of each rear-facing CRS that has a means for repositioning the seating surface of the system that allows the system's occupant to move from a reclined position to an upright position during testing, the instructions include a warning against impeding the ability of the restraint to change adjustment position.	
S5.6.1.10(a)	Instructions for a booster seat that is recommended for use with either a vehicle's Type I or Type II seat belt assembly, one of the following statements, as appropriate, and the reasons for the statement:	
S5.6.1.10(a)(1)	Warning! Use only the vehicle's lap and shoulder belt system when restraining the child in this booster seat; or	
S5.6.1.10(a)(2)	Warning! Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child in this seat.	

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.1.10(b)(1)	Except as provided in S5.6.1.10(b)(2), the instructions for a booster seat that is recommended for use with both a vehicle's Type I and Type II seat belt assemblies shall include the following statement and the reasons therefor: Warning! Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child with the (insert description of the system element provided to restrain forward movement of the child's torso when used with a lap belt (e.g., shield)), and only the vehicle's lap and shoulder belt system when using this booster without the (insert above description).	
S5.6.1.10(b)(2)	A booster seat which is recommended for use with both a vehicle's Type I and Type II seat belt assemblies is not subject to S5.6.1.10(b)(1) if, when the booster is used with the shield or similar component, the booster will cause the shoulder belt to be located in a position other than in front of the child when the booster is installed. However, the instructions for such a booster shall include a warning to use the booster with the vehicle's lap and shoulder belt system when using the booster without a shield.	
S5.6.1.10(c)	The instructions for belt-positioning seats include the statement, “This restraint is not certified for aircraft use,” and the reasons for this statement.	
	Harnesses Manufactured for Use on School Bus Seats	
S5.6.1.11	For harnesses that are manufactured for use on school bus seats, the instructions include the following statements: “WARNING! This restraint must only be used on school bus seats. Entire seat directly behind must be unoccupied or have restrained occupants.” The labeling requirement refers to a restrained occupant as: an occupant restrained by any user appropriate vehicle restraint or CRS (e.g. lap belt, lap and shoulder belt, booster, child seat, harness).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
	Add-on Child Restraint Systems	
S5.6.1.12(a)	**CRS manufactured from Feb. 27, 2014 to Feb. 26, 2015:** The instructions for CRSs equipped with an internal harness to restrain the child and with components to attach to a child restraint anchorage system, and for which the combined weight of the CRS and the maximum recommended child weight for use with internal harnesses exceeds 65 pounds, must include the following statement: “Do not use the lower anchors of the child restraint anchorage system (LATCH system) to attach this child restraint when restraining a child weighing more than * [*insert a recommended weight value in English and metric units such that the sum of the recommended weight value and the weight of the CRS does not exceed 65 pounds (29.5 kg)] with the internal harnesses of the child restraint.”	
S5.6.1.12(b)	**CRS manufactured on or after Feb. 27, 2015:** If the child restraint is designed to meet the requirement of FMVSS 213 when installed by the lower anchors, the installation diagram meets S5.5.2(l)(3). Note: Complete Data Sheet 6 if this requirement applies.	
	Built-in Child Restraint Systems	
S5.6.2(a)	Each built-in CRS is accompanied by printed instructions in English that provide a step-by-step procedure, including diagrams, for activating the restraint system, positioning a child in the system, adjusting the restraint and, if provided, the restraint harness to fit the child.	
	The instructions for each built-in car bed explain that the child should be positioned in the bed in such a way that the child's head is near the center of the vehicle.	
S5.6.2(b)	Each motor vehicle equipped with a factory-installed built-in child restraint has the information specified in paragraph (a) of this section included in its vehicle owner's manual.	
S5.6.2.1	The instructions explain the primary consequences of not following the manufacturer's warnings for proper use of the CRS in accordance with S5.5.5 (f) through (i).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.2.2	The instructions for each built-in CRS other than a factory-installed restraint, include one of the following statements, inserting an address and a U.S. telephone number. If a manufacturer opts to provide a Web site on the registration card as permitted in Figure 59, the manufacturer must include the statement in part (ii):	
S5.6.2.2(i)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert a U.S. telephone number). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327- 4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov."	
S5.6.2.2(ii)	"Child restraints could be recalled for safety reasons. You must register this restraint to be reached in a recall. Send your name, address, e-mail address if available (preceding four words are optional), and the restraint's model number and manufacturing date to (insert address) or call (insert U.S. telephone number) or register online at (insert Web site for electronic registration form). For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888- 327-4236 (TTY: 1-800-424-9153), or go to http://www.NHTSA.gov."	
S5.6.2.3	Each built-in CRS other than a factory- installed built-in restraint, has a location on the restraint for storing the instructions.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.2.4	Each built-in CRS, other than a system that has been installed in a vehicle or a factory-installed built-in system that is designed for a specific vehicle model and seating position, is accompanied by instructions in English that provide a step-by-step procedure for installing the system in a motor vehicle.	
	The instructions specify the types of vehicles and the seating positions into which the restraint can or cannot be installed.	
	The instructions for a car bed explain that the bed should be installed so that the child's head will be near the center of the vehicle.	
S5.6.2.5	In the case of a built-in belt-positioning seat that uses either the vehicle's Type I or Type II belt systems or both, the instructions include a statement describing the manufacturer's recommendations for the maximum height and weight of children who can safely occupy the system and how the booster must be used with the vehicle belt systems appropriate for the booster seat.	
	The instructions explain the consequences of not following the directions.	
	The instructions specify that, if the booster seat is recommended for use with only the lap-belt part of a Type II assembly, the shoulder belt portion of the assembly must be placed behind the child.	
	Add-on and Built-in Child Restraint Systems	
S5.6.3	For a CRS that has belts designed to restrain children using them and which do not adjust automatically to fit the child, the printed instructions include the following statement: A snug strap should not allow any slack. It lies in a relatively straight line without sagging. It does not press on the child's flesh or push the child's body into an unnatural position.	
	Systems Manufactured for Use in Aircraft.	
S8.1	CRS manufactured for use in aircraft are accompanied by printed instructions in English that provide a step-by-step procedure, including diagrams, for installing the system in aircraft passenger seats, securing a child in the system when it is installed in an aircraft, and adjusting the system to fit the child.	

FOR CRS MANUFACTURED ON OR AFTER DECEMBER 5, 2026

DATA SHEET 4b
PRINTED INSTRUCTIONS FOR PROPER USE (S213b, S5.6)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

FMVSS 213b, S5.6	**Pass/Fail**
The printed instructions accompanying the subject child restraint system were inspected and compared to the requirements of FMVSS No. 213b S5.6, as applicable.	

Remarks:

List any failures by describing the applicable section of the standard and explaining what information is missing or incorrect.

DATA SHEET 4b- supplement
PRINTED INSTRUCTIONS FOR PROPER USE (S213b, S5.6)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
	All Child Restraint Systems	
S5.6	Any labels or written instructions provided in addition to those required by this section do not obscure or confuse the meaning of the required information or be otherwise misleading to the consumer.	
	Any labels or written instructions other than in the English language are an accurate translation of English labels or written instructions.	
	Unless written in all capitals, the information required by S5.6.1 through S5.6.3 shall be stated in sentence capitalization.	
	Add-On Child Restraint Systems	
S5.6.1	Each add-on CRS are accompanied by printed installation instructions in English that provide a step-by-step procedure, including diagrams, for installing the system in motor vehicles, securing the system in the vehicles, positioning a child in the system, and adjusting the system to fit the child.	
	For a CRS that has components for attaching to a tether anchorage or a child restraint anchorage system, the installation instructions include a step-by-step procedure, including diagrams, for properly attaching to that anchorage or system.	
S5.6.1.1	In a vehicle with rear designated seating positions, the instructions alert vehicle owners that, according to accident statistics, children are safer when properly restrained in the rear seating positions than in the front seating positions.	
S5.6.1.2	The instructions specify in general terms the types of vehicles, the types of seating positions, and the types of vehicle safety belts with which the add-on CRS can or cannot be used.	
S5.6.1.3	The instructions explain the primary consequences of not following the warnings required to be labeled on the CRS in accordance with S5.5.2 (g) through (k).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.1.4	The instructions for a car bed explain that the car bed should position in such a way that the child's head is near the center of the vehicle.	
S5.6.1.5	The instructions state that the add-on CRSs should be securely belted to the vehicle, even when they are not occupied, since in a crash an unsecured CRS may injure other occupants.	
S5.6.1.6	Each add-on CRS has a location on the restraint for storing the manufacturer's instructions.	
	This storage location is located on the CRS and not on a supplemental device, such as a detachable base.	
S5.6.1.7	The CRS has statements informing the owner of the importance of registering the child restraint system for recall purposes and instructing the owner how to register the child restraint system at least by mail and by telephone, providing a U.S. telephone number.	
	The following statement is also provided: "For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to www.NHTSA.gov."	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.1.8	For CRS that can be used in a position so that it is facing the rear of the vehicle, the instructions shall provide a warning against using rear-facing restraints at seating positions equipped with air bags, and shall explain the reasons for, and consequences of not following the warning.	
	The instructions also include a statement that owners of vehicles with front passenger side air bags should refer to their vehicle owner's manual for child restraint installation instructions.	
S5.6.1.9	For a rear-facing CRS that has a means for repositioning the seating surface of the system that allows the system's occupant to move from a reclined position to an upright position during testing, the instructions include a warning against impeding the ability of the restraint to change adjustment position.	
S5.6.1.10(a)	For instructions for a booster seat that is recommended for use with either a vehicle's Type I or Type II seat belt assembly, one of the following statements, as appropriate, and the reasons for the statement:	
S5.6.1.10(a)(1)	Warning! Use only the vehicle's lap and shoulder belt system when restraining the child in this booster seat; or	
S5.6.1.10(a)(2)	Warning! Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child in this seat.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.1.10(b)(1)	Except as provided in S5.6.1.10(b)(2), the instructions for a booster seat that is recommended for use with both a vehicle's Type I and Type II seat belt assemblies include the following statement and the reasons therefor: Warning! Use only the vehicle's lap belt system, or the lap belt part of a lap/shoulder belt system with the shoulder belt placed behind the child, when restraining the child with the (insert description of the system element provided to restrain forward movement of the child's torso when used with a lap belt (e.g., shield)), and only the vehicle's lap and shoulder belt system when using this booster without the (insert above description).	
S5.6.1.10(b)(2)	A booster seat which is recommended for use with both a vehicle's Type I and Type II seat belt assemblies is not subject to S5.6.1.10(b)(1) if, when the booster is used with the shield or similar component, the booster will cause the shoulder belt to be located in a position other than in front of the child when the booster is installed.	
	The instructions for such a booster include a warning to use the booster with the vehicle's lap and shoulder belt system when using the booster without a shield.	
S5.6.1.10(c)	The instructions for belt-positioning seats include the statement, “This restraint is not certified for aircraft use,” and the reasons for this statement.	
	School Bus Seats Equipped with Harnesses	
S5.6.1.11	For school bus CRS, the instructions include the following statement: “WARNING! This restraint must only be used on school bus seats. Entire seat directly behind must be unoccupied or have restrained occupants.” The labeling requirement refers to a restrained occupant as: an occupant restrained by any user appropriate vehicle restraint or CRS (e.g. lap belt, lap and shoulder belt, booster, child seat, harness).	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
	Add-on Child Restraint Systems	
S5.6.1.12	If the CRS is designed to meet the requirements of this standard when installed by the child restraint anchorage system according to S5.3.2: • The installation diagram showing the child restraint system installed using a child restraint anchorage system meets the specifications in S5.5.2(l)(3).	
S5.6.1.13	If the CRS is marked as specified in S5.9(a) and (b), then: • The markings identify the lower anchor connectors and the tether anchor connector, respectively, and • An explanation is provided that the consumer should look for corresponding marks on the vehicle child restraint anchorage system to attach the appropriate connectors.	
S5.6.1.14	The printed instructions use the following terms when referring to the different components of the child restraint anchorage system or for components of the CRS that are used to connect the CRS to the vehicle: • Lower anchor • Tether anchor • Lower anchor attachment • Rigid lower anchor attachment • Tether	
	Built-in Child Restraint Systems	
S5.6.2(a)	The built-in CRS is accompanied by printed instructions in English that provide a step-by-step procedure, including diagrams, for activating the restraint system, positioning a child in the system, adjusting the restraint and, if provided, the restraint harness to fit the child.	
	The instructions for each built-in car bed shall explain that the child should be positioned in the bed in such a way that the child's head is near the center of the vehicle.	
S5.6.2(b)	Each motor vehicle equipped with a factory-installed built-in child restraint has the information specified in paragraph (a) of this section included in its vehicle owner's manual.	

S5.6.2.1	The instructions explain the primary consequences of not following the manufacturer's warnings for proper use of the CRS in accordance with S5.5.5 (f) through (i).	
S5.6.2.2	The instructions for each built-in child restraint system other than a factory-installed restraint include statements informing the owner of the importance of registering the child restraint system for recall purposes and instructing the owner how to register the child restraint system at least by mail and by telephone, providing a U.S. telephone number.	
	The following statement is also be provided: “For recall information, call the U.S. Government's Vehicle Safety Hotline at 1-888-327-4236 (TTY: 1-800-424-9153), or go to www.NHTSA.gov.”	
S5.6.2.3	Each built-in CRS other than a factory- installed built-in restraint, has a location on the restraint for storing the instructions.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.6.2.4	A built-in CRS, other than a system that has been installed in a vehicle or a factory-installed built-in system that is designed for a specific vehicle model and seating position, is accompanied by instructions in English that provide a step-by-step procedure for installing the system in a motor vehicle.	
	The instructions specify the types of vehicles and the seating positions into which the restraint can or cannot be installed.	
	The instructions for each car bed explain that the bed should be installed so that the child's head will be near the center of the vehicle.	
S5.6.2.5	In the case of a built-in belt-positioning seat that uses either the vehicle's Type I or Type II belt systems or both, the instructions include a statement describing the manufacturer's recommendations for the maximum height and weight of children who can safely occupy the system and how the booster must be used with the vehicle belt systems appropriate for the booster seat.	
	The instructions explain the consequences of not following the directions.	
	The instructions specify that, if the booster seat is recommended for use with only the lap-belt part of a Type II assembly, the shoulder belt portion of the assembly must be placed behind the child.	
	Add-on and Built-in Child Restraint Systems	
S5.6.3	In the case of a CRS that has belts designed to restrain children using them and which do not adjust automatically to fit the child, the printed instructions include the following statement: A snug strap should not allow any slack. It lies in a relatively straight line without sagging. It does not press on the child's flesh or push the child's body into an unnatural position.	
	Systems Manufactured for Use in Aircraft.	
S8.1	CRS manufactured for use in aircraft are accompanied by printed instructions in English that provide a step-by-step procedure, including diagrams, for installing the system in aircraft passenger seats, securing a child in the system when it is installed in an aircraft, and adjusting the system to fit the child.	

DATA SHEET 5
REGISTRATION FORM (S213, S5.8)

Report No.: ____________________ Model No.: ____________________
Test Date: ____________________

FMVSS 213, S5.8	Pass/Fail
The printed registration form accompanying the subject child restraint system and the electronic registration form were inspected and compared to the requirements of FMVSS No. 213 S5.8.	

Remarks:

List any failures by describing the applicable section of the standard and explaining what information is missing or incorrect.

DATA SHEET 5- supplement
REGISTRATION FORM (S213, S5.8)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.8	Information requirements—attached registration form and electronic registration form.	
S5.8.1	Attached registration form	
S5.8.1(a)	The CRS has a registration form attached to any surface of the restraint that contacts the dummy when the dummy is positioned in the system in accordance with S6.1.2 of Standard 213. *Does not apply to factory-installed built-in CRS	
S5.8.1(b)	Each attached form:	
S5.8.1(b)(1)	Consists of a postcard that is attached at a perforation to an informational card;	
S5.8.1(b)(2)	Conforms in size, content, and format to Figure 59; and	
S5.8.1(b)(3)	Has a thickness of at least 0.007 inches and not more than 0.0095 inches.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.8.1(c)	The attached postcard provides:	
	The model name or number of the CRS	
	The date of manufacture (month, year) of the CRS	
	A space for the purchaser to record his or her name, mailing address, and (at the manufacturer's option) e-mail address	
	The attached postcard is:	
	Addressed to the manufacturer	
	Postage paid	
	No other information appears on the postcard, Except identifying information that distinguishes a particular CRS from other systems of that model name or number may be preprinted in the shaded area of the postcard, as shown in Figure 59.	
S5.8.1(d)	Manufacturers may voluntarily provide a web address on the informational card enabling owners to register child restraints online, provided that the Web address is a direct link to the electronic registration form meeting the requirements of S5.8.2 of this section.	

S5.8.2	**Electronic registration form.**	
S5.8.2(a)(1)	The electronic registration form contains the following statements at the top of the form:	
S5.8.2(a)(1)(i)	"FOR YOUR CHILD'S CONTINUED SAFETY" (Displayed in bold type face, caps, and minimum 12-point type.)	
S5.8.2(a)(1)(ii)	"Although child restraint systems undergo testing and evaluation, it is possible that a child restraint could be recalled." (Displayed in bold typeface, caps and lower case, and minimum 12-point type.)	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.8.2(a)(1)(iii)	"In case of a recall, we can reach you only if we have your name and address, so please fill in the registration form to be on our recall list." (Displayed in bold typeface, caps and lower case, and minimum 12-point type.)	
S5.8.2(a)(1)(iv)	"In order to properly register your child restraint system, you will need to provide the model number, serial number and date of manufacture. This information is printed on the registration card and can also be found on a white label located on the back of the child restraint system." (Displayed in bold typeface, caps and lower case, and minimum 12-point type.)	
S5.8.2(a)(1)(v)	"This registration is only applicable to child restraint systems purchased in the United States." (Displayed in bold typeface, caps and lower case, and minimum 12-point type.)	
S5.8.2(a)(2)	The following registration fields for the purchaser are provided:	
	Model name or number of the CRS	
	Date of manufacture (month, year) of the CRS	
	Purchaser's name and mailing address	
	Purchaser's mailing address	
	Purchaser's e- mail address (at the manufacturer's option)	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.8.2(b)	No other information appears on the electronic registration form. Except for information identifying the manufacturer or a link to the manufacturer's home page, a field to confirm submission, and a prompt to indicate any incomplete or invalid fields prior to submission.	
	Accessing the web page that contains the electronic registration form does not cause additional screens or electronic banners to appear.	
S5.8.2(c)	The electronic registration form is accessed directly by the web address that the manufacturer printed on the attached registration form.	
	The form appears on screen when the consumer has inputted the web address provided by the manufacturer, without any further keystrokes on the keyboard or clicks of the mouse.	

FOR CRS MANUFACTURED ON OR AFTER DECEMBER 5, 2026

DATA SHEET 5b
REGISTRATION FORM (S213b, S5.8)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

FMVSS 213b, S5.8	Pass/Fail
The printed registration form accompanying the subject child restraint system and the electronic registration form were inspected and compared to the requirements of FMVSS No. 213b S5.8.	

Remarks:

List any failures by describing the applicable section of the standard and explaining what information is missing or incorrect.

DATA SHEET 5b- supplement
REGISTRATION FORM (S213b, S5.8)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.8	Information requirements—attached registration form and electronic registration form.	
S5.8.1	**Attached registration form**	
S5.8.1(a)	The CRS has a registration form attached to any surface of the restraint that contacts the dummy when the dummy is positioned in the system in accordance with S6.1.2 of Standard 213. *Does not apply to factory-installed built-in restraint CRS.	
	The form does not have advertising or any information other than that related to registering the child restraint system.	
S5.8.1(b)	The attached registration form provides a mail-in postcard that conforms in size, and in basic content and format to the forms depicted in Figure 60 of this section.	
S5.8.1(b)(1)	The mail-in postcard:	
S5.8.1(b)(1)(i)	Has a thickness of at least 0.007 inches and not more than 0.0095 inches.	
S5.8.1(b)(1)(ii)	Is pre-printed with the information identifying:	
	The model name or number of the CRS	
	The date of manufacture (month, year) of the CRS	
S5.8.1(b)(1)(iii)	Contains space for the owner to record:	
	His or her name	
	His or her mailing address	
	His or her e-mail address (optional)	
	His or her telephone number (optional)	
	Other pertinent information	
S5.8.1(b)(1)(iv)	Is addressed to the manufacturer, and be postage paid.	
S5.8.1(b)(1)(v)	Is detachable from the information card without the use of scissors or other tools.	

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.8.1(c)	The registration form attached to the child restraint system also provides an information card with the following:	
S5.8.1(c)(1)	A statement informing the owner of the importance of registering the child restraint system;	
S5.8.1(c)(2)	Instructions to the owner on how to register the CRS.	
S5.8.1(c)(3)	Statements informing the purchaser that the registration card is pre-addressed, and that postage has been paid.	
S5.8.1(c)(4)	Instructions on how to register the child restraint system electronically if an electronic registration form is used.	
	If an electronic registration form is used or referenced, it must meet the requirements of S5.8.2 of this section.	
S5.8.1(c)(5)	Optional statements to the owner explaining that the registration card is not a warranty card, and that the information collected from the owner will not be used for marketing purposes.	

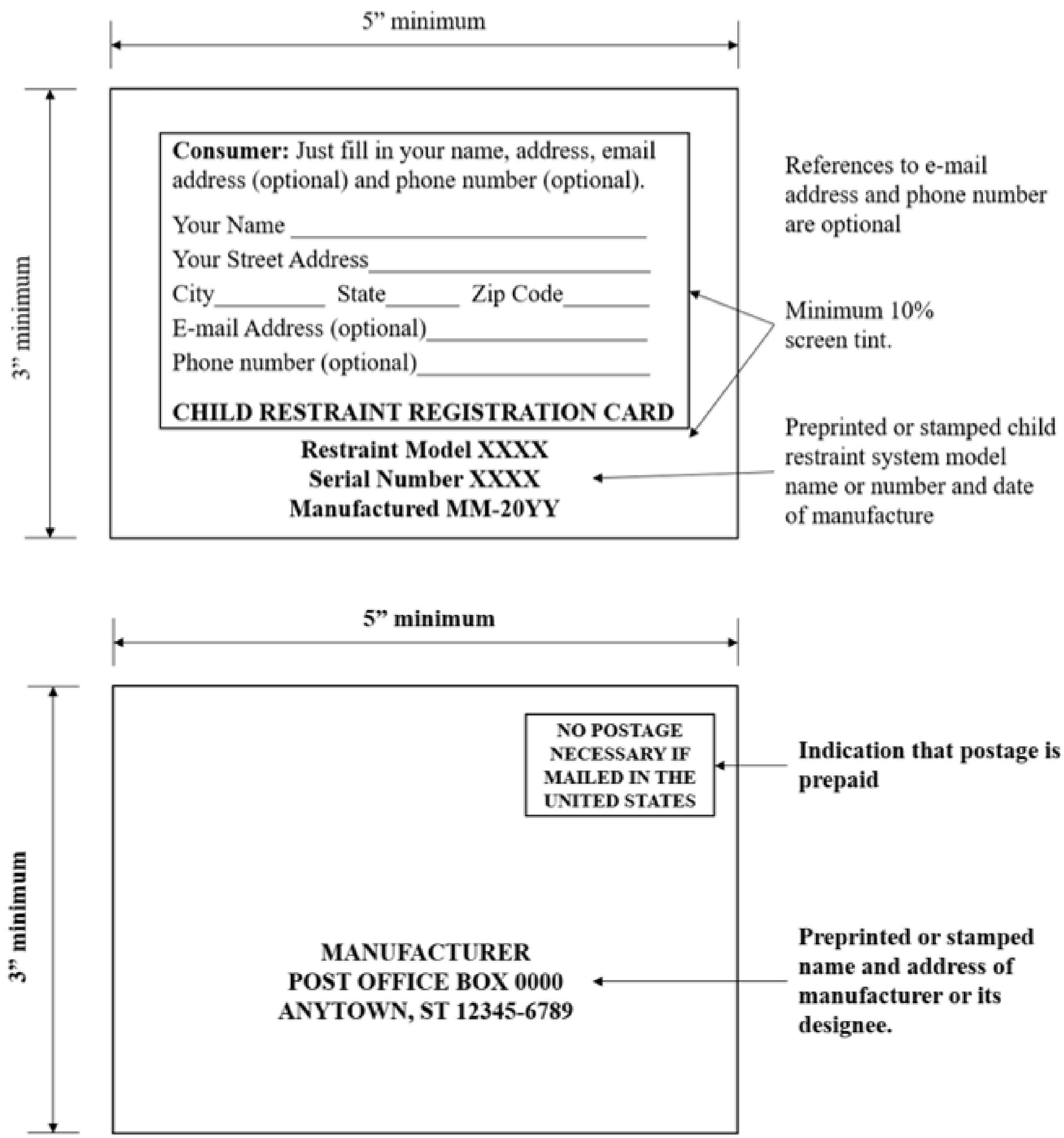


FIGURE 60. REQUIRED SIZE, CONTENT, and FORMAT FOR REGISTRATION CARD

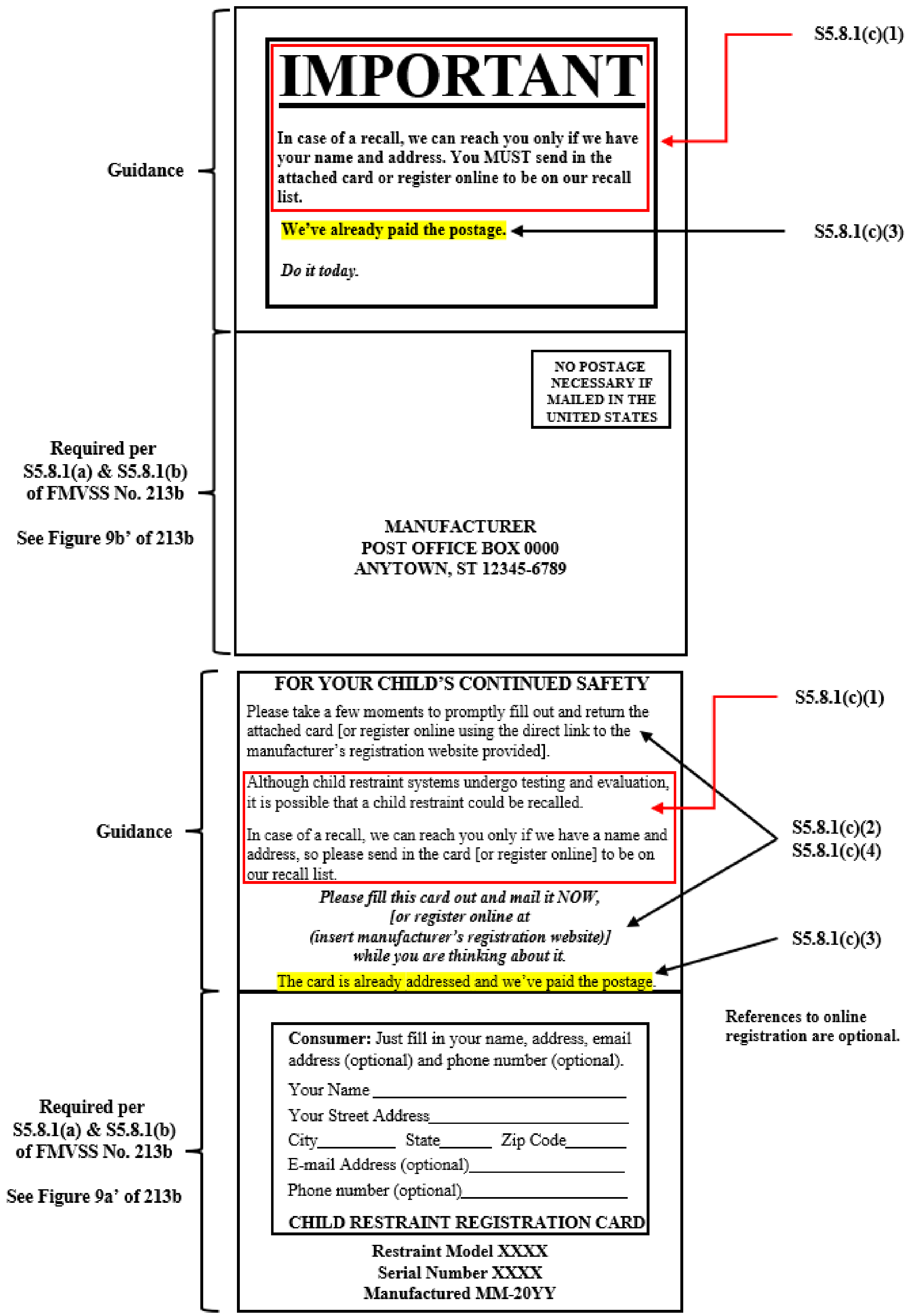


FIGURE 61. REGISTRATION CARD STATEMENT SIMILARITIES BETWEEN FMVSS NO. 213 and 213b

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Required Statement – or – Requirement	Pass/Fail
S5.8.2	**Electronic registration form.**	
S5.8.2(a)(1)	Each electronic registration form contains the following:	
S5.8.2(a)(1)(i)	A statement informing the owner of the importance of registering the CRS at the top of the form	
S5.8.2(a)(1)(ii)	A statement instructing the owner how to register the CRS at the top of the form	
S5.8.2(a)(2)	The following registration fields:	
	Model name or number of the CRS	
	Date of manufacture (month, year) of the CRS	
	Purchaser's name	
	Purchaser's mailing address	
	Purchaser's e-mail address (optional)	
	Purchaser's telephone number (optional)	
S5.8.2(b)	No advertising or other information appears on the electronic registration form.	
	Statements to the owner explaining that the registration is not for a warranty, and that the information collected from the owner will not be used for marketing purposes. *(Optional)	
S5.8.2(c)	The electronic registration form may provide information identifying the manufacturer or a link to the manufacturer's home page, a field to confirm submission, and a prompt to indicate any incomplete or invalid fields prior to submission.	
S5.8.2(d)	If an electronic address (in form of a website (printed URL)) is provided on the attached registration form:	
	The electronic registration form is accessed directly by the electronic address.	
	Additional screens or electronic banners do not appear when accessing the electronic registration form.	
	Manufacturers may also include a code (such as QR code or similar) to access the electronic address.	

DATA SHEET 6
MAXIMUM CHILD WEIGHT FOR LOWER ANCHOR USE (S213/S213b, S5.5.2(l)(3))

Report No.: ______________________ Model No.: ______________________

Test Date: ______________________

Installation Direction	A Max Child Weight is Required for this Installation Mode (Y or N)	Installation Diagram Shown (Y or N)	Max Child Weight Indicated on Installation Diagram (lb.)
Rear Facing			
Forward Facing			

CRS Weight (lb.)	Child Weight (CW) Calculation (lb.)	Rounded CW Limit permitted under S5.5.2(l)(3)(A)
	Rear Facing 60-CRS Weight =	
	Forward Facing 65-CRS Weight =	

Calculated CW	Rounded CW
15 < CW ≤ 20	20
20 < CW ≤ 25	25
25 < CW ≤ 30	30
30 < CW ≤ 35	35
35 < CW ≤ 40	40
40 < CW ≤ 45	45
45 < CW ≤ 50	50
50 < CW ≤ 55	55
55 < CW ≤ 60	60

Section	Requirement	Pass/Fail
S5.5.2(l)(3)(A)	A maximum child weight is required on an installation diagram when the CRS + child weight is greater than 65 lb. for CRS that are used with the internal harness and installed with lower anchors. The maximum weight on the label conforms to the limits established in S5.5.2(l)(3)(A)	
S5.5.2(l)(3)(B)	Either: (1) separate diagrams are provided and labeled; or (2) only one diagram is applicable, provided, and labeled; or (3) two diagrams are applicable and the diagram shown contains the lesser of the permitted weights	

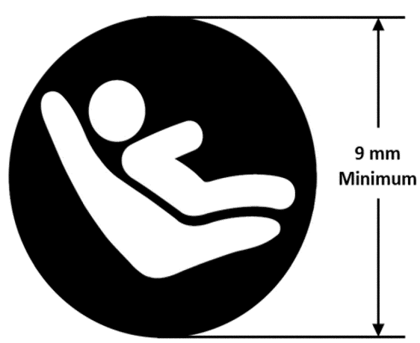
REMARKS:

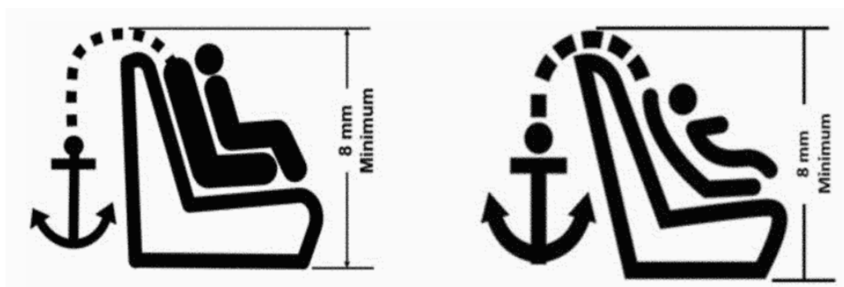
Technician:______________________ Date: ______________________

DATA SHEET 7
ATTACHMENT TO ANCHORAGE SYSTEM (S213/S213b, S5.9)

Report No.: ____________________ Model No.: ____________________

Test Date: ____________________

Section	Requirement	Pass/Fail
S5.9(a)	This add-on CRS (excluding car beds, harnesses, and belt-positioning seats) has a permanently attached anchorage system having components that enable the restraint to be securely fastened to the lower anchorages. • If this is a rear-facing CRS with a detachable base, then the manufacturer can elect to place the components only on the base. • If this is a forward-facing CRS with a detachable base, then the child restraint is required to have the components. • If this CRS can be used in both rearward and forward-facing directions with a detachable base, then the child restraint is required to have the components.	
	If the components are removable, these components can only be removed with a tool, such as a screwdriver.	
	For CRS manufactured on or after January 8, 2028, the components are permanently marked with the following symbol:  **LOWER ANCHORAGE CONNECTOR SYMBOL**	

S5.9(b)	If this CRS has components for attaching the system to a tether anchorage, and those components include a tether hook, then:	
	The tether hook conforms to the configuration and geometry specified in Figure 7.	
	The components for attaching the system to a tether anchorage are located on the restraint itself. • If this is a forward-facing CRS with a detachable base, then the child restraint is required to have the components. • If this CRS can be used in both rearward and forward-facing directions with a detachable base, then the child restraint is required to have the components.	
	For CRS manufactured on or after January 8, 2028, the tether hook or the tether strap is permanently marked with either of the following pictograms within 25 mm of the tether hardware assembly:  **TETHER ANCHORAGE SYMBOLS**	
S5.9(c)	This CRS has adjustable components for attaching the system to a tether anchorage or to lower anchors to allow the restraint to be tightened to the vehicle.	
	For CRS manufactured on or after January 8, 2028, the length of the tether hardware assembly (tether hook and a mechanism to tighten and loosen the tether strap) does not exceed 165 mm.	
S5.9(d)	If the anchorage system on this CRS has components, other than hooks, that enable the restraint to be securely fastened to the lower anchorages, it provides either an indication when each attachment to the lower anchorage becomes fully latched or attached or provides a visual indication that all attachments to the lower anchorages are fully latched or attached.	
	Visual indications that all attachments to the lower anchorages are fully latched or attached are detectable under normal daylight lighting conditions.	

REMARKS:

Technician:______________________________ Date: ____________________

DATA SHEET 8
INSTALLATION (S213, 5.3)

Report No.: ____________________________ Model No.: _________________________

Test Date: ____________________________

<table>
<tr><th>Section</th><th colspan="6">Requirement</th><th>Pass/Fail</th></tr>
<tr><td>S5.3.1</td><td colspan="6">Add-on child restraints meet either (a) or (b) as appropriate</td><td></td></tr>
<tr><td>S5.3.1(a)</td><td colspan="6">Except for components designed to attach a child restraint anchorage system, this add-on child restraint does not have any means designed for attaching the system to a vehicle seat cushion or vehicle seat back and any component (except belts) that is designed to be inserted between the vehicle seat cushion and vehicle seat back.</td><td></td></tr>
<tr><td>S5.3.1(b)</td><td colspan="6">Harnesses manufactured for use on school bus seats meet S5.3.1(a) unless labeled appropriately.
Refer to the S5.3.1(b) and the labeling data sheet for the specific requirements.</td><td></td></tr>
<tr><td rowspan="8">S5.3.2</td><td colspan="6">This CRS is capable of being installed solely by each means of installation indicated by an “X” below. See Table S5.3.2 of FMVSS No. 213.</td><td></td></tr>
<tr><td></td><td>Lap Belt</td><td>Lap Belt & Tether</td><td>Lower Anchors</td><td>Lap & Shoulder Belt</td><td>Seatback Mount</td><td></td></tr>
<tr><td>Harnesses labeled per S5.3.1(b)(1)-(3) and Fig. 12</td><td></td><td></td><td></td><td></td><td>X</td><td></td></tr>
<tr><td>Other Harnesses</td><td></td><td>X</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Car Beds</td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Rear-Facing Restraints</td><td>X</td><td></td><td>X</td><td></td><td></td><td></td></tr>
<tr><td>Belt-Positioning Seats</td><td></td><td></td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>Other</td><td>X</td><td>X</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td>S5.3.3</td><td colspan="6">If a car bed, this CRS is designed to be installed laterally.</td><td></td></tr>
</table>

REMARKS:

Technician:___________________________________ Date: _________________________

DATA SHEET 8 (continued)
INSTALLATION (S213a, S5.1.6)

Report No.: ______________________________ Model No.: __________________________

Test Date: ______________________________

<table>
<tr><th>Section</th><th colspan="5">Requirement</th><th>Pass/Fail</th></tr>
<tr><td rowspan="4">S5.1.6</td><td colspan="5">For child restraints manufactured on or after June 30, 2025, or child restraints certified to optional early compliance with FMVSS No. 213a: In addition to meeting the frontal requirements, this CRS is also capable of:
• being installed solely by each means of installation indicated by an “X” below, and
• meeting the dynamic requirements of the standard when installed solely by each of the means of installation. (S5.1, S6.1)

See Table S5.1.6 of FMVSS No. 213a.</td><td></td></tr>
<tr><td></td><td>Lap & Shoulder Belt</td><td>Lap & Shoulder Belt w/Tether (if provided)</td><td>Lower Anchors</td><td>Lower Anchors w/Tether (if provided)</td><td></td></tr>
<tr><td>Rear-Facing Restraints</td><td>X</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>Forward-Facing Restraints</td><td></td><td>X</td><td></td><td>X</td><td></td></tr>
</table>

REMARKS:

Technician:___________________________________ Date: __________________________

DATA SHEET 8 (continued)
INSTALLATION (S213b, S5.3)

Report No.: ______________________________ Model No.: ________________________________

Test Date: ______________________________

<table>
<tr><th>Section</th><th colspan="7">Requirement</th><th>Pass/Fail</th></tr>
<tr><td>S5.3.1</td><td colspan="7">Add-on child restraints meet either (a) or (b) as appropriate</td><td></td></tr>
<tr><td>S5.3.1(a)</td><td colspan="7">Except for components designed to attach a child restraint anchorage system, this add-on child restraint does not have any means designed for attaching the system to a vehicle seat cushion or vehicle seat back and any component (except belts) that is designed to be inserted between the vehicle seat cushion and vehicle seat back.</td><td></td></tr>
<tr><td>S5.3.1(b)</td><td colspan="7">Harnesses manufactured for use on school bus seats must meet S5.3.1(a) unless labeled appropriately.
Refer to the labeling data sheet for the specific requirements.</td><td></td></tr>
<tr><td rowspan="8">S5.3.2</td><td colspan="7">For child restraints manufactured on or after December 05, 2026, or child restraints certified to optional early compliance with FMVSS No. 213b:
This CRS is capable of:
• being installed solely by each means of installation indicated by an “X” below, and
• meeting the dynamic requirements of the standard when installed solely by each of the means of installation. (S5.1, S6.1)

See Table S5.3.2 of FMVSS No. 213b.</td><td></td></tr>
<tr><td></td><td>Lap Belt w/ Tether</td><td>Lap & Shoulder Belt</td><td>Lap & Shoulder Belt w/ Tether</td><td>Lower Anchors</td><td>Lower Anchors w/ Tether</td><td>Seat Back Mount</td><td></td></tr>
<tr><td>School bus CRS</td><td></td><td></td><td></td><td></td><td></td><td>X</td><td></td></tr>
<tr><td>Harnesses</td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Car Beds</td><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Rear-Facing Restraints</td><td></td><td>X</td><td></td><td>X</td><td></td><td></td><td></td></tr>
<tr><td>Belt-Positioning Seats</td><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>All Other CRS</td><td></td><td>X</td><td>X</td><td>X</td><td>X</td><td></td><td></td></tr>
<tr><td>S5.3.3</td><td colspan="7">If a car bed, this CRS is designed to be installed laterally.</td><td></td></tr>
</table>

DATA SHEET 9
MINIMUM HEAD SUPPORT SURFACE (S213, S5.2.1)

Report No.: ______________________________ Model No.: __________________________

Test Date: ______________________________

Section	Requirement	
S5.2.1.2	The CRS is exempt from S5.2.1.1 if it is a forward-facing restraint and the target points on either side of the dummy's head (using the largest test dummy specified in S7, excluding the 6-year-old) is below the top of the back cushion of the test bench.	
S5.2.1.1.(a)	**Maximum Recommended Child Weight**	**Minimum Seat Back Height Required**
	≤ 18 kg (39.7 lb.)	50 cm (19.7 in.)
	> 18 kg (39.7 lb.)	56 cm (22.0 in.)
S5.2.1.1(b)	**Side Wing Depth**	**Minimum Back Support Width**
	< 10.2 cm (4.0 in.)	20.3 cm (8.0 in.)
	≥ 10.2 cm (4.0 in.)	15.2 cm (6.0 in.)

The child restraint system is **exempt** from S5.2.1.1 ______________
(YES, NO)

Back Support Height

Manufacturer's Recommended Maximum Child Weight kg (lb.)	Measured Height cm (in.)	Pass/Fail

Back Support Width

Measured Side Wing Depth cm (in.)	Measured Width cm (in.)	Pass/Fail

REMARKS:

Technician:___________________________________ Date: __________________________

DATA SHEET 10
TORSO IMPACT PROTECTION (S213, S5.2.2)

Report No.: ______________________ Model No.: ______________________

Test Date: ______________________

Section	Surface Requirement	Contour Requirement	Other Requirement
S5.2.2.1(a)	Back Support Surface	flat or concave	Continuous surface area of ≥ 85 in.^{2}
S5.2.2.1(b)	Side Support Surface	flat or concave	Continuous surface area of ≥ 24 in.^{2} for restraints having a recommended child weight ≥ 20 lb.
		flat or concave	Continuous surface area of ≥ 48 in.^{2} for restraints having a recommended child weight < 20 lb.
S5.2.2.1(c)	Horizontal Cross Sections of Surfaces Restraining Torso Forward Movement	flat or concave	
	Vertical Longitudinal Cross Sections of Surfaces Restraining Torso Forward Movement	flat or convex	Radius of curvature ≥ 2 in.
S5.2.2.2	Fixed or movable surface forward of dummy		Must be used to restrain dummy and allow compliance with injury and excursion criteria

Support Surface- Results

Surface	Contour	Measured Area	Pass/Fail
Back Support Surface			
Side Support Surface			

Surfaces Restraining Torso Forward Movement- Results

	Contour	Radius of Curvature	Pass/Fail
Horizontal Cross Section			
Vertical Cross Section			

Fixed or Movable Surfaces Forward of Dummy- Results

Yes/No	Pass/Fail

Technician: ______________________ Date: ______________________

DATA SHEET 11
PROTRUSION LIMITATION (S213, S5.2.4)

Report No.: ____________________________ Model No.: ____________________________

Test Date: ____________________________

S5.2.4. Any portion of a rigid structural component within or underlying a contactable surface is subject to the protrusion limitations described below.

Test	Requirement mm. (in.)	Measurement mm. (in.)	Pass/Fail
Height	≤ 9.53 mm. (3/8 in.)		
Edge Radius	≥ 6.35 mm. (1/4 in.)		

REMARKS:

Technician: ____________________________ Date: ____________________________

DATA SHEET 12
FRONTAL IMPACT DYNAMIC TEST CONDITIONS (S213/S213b, S6.1)

Report No. ________________ Sled Test No. ________________

Test Date: ________________ Item Code: ________________

Laboratory Ambient Conditions During Testing:

Temperature (ºC)	
Relative Humidity (%)	

Pulse:

Test Configuration (I or II)	
Nominal Velocity (km/h)	

Dummy:

Dummy Description	(Include age, family, and 572 Part)
Dummy Serial Number	

Restraint Installation:

Installation Direction	
Detachable Base Usage	
Attachment Method	
Tether Usage	
Seat Back Position	
Shoulder Harness Position	Describe using language such as "*Slot X, counted from the bottom*" or "*The shoulder harness was adjusted to match the shoulder height of the ATD*."
Buckle Harness Position	Describe using language such as "*Slot Y, counted from the seat back outward*"
Recline Position	Describe using language such as "*Slot X, counted from most Upright*"
Belt Tension (lb.)	
Internal Harness Tension (lb.)	
Knee Spacing[33] (mm.)	

Foam:

Seat Back Foam S/N	
Seat Bottom Foam S/N	

[Take pre- and post-test photographs as described in this test procedure and include them in the test report]

REMARKS:

Pretest and posttest photographs are presented in Appendix C.

Technician: ______________________________ Date: _____________________

[33] Include only for 6H3 and TH3 booster testing. Measured from outer edges of the knees.

DATA SHEET 12 (continued)
SIDE IMPACT DYNAMIC TEST CONDITIONS (S213a, S6.1)

Report No. ___________________ Sled Test No. ___________________

Test Date: ___________________ Item Code: ______________________

Test Pulse:

Max Sliding Seat Velocity[34] (km/h)	
Relative Velocity at T_0 (km/h)	

Laboratory Ambient Conditions During Testing:

Temperature (ºC)	
Relative Humidity (%)	

Dummy:

Dummy Description	(Include age, family, and 572 Part)
Dummy Serial Number	

Restraint Installation:

Installation Direction	
Detachable Base Usage	(For 213a, always used for rear facing CRS)
Attachment Method	
Tether Usage	(For 213a, always used for forward facing CRS if one is provided)
Seat Back Position	
Shoulder Harness Position	Describe using language such as "*Slot X, counted from the bottom*" or "*The shoulder harness was adjusted to match the shoulder height of the ATD*."
Buckle Harness Position	Describe using language such as "*Slot Y, counted from the seat back outward*"
Recline Position	Describe using language such as "*Slot X, counted from most Upright*"
Belt Tension (lb.)	
Internal Harness Tension (lb.)	

Foam:

Seat Back Foam S/N	
Seat Bottom Foam S/N	

[Take pre- and post-test photographs as described in this test procedure and include them in the test report]

REMARKS:

Pretest and posttest photographs are presented in Appendix C.

Technician: ____________________________________ Date: _________________________

[34] For reference only. Sliding seat velocity criteria is not specified in FMVSS No. 213a.

DATA SHEET 12 (continued)
DYNAMIC IMPACT TEST CONDITIONS

Report No. ________________ Sled Test No. ________________213

Test Date: ________________ Item Code: ________________

FMVSS 213 / 213b or 213a PULSE ENVELOPE

[INSERT SLED PULSE HERE]

(Include acceleration-time and velocity-time history plots, using units of g for acceleration, km/h for velocity, and ms for time. The data shall be filtered using CFC 60 and CFC 180 should be used for the acceleration-time and velocity-time plots, respectively. The plots shall be labeled with maximum acceleration and time of maximum acceleration, or velocity as appropriate, and the filter.)

DATA SHEET 13
BELT RESTRAINT (S213/213b, S5.4.3)

Report No. ________________ Sled Test No. ________________

Test Date: ________________ Item Code: ________________

Section	Requirement	Pass/Fail
S5.4.3.1	**Snug Fit of Belts**. Belts that are part of the restraint and designed to restrain the child are adjustable to snugly fit any child of height and weight identified by the manufacturer in accordance with the manufacturer's installation instructions.	

Section	Requirement	Yes/No	Pass/Fail
S5.4.3.2	**Direct Restraint**. Belts impose no loads on the child resulting from the mass of the system or the test seat.		
	This restraint has one or more belts that contact the dummy for restraint.		If all are "yes," restraint fails S5.4.3.2.
	This restraint has a rigid structure behind the dummy.		
	The restraint could move relative to the belt.		

Section	Requirement	Pass/Fail
S5.4.3.3	**Seating Systems**. Except for harnesses, each restraint designed for a child in a seated position[35] and having belts shall provide:	
S5.4.3.3(a)	Upper torso restraint (either belts or a shield)	
S5.4.3.3(b)	Lower torso restraint (either belts or a shield)	
S5.4.3.3(c)	Crotch restraint (either a belt attached to the lap belt or a shield)	

Section	Requirement	Pass/Fail
S5.4.3.4	**Harnesses**. Each harness shall:	
S5.4.3.3(a)	Provide upper torso restraint	
S5.4.3.3(b)	Provide lower torso restraint (lap and crotch restraint)	
S5.4.3.3(c)	Prevent standing	

REMARKS:

Technician:________________________________ Date: ________________________

[35] Does not refer to seats who maintain children in reclined position. See *http://isearch.nhtsa.gov/gm/81/nht81-1.39.html,* last accessed on 11/21/13.

DATA SHEET 14

BUCKLE RELEASE (S213/S213b, S5.4.3.5, S6.2)

Report No. ________________ Sled Test No. ________________

Test Date: ________________ Item Code: ________________

Section	Requirement	Measurement	Pass/Fail
S5.4.3.5(a)	***Pre-Impact Release Force***— Releases under 40-62 N (9-14 lb.)	N (lb.)	
S5.4.3.5(b)	***Post-Impact Release Force***— Releases ≤ 71 N (16 lb.)	N (lb.)	
S5.4.3.5(c)	***Minimum Surface Area of Buckle***- ≥ 3.9 cm^2 (0.6 $in.^2$)	mm (in.)	
S5.4.3.5(e)	***Buckle Integrity*** Shall not release during testing		

REMARKS:

Technician:________________________________ Date: ____________

DATA SHEET 15
SYSTEM INTEGRITY (S213/S213b, S5.1.1)

Report No. ________________ Sled Test No. ________________
Test Date: ________________ Item Code: ________________

S5.1.1 When dynamically tested, the CRS shall:

Section	Requirement	Pass/Fail
S5.1.1(a)	**Structural Integrity-** Exhibit no complete separation of any load bearing structural element	
	Exhibit no partial separation exposing surfaces with a radius of less than ¼ in. (6 mm)	
	Exhibit no partial separation exposing surfaces with protrusions greater than 3/8 in. (9 mm)	
S5.1.1(b)(1)	**Adjustment Position-** Remain in the same adjustment position during the test that it was in immediate before the test	
S5.1.1(b)(2)(ii)	**Exposed Openings-** Have no exposed opening larger than ¼ inch (6 mm) before the test becomes smaller during the testing as a result of the movement of the seating service relative to the restrain system as a whole	
S5.1.1(c)	**Seating Surface Angle-** Forward facing restraints do not allow the angle between the system's back support surface and seating surface to be less than 45 degrees at the completion of the test.	

REMARKS: (Describe any failures here and include labeled photographs in the final report.)

Technician:________________________ Date: ________________________

DATA SHEET 16
FRONTAL IMPACT INJURY CRITERIA (S213/213b, S5.1.2)

Report No. ________________ Sled Test No. ________________

Test Date: ________________ Item Code: ________________

Section	Requirement
S5.1.2.1(a)[36]	**Head Injury Criterion**- The maximum calculated head injury criterion for a 36-millisecond time interval (HIC36) shall not exceed 1,000
S5.1.2.1(b)	**Chest Injury Criterion**- The chest acceleration shall not exceed 60g for intervals whose cumulative duration is more than 3 milliseconds.

Head Injury Criterion Results

Calculated HIC36	Pass/Fail

Chest Injury Criterion Results

Max acceleration lasting 3 ms (g)	Pass/Fail

(Include X, Y, Z, and resultant acceleration-time history plots for both head and chest tests, using G for acceleration and ms for time. CFC 1000 and 180 should be used for the head and chest, respectively. The HIC score should be displayed on the history plots.)

REMARKS:

Technician:______________________________ Date: ______________________

[36] See S5 (d), (e), and (f) of FMVSS No. 213 or 213b for exceptions to this requirement.

DATA SHEET 16
SIDE IMPACT INJURY CRITERIA (S213a, S5.1.2)

Report No. ________________ Sled Test No. ________________

Test Date: ________________ Item Code: ________________

Section	Requirement
S5.1.2.1(a)	**Head Injury Criterion**- The maximum calculated head injury criterion for a 15-millisecond time interval (HIC15) shall not exceed 570
S5.1.2.1(b)	**Chest Deflection**- The chest deflection shall not exceed 23 millimeters at any point during the side impact dynamic test.

Head Injury Criterion Results

Calculated HIC15	Pass/Fail

Chest Injury Criterion Results

Max Chest Deflection (mm)	Pass/Fail

(Include X, Y, Z, and resultant acceleration-time history plots for the head tests, using G for acceleration and ms for time. The HIC score should be displayed on the history plots. Include the chest deflection-time history plots. The max deflection should be displayed on the history plots. CFC 1000 and 180 should be used for the head and chest deflection plots, respectively.)

REMARKS:

Technician:________________________________ Date: ________________________

DATA SHEET 17
OCCUPANT EXCURSION (S213/S213b, S5.1.3, S5.1.4, S5.2.1.1(c))

Report No. ________________ Sled Test No. ________________

Test Date: ________________ Item Code: ________________

FORWARD-FACING RESTRAINTS

Section	Requirement	Measurement	Pass/Fail
S5.1.3.1	***Torso retention***—CRS shall retain the torso within system		
S5.1.3.1(a)(1)	***Head excursion***- ≤ 720 mm (28 in.) with tether ≤ 813 mm (32 in.) no tether	mm (in.)	
S5.1.3.1(a)(2)	***Knee target excursion***- ≤ 915 cm (36 in.)	mm (in.)	
S5.2.1.1(c)	***Head-torso angle***- rearward change ≤ 45º	deg.	

REAR-FACING RESTRAINTS

Section	Requirement	Measurement	Pass/Fail
S5.1.3.2	***Torso retention***—CRS shall retain the torso within system		
S5.1.3.2	***Head target excursion***-Not beyond restraint's top and forward edge		
S5.1.4	***Back support angle***- Angle between the back support surface and the vertical ≤ 70º	deg.	
S5.2.1.1(c)	***Head-torso angle***- rearward change ≤ 45º	deg.	

REMARKS:
Describe excursion camera locations (distance forward of point Z), camera speeds, and lens focal lengths here.

Technician:________________________________Date:____________________________

DATA SHEET 18

OCCUPANT EXCURSION (S213a, S5.1.3.3)

Report No. ________________ Sled Test No. ________________

Test Date: ________________ Item Code: ________________

CAR BED RESTRAINTS

Section	Requirement	Pass/Fail
S5.1.3.3	***Head-torso retention***- CRS shall retain the head and torso within confines of system	

SIDE IMPACT TESTED RESTRAINTS

Section	Requirement	Pass/Fail
S5.1.3	***Head retention***- When tested with the 12-month-old CRABI, the CRS shall retain the head from impacting any portion of the SISA	

REMARKS:

Technician:________________________________ Date: ________________________

DATA SHEET 19
AIRCRAFT PASSENGER SEAT INVERSION TEST (S213.S213b, S8.2, S8.2.5, S8.2.6)

Report No. ________________ Sled Test No. ________________
Test Date: ________________ Item Code: ________________

INVERSION TEST

Dummy:

Dummy Description	(Include age, family, and 572 Part)
Dummy Serial Number	

ROTATION ABOUT Y-AXIS (FORWARD)

Section	Requirement	Pass/Fail
S8.2.5	The test dummy shall be retained within the CRS	
S8.2.5	The CRS shall be retained within the aircraft seat	

ROTATION ABOUT X-AXIS (LATERAL)

Section	Requirement	Pass/Fail
S8.2.6	The test dummy shall be retained within the CRS	
S8.2.6	The CRS shall be retained within the aircraft seat	

REMARKS

Technician:________________________________ Date: ________________________

DATA SHEET 20

FLAMMABILITY (S213/S213b, S5.7/S302-S4.3)

Report No.:______________________________ Model No.: __________________________

Test Date: ______________________________

Laboratory Ambient Conditions during Testing:

Temperature (ºC)	
Relative Humidity (%)	

Data:

Type of Material		
Description of How the Material is Used on the CRS		
Dimensions of the Sample	Length, mm	
	Width, mm	
	Height, mm	
Burn Direction		
Burn Distance/Length, mm		
Burn Time, sec		
Burn Rate, mm per min		

Section	**Requirement**	**Pass/Fail**
S4.3(a)	Material shall only burn or transmit a flame front across its surface at a rate ≤ 102 mm/min or	
S4.3(b)	Material stops burning < 60 sec and ≤ 51 mm	

REMARKS:

Technician:______________________________________ Date: __________________________

DATA SHEET 21
WEBBING PERFORMANCE (S213/S213b, S5.4.1)

Report No.:____________________________ Date of Test: ______________________

New Webbing Breaking Strength

Section	**Requir ement**		
FMVSS 213, S5.4.1.2(a) FMVSS 213b, S5.4.1.2(a) FMVSS 209, S5.1 (b)	Each sample must meet the new webbing breaking strength requirement. ≥15,000 N for webbing used to secure the CRS to the vehicle ≥11,000 N for webbing used to secure the child within the CRS		
Webbing Use/ Sample Description	Measured Breaking Strength (N)	Pass/Fail	Median (N)

Resistance to Abrasion

Section	**Requirement**
FMVSS 213, S5.4.1.2(b)(1) FMVSS 213b, S5.4.1.2(b)(1) FMVSS 209, S5.1(d) FMVSS 209, S5.3(c)	After being subject to abrasion, the median breaking strength ≥ 75% of the median new webbing breaking strength

Method of Abrasion	Number of Cycles Performed
(Hex bar or Buckle)	

Measured Breaking Strength N (lb.)	Median N	% Strength Retained	Pass/Fail

Resistance to Light

Section	Requirement
FMVSS 213 S5.4.1.2(c)(1) FMVSS 213b S5.4.1.2(c)(1) FMVSS 209 S5.1(e)	After exposure to the light of a carbon arc, the median breaking strength ≥ 60% of the median new webbing breaking strength, and
	Color retention not less than No. 2 on the AATCC Gray Scale for Evaluating Change in Color

Exposure Time	Color Retention	Measured Breaking Strength N	Median N	% Strength Retained	Pass/Fail

Resistance to Micro-Organisms

Section	Requirement
FMVSS 213 S5.4.1.2(c)(2) FMVSS 213b S5.4.1.2(c)(2) (FMVSS 209 S5.1(f))	After being subject to micro-organisms, the median breaking strength ≥ 85% of the median new webbing breaking strength

Measured Breaking Strength N	Median N	% Strength Retained	Pass/Fail

Width

Section	Requirement
FMVSS 213 S5.4.1.2(d), S5.4.1.3 FMVSS 213b S5.4.1.2(d), S5.4.1.3	Width of the webbing touching the dummy torso must be ≥ 1.5 in (38.1 mm)

Measured Width (cm)	Pass/Fail

REMARKS:

Technician:____________________________________ Date: ____________

DATA SHEET 22
BUCKLE AND ADJUSTMENT HARDWARE (S213/S213b, S5.4.2; S209, S4.3)

Report No.:____________________ Date of Test: ____________________

Section	Requirement		Pass/Fail
FMVSS 213 S5.4.3.5(d) FMVSS 213b S5.4.3.5(d) FMVSS 209 S4.3(g)	***As Received Partial Engagement*** — Shall separate when in any position of partial engagement by ≤ 22 N (4.9 lb)	Partial engagement observed?	
FMVSS 213 S5.4.2 FMVSS 213b S5.4.2 FMVSS 209 S4.3(a)	***Corrosion Resistance*** — Surfaces shall be free of corrosion following 24 hours of exposure time and 1 hour of drying time.	Exposure Time:	
		Drying Time:	
FMVSS 213 S5.4.2, FMVSS 213b S5.4.2 FMVSS 209 S4.3(b)	***Temperature Resistance*** — Shall show no functional deterioration after 24 hours exposure over 80ºC water followed by 24-hour exposure in 80º C dry oven.	Exposure Time Over Water:	
		Exposure Time in Dry Oven:	
FMVSS 213 S5.4.3.5(d) FMVSS 213b S5.4.3.5(d) FMVSS 209 S4.3(g)	***Buckle Latch*** — After 200 conditioning cycles, buckle shall show no functional deterioration	Number of conditioning cycles performed:	
FMVSS 213 S5.4.3.5(d) FMVSS 213b S5.4.3.5(d) FMVSS 209 S4.3(g)	***Partial Engagement*** — Shall separate when in any position of partial engagement by ≤ 22 N (4.9 lb)	Partial engagement observed?	

Section	Requirement		Pass/Fail
FMVSS 213 S5.4.3.5(c) FMVSS 213b S5.4.3.5(c) FMVSS 209 S4.3(d)(2)	***Buckle Release Access*** — If pushbutton, ≥ .6 in^2 (387 mm^2) and linear dimension ≥10 mm (.39 in); If lever release, cylinder insertion test; If other design, access should permit ≥ two fingers	Buckle design:	
FMVSS 213 S5.4.2 FMVSS 213b S5.4.2 FMVSS 209 S4.3(e)	***Adjustment Force*** — After 10 conditioning cycles, the force required to decrease the size of the assembly ≤ 49N (11 lb.)	Number of conditioning cycles performed:	
FMVSS 213 S5.4.2 FMVSS 213b S5.4.2 FMVSS 209 S4.3(f)	***Tilt-Lock Adjustment*** — Buckle shall lock the webbing at an angle ≥ 30º	Angles Measured:	

REMARKS:

Technician:________________________________ Date: ____________

16. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS (specify 213, 213a, or 213b) TEST DATE: ___________________________

LABORATORY: ____

CONTRACT NO.: _____________________________;

LABORATORY PROJECT ENGINEER'S NAME: _____________________________________

TEST SPECIMEN DESCRIPTION:

MANUFACTURER: ____

MODEL: ____

PART NO.: ____

TEST FAILURE DESCRIPTION:____

____

____

____

FMVSS REQUIREMENT, PARAGRAPH §____ : ____________________________________

____

____

LIST ALL APPLICABLE TEST EQUIPMENT and LAST DATE OF CALIBRATION:

____

NOTIFICATION TO NHTSA (COR): ____

DATE: _______________________ BY: ___________________________________

REMARKS: (list remarks here, if applicable)

FMVSS (specify 213/213b dynamic, component or 213a side)

TEST STATUS REPORT

DATE OF REPORT: ____________

GROUP NO.	MANUFACTURER AND BRAND NAME	TEST START DATE	TEST COMPLETE DATE	PASS/ FAIL	DATE FINAL REPORT SUBMITTED
001					
002					
003					
004					
005					
006					
007					
008					
009					
010					
011					
012					
013					
014					
015					
016					
017					
018					
019					
020					
021					
022					
023					
024					

FMVSS (specify 213/213b dynamic, component or 213a side)
INVENTORY STATUS REPORT
DATE OF REPORT: _______________

GROUP NO.	MANUFACTURER'S NAME	MODEL	NUMBER OF SPECIMENS RECEIVED	CONDITION OF SAMPLE	DATE RECEIVED
001					
002					
003					
004					
005					
006					
007					
008					
009					
010					
011					
012					
013					
014					
015					
016					
017					
018					
019					
020					
021					
022					
023					
024					

FY 200X FMVSS 213 (**Component**) Monthly Status Test Report

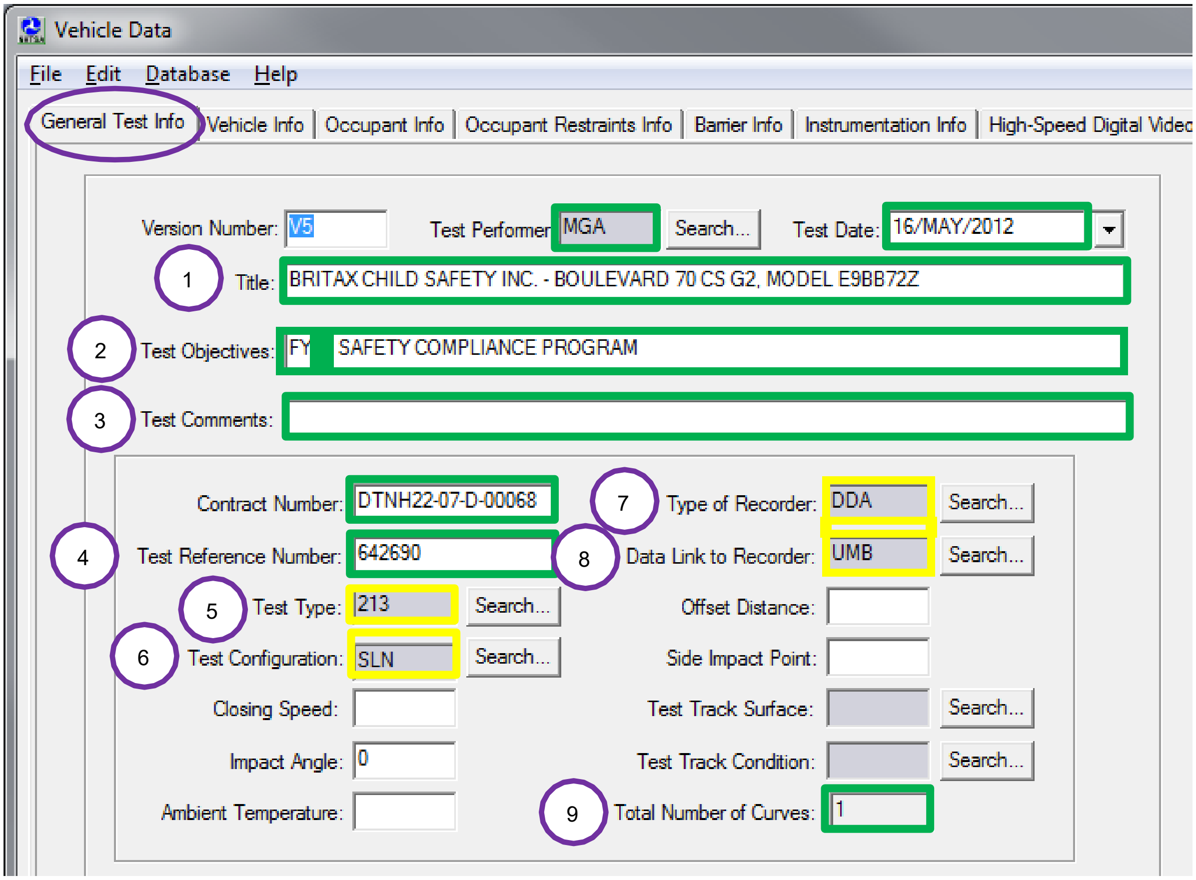
Test Number	Manu facturer	Model	CRS Rec'd		Web Rec'd	Verifi Rec'd		Web Start	Web Done	Buckle Start	Buckle Finish	Photo Taken		Web Pass	Buckle Pass	Est Compl.	Actual Compl.	Comments

APPENDIX A: INSTRUCTIONS AND TEMPLATES FOR CREATING ENTREE FILES

Creating Entree Files for the Vehicle Database

Electronic test data and high-speed videos can be submitted to the Vehicle Test Database if they are accompanied by Entree files. These instructions are intended to facilitate consistency in creating Entree files and supplement the information available in the Test Reference Guide, Volume I: Vehicle Tests (Revision) June 3, 2013 available on the NHTSA.gov website. The template was created to show the codes typically used during a 213 dynamic sled test. The fields completed in the screen shots below should be completed for every 213 sled test data submission but should be updated to reflect information accurate for that test. The summary below each screen shot includes codes that apply to typical 213 compliance tests; however, other codes are available and can be found by selecting the “search” button in the Entree software or by reviewing the MS Access database available from the NTHSA website.

A. General Test Info Tab

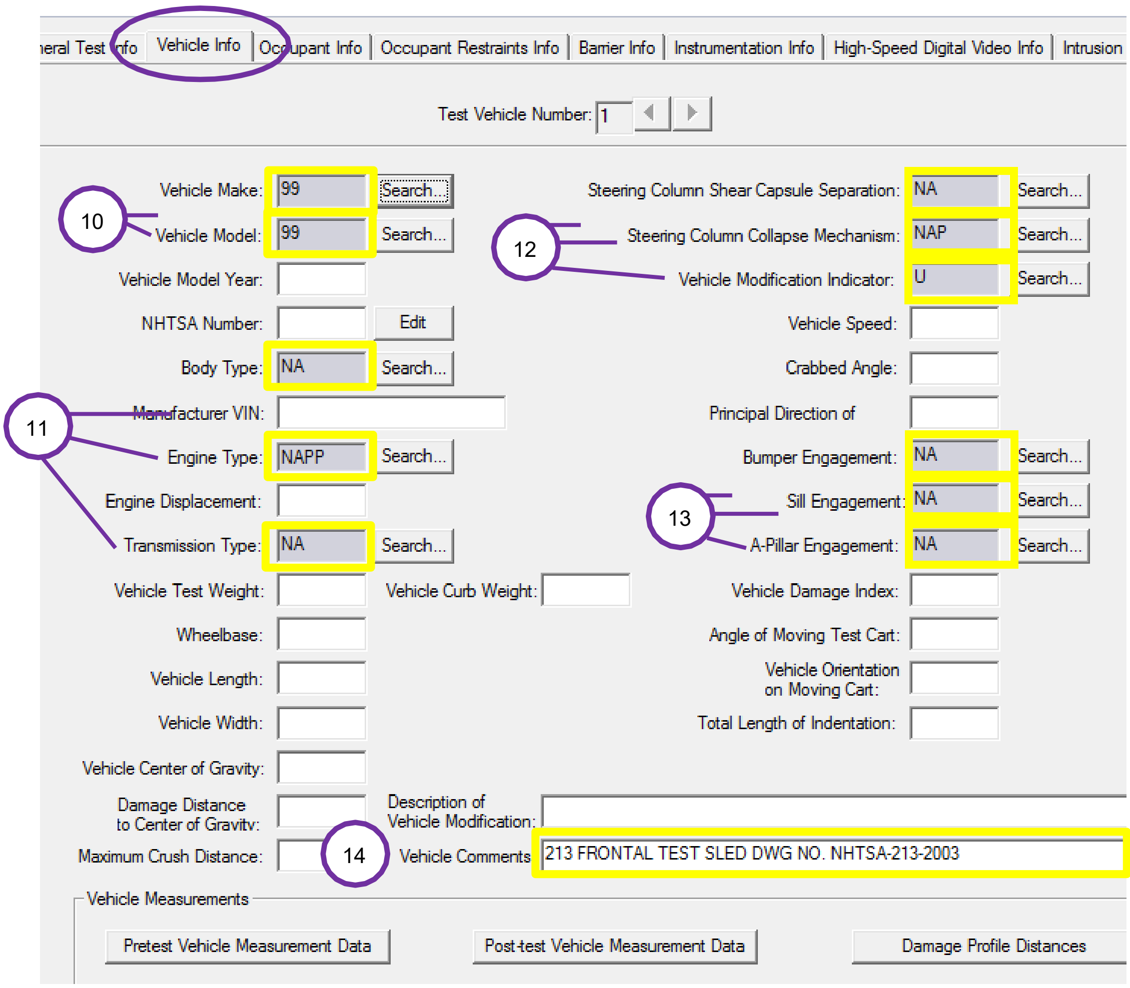


Fields highlighted in green are test specific and have been completed to serve as an example. A test is defined by all sled tests contained in a single test report. Fields highlighted in yellow represent the code most likely to be used in a standard FMVSS 213 sled test.

1- Title: Include the manufacturer, model name, and model of the CRS in this field.
2- Test Objectives: Update the fiscal year.
3- Test Comments: Typically leave this field blank. However, should an atypical test event occur that would be important to a viewer of the test data or video, include a comment in this field.
4- Test Reference Number will need to be obtained from the COR. This is the number NHTSA assigns to the corresponding test report.
5- Test Type: 213 indicates this is a “FMVSS 213 Child Restraint Systems” test.
6- Test Configuration: SLN indicates this is a “sled without vehicle body” test.
7- Type of Recorder: DDA indicates that “digital data acquisition” was used for this test.
8- Data Link to Recorder: UMB indicates that the data was collected via an “umbilical cable”. UCT would be used if both an “umbilical cable and telemetry” were used. If no data is recorded, leave this field blank.

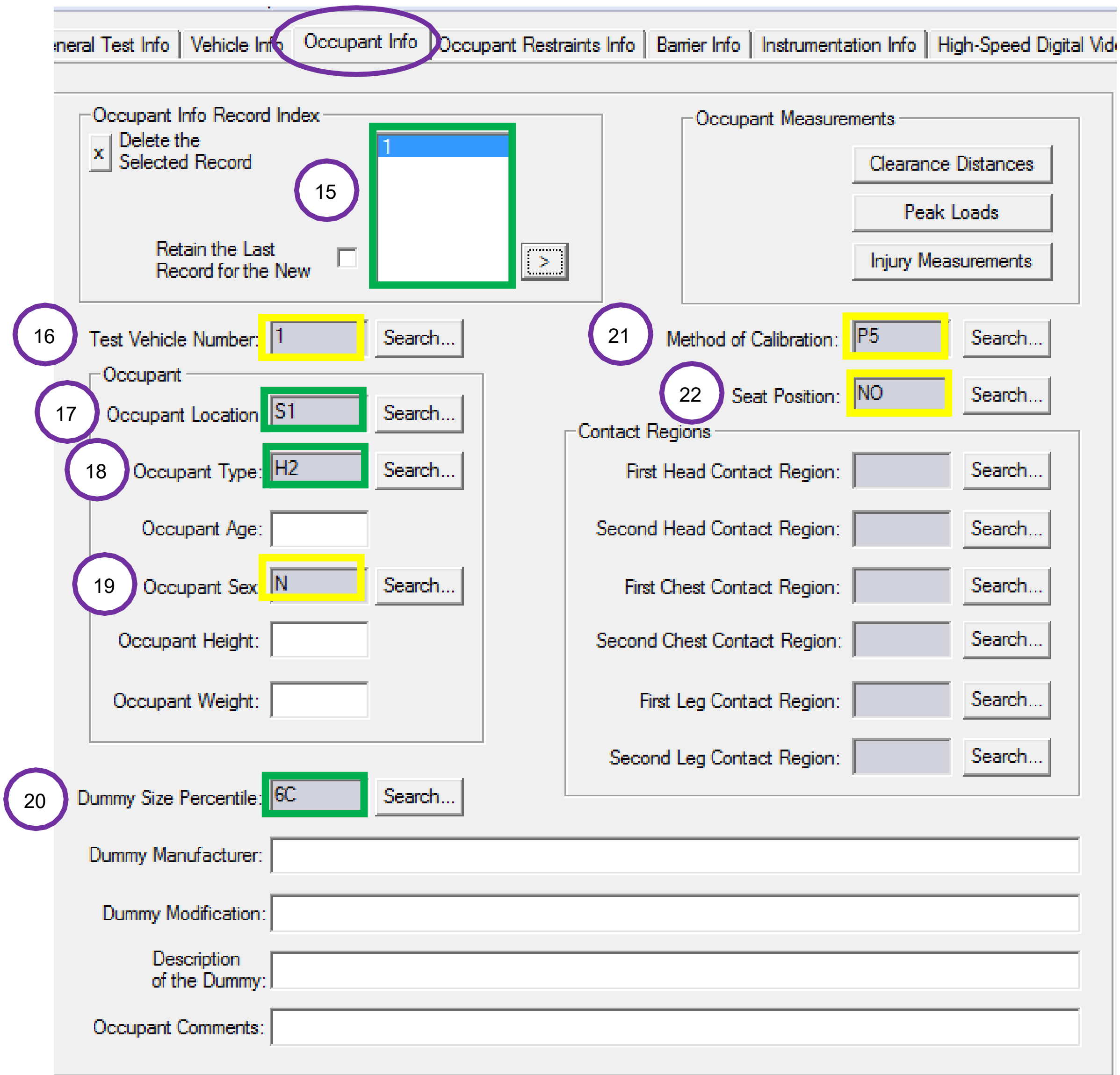
9- The total number of curves is the total number of recorded instrument channels. The number in this field needs should be consistent with the Instrumentation Info tab's "curve/channel number" window. (See Item Number 30)

B. Vehicle Info Tab



10- Vehicle Make and Vehicle Model- "99" indicates "Other"
11- Body type, Engine type, Transmission type- "NA" and "NAPP" indicate not applicable
12- Steering Column Shear Capsule Separation, Steering Column Collapse Mechanism, Vehicle Modification Indicator- "NA", "NAP", and "U" indicates "not applicable" or "Unknown"
13- Bumper Engagement, Sill Engagement, Pillar Engagement- "NA" indicates not applicable.
14- Vehicle Comments - Specify Proper Test Sled Drawing Number such as, "213 FRONTAL TEST SLED DWG NO. NHTSA-213-2003"

C. Occupant Info Tab



15- Occupant Info Record Index- Press '>' button under Occupant Info Record Index repeatedly until the total number of sled runs for the Test appears in the box.

Highlight one of the Occupant Record Index Numbers, and complete an occupant record specific to that test run. Repeat for all runs.

16- Test Vehicle No.- Indicates the “vehicle” containing the occupant. For sled tests, the field should always be completed with “1”.

17- Occupant Location- Either S1, S2, S3, S4, S5, S6, S7, S8 or S9 where “S” indicates a sled test and the sequential number, 1 through 9, corresponds to the run number from field 15. These codes are different from the traditional occupant locations assigned by location in the vehicle and are essential to allow the user to relate all sled runs in a test within a single record.

18- Occupant Type- The correct occupant type code can be identified using the table below.

19- Occupant Sex- “N” indicates the occupant is not an adult dummy.

20- Dummy Size Percentile- The correct dummy size percentile code can be identified using the table below.

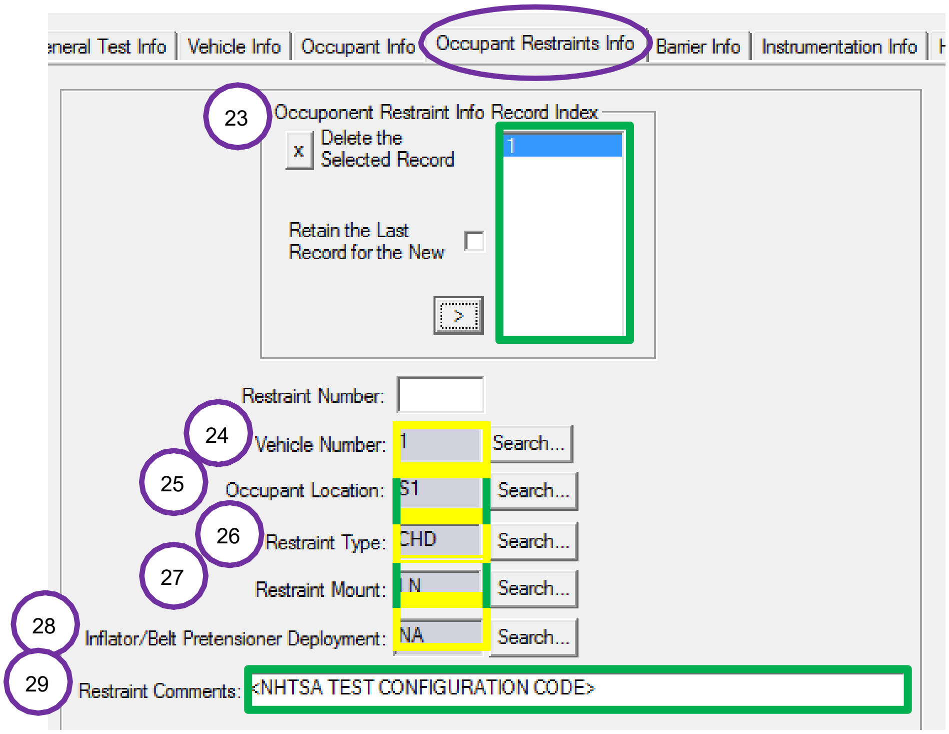
21- Method of Calibration- “P5” indicates Part 572 was the method of calibration.

22- Seat Position- “NO” indicates a non-adjustable seat.

TABLE 22. CODES FOR OCCUPANT TYPE AND DUMMY SIZE PERCENTILE FIELDS

	Occupant Type Code	Dummy Size Percentile
Subpart K – Newborn Infant	CH	06
Subpart R – Twelve-Month-Old Infant	CR	12
Subpart P – Three-Year-Old Child	H3	3C
Subpart N – Six-Year-Old (HIII) Child	H3	6C
Subpart I – Six-Year-Old (HII) Child	H2	6C
Subpart S – Six-Year-Old Weighted Child	H3	6W
Subpart T – Ten-Year-Old Child	H3	10
Subpart W – Q3S Child	QC	3C

D. Occupant Restraints Info Tab



23- Press '>' button under Occupant Restraints Info Record Index to match number of conducted runs in Test.

24- Vehicle Number is the number that identifies the vehicle containing the test occupant. Since this is a sled test and represents a frontal impact, select "1".

25- Occupant Location- Either S1, S2, S3, S4, S5, S6, S7, S8 or S9 where "S" indicates a sled test and the sequential number, 1 through 9, corresponds to the run number from field 15. These codes are different from the traditional occupant locations assigned by location in the vehicle and are essential to allow the user to relate all sled runs in a test within a single record. The number selected must match the Occupant Info tab.

26- RSTTYP is the type of restraint system in use at a given occupant location. Inflatable restraints are considered to be "in use" for occupied seating positions. "CHD" indicates a child restraint.

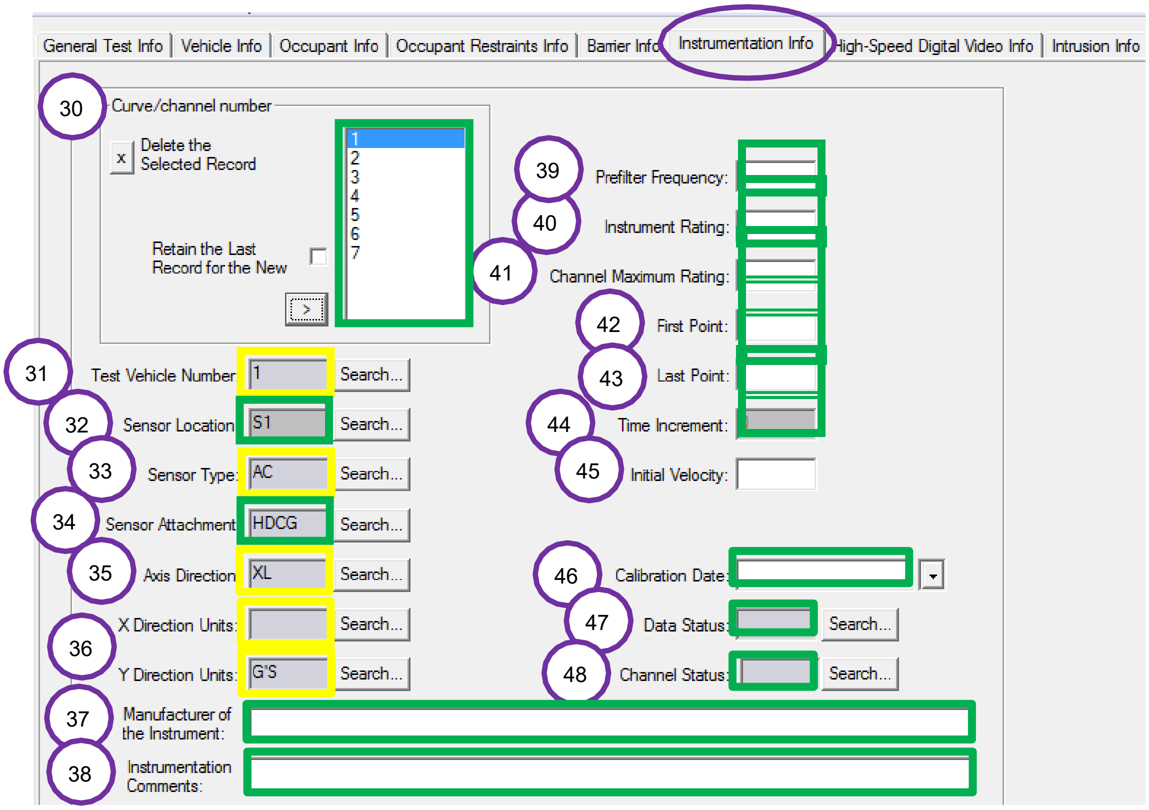
27- RSTMNT indicates the interior component(s) to which the restraint is mounted.
- "LT" indicates LATCH - LOWER ANCHORAGES AND TOP TETHER
- "3N" indicates LAP/SHOULDER BELT, NO TOP TETHER
- "3T" indicates LAP/SHOULDER BELT, TOP TETHER
- "2T" indicates LAP BELT ONLY, TOP TETHER
- "2N" indicates LAP BELT ONLY, NO TOP TETHER
- "LN" indicates LATCH - LOWER ANCHORAGES NO TOP TETHER

28- Inflator/Belt Pretensioner Deployment should be set to 'NA'

29- Restraint Comments will contain the OVSC Configuration code specific to the test run.

Repeat for all Runs.

E. Instrumentation Info Tab



30- Increase the number of curve/channel numbers to equal the total number of channels of data collected (x, y, z, and time channel for each accelerometer) for the entire test sequence.

31- Test Vehicle Number is the number that identifies the vehicle containing the test occupant. Since this is a sled test and represents a frontal impact, select “1”.

32- Sensor Location- Either S1, S2, S3, S4, S5, S6, S7, S8 or S9 where “S” indicates a sled test and the sequential number, 1 through 9, corresponds to the run number from field 15. These codes are different from the traditional occupant locations assigned by location in the vehicle and are essential to allow the user to relate all sled runs in a test within a single record. The number selected must match the record number in the Occupant Info tab.

33- Sensor Type indicates the type of sensor used for collecting the measurements at the time of the test.

AC indicates accelerometer.

LC indicates load cell

34- Sensor Attachment indicates where the sensor is attached.

HDCG indicates head CG

CHST indicates chest

35- Axis Direction is required for sensors measuring vector quantities (acceleration, force, velocity, etc..). The global coordinate system would apply to sensors affixed to the sled. With respect to the sled longitudinal axis, X is positive forward, Y is positive right, and Z is positive down.

AXIS is required when the measurement is a vector quantity such as acceleration, force, velocity, etc. All signals from anatomical sensors, (HDCG, CHST, etc.), are local coordinate systems.

XL indicates X-local coordinate system
YL indicates Y-local coordinate system
ZL indicates Z-local coordinate system
XG indicates X-global coordinate system
YG indicates G-global coordinate system
ZG indicates Z-global coordinate system
RS indicates a resultant
OT indicates other (note: when using this field, add an explanation in the Instrumentation commentary field)
NA indicates not applicable (note: when using this field, add an explanation in the Instrumentation commentary field)

36- XDirectionUnits indicates the units used to measure the independent variable (usually time). Y Direction Units indicates the units used to measure the signal of the sensor data.

G'S indicates acceleration
SEC indicates seconds

37- Manufacturer of the Instrument describes the manufacturer, model, and serial number of the instrument in the following format:

MFG: manufacturer name, Model: model number, S/N: serial number.

38- Instrumentation Commentary should include any further commentary on an instrumentation information record and its correlated signal data, including any unusual conditions affecting the data or a reference to a document that describes problems with a particular curve.

39- Pre-filter Frequency is the cutoff frequency in Hz of a low-pass filter applied to the signal. This frequency is defined as where filter gain equals 70 percent (-3db.)

40- Instrument Rating represents the maximum value that can be accurately measured by the recording system for a channel, in the same units as the data channel

41- Channel Maximum Rating represents the full-scale value of the data based upon the actual test setup, including signal conditioning, as a percentage of INSRAT, and may exceed 100%.

42- Number of First Point represents the index number of the first point in the data array (less than or equal to 0). Time zero always has an index number of 0. If no data exists prior to time zero then this field equals 0; if 20 data points exist prior to time zero, enter -20. There may never be more than 10,000 points before time zero.

43- Number of Last Point represents the index number of the last point in the data array. If 1,000 points were digitized, and number of first point (above) is equal to -100, then the number of last point is equal to 899. This field can never be greater than 99,999.

44- Time Increment is the time increment in microseconds between each data point.

45- Initial Velocity is the initial (time zero) velocity of the sensor along its axis and applies only to linear accelerometers.

46- Calibration Date in the format (DD/MMM/YYYY) is the most recent calibration date of the instrument.

47- Data Status indicates the status of the data as it appears in the data

AM indicates as measured.

MN indicates meaningless if the signal is invalid

CF indicates that the signal becomes questionable or invalid part of the way through a signal

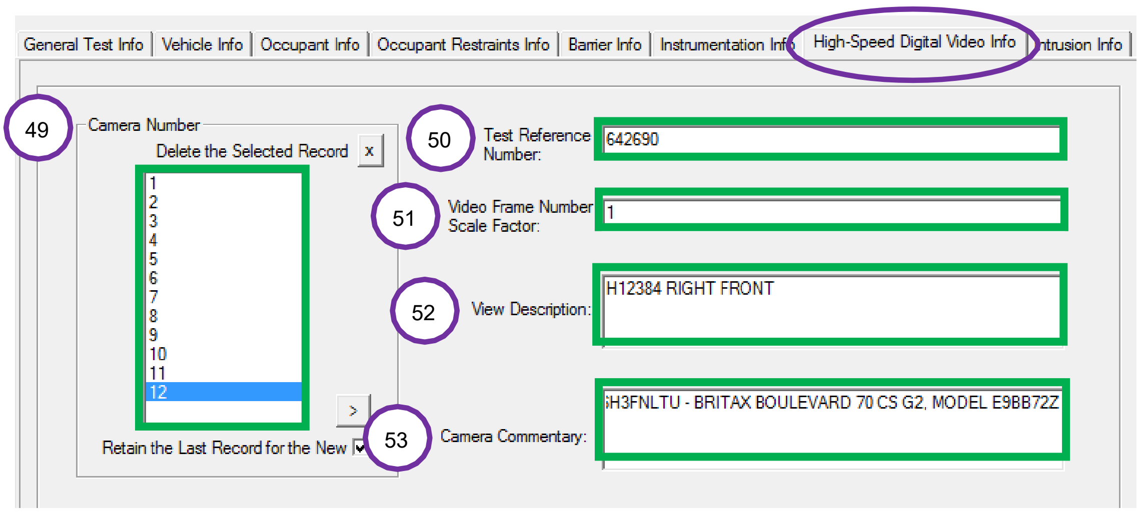
CM indicates the signal is computed, an example of a computed signal would be the resultant acceleration or the rotational acceleration of the head measured with a nine linear accelerometer array.

48- Channel Status indicates whether the data channel is primary or redundant.

P indicates primary

R indicates redundant

F. High-Speed Digital Video Info Tab



49- Camera Number- total number of records should reflect the total number of camera views for all of the sled runs contained in a single test report.

50- Test Reference Number- must match field 4- This is the number OVSC assigns to the corresponding test report and is obtained from the COR.

51- Video Frame Number Scale Factor is the scale factor to be applied against the integer frame number of a sequential image file, as described below, in order to convert the integer frame sequence value into a time value in seconds.

52- View Description should include the manufacturer's assigned run number and position of the camera. Example formats are shown

53- Camera Commentary should include NTHSA's test configuration, model name and model number.

APPENDIX B: DATA PROCESSING AND RELATIVE VELOCITY CALCULATIONS FMVSS NO. 213a

The data collection process for the FMVSS 213a side impact test consists of the entire dynamic event. This includes the main sled carriage acceleration profile and the sliding seat interaction with the SISA honeycomb. The instance when the sliding seat impacts the honeycomb located on the door structure is defined as Time zero (T_0). The instance of initial acceleration of the sled carriage is defined as Time zero-prime (T_{0P}).

The main sled and sliding seat accelerations should both be analyzed for data processing and calculation of the relative velocity. The lab shall develop a repeatable methodology for the offset removal of all instrumentation prior to the overall event and with the event duration of -20 to 310 ms relative to T_{0P}. Best practice suggests performing this data analysis with a filter of CFC 1000 applied.[37]

Accelerate the test platform (main sled and sliding seat) to achieve a relative velocity of 31.3 ± 0.64 km/h (19.4 ± 0.4 mph) in the direction perpendicular to the SORL between the SISA sliding seat and the door assembly at the time they come in contact (time = T_0).

The SISA sliding seat acceleration must be within the corridor shown in Table 12 and Figure 34. This is measured by the accelerometer mounted on the rear leg of the SISA sliding seat. See Figure 33.

To calculate the relative velocity, both the main sled and sliding seat primary accelerometers shall be analyzed from T_{0P}. In the instance that one of the primary accelerometers has an issue and does not collect data during the test, the redundant accelerometer can be used in place of the primary accelerometer.

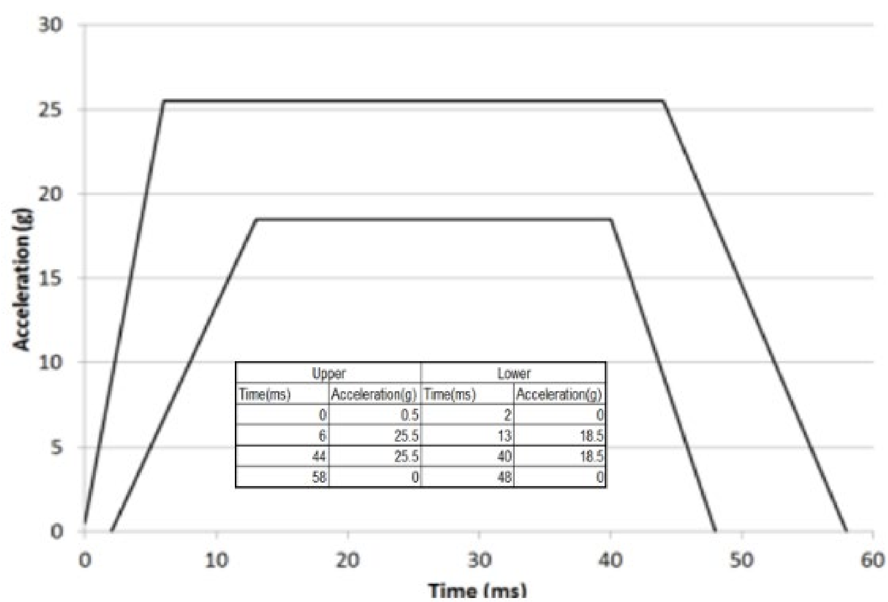


Figure 34 of TP-213-12 – SISA Sliding Seat Acceleration Corridor

The instance of initial sled carriage acceleration (T_{0P}) is plotted at 0 ms on the final

[37] Per SAE J211 and SAE J1727.

data plot. The SISA sliding seat acceleration pulse corridors shown in Figures 34 and 35 are defined by the coordinates in Tables 12 and 13 (see Section 12.E.3.3). The upper and lower acceleration limits were developed to create boundaries about the time where the sliding seat makes contact with the honeycomb (T_0). Due to the variability of CRS sizes and shapes, the dynamic test corridors may be shifted, in unison as necessary.

In the event that the contact switch sensor fails to record the contact between the sliding seat and the honeycomb; the sliding seat accelerometers will be used to analyze the time of impact (T_0). The CFC1000 data as previously defined should be used. T_0 will be determined by analyzing when the SISA acceleration data starts to deviate from its typical oscillation about 0g prior to contact with the honeycomb (see figures below).

The CFC 1000 sliding seat acceleration data starts to deviate from its typical oscillation when any of the following observations are identified:

a) when a peak or valley in the oscillation should have crossed 0 g, but did not,
b) or it reaches a peak or valley larger than its typical oscillation,
c) or if a peak or valley should have occurred, but the data continued to trend further positive or negative.

Examples are shown in Figures 62, 63, and 64, below.

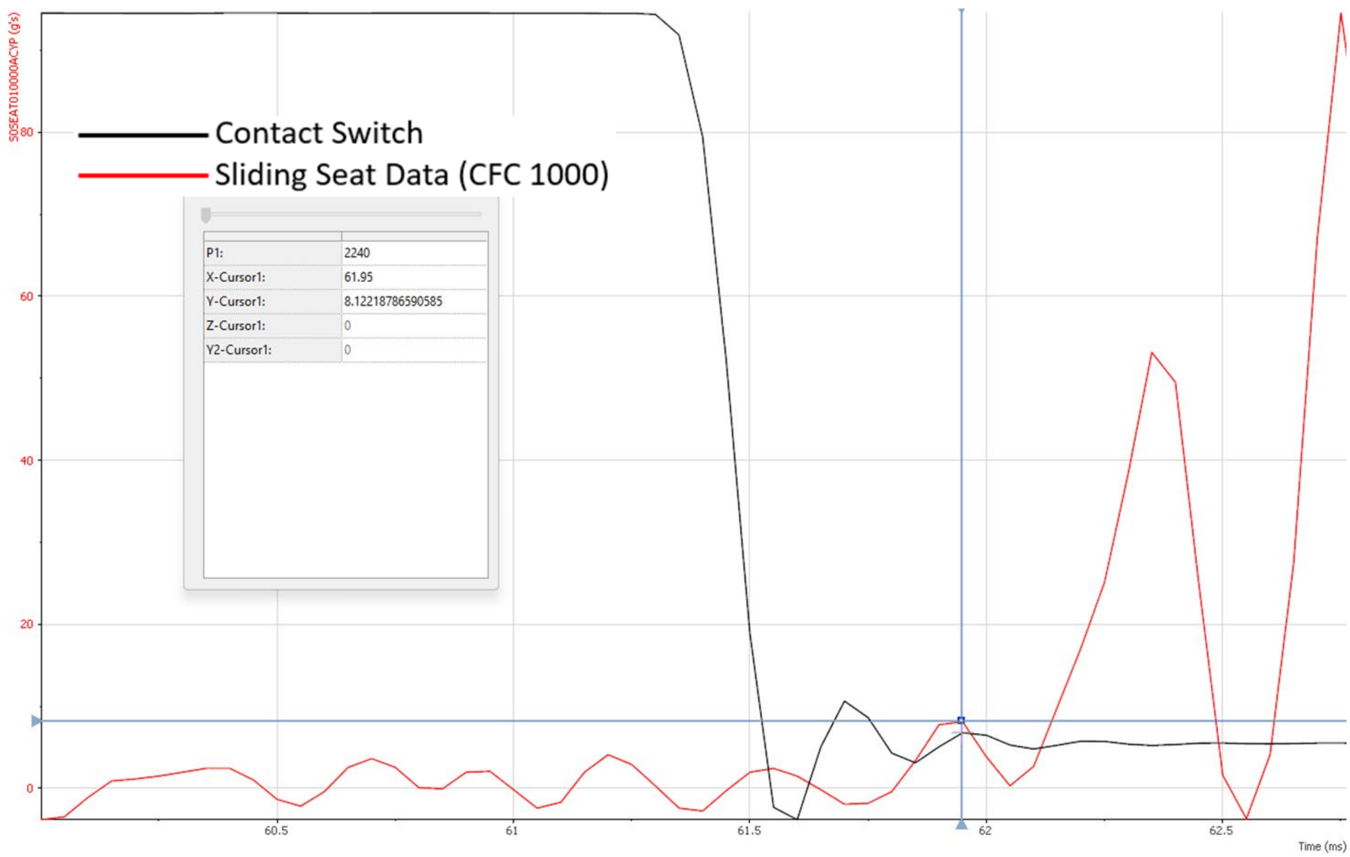


FIGURE 62. IDENTIFYING T_0 EXAMPLE 1

Peak is larger than its normal oscillation; select next highest data point.

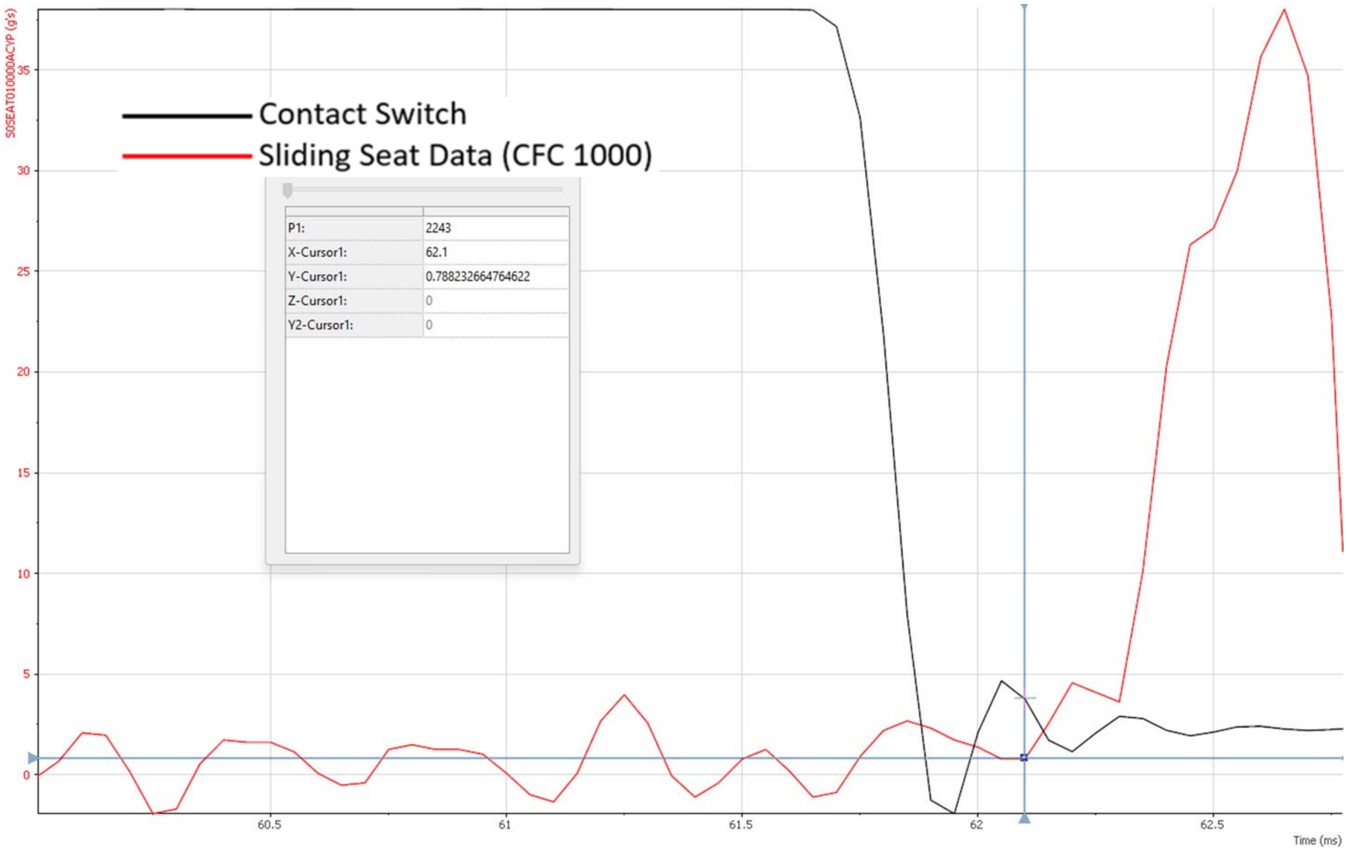


FIGURE 63. IDENTIFYING T_0 EXAMPLE 2

Valley in the oscillation should have crossed 0 g but did not; select next data point that is different.

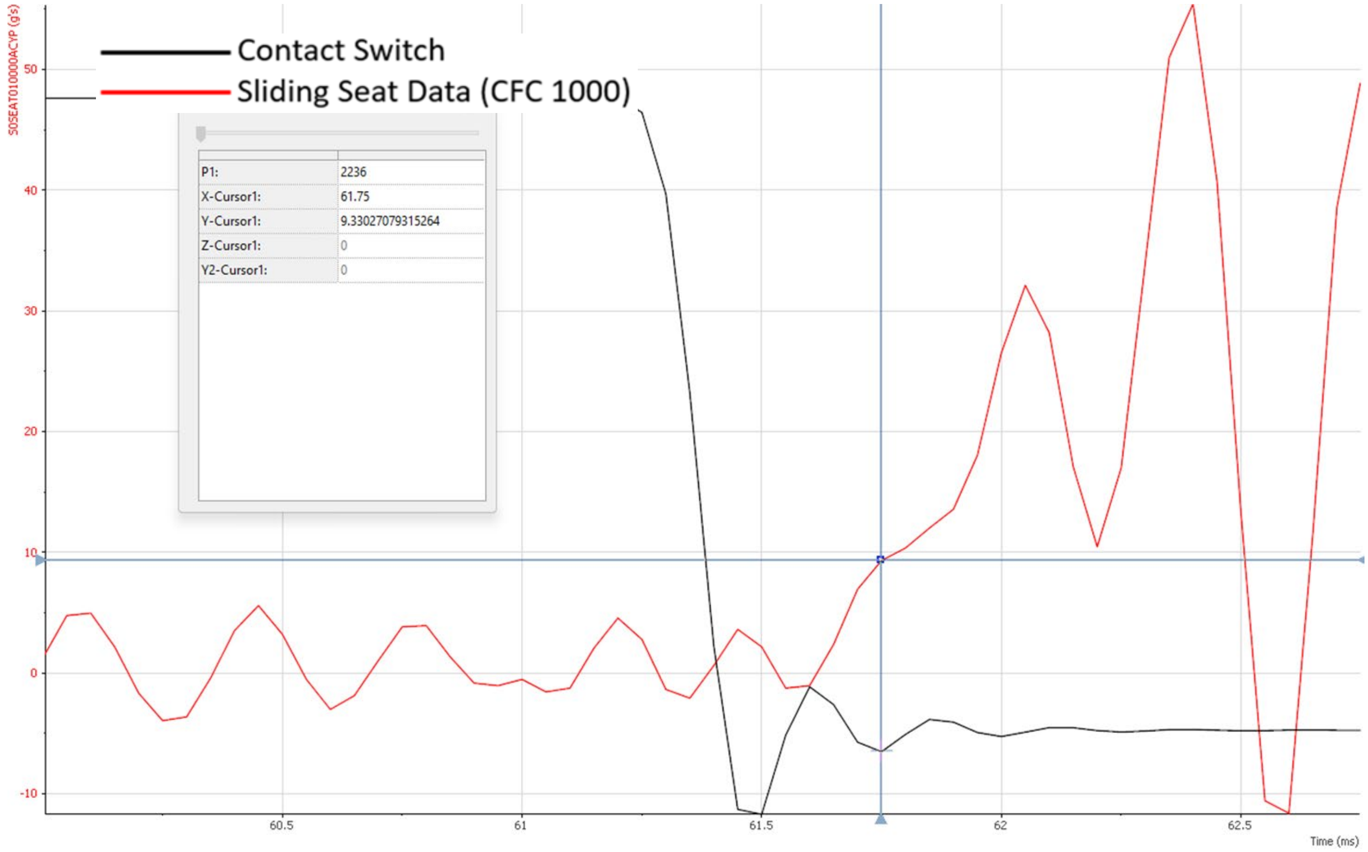


FIGURE 64. IDENTIFYING T_0 EXAMPLE 3

A peak should have occurred, but the data continued to trend further positive; select the closest point where the oscillation curve is starting to be different.

The change in relative velocity, perpendicular to the SORL, between the SISA sliding seat and the main sled buck must be within the corridor shown in Table 13 and Figure 34. The calculation for the relative velocity (V_R) is:

$$V_R = [(V_{SB} * \cos(10)) - V_{SISA}] * (-1)$$

Where V_{SB} is the main sled buck velocity and V_{SISA} is the SISA sliding seat velocity, both velocities are filtered at CFC 180 in order to do the calculation.

The test platform velocity in the direction perpendicular to the SORL during the time of interaction of the door with the CRS is no lower than 2.5 km/h less than its velocity at time = T_0.

Peak acceleration and velocity results are recorded and plotted on the Data Sheet 12.

Process the data to calculate the relative velocity as follows:

a. If necessary, remove the offset and trim the data of the sliding seat and sled buck platform accelerometers.[38]

   For example, determine a subset of time (pre-trigger time) prior to time zero prime (T_{0P}) based on sled and data acquisition system setup.

   i. Perform bias offset removal of the data channels (CFC1000) by subtracting the average value of the data samples over the period prior to main sled impact with sled system (T_{0P})
   ii. Trim the CFC1000 data to -20 to 310 ms relative to T_{0P}

b. Best practice suggests performing the data analysis with a filter of CFC 1000 applied. Once the offset has been removed, apply a CFC 180 filter to both the sled buck platform X acceleration (accelerometer located on the sled) and the sliding seat X acceleration to calculate the velocities of each to the sliding seat accelerometer and the main sled accelerometer.

c. Convert and integrate the filtered sled buck platform and sliding seat accelerations (from step b) to calculate the sled buck platform and sliding seat X velocities by doing the following:

   i. Convert each acceleration trace from g to m/s^2 by multiplying each acceleration data point by 9.80665 for both the sled buck platform X acceleration (accelerometer located on the sled) and the sliding seat X acceleration sets.
   ii. Integrate each converted acceleration trace from step c(i) to determine the velocity traces in m/s.
   iii. Convert each velocity trace in step c(ii) from m/s to km/h by multiplying each velocity data point by 3.6.

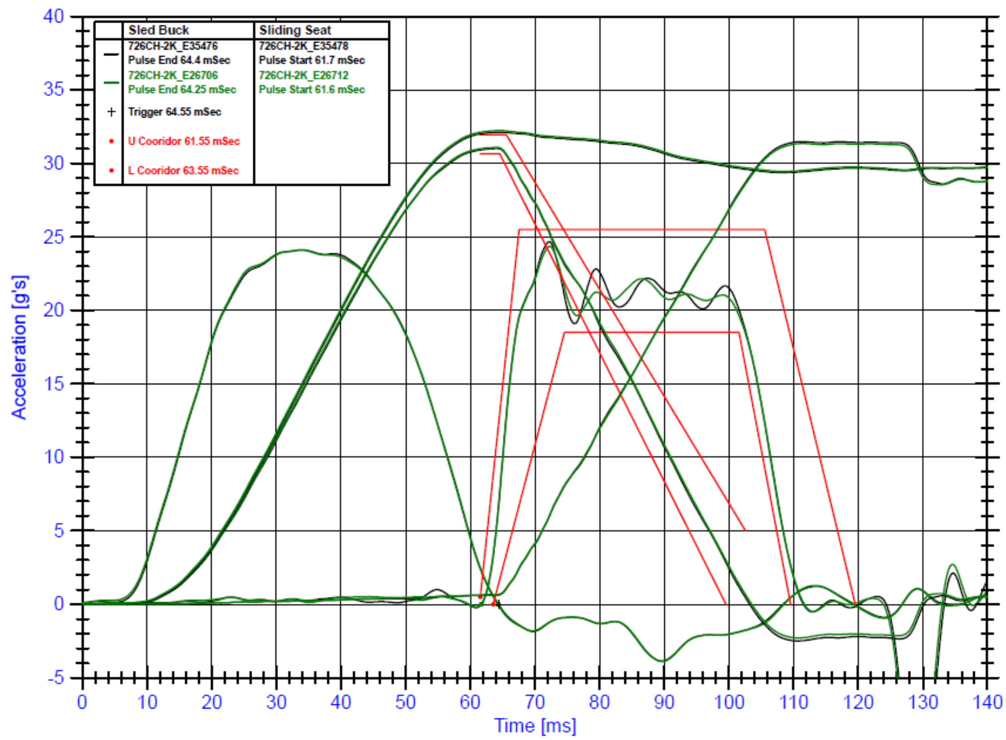
d. To calculate the sled buck velocity in the direction perpendicular to the SORL, multiply the sled buck platform X velocity calculated in step c(iii) by cos(10 degrees) rounded to four significant digits (i.e. 0.9848).

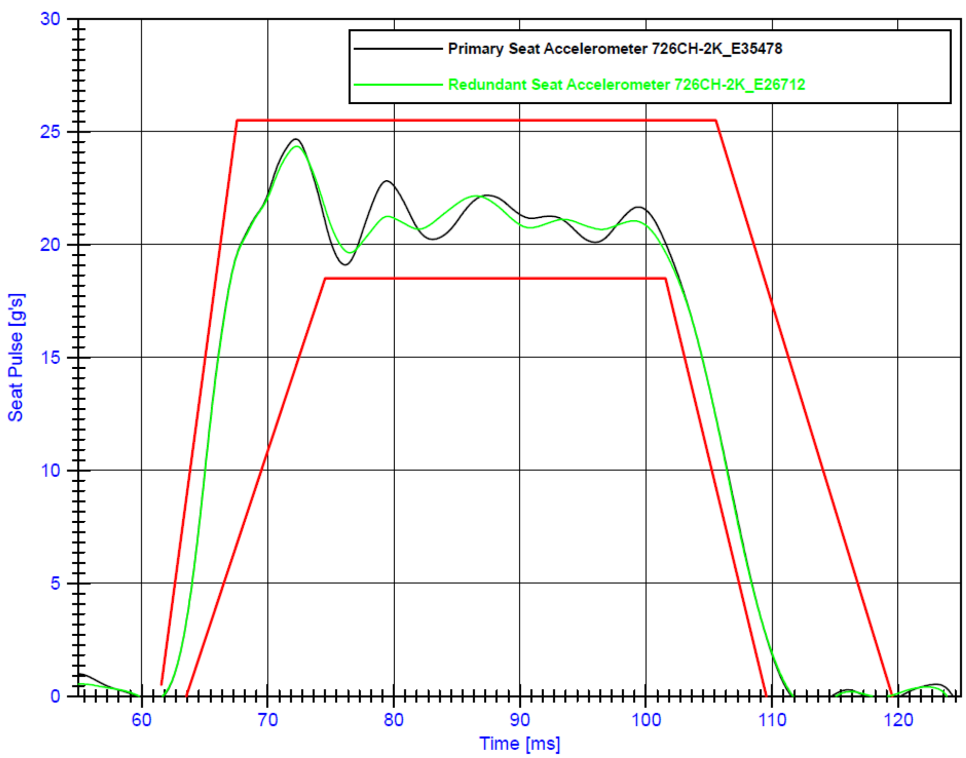
e. To calculate the relative velocity, $V_{R,}$ subtract the sliding seat velocity calculated in step c(iii) from the sled buck velocity in the direction perpendicular to the SORL calculated in step d.

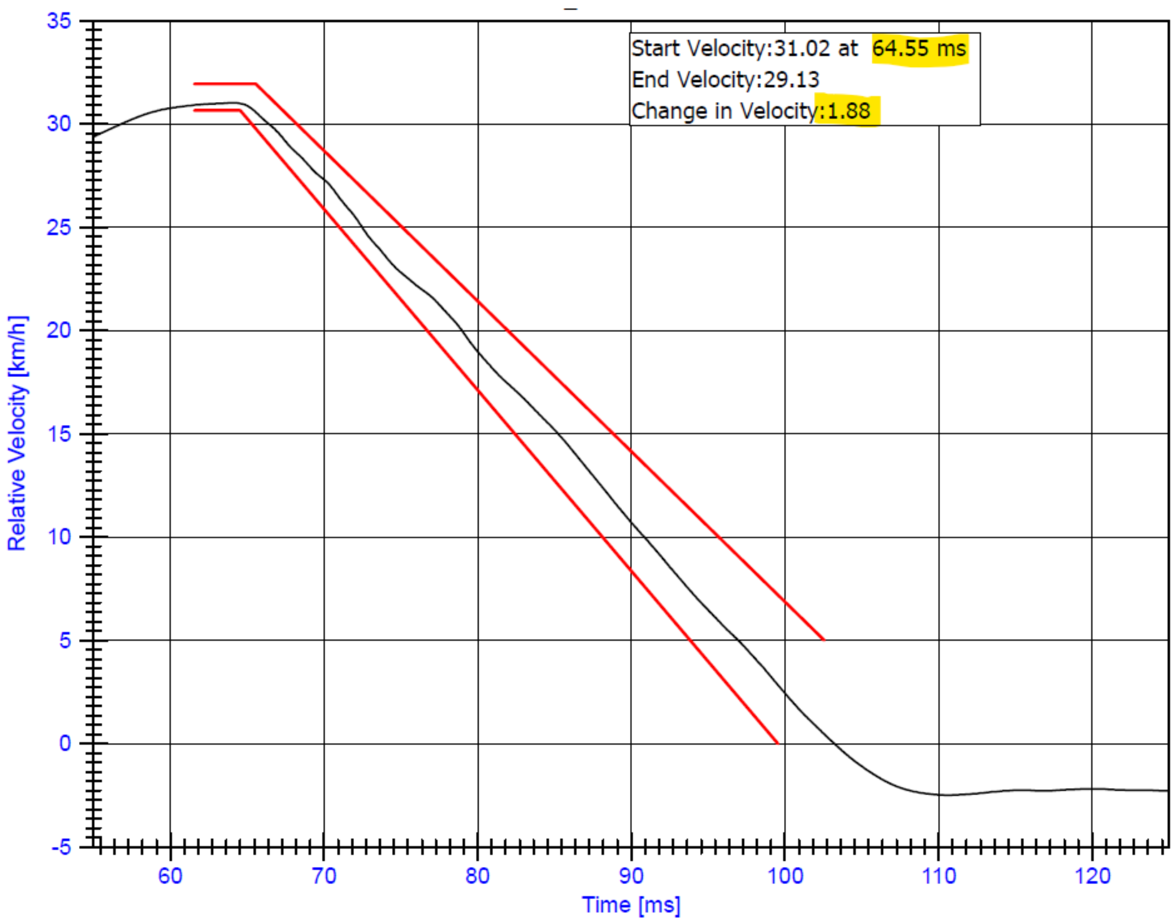
f. If the relative velocity calculated in step e is inverted, multiply this inverted relative velocity from step e by -1.

Examples are shown below for final plots.

[38] This was described earlier in the process, if this offset removal process has been completed, it shall not be repeated.


Sled Buck
Sliding Seat
726CH-2K_E35476
Pulse End 64.4 mSec
726CH-2K_E26706
Pulse End 64.25 mSec
Trigger 64.55 mSec
U Cooridor 61.55 mSec
L Cooridor 63.55 mSec
726CH-2K_E35478
Pulse Start 61.7 mSec
726CH-2K_E26712
Pulse Start 61.6 mSec
Acceleration [g's]
Velocity [km/h]
Time [ms]


Primary Seat Accelerometer 726CH-2K_E35478
Redundant Seat Accelerometer 726CH-2K_E26712
Seat Pulse [g's]
Time [ms]



Start Velocity:31.02 at 64.55 ms
End Velocity:29.13
Change in Velocity:1.88
Relative Velocity [km/h]
Time [ms]
35
30
25
20
15
10
5
0
-5
60
70
80
90
100
110
120

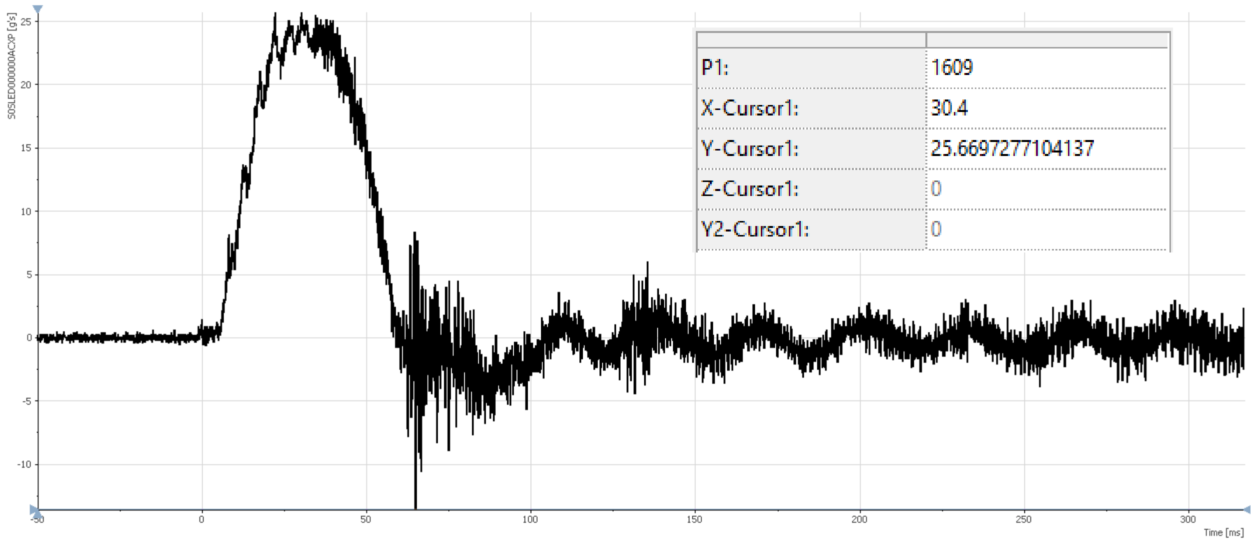
EXAMPLE:

STEP A – REMOVE OFFSET

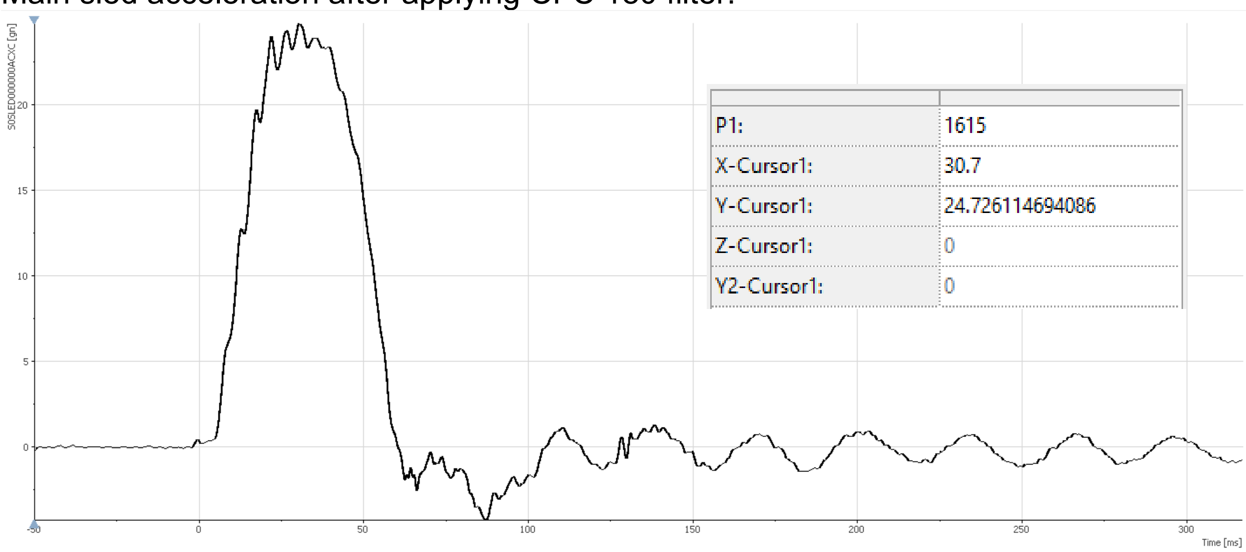
For this example, the data has been zeroed (offset removed) and data has been trimmed to appropriate time frame with T_{0P} as the starting point (time zero prime) for the operations.

STEP B – APPLY A CFC 180 FILTER TO BOTH THE SLED BUCK PLATFORM AND THE SLIDING SEAT X ACCELERATIONS

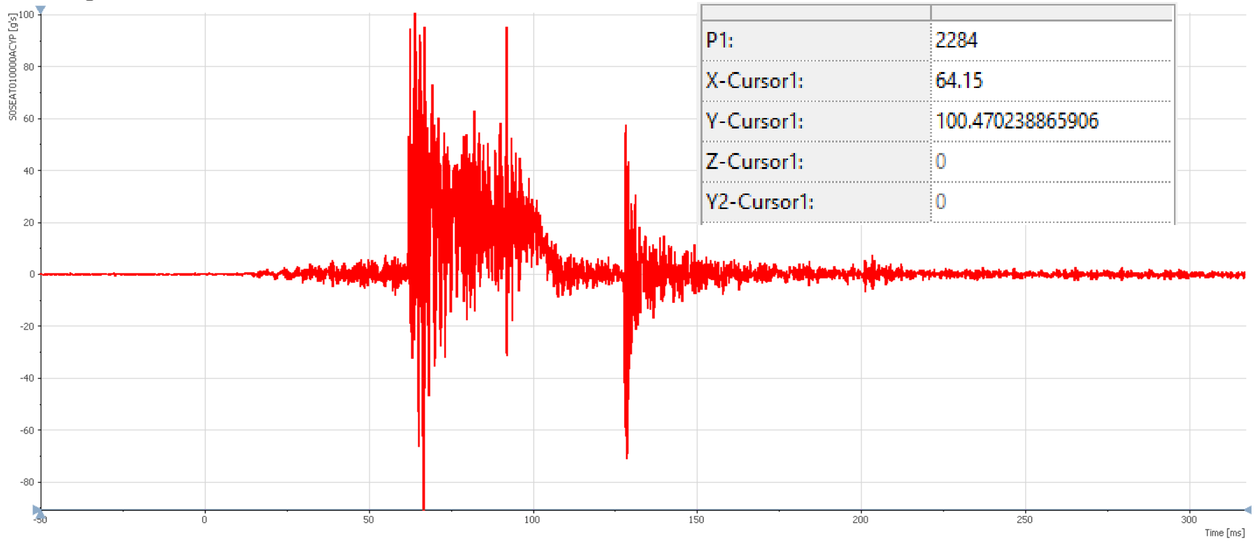
Main sled acceleration before filter:



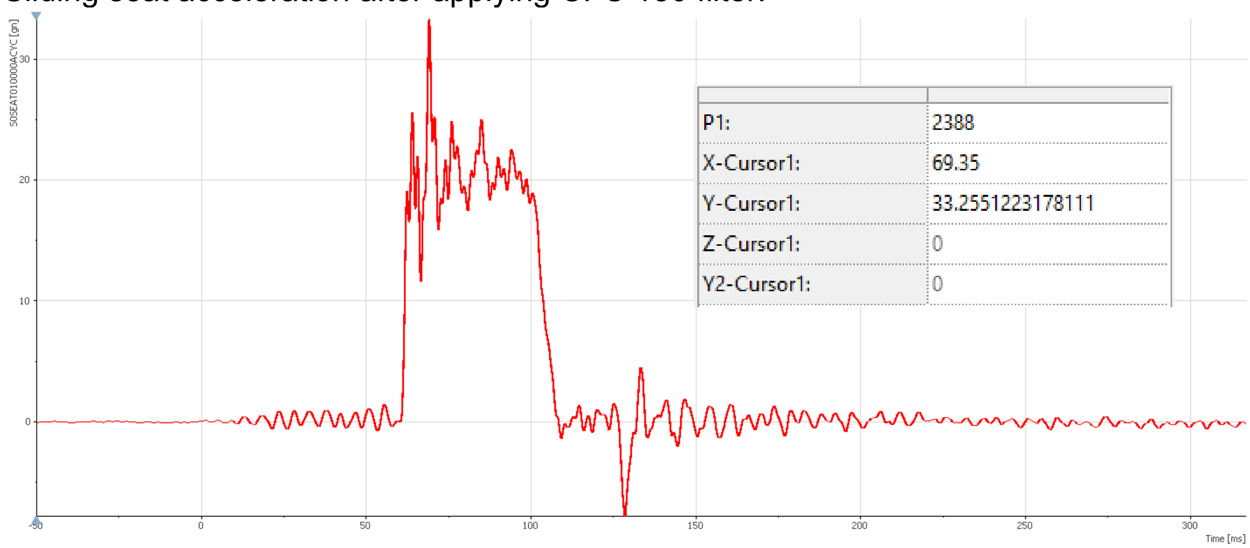
Main sled acceleration after applying CFC 180 filter:



Sliding seat acceleration before filter:

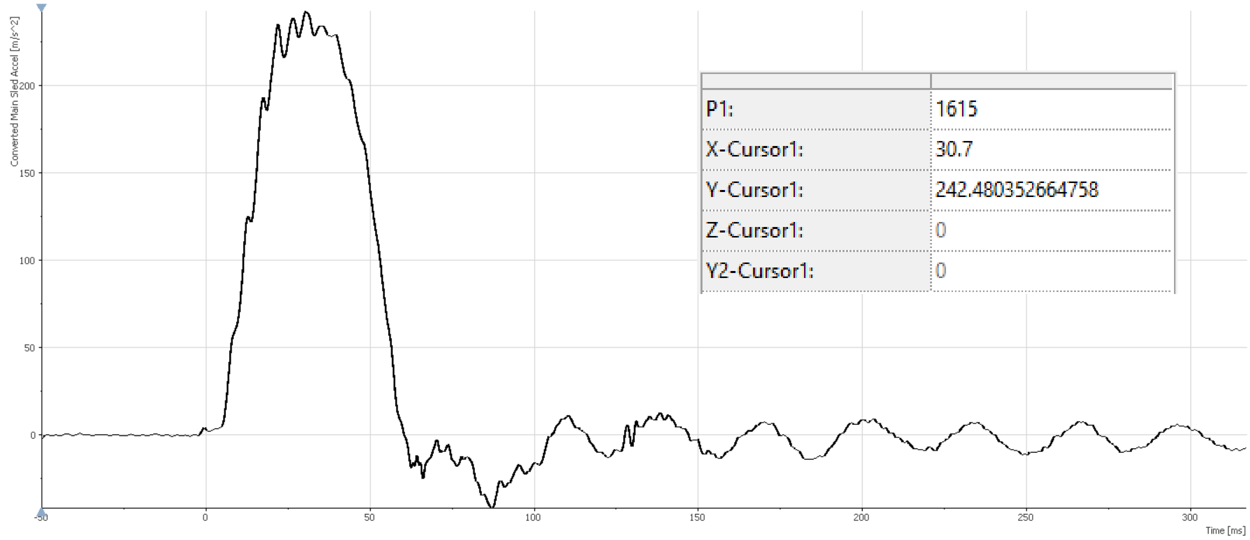


Sliding seat acceleration after applying CFC 180 filter:

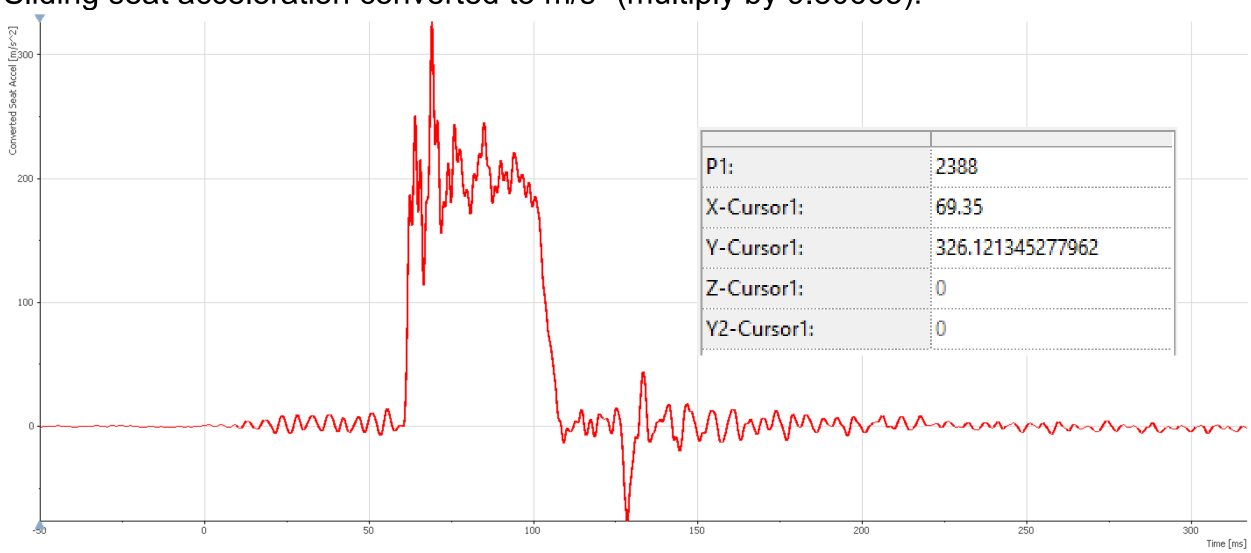


STEP C(i) – CONVERT EACH ACCELERATION TRACE FROM g TO m/s^2

Main sled acceleration converted to m/s^2 (multiply by 9.80665):

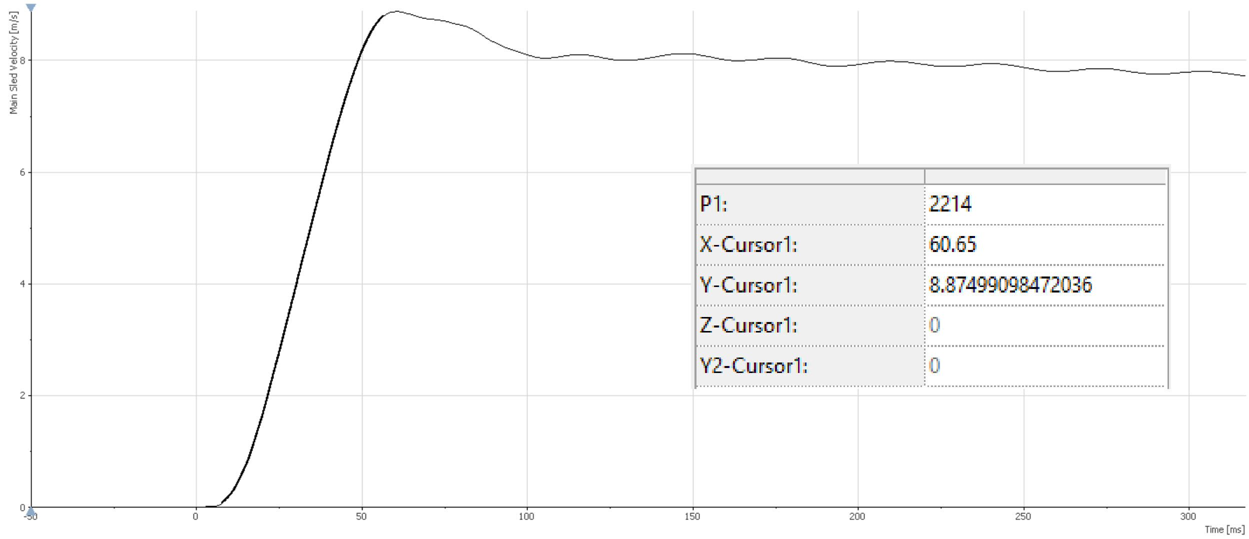


Sliding seat acceleration converted to m/s^2 (multiply by 9.80665):

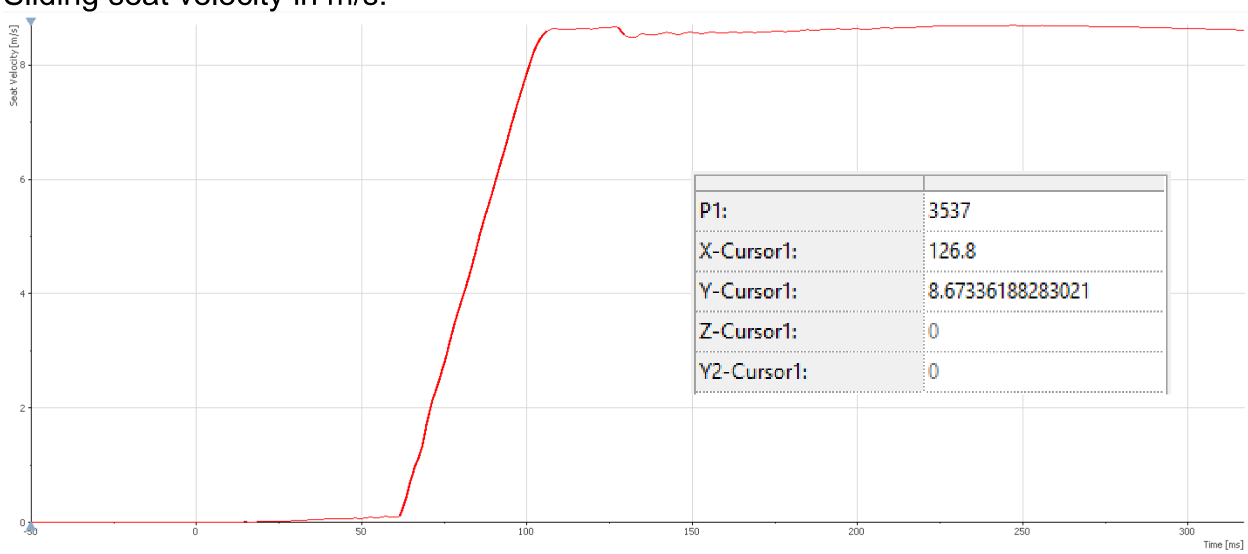


STEP C(ii) – INTEGRATE EACH CONVERTED ACCELERATION FROM STEP C(i) TO DETERMINE THE VELOCITY TRACES IN m/s

Main sled velocity in m/s:

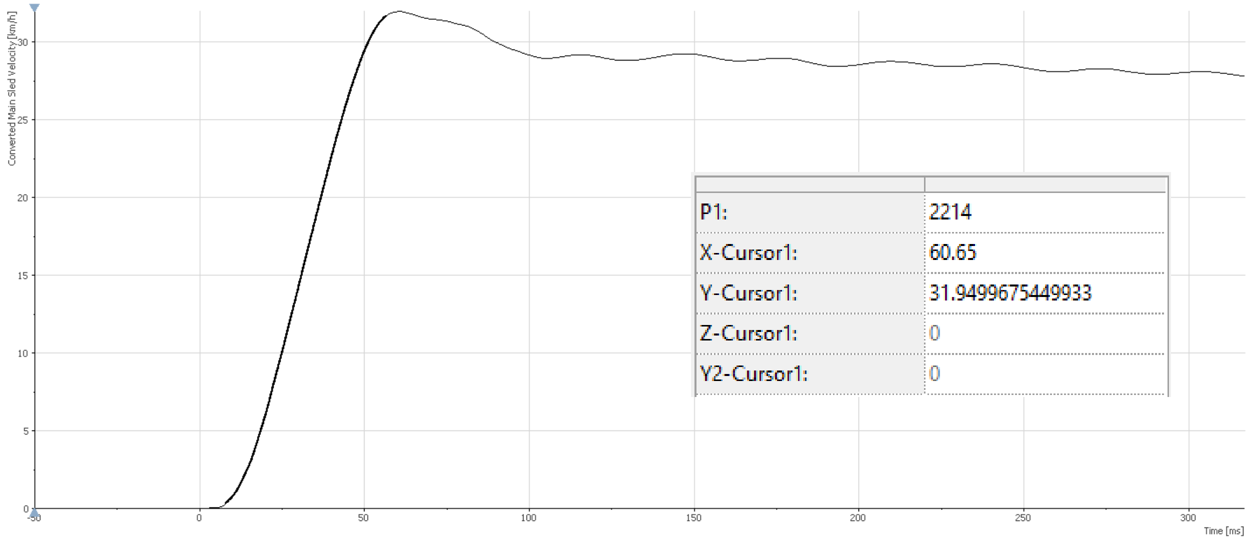


Sliding seat velocity in m/s:

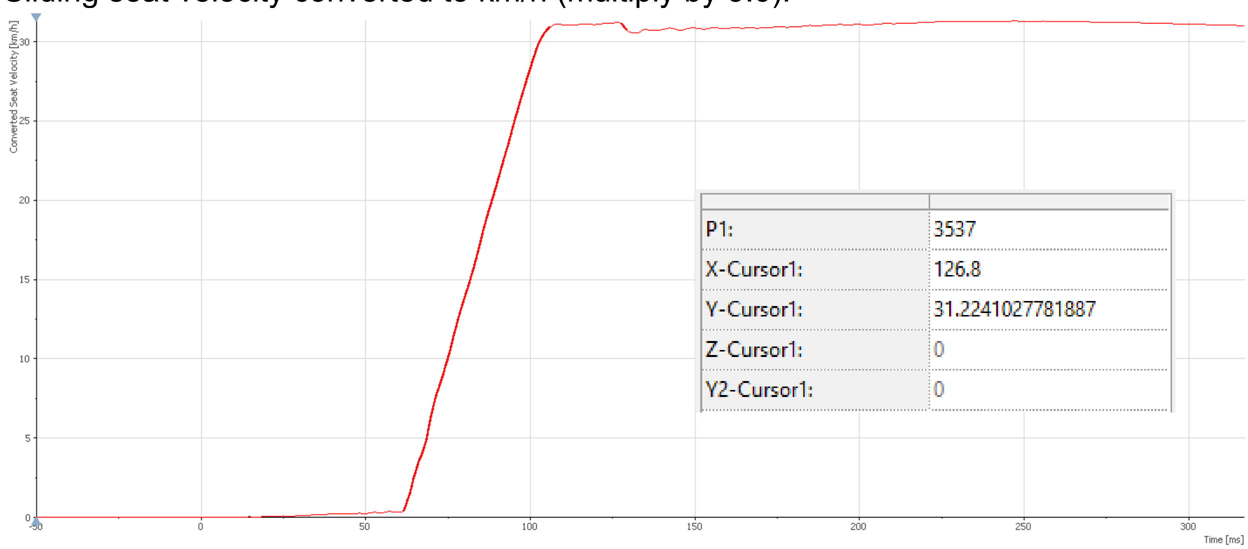


STEP C(iii) – CONVERT EACH VELOCITY TRACE IN STEP C(ii) FROM m/s TO km/h

Main sled velocity converted to km/h (multiply by 3.6):

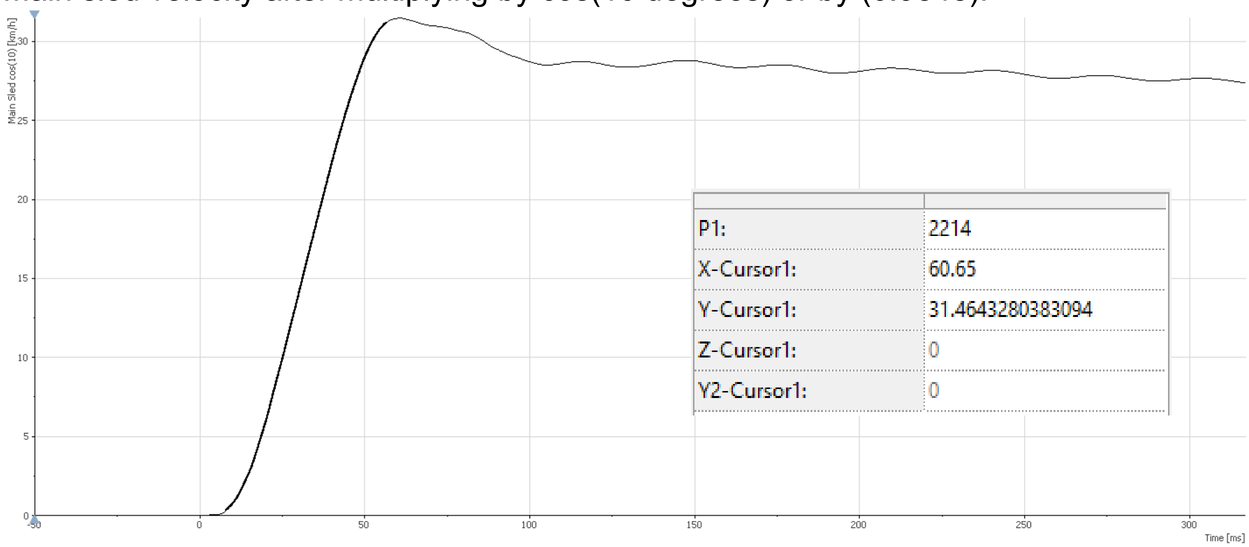


Sliding seat velocity converted to km/h (multiply by 3.6):



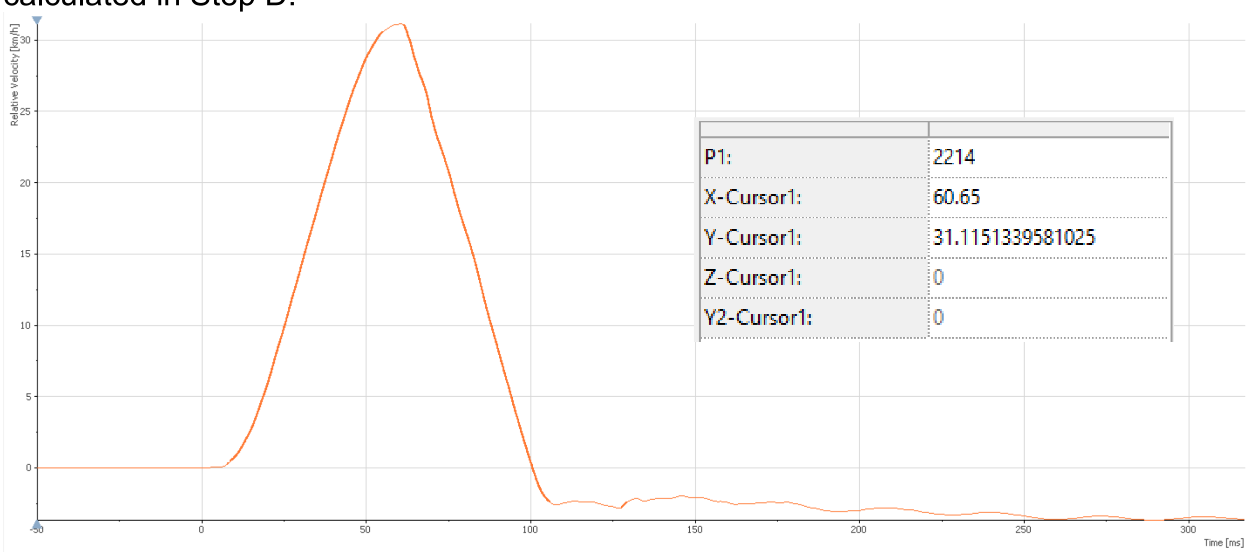
STEP D – CALCULATE THE SLED BUCK VELOCITY IN THE DIRECTION PERPINDICULAR TO THE SORL

Main sled velocity after multiplying by cos(10 degrees) or by (0.9848):



STEP E – CALCULATE RELATIVE VELOCITY

Subtract the sliding seat velocity calculated in Step C(iii) from the sled buck velocity calculated in Step D:



STEP F – INVERT RELATIVE VELOCITY (IF NECESSARY)

Multiply the inverted relative velocity from Step E by -1

NOTE: (Not needed in this example dataset since both channels were flipped prior to processing)

Check your data to make sure everything is in the required corridors.