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U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 138, Tire Pressure Monitoring Systems



ENFORCEMENT
Office of Vehicle Safety Compliance
NEF-210
1200 New Jersey Avenue, SE
Washington, DC 20590

OVSC LABORATORY TEST PROCEDURE NO. 138
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**REVISION CONTROL LOG
FOR OVSC LABORATORY
TEST PROCEDURES**

TP-138
TIRE PRESSURE MONITORING SYSTEMS

| TEST PROCEDURE | | FMVSS 138 | | DESCRIPTION |
|----------------|-----------|------------------------|----------------|---|
| REV. No. | DATE | AMENDMENT | EFFECTIVE DATE | |
| 00 | 4/8/05 | 70 FR 18136 4/8/05 | 10/5/05 | Final Rule |
| 01 | 7/1/05 | None | NA | Corrected TP Data Sheet 5, TPMS Written Instructions |
| 02 | 9/14/2005 | 70 FR 53079 9/7/05 | 10/7/05 | Revisions for telltale labeling, written instructions, deflation pressure set point, and malfunction test conditions. |
| 03 | 7/12/07 | 72 FR 38017 7/12/07 | 8/13/07 | Revisions to malfunction detection test procedures and corrections to typographical errors. (pp.17-18, pp.39-41) |
| 04 | 8/28/17 | None | NA | In General Requirements section removed reference to phase-in requirements. Inserted new section 13.4, <i>TPMS Low Inflation Pressure Performance – Gradual Deflation Test</i> , and renumbered remaining sections. |
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| 06 | | | | |

1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contractor laboratories with Laboratory Test Procedures (TPs) as guidelines for obtaining compliance test data. The data are used to determine if a specific vehicle or item of motor vehicle equipment meets the minimum performance requirements of the subject Federal Motor Vehicle Safety Standard (FMVSS). The purpose of the 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 an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard or observes any deficiencies in a Laboratory Test Procedure, the contractor is required to advise the Contracting Officer's Representative (COR) and resolve the discrepancy prior to the start of compliance testing.

The OVSC Laboratory Test Procedures are 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.

NOTE: The OVSC Laboratory Test Procedures, prepared for the limited purpose of use by independent laboratories under contract to conduct compliance tests for the OVSC, are not rules, regulations or NHTSA interpretations regarding the meaning of a FMVSS. The Laboratory Test Procedures are not intended to limit the requirements of the applicable FMVSS(s). In some cases, the OVSC Laboratory Test Procedures do not include all of the various FMVSS minimum performance requirements. Recognizing applicable test tolerances, the Laboratory Test Procedures may specify test conditions that are less severe than the minimum requirements of the standard. In addition, the Laboratory Test Procedures 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 OVSC Laboratory Test Procedures.

2. GENERAL REQUIREMENTS

FMVSS No. 138 specifies performance requirements for tire pressure monitoring systems (TPMS) installed in motor vehicles to prevent significant under-inflation of tires, potential loss of control, and a crash. It is applicable to passenger cars, multipurpose passenger vehicles (MPV), trucks and buses that have a gross vehicle weight rating (GVWR) of 4,536 kilograms or less, except those vehicles with dual wheels on an axle. These vehicles are required to comply with S4.1, *General*, S4.2, *TPMS detection*, S4.3, *Low tire pressure warning telltale*, S4.4, *TPMS malfunction*, and S4.5, *Written instruction requirements*.

Vehicles certified to comply with FMVSS No. 138 are expected to perform their intended tire pressure monitoring system functions over a wide range of streets, roads and environmental conditions encountered in the United States. For compliance testing purposes, performance is evaluated on a specific roadway course. It is the "Southern Loop" of the Treadwear Test Course as defined in Part 575.104 (approximately 225 kilometers (140 miles) of road) established by NHTSA both for its compliance testing and for certification tests for tire companies.

METRIC SYSTEM OF MEASUREMENT

As a general rule, use of the metric system of weights and measures is preferred. Performance parameters and test conditions in FMVSS are now specified in metric units. In this Laboratory Test Procedure metric values may be followed by English units only for reference (not necessarily equal). If test equipment is not available for direct measurement in metric units, the test laboratory calculates the exact metric equivalent by means of a conversion factor carried out to at least five significant digits before rounding consistent with the specified metric requirement. Metric units are to be used in the Final Test Reports.

TEST DATA LOSS

A compliance test is not to be conducted unless all the conditions specified in this TP have been met. Failure of a contractor to obtain the required test data or to maintain acceptable limits on test parameters in the manner outlined in this TP may require a retest at the expense of the contractor. Retest costs include all costs associated with conducting the retest, and may include the cost of an equivalent replacement vehicle (or equipment item). The original test vehicle used for the invalid test remains the property of OVSC, and the retest vehicle remains the property of the contractor.

The NHTSA Contracting Officer is the only person authorized to notify the contractor that a retest is required. The retest is to be conducted 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.

3. SECURITY

The contractor will provide appropriate security measures to protect the OVSC test vehicles 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 vehicles. Any security problems which arise are to 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 will protect and segregate the photographs and data that evolve from compliance testing. No information concerning the vehicle safety compliance testing program may be released to anyone except the COR, unless specifically authorized by the COR or the COR's Division Chief.

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

4. GOOD HOUSEKEEPING

The contractor will maintain the indoor compliance testing area, test fixtures and instrumentation in a neat and clean condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

5. TEST SCHEDULING AND MONITORING

The contractor will submit a test schedule to the COR prior to testing. Tests will be completed as required in the contract. Scheduling will be adjusted to permit sample motor vehicles to be tested to other FMVSS as may be required by the OVSC. All testing will be coordinated to allow monitoring by the COR.

6. TEST DATA DISPOSITION

The contractor will make all vehicle 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), will be made available to the COR within five working days. Additionally, the contractor will analyze the preliminary test results as directed by the COR. All backup data sheets, strip charts, recordings, plots, technicians' notes, etc., will be either sent to the COR or destroyed at the conclusion of each delivery order, purchase order, etc.

7. GOVERNMENT FURNISHED PROPERTY (GFP):

ACCEPTANCE OF TEST VEHICLE

The contractor has the responsibility of accepting each test vehicle whether delivered by a new vehicle dealership or another vehicle transporter. In both instances, the contractor acts in the OVSC's behalf when signing an acceptance of the test vehicle delivery. When a vehicle is delivered, the contractor will check to verify the following items:

- A. All options listed on the window sticker or Monroney label are present;
- B. Tires and wheels are like new and the same as listed on vehicle labels;
- C. There are no dents or other interior or exterior flaws;
- D. The vehicle has been properly prepared and is in running condition;
and
- E. Owner's manual, warranty document, consumer information, and extra set of keys are present.

In addition, if the GFP test vehicle is delivered by a government contracted transporter, the contractor will check for damage which may have occurred during transit.

When rented and leased vehicles are tested, items B, C, D. above and owner's manual conditions are applicable.

A Vehicle Condition form will be supplied to the contractor by the COR when the test vehicle is transferred from a new vehicle dealership or between test contracts. The contractor will complete a Vehicle Condition form for each vehicle and deliver it to the COR with the Final Test Report or the report will NOT be accepted for payment.

NOTIFICATION OF COR

The COR is to be notified within 24 hours after a vehicle has been delivered. In addition, if any discrepancy or damage is found at the time of delivery, a copy of the Vehicle Condition form will be sent to the COR immediately.

8. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system will be implemented and maintained in accordance with established calibration practices. The calibration system will 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 will 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), will 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) Name of the technician who calibrated the equipment
- D. A written calibration procedure will 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 is to be evident)
- E. Records of calibration for all test instrumentation will be kept by the contractor in a manner that assures the maintenance of established calibration schedules. All such records will be readily available for inspection when requested by the COR. The calibration system will need the acceptance of the COR before the test program commences.

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".

9. SUGGESTED TEST EQUIPMENT

- A. Portable tire pressure gage and bleeder valve with an operating pressure of 0-700 kPa (0-100 psi), accuracy of $\pm 0.5\%$ of applied pressure, and graduated increments of 1 kPa (0.1 psi) (Intercomp Digital Tire Pressure Gage (Model Digital Air) or equivalent);
- B. Portable rechargeable air compressor to inflate deflated passenger car or light truck tires;
- C. Portable tire shade equipment (RV Vinyl Tire Guards or equivalent);
- D. Portable lighting equipment for night-time testing;
- E. Ballast to simulate passenger, cargo, etc.
- F. Temperature gage to measure ambient temperatures, 0-55 °C (32-131 °F), accuracy of $\pm (0.1\% + 0.7 \text{ °C } (1.3 \text{ °F}))$, and graduated increments of 1 degree (Fluke Digital 50D Thermometer (K-type) or equivalent);
- G. Data acquisition system to measure, calculate and provide a continuous recording of the velocity, distance, time, lateral acceleration and longitudinal acceleration of a TPMS-equipped vehicle driven on a designated roadway at speeds not to exceed 113 km/h (70 mph) for a time period of no less than 90 minutes. (Racelogic Velocity Box (model VBOX III or equivalent). The system should have the following target unit accuracy and resolution:

| <u>Unit</u> | <u>Accuracy</u> | <u>Resolution</u> |
|---------------------------|---------------------|-------------------|
| Velocity | 0.1 km/h full scale | 0.01 km/h |
| Distance | .05% | 1 cm |
| Time | 0.001 sec | 0.01 sec |
| Lateral Acceleration | 0.5% | 0.01 g |
| Longitudinal Acceleration | 0.5% | 0.01 g |

- H. Temperature gage to measure tire sidewall and road surface temperatures, 0-400 °C (32-752 °F), accuracy above 23 °C (73 °F) of $\pm 1\%$ of reading or $\pm 1 \text{ °C } (\pm 2 \text{ °F})$ whichever is greater and at -18 to 23 °C (0-73 °F) of $\pm 2 \text{ °C } (4 \text{ °F})$, and graduated increments of 0.2 °C (0.5 °F) (Raynger ST20 Pro Non-contact Infrared Thermometer or equivalent); and
- I. Platform scales to measure individual wheel, axle and vehicle loads, 0-1,000 kg (0-2,200 lb) per pad x 4 = 0-4,000 kg (0-8,800 lb), accuracy $\pm 1\%$ of the measured reading, and graduated increments of 0.5 kg (1 lb) (Intercomp SW Deluxe or equivalent).

10. PHOTOGRAPHIC DOCUMENTATION

Photographs for final test reports will be 8 x 10 inches, and clearly illustrate the intended features. A label or placard identifying the test vehicle make and model, NHTSA number, and date (as a minimum) will appear in each photograph and be legible. In addition, each photograph will be labeled as to subject matter in the contractor's Final Test Report. As a minimum the following photographs will be included:

- A. 3/4 frontal view of left side of vehicle;
- B. Vehicle's Certification Label;
- C. Vehicle Placard (titled, "Tire and Loading Information");
- D. Tire inflation Pressure Label (if available);
- E. Close-up view(s) of inner and outer tire sidewall information (manufacturer/brand name, model, size, serial number, load rating, maximum cold inflation pressure and sidewall/tread construction). Markings should be highlighted, i.e. chalk, white paint, etc. Photograph each tire that is different;
- F. Close-up view(s) of combined or separate low tire pressure warning and malfunction telltale(s), and display(s);
- G. Close-up view of manual TPMS reset control, if equipped;
- H. Close-up view of test instrumentation mounted on vehicle;
- I. Close-up view(s) of vehicle loaded to lightly loaded vehicle weight and GVWR (inside vehicle occupant compartment and trunk/cargo area);
- J. View of vehicle on weight scales; and
- K. Any damage or apparent test failure that cannot be seen in the above photographs.

11. DEFINITIONS

COMBINATION LOW TIRE PRESSURE/MALFUNCTION TELLTALE

A yellow telltale identified by one of the symbols shown for the "Low Tire Pressure" Telltale in Table 1 of FMVSS No. 101 that illuminates for a low tire pressure warning and flashes for one minute upon detection of a malfunction.

11. DEFINITIONS.....continued**DEDICATED MALFUNCTION TELLTALE**

A yellow telltale separate from the low tire pressure warning indicator, identified by the symbol shown for the "Tire Pressure Monitoring System Malfunction" Telltale in Table 1 of FMVSS No. 101.

GROSS VEHICLE WEIGHT RATING (GVWR)

The value specified by the manufacturer as the loaded weight of a single vehicle.

LIGHTLY LOADED VEHICLE WEIGHT (LLVW)

The unloaded vehicle weight plus the weight of a mass of 180 kg (396 lbs), including the test driver and instrumentation.

RECONFIGURABLE DISPLAY

A display that gives important safety and maintenance information in a common space; typically, this display has a screen on which different messages may occupy the same position at different times.

TIRE PRESSURE MONITORING SYSTEM (TPMS)

A system that detects when one or more of a vehicle's tires is significantly under-inflated and illuminates a low tire pressure warning telltale.

UNLOADED VEHICLE WEIGHT (UVW)

The weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo, occupants, or accessories that are ordinarily removed from the vehicle when they are not in use.

VEHICLE CAPACITY WEIGHT

As identified on the vehicle placard, "the combined weight of occupants and cargo should never exceed XXX kg or XXX lb."

VEHICLE PLACARD AND OPTIONAL TIRE INFLATION PRESSURE LABEL

The sources of cold tire inflation pressure recommended by the vehicle manufacturer and provided in the location and format per Federal motor vehicle safety standard (FMVSS) No. 110.

12. TEST PREPARATION REQUIREMENTS (Data Sheet 1)

- A. Review all pretest, safety standard performance, and test instrumentation requirements relating to this compliance test. Personnel supervising and/or performing the compliance test will be thoroughly familiar with all the requirements.
- B. Review applicable contents of vehicle Owner's Manual or equivalent documentation.
- C. Verify COR approval of contractor's detailed in-house test procedure.
- D. Verify the calibration status of test equipment.
- E. The vehicle's front and rear (if applicable) wheel alignments should be checked and adjusted to manufacturer specifications. Each wheel and tire assembly should be balanced prior to test execution. The COR may waive this condition. The vehicle rims may be positioned at any wheel position, consistent with any related instructions or limitations in the vehicle Owner's Manual.
- F. If the vehicle is received with less than 100 km (62 miles) on its odometer, the vehicle, with tires properly inflated, should be driven at a speed within 90 – 110 km/h (56 – 68 mph) until the vehicle has a minimum cumulative distance of 100 km (62 miles).
- G. Determine make, model and type of TPMS equipped on vehicle being tested. If applicable, determine if the TPMS has a dedicated TPMS malfunction telltale or a combination low tire pressure warning/TPMS malfunction telltale. Determine if the TPMS requires execution of a learning and/or calibration driving phase. The vehicle manufacturer or COR will provide this information to be verified by contractor's inspection.
- H. Determine if the vehicle being tested is equipped with a TPMS that requires activation of a manual reset control. The vehicle Owner's Manual should provide an explanation of the system reset function if it exists. Describe the reset control location and function.
- I. From the Vehicle Placard or optional Tire Inflation Pressure Label, identify the vehicle's designated tire size(s) and respective recommended cold inflation pressure(s).

12. TEST PREPARATION REQUIREMENTS..... continued

- J. Document installed tire identification data. The vehicle is tested with the tires mounted on the vehicle at the time of purchase unless otherwise specified by COR. Notify COR if any tire installed on the vehicle is different from the manufacturer's designated tire size(s) obtained from the Vehicle Placard or optional Tire Inflation Pressure Label, and request further guidance before proceeding.
- K. Determine at what inflation pressure the TPMS low tire pressure warning telltale activation is to occur by filling in the data required in the "Worksheet for Determining FMVSS No. 138 Telltale Warning Activation Pressure for Tires Installed on Vehicle" on Data Sheet 1 (Sheet 4 of 4). Fill in Part (A) using the vehicle manufacturer's recommended cold inflation pressure to calculate the activation pressure, and fill in Part (B) with the pressure specified in the third column of Table 1 for the corresponding type of tire. Part (C) determines at what inflation pressure the TPMS low tire pressure warning telltale activation is to occur and Part (D) determines pressure set point for deflation.
- L. To begin the test and during test execution, the ambient temperature is to be between 0°C (32°F) and 40°C (104°F).
- M. The roadway test surface will be any portion of the Southern Loop of the Treadwear Test Course defined in Appendix A and Figure 2 of the 49 CFR 575.104. The road surface used is to be dry during compliance testing.

13. COMPLIANCE TEST EXECUTION

13.1 GENERAL

- A. As directed by the COR, the vehicle will be tested at its LLVW (+50, -0 kg) (+110, -0 lb) and/or GVWR (+0, -50 kg) (+0, -110 lb) without exceeding any of its gross axle weight ratings or vehicle capacity weight.
- B. Fill the fuel tank and all other reservoirs of fluids necessary for operation of the vehicle prior to executing this test.
- C. Test drivers are to obey all traffic laws and adopt a non-aggressive driving style at all times during test. Increases and decreases in vehicle speed are to be smooth and steady. Steering inputs are to be smooth, steady and with purpose. The brake pedal is to be applied and released at normal rates.
- D. The vehicle's parking brake is to be applied and engine shut off whenever the vehicle is stopped and test personnel are outside of the vehicle.
- E. At all times when the vehicle is parked during testing, the tires are shaded from the direct rays of sun.

13.2 LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE(S) (Data Sheet 2)

- A. Locate the low tire pressure warning telltale and verify that it is mounted inside the occupant compartment in front of and in clear view of the driver. Describe the telltale location.
- B. Verify that one of the two acceptable FMVSS No. 101 warning telltale symbols is used on the vehicle. Identify if the telltale is part of a reconfigurable display. Make note of any additional symbols and/or words used.
- C. If applicable, locate the TPMS malfunction telltale. Identify if the malfunction telltale is a dedicated stand-alone telltale or if the malfunction indication is combined with the low tire pressure warning telltale. Verify that it is mounted inside the occupant compartment in front of and in clear view of the driver. Describe the telltale location and identify if it is the acceptable FMVSS No. 101 malfunction telltale, the word "TPMS". Identify if the telltale is part of a reconfigurable display. Make note of any additional symbols and/or words used.

13. COMPLIANCE TEST EXECUTION.....continued

- D. With the vehicle stationary and the ignition locking system in the “Lock” or “Off” position, activate the ignition locking system to the “On” (“Run”) position when the engine is not running, or to a position between “On” (“Run”) and “Start” if designated by the vehicle manufacturer, and verify that the TPMS performs a check of lamp function of each telltale. Document the position(s) of the ignition locking system when the low tire pressure warning telltale and the dedicated malfunction telltale (if equipped) illuminate. The telltale(s) should be yellow in color and illuminate for a short period of time and then extinguish. Document the color of the illuminated telltale(s). Measure and record the time the telltale(s) remain illuminated. If the telltale(s) does (do) not illuminate proceed to step E.
- E. If the telltale(s) does (do) not illuminate in step D, a starter interlock may be engaged. The telltale(s) need not activate as a check of lamp function when a starter interlock is in operation. Review the vehicle Owner’s Manual to determine if the vehicle is equipped with any starter interlocks (most common interlock designs are between the ignition locking system/vehicle starter and the brake pedal and/or transmission). Disengage the interlock and repeat step D. above. Describe any interlock features that affect the check of lamp function of each telltale.

13.3 TPMS LOW INFLATION PRESSURE PERFORMANCE – NORMAL DEFLATION TEST (Data Sheet 3)

Perform steps A. – X. continuously and, except as specified, without delay.

- A. Normalize vehicle temperature in outdoor ambient air for at least 1 hour (engine off, vehicle tires shaded from direct sunlight, and vehicle placed on level roadway with all tires on a common surface material).
- B. Inflate each tire to the vehicle manufacturer’s recommended cold inflation pressure obtained from the vehicle placard or optional tire inflation pressure label.
- C. Level scales and measure the vehicle’s unloaded vehicle weight (UVW), wheel and axle loads.
- D. Load ballast into cargo area if needed for the vehicle’s LLVW (+50, -0 kg) (+110, -0 lb) without exceeding any of its GAWRs or vehicle capacity weight. (Ballast = 180 kg – instrumentation wt. – test driver wt. – test observer wt. when applicable.) Measure the actual wheel and axle loads to verify gross weight including instrumentation and occupant(s).
- E. Drive the vehicle to any section of the test roadway defined in paragraph S5.2 of FMVSS No. 138. Stop the vehicle at the selected starting point.

13. COMPLIANCE TEST EXECUTION.....continued

- F. Allow the vehicle to cool down for 1 hour in the same location (engine off, vehicle tires shaded from direct sunlight, and vehicle placed on a common level roadway surface material).
- G. Recheck tire pressures and reset to the vehicle manufacturer's recommended cold inflation pressure obtained from the vehicle placard or optional tire inflation pressure label.
- H. If applicable, manually set or reset the TPMS in accordance with the instructions in the vehicle Owner's Manual. If the telltale illuminates during the execution of the reset function it should also extinguish automatically and remain off.

System calibration / learning phase

- I. Energize the data acquisition system.
- J. With the vehicle stopped, the engine running and the transmission in gear, press the accelerator control and smoothly accelerate up to a vehicle speed of 75 ± 25 km/h (31-62 mph). Drive the vehicle within this speed range for 10 – 15 minutes of cumulative time. Time does not accumulate when vehicle speeds are outside the speed range or when the brake pedal is applied. Timing starts when the vehicle's speed exceeds 50 km/h (31 mph) and continues as long as the vehicle is within the speed range specified. When the vehicle speed is below or above the specified speed range the test should continue but the vehicle operational time accumulated outside the speed range will not be included in the 10-15 minute test time requirement. Record the cumulative driving time.
- K. Turn the vehicle around and repeat step J. for 5 – 10 minutes of cumulative time with the vehicle traveling in the opposite direction. Total cumulative driving time for steps J. and K. added together should be 20-22 minutes.
- L. Stop vehicle and shut off engine. Immediately measure and record tire pressures and sidewall and roadway temperatures.

Deflation of Tire(s)

- M. Before moving the vehicle, select one or more tires at random as directed by COR. Deflate the selected tire(s) as calculated in Sheet 1, Part (D), that is **7 kPa (1 psi) below the Telltale Warning Activation Pressure determined in Part (C)**. Recheck inflation pressure **of only deflated tire(s)** 1 minute after deflation and adjust as necessary. Record location(s) of deflated tire(s) (LF, LR, RF, RR) and corresponding deflated tire pressure. If the low tire pressure warning telltale illuminates, proceed to step Q.

13. COMPLIANCE TEST EXECUTION.....continued*System Detection Phase*

- N. Energize the data acquisition system. Proceed to step O. within 5 minutes of reducing the inflation pressure in the tire(s).
- O. With the vehicle stopped, the engine running and the transmission in gear, press the accelerator control and smoothly accelerate up to a vehicle speed of 75 ± 25 km/h (31-62 mph). **Drive the vehicle within this speed range for 10 - 15 minutes of cumulative time or until the low tire pressure warning telltale illuminates, whichever occurs first.** Time does not accumulate when vehicle speeds are outside the speed range or when the brake pedal is applied. Vehicle timing should start when the vehicle's speed exceeds 50 km/h (31 mph) and continue as long as the vehicle is within the speed range specified. When the vehicle speed is below or above the specified speed range the test should continue but the vehicle operational time accumulated outside the speed range will not be included in the cumulative driving time requirement. Record the cumulative driving time until the low tire pressure warning telltale illuminates.
- P. If the low tire pressure warning telltale did not illuminate in step O, turn the vehicle around and repeat step O. for 5 – 10 minutes of cumulative time with the vehicle traveling in the opposite direction or until the low tire pressure warning telltale illuminates. The vehicle fails if the total cumulative driving time for steps O. and P. added together is greater than 20 minutes. Record cumulative driving time up to 22 minutes. Stop the vehicle.
- Q. If the vehicle has a telltale that identifies which tire(s) is (are) under-inflated, verify that each tire in the symbol illuminates when the tire it represents was under-inflated in step M. Record tire locations verified.
- R. Deactivate the ignition locking system to the "Off" or "Lock" position.
- S. After 5 minutes, activate the vehicle's ignition locking system to the "On" or "Run" position and verify that the telltale re-illuminates and stays illuminated. (i.e. Key-On-Engine-Off)
- T. Deactivate the ignition locking system, re-activate the ignition locking system, and then re-start the vehicle engine. Verify that the telltale re-illuminates and stays illuminated. (i.e. Key-On-Engine-On)
- U. Deactivate the ignition locking system to the "Off" or "Lock" position. Allow the vehicle to cool down for approximately 1 hour or until all tires excluding the tire(s) deflated in step M. are within 7 kPa (1 psi) of the pressure(s) set in step G, whichever occurs first. Record cool down time. Measure and record tire pressures and temperatures of tire sidewalls and roadway.

13. COMPLIANCE TEST EXECUTION.....continued

- V. Re-start the vehicle engine and verify that the telltale re-illuminates and stays illuminated.
- W. Adjust the air pressure in all tires to the vehicle manufacturer's recommended cold inflation pressure obtained from the vehicle placard or optional tire inflation pressure label. Recheck pressures 1 minute after adjusting and record adjusted tire pressures.
- X. If applicable, manually reset the TPMS system in accordance with the instructions specified in the vehicle Owner's Manual. Verify that the telltale extinguishes. If necessary, drive vehicle at 75 ± 25 km/h (31-62 mph) until the telltale extinguishes. Record the time it takes for the telltale to extinguish. If the vehicle needs to be driven to extinguish the telltale, record the time from when the vehicle's speed exceeds 50 km/h (31 mph).
- Y. Repeat steps A.–X. (excluding steps C. and D.), reducing the inflation pressure of a different tire in step M. Complete a separate Data Sheet 3 for each tire location specified by the COR.
- Z. Repeat steps A.–X. (excluding steps C. and D.), reducing the inflation pressure of two tires in step M. as directed by the COR. Complete a separate Data Sheet 3 for each two-tire combination selected.
- AA. Repeat steps A.–X. (excluding steps C. and D.), reducing the inflation pressure of three tires in step M. as directed by the COR. Complete a separate Data Sheet 3 for each three-tire combination selected.
- BB. Repeat steps A.–X. (excluding steps C. and D.), reducing the inflation pressure of four tires in step M. as directed by the COR. Complete a separate Data Sheet 3.
- CC. Repeat steps A.–BB. with the vehicle loaded to GVWR (+0, -50 kg) (+0, -110 lb) without exceeding any gross axle weight ratings or vehicle capacity weight, if directed by the COR.

13. COMPLIANCE TEST EXECUTION.....continued**13.4 TPMS LOW INFLATION PRESSURE PERFORMANCE – GRADUAL DEFLATION TEST – (OPTIONAL SEE COR) (Data Sheet 4)**

Perform steps A. – Z. continuously and, except as specified, without delay.

- A. Normalize vehicle temperature in outdoor ambient air for at least 1 hour (engine off, vehicle tires shaded from direct sunlight, and vehicle placed on level roadway with all tires on a common surface material).
- B. Inflate each tire to the vehicle manufacturer's recommended cold inflation pressure obtained from the vehicle placard or optional tire inflation pressure label.
- C. Level scales and measure the vehicle's unloaded vehicle weight (UVW), wheel and axle loads.
- D. Load ballast into cargo area if needed for the vehicle's LLVW (+50, -0 kg) without exceeding any of its GAWRs or vehicle capacity weight. (Ballast = 180 kg – instrumentation wt. – test driver wt. – test observer wt. when applicable.) Measure the actual wheel and axle loads to verify gross weight including instrumentation and occupant(s).
- E. Drive the vehicle to any section of the test roadway defined in paragraph S5.2 of FMVSS No. 138. Stop the vehicle at the selected starting point.
- F. Allow the vehicle to cool down for 1 hour in the same location (engine off, vehicle tires shaded from direct sunlight, and vehicle placed on a common level roadway surface material).
- G. Recheck tire pressures and reset to the vehicle manufacturer's recommended cold inflation pressure obtained from the vehicle placard or optional tire inflation pressure label.
- H. If applicable, manually set or reset the TPMS in accordance with the instructions in the vehicle Owner's Manual. If the telltale illuminates during the execution of the reset function it should also extinguish automatically and remain off.

System calibration / learning phase

- I. Start vehicle. Energize the data acquisition system.
- J. With the vehicle stopped, the engine running and the transmission in gear, press the accelerator control and smoothly accelerate up to a vehicle speed of 75 ± 25 km/h (31-62 mph). Drive the vehicle within this speed range for 10 – 15 minutes of cumulative time. Time does not accumulate when vehicle speeds are outside the speed range or when the brake pedal is applied.

13. COMPLIANCE TEST EXECUTION.....continued

Timing starts when the vehicle's speed exceeds 50 km/h (31 mph) and continues as long as the vehicle is within the speed range specified. When the vehicle speed is below or above the specified speed range the test should continue but the vehicle operational time accumulated outside the speed range will not be included in the 10-15 minute test time requirement. Record the cumulative driving time.

- K. Turn the vehicle around and repeat step J. for 5 – 10 minutes of cumulative time with the vehicle traveling in the opposite direction. Total cumulative driving time for steps J. and K. added together should be 20-22 minutes.
- L. Stop vehicle and shut off engine (Key-Off-Engine-Off). Immediately measure and record tire pressures and sidewall and roadway temperatures.

Deflation of Tire(s)

- M. Initial 14 kPa (2 psi) Deflation - Before moving the vehicle, select one or more tires as directed by COR. Deflate the selected tire(s) 14 kPa (2psi). Recheck inflation pressure **of only deflated tire(s)** 1 minute after deflation and adjust as necessary. Record location(s) of deflated tire(s) (LF, LR, RF, RR) and corresponding deflated tire pressure.

System Detection Phase

- N. Start vehicle engine. Energize the data acquisition system. If the low tire pressure warning telltale illuminates, proceed to step "R." Otherwise, proceed to step "O" within 5 minutes of reducing the inflation pressure in the tire(s).
- O. With the vehicle stopped, the engine running and the transmission in gear, press the accelerator control and smoothly accelerate up to a vehicle speed of 75 ± 25 km/h (31-62 mph). **Drive the vehicle within this speed range for 10 – 15 minutes of cumulative time or until the low tire pressure warning telltale illuminates, whichever occurs first.** Time does not accumulate when vehicle speeds are outside the speed range or when the brake pedal is applied. Vehicle timing should start when the vehicle's speed exceeds 50 km/h (31 mph) and continue as long as the vehicle is within the speed range specified. When the vehicle speed is below or above the specified speed range the test should continue but the vehicle operational time accumulated outside the speed range will not be included in the cumulative driving time requirement. Record the cumulative driving time until the low tire pressure warning telltale illuminates.

13. COMPLIANCE TEST EXECUTION.....continued

- P. If the telltale illuminated in step O, proceed to step "R." If the low tire pressure warning telltale did not illuminate in step "O," turn the vehicle around and repeat step "O" for 5 – 10 minutes of cumulative time with the vehicle traveling in the opposite direction or until the low tire pressure warning telltale illuminates. Record cumulative driving time (up to 22 minutes), then stop the vehicle and deactivate vehicle engine. Record tire pressures and tire temperatures.
- Q. If telltale did not illuminate in steps O or P, deflate the same tire(s) originally selected in step M above another 14 kPa (2 psi). Recheck inflation pressure of only deflated tire(s) 1 minute after deflation and adjust as necessary. Repeat steps N - P.
- NOTE:** For safety reasons, do not deflate and run any test with tire pressures deflated more than 33% below the manufacturer's recommended cold inflation pressure. If the low inflation pressure telltale does not illuminate above this inflation pressure threshold, stop test and proceed to step R.
- R. Evaluate low inflation pressure warning telltale illumination. The vehicle passed the low inflation pressure performance test if the low inflation pressure warning telltale illuminated any time the deflated tire(s) inflation pressure(s) was(were) above the low inflation pressure activation threshold calculated in 12.K. The vehicle failed the low inflation pressure performance test if the low inflation pressure warning telltale did not illuminate during execution of O-P above, or if the warning telltale did not illuminate before 20 minutes of cumulative driving occurred after the deflated tire(s) inflation pressure(s) was(were) dropped to the first 14 kPa (2 PSI) increment below the activation pressure calculated in 12.K.
- S. If the vehicle has a telltale that identifies which tire(s) is (are) under-inflated, verify that each tire in the symbol illuminates when the tire it represents was under-inflated in step M. Record tire locations verified.
- T. Deactivate the ignition locking system to the "Off" or "Lock" position.
- U. After 5 minutes, activate the vehicle's ignition locking system to the "On" or "Run" position (i.e. Key-On-Engine-Off) and verify that the telltale re-illuminates and stays illuminated.
- V. Deactivate the ignition locking system, re-activate the ignition locking system, and then re-start the vehicle engine. Verify that the telltale re-illuminates and stays illuminated (i.e. Key-On-Engine-On).
- W. Deactivate the ignition locking system to the "Off" or "Lock" position. Allow the vehicle to cool down for approximately 1 hour or until all tires excluding the tire(s) deflated in step M are within 7 kPa (1 psi) of the pressure(s) set in step G, whichever occurs first. Record cool down time. Measure and record tire pressures and temperatures of tire sidewalls and roadway.

13. COMPLIANCE TEST EXECUTION.....continued

- X. Re-start the vehicle engine and verify that the telltale re-illuminates and stays illuminated. (i.e. Key-On-Engine-On).
- Y. Adjust the air pressure in all tires to the vehicle manufacturer's recommended cold inflation pressure obtained from the vehicle placard or optional tire inflation pressure label. Recheck pressures 1 minute after adjusting and record adjusted tire pressures.
- Z. If applicable, manually reset the TPMS system in accordance with the instructions specified in the vehicle Owner's Manual. Verify that the telltale extinguishes. If necessary, drive vehicle at 75 + 25 km/h (31-62mph) until the telltale extinguishes. Record the time it takes for the telltale to extinguish. If the vehicle needs to be driven to extinguish the telltale, record the time from when the vehicle's speed exceeds 50 km/h (31 mph).
- AA. Repeat steps A - Z (excluding steps C. and D.), reducing the inflation pressure in other combinations of 1 to 4 tires. as directed by the COR. Complete Data Sheet 4 for each tire combination selected.

13.5 MALFUNCTION DETECTION TEST (Data Sheet 5)

- A. With the vehicle stationary and the ignition locking system in the "Lock" or "Off" position, activate the ignition locking system to the "On" ("Run") position when the engine is not running, or to a position between "On" ("Run") and "Start" if designated by the vehicle manufacturer, and verify that the function of the malfunction telltale. Deactivate the ignition locking system to the "Lock" or "Off" position.
- B. If the vehicle is equipped with a combination low tire pressure warning and TPMS malfunction telltale, deflate the left front tire as described in Section 13.3, step M. above. (For information only about priority of warnings; if the combination telltale first indicates low tire pressure during malfunction test, re-inflate the tire).
- C. As directed by the COR, simulate one TPMS malfunction by disconnecting the power source to any TPMS component, disconnecting any electrical connection between TPMS components, by simulating a TPMS sensor malfunction, including installing a tire on the vehicle that is incompatible with the TPMS. When simulating a TPMS malfunction, the electrical connections for the telltale lamps are not to be disconnected. Complete a separate Data Sheet 4 for each malfunction simulation specified by the COR. If the TPMS malfunction or combination telltale illuminates, proceed to step G.
- D. Energize the data acquisition system.

13. COMPLIANCE TEST EXECUTION.....continued

- E. With the vehicle stopped, the engine running and the transmission in gear, press the accelerator control and smoothly accelerate up to a vehicle speed of 75 ± 25 km/h (31-62 mph). **Drive the vehicle within this speed range for 10 - 15 minutes of cumulative time or until the TPMS malfunction telltale illuminates in accordance with step G, whichever occurs first.** Time does not accumulate when vehicle speeds are outside the speed range or when the brake pedal is applied. Vehicle timing should start when the vehicle's speed exceeds 50 km/h (31 mph) and continue as long as the vehicle is within the speed range specified. When the vehicle speed is below or above the specified speed range the test should continue but the vehicle operational time accumulated outside the speed range will not be included in the cumulative driving time requirement. Record the cumulative driving time.
- F. If the TPMS malfunction telltale did not illuminate in step E, turn the vehicle around and repeat step E. for 5 – 10 minutes with the vehicle traveling in the opposite direction. Stop the vehicle. The TPMS malfunction indicator is to illuminate in accordance with step G. The vehicle fails if the total cumulative driving time for steps E. and F. added together is greater than 20 minutes.
- G. For a vehicle with a dedicated TPMS malfunction telltale, verify that the telltale illuminates and remains illuminated. For a vehicle with a combination low tire pressure/TPMS malfunction telltale, verify that the telltale flashes for a period of at least 60 seconds but no longer than 90 seconds and then remains illuminated.
- H. Deactivate the vehicle's ignition locking system to the "Off" or "Lock" position.
- I. After 5 minutes, activate the vehicle's ignition locking system to the "On" or "Run" position and verify that the TPMS malfunction telltale illuminates in accordance with step G. Record the time it takes for the combination telltale to start flashing and how long the telltale flashes. Verify for at least 60 seconds that the combination telltale remains illuminated.
- J. Deactivate the ignition locking system, re-activate the ignition locking system, and then start the vehicle engine. Verify that the TPMS malfunction telltale illuminates in accordance with step G. Shut the engine off.
- K. Restore the TPMS to normal operation. Verify that the malfunction telltale extinguishes when the engine is started. If necessary, drive vehicle 75 ± 25 km/h (31-62 mph) until the telltale extinguishes. Record the time it takes for the malfunction indicator to extinguish from when the engine is started. If the vehicle needs to be driven to extinguish the malfunction telltale, record the time from when the vehicle's speed exceeds 50 km/h (31 mph).
- L. Repeat steps A.-K. using another method of malfunction simulation as directed by the COR. Complete a separate Data Sheet 4 for each different method of malfunction simulated.

13. COMPLIANCE TEST EXECUTION.....continued

- M. If the vehicle is equipped with a combination low tire pressure warning and TPMS malfunction telltale, inflate the left front tire to the vehicle manufacturer's recommended cold inflation pressure.

13.6 TPMS WRITTEN INSTRUCTIONS (Data Sheet 6)

- A. Review the vehicle Owner's Manual, or other manufacturer provided document if an owner's manual is not provided, verify that the information is discussed and/or stated (see Data Sheet 5), and record observations.

14. POST TEST REQUIREMENTS

After the required tests are completed, the contractor will:

- A. Verify all instrumentation, test data records and photographs;
- B. Restore the vehicle to its original configuration, if necessary;
- C. Complete the Vehicle Condition Report form including a word description of the vehicle's post test condition;
- D. Copy applicable pages of the vehicle Owner's Manual for attachment to the final test report;
- E. Move the test vehicle to a secure area; and
- F. Place all original records in a secure and organized file awaiting test data disposition.

15. REPORTS

15.1 MONTHLY STATUS REPORTS

The contractor will submit a monthly Test Status Report and a Vehicle Status Report to the COR. Samples of the required Monthly Status Reports are contained in the report forms section.

15.2 APPARENT TEST FAILURE

Any indication of a test failure will be communicated by telephone to the COR within 24 hours with written notification mailed within 48 hours (Saturdays and Sundays excluded). A Notice of Test Failure (see report forms section) with a copy of the particular compliance test data sheet(s) and preliminary data plot(s) will be included.

In the event of a test failure, a post test calibration check of some critically sensitive test equipment may be required for verification of accuracy. The necessity for the calibration will be at the COR's discretion and will be performed without additional costs to the OVSC.

15.3 FINAL TEST REPORTS

15.3.1 COPIES

In the case of a test failure, **SEVEN** copies of the Final Test Report will be submitted to the COR for acceptance within three weeks of test completion. Where there has been no indication of a test failure, **THREE** copies of each Final Test Report will be submitted to the COR within three weeks of test completion.

Contractors are required to submit the first Final Test Report in draft form within two weeks after the compliance test is conducted. The contractor and the COR will then be able to discuss the details of both test conduct and report content early in the compliance test program.

Contractors are required to **PROOF READ** all Final Test Reports before submittal to the COR. The OVSC will not act as a 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.

15. REPORTS.....continued

15.3.2 REQUIREMENTS

The Final Test Report and associated documentation (including photographs) are relied upon as the chronicle of the compliance test. The Final Test Report will be released to the public domain after review and acceptance by the COR. For these reasons, each final report is to be a complete document capable of standing by itself.

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. Instructions for the preparation of the first three pages of the final test report are provided below for the purpose of standardization.

15.3.3 FIRST THREE PAGES

A. FRONT COVER

A heavy paperback cover (or transparency) will be provided for the protection of the final report. The information required on the cover is as follows:

(1) Final Report Number such as 138-ABC-0X-001, where –

138 is the FMVSS tested ABC
are the initials for the laboratory
0X is the Fiscal Year of the test program
001 is the Group Number (001 for the 1st test,
002 for the 2nd test, etc.)

(2) Final Report Title And Subtitle, such as

SAFETY COMPLIANCE TESTING FOR FMVSS 138
TIRE PRESSURE MONITORING SYSTEMS

World Motors Corporation
200X Ace Super Coupe
NHTSA No. XXXXX

(3) Contractor's Name and Address, such as

COMPLIANCE TESTING LABORATORIES, INC.
4335 West Dearborn Street
Detroit, Michigan 48090

15. REPORTS.....continued

NOTE: DOT SYMBOL WILL BE PLACED BETWEEN ITEMS (3) AND (4)

- (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
 1200 New Jersey Avenue, SE
 NEF-210
 Washington, DC 20590

B. FIRST PAGE AFTER FRONT COVER

A disclaimer statement and an acceptance signature block for the COR will 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 COR:

Accepted By: _____

Acceptance Date: _____

15. REPORTS.....continued**C. SECOND PAGE AFTER FRONT COVER**

A completed Technical Report Documentation Page (Form DOT F1700.7) will 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 1 — REPORT NUMBER

138-ABC-0X-001

Block 2 — GOVERNMENT ACCESSION NUMBER

Leave blank

Block 3 — RECIPIENT'S CATALOG NUMBER

Leave blank

Block 4 — TITLE AND SUBTITLE

Final Report of FMVSS 138 Compliance Testing of 200X Ace Super Coupe, NHTSA No. XXXXX

Block 5 — REPORT DATE

March 1, 200X

Block 6 — PERFORMING ORGANIZATION CODE

ABC

Block 7 — AUTHOR(S)

John Smith, Project Manager
Bill Doe, Project Engineer

Block 8 — PERFORMING ORGANIZATION REPORT NUMBER

ABC-DOT-138-001

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070

15. REPORTS.....continued

Block 10 — WORK UNIT NUMBER

Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

DTNH22-0X-D-12345

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

U.S. Department of Transportation
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance (NEF-210)
1200 New Jersey Avenue, SE
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report Feb.
15 to Mar. 15, 200X

Block 14 — SPONSORING AGENCY CODE

NVS-220

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 200X Ace Super 2-door coupe in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-138-0X for the determination of FMVSS 138 compliance. Test failures identified were as follows:

None

NOTE: Above wording will be shown with appropriate changes made for a particular compliance test. Any questions should be resolved with the COR.

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 138

15. REPORTS.....continued

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from:
 National Highway Traffic Safety Administration
 Technical Information Services (NIO-120)
 1200 New Jersey Avenue, SE
 Washington, DC 20590 Email:
 tis@nhtsa.dot.gov Telephone:
 202-366-4942

Block 19 — SECURITY CLASSIFICATION OF REPORT

Unclassified

Block 20 — SECURITY CLASSIFICATION OF PAGE

Unclassified

Block 21 — NUMBER OF PAGES

Add appropriate number Block

22 — PRICE

Leave blank

15.3.4 TABLE OF CONTENTS

Final test report Table of Contents will include the following:

Section 1 - Purpose of Compliance Test

Section 2 - Test Procedure and Discussion of Results

Section 3 - Compliance Test Data

Section 4 - Test Equipment List and Calibration Due Dates

Section 5 - Photographs

Section 6 - Vehicle Owner's Manual (applicable pages)

Section 7 - Notice of Test Failure (if applicable)

16. DATA SHEETS

FMVSS No. 138 – TEST DATA SUMMARY

TEST DATE: _____

LAB: _____

CONTRACT: DTNH22-_____

VEH. NHTSA NO.: _____

VIN: _____

CERT LABEL BUILD DATE: _____

| REQUIREMENTS | PASS/FAIL |
|---|-----------|
| LOW TIRE PRESSURE WARNING TELLTALE S138: S4.3.1 (a), (b); S4.3.3 (a), (b) | |
| Mounting | |
| Symbol and color | |
| Check of lamp function | |
| MALFUNCTION TELLTALE S138: S4.4 (b) or (c) | |
| Mounting | |
| Symbol and color | |
| Check of lamp function | |
| LOW TIRE PRESSURE WARNING - OPERATIONAL PERFORMANCE S138: S4.2, S4.3.1 (c), S4.3.2 | |
| Telltale illumination | |
| MALFUNCTION INDICATOR – OPERATIONAL PERFORMANCE S138: S4.4 (a) | |
| Telltale illumination | |
| TPMS WRITTEN INSTRUCTIONS S138: S4.5 | |
| Image of telltales | |
| Verbatim Statements | |
| Other statements | |

16. DATA SHEETS.....continued

DATA SHEET 1 (Sheet 1 of 4)
TEST PREPARATION

TEST DATE: _____ LAB: _____

CONTRACT: DTNH22- _____ VEH. NHTSA NO.: _____

VIN: _____ CERT LABEL BUILD DATE: _____

MY/MAKE/MODEL/BODY STYLE: _____

VEHICLE ALIGNMENT AND WHEEL BALANCING:

Alignment checked: () Front () Rear () COR waived Wheels

balanced: () Front () Rear () COR waived TIRE

CONDITIONING:

() Tires used more than 100 km. Actual odometer reading (km) : _____

() Other, describe reason and procedure applied: _____

TPMS IDENTIFICATION:

TPMS MAKE/MODEL: _____
(information obtained from the COR)

TPMS TYPE:
() Direct () Indirect () Other Describe _____

TPMS MALFUNCTION INDICATOR TYPE:
() Dedicated Telltale () Combination low tire pressure warning/malfunction telltale

Does TPMS require execution of a learning/calibration driving phase? YES NO

Does TPMS have a manual reset control? YES NO

If yes, describe reset control location and function: _____

16. DATA SHEETS.....continued

DATA SHEET 1 (Sheet 2 of 4)
TEST PREPARATION INFORMATION

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING AND OWNER'S MANUAL:

| Axle | Tire Size | Recommended Cold Inflation Pressure (kPa) | Source |
|-------|-----------|--|--------|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

16. DATA SHEETS....continued

DATA SHEET 1 (Sheet 3 of 4)
TEST PREPARATION

INSTALLED TIRE DATA (Use diagrams as reference):

Diagram - Passenger Car Tire Labeling

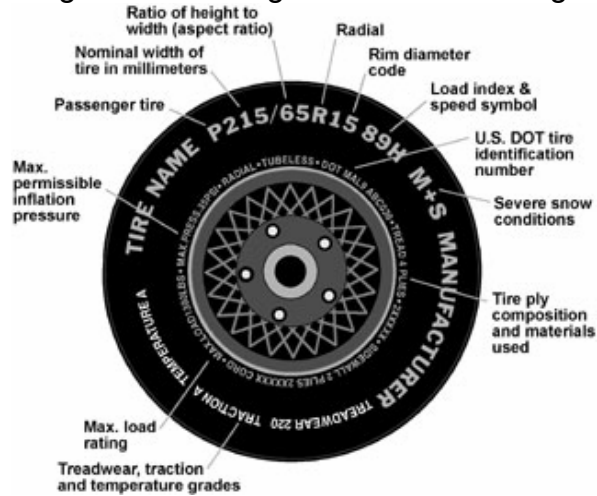
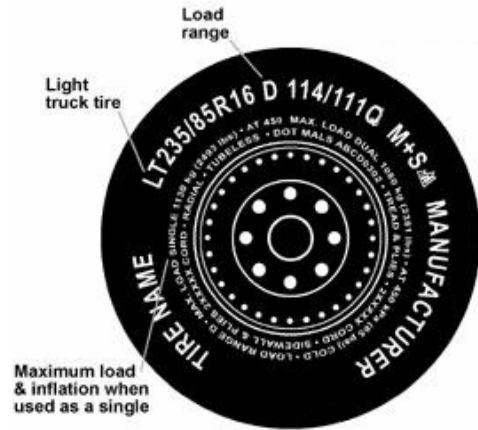


Diagram - Other Markings on Light Trucks



Front Axle

Tire Size (ex. P215/65R15 89H): _____

Manufacturer/Tire Name: _____

Sidewall Max. Load Rating (kg): _____ Max. Inflation Press (kPa): _____

Sidewall Construction (number of plies and ply material): _____

Tread Construction (number of plies and ply material): _____

Rear Axle (if different than front axle)

Tire Size (ex. P225/65R15 89H): _____

Manufacturer/Tire Name: _____

Sidewall Max. Load Rating (kg): _____ Max. Inflation Press (kPa): _____

Sidewall Construction (number of plies and ply material): _____

Tread Construction (number of plies and ply material): _____

Do all installed tires have the same sidewall information?

YES NO If no, explain: _____

Are all installed tires the same as designated by the vehicle manufacturer on the Vehicle Placard?

YES NO If no, explain: _____

16. DATA SHEETS....continued

DATA SHEET 1 (Sheet 4 of 4)
TEST PREPARATION

| Worksheet for Determining FMVSS No. 138 Telltale Warning Activation Pressure for Tires Installed on Vehicle | | |
|--|---|---|
| Part | Front Axle | Rear Axle |
| (A) Recommended Inflation Pressure x .75 | ____ kPa x .75 = ____ kPa | ____ kPa x .75 = ____ kPa |
| (B) Information from FMVSS 138 Table 1 below, Tire types are: | () P-metric-Standard load () P-metric-Extra Load Load Range () C, () D, or () E | () P-metric-Standard load () P-metric-Extra Load Load Range () C, () D, or () E |
| Inflation pressure | () Maximum or () Rated ____ kPa | () Maximum or () Rated ____ kPa |
| Minimum activation pressures from Table 1 | ____ kPa | ____ kPa |
| (C) Telltale Warning Activation Pressure is the higher of Part (A) or (B) | ____ kPa | ____ kPa |
| (D) Pressure at which to deflate tire(s) = (C) – 7 kPa | ____ kPa | ____ kPa |

FMVSS 138 Table 1 - Low Tire Pressure Warning Telltale - Minimum Activation Pressure

| Tire Type | Maximum or Rated Inflation Pressure | | Minimum Activation Pressure | |
|---------------------------|-------------------------------------|---------------------|-----------------------------|----------------|
| | (kPa) | (psi) | (kPa) | (psi) |
| P-metric -- Standard Load | 240, 300, or 350 | 35, 44, or 51 | 140 140 140 | 20 20 20 |
| P-metric - Extra Load | 280 or 340 | 41 or 49 | 160 160 | 23 23 |
| Load Range C | 350 | 51 | 200 | 29 |
| Load Range D | 450 | 65 | 240 | 35 |
| Load Range E | 550 | 80 | 240 | 35 |

REMARKS: _____

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

16. DATA SHEETS....continued

DATA SHEET 2 (Sheet 1 of 2)
 LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE

TPMS Low Tire Pressure Warning Telltale

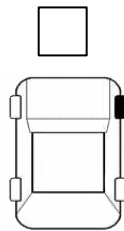
TPMS Low Tire Pressure Warning Telltale Location _____

Telltale is mounted inside the occupant compartment in front of and in clear view of the driver?

YES NO (fail) If no, explain: _____

Telltale is part of a reconfigurable display? YES NO

Identify Telltale Symbol Used (check box above figure).



OTHER (fail)
(describe below)

Note any words or additional symbols used.

TPMS Malfunction Telltale

() None () Dedicated stand-alone () Combined with low tire pressure telltale

TPMS Dedicated Malfunction Telltale Location _____

Dedicated Telltale is mounted inside the occupant compartment in front of and in clear view of the driver?

YES NO (fail) If no, explain: _____

Malfunction Telltale is part of a reconfigurable display? YES NO

Identify Dedicated Malfunction Telltale Label Used (check appropriate box).

“TPMS”

OTHER (fail) (describe below)

Note any additional words or symbols used _____

16. DATA SHEETS....continued

DATA SHEET 2 (Sheet 2 of 2)
LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE

Check Telltale Lamp Functions:

LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE, IF COMBINED

Identify position of ignition locking system when telltale illuminates.

- OFF/LOCK Between OFF/LOCK and ON/RUN
- ON/RUN Between ON/RUN and START

Is the telltale yellow in color? YES NO (fail) If no, explain: _____

Time telltale remains illuminated _____ seconds

DEDICATED MALFUNCTION TELLTALE (IF EQUIPPED)

Identify position of ignition locking system when telltale illuminates.

- OFF/LOCK Between OFF/LOCK and ON/RUN
- ON/RUN Between ON/RUN and START

Is the telltale yellow in color? YES NO (fail) If no, explain: _____

Time telltale remains illuminated _____ seconds

Starter Interlocks:

Does vehicle have any starter, transmission or other interlocks that affect operation of the telltale lamp check function? YES NO

If yes, describe the interlock features:

TEST RESULTS

Low Tire Pressure Warning Telltale (PASS/FAIL) _____

If equipped, Dedicated Malfunction Telltale (PASS/FAIL) _____

REMARKS: _____

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

16. DATA SHEETS....continued

DATA SHEET 3 (Sheet 2 of 5)
TPMS LOW INFLATION PRESSURE PERFORMANCE-NORMAL DEFLATION TEST

TIRE INFLATION PRESSURES AND TIRE/ROADWAY TEMPERATURES:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|--|---------|---------|---------|---------|
| G. | After loading vehicle to lightly loaded vehicle weight or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Vehicle cool-down period: _____ minutes | | | | |
| | Re-adjusted Inflation Pressure kPa | | | | |
| | Tire Sidewall Temp °C | | | | |
| | Roadway Temp °C | | | | |

SYSTEM CALIBRATION/LEARNING PHASE:

J. Driving in first direction:

Starting point: _____; Direction: _____
 Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of ≥ 25 km/h excluding time periods when brake pedal is applied.
 _____ minutes (a) _____ distance (km)

K. Driving in opposite direction:

Starting point: _____; Direction: _____
 Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of ≥ 25 km/h excluding time periods when brake pedal is applied:
 _____ minutes (b) _____ distance (km)

Max speed: _____ km/hr

Total Driving Time (a) + (b) _____ minutes
 (total cumulative time should be 20 minutes)

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|--|---------|---------|---------|---------|
| L. | Immediately, after vehicle is stopped, engine off; Inflation Pressure kPa | | | | |
| | Tire Sidewall Temp °C | | | | |
| | Roadway Temp °C | | | | |

16. DATA SHEETS....continued

DATA SHEET 3 (Sheet 3 of 5)

TPMS LOW INFLATION PRESSURE PERFORMANCE-NORMAL DEFLATION TEST

LOCATION AND PRESSURE(S) OF DEFLATED TIRE(S)

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|---|---------|---------|---------|---------|
| M. | Indicate Location of Tire(s) Deflated: ()LF ()LR ()RF ()RR Inflation Pressure kPa | | | | |

TELLTALE ILLUMINATION:

O. Driving in first direction:

Starting point: _____; Direction: _____
 Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 10 -15 minutes or until the telltale illuminates, whichever occurs first.

Did the telltale illuminate? YES NO ; _____minutes (a) _____distance (km)

P. Driving in opposite direction (if required):

Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 5 -10 minutes or until the telltale illuminates, whichever occurs first.

Did the telltale illuminate? YES NO ; _____minutes (b) _____distance (km)

Max speed: _____km/hr **Total Driving Time (a) + (b):** _____minutes

If the telltale did not illuminate within 20 minutes, note the additional driving time it took for it to illuminate. (Subtract 20 minutes from Total Driving Time above.)

_____minutes _____distance (km)

| |
|--|
| TELLTALE ILLUMINATES WITHIN 20 MINUTES: <input type="checkbox"/> YES <input type="checkbox"/> NO (fail) |
|--|

Q. Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?

YES NO

If yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?

YES NO (fail)

Tire Locations Verified: ()LF ()LR ()RF ()RR

S. After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position (i.e. Key-on-Engine-off)? YES NO (fail)

16. DATA SHEETS....continued

DATA SHEET 3 (Sheet 4 of 5)

TPMS LOW INFLATION PRESSURE PERFORMANCE-NORMAL DEFLATION TEST

T. Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position (i.e. Key-on-Engine-on)?

YES NO (fail)

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|--|---------|---------|---------|---------|
| U. | After vehicle cool down period. Vehicle cool-down period: _____ minutes | | | | |
| | Inflation Pressure kPa | | | | |
| | Tire Sidewall Temp °C | | | | |
| | Roadway Temp °C | | | | |

V. After the cool down period of approximately one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position?

YES NO (fail)

TELLTALE EXTINGUISHMENT:

RE-ADJUSTED TIRE INFLATION PRESSURES:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|---|---------|---------|---------|---------|
| W. | After cool down period; Re-adjusted Inflation Pressure kPa | | | | |

X. If vehicle is equipped with a manual reset control, does activation of this control extinguish the telltale?

YES NO N/A

Is it necessary to drive the vehicle to extinguish the telltale?

YES NO

Driving direction:

Starting point: _____; Direction: _____

Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied for telltale to extinguish.

_____ minutes _____ distance (km)

16. DATA SHEETS....continued

DATA SHEET 3 (Sheet 5 of 5)
TPMS LOW INFLATION PRESSURE PERFORMANCE-NORMAL DEFLATION TEST

TPMS PERFORMANCE TEST RESULTS (PASS/FAIL) _____

REMARKS:

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

16. DATA SHEETS....continued

DATA SHEET 4 (Sheet 1 of 7)

TPMS LOW INFLATION PRESSURE PERFORMANCE-GRADUAL DEFLATION TEST

TEST DATE: _____; LAB: _____; VEHICLE NHTSA NO.: _____

Time: Start: _____; End _____

Ambient Temperature (°C): Start: _____; End _____

Odometer Reading (km): Start: _____; End _____

Fuel Level: Start: _____; End _____

Weather Conditions: _____

Time Vehicle has remained outdoors with engine off and tires shielded from direct sunlight

(1 hour minimum): _____ hours

TIRE INFLATION PRESSURES AND TIRE/ROADWAY TEMPERATURES:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|--|---------|---------|---------|---------|
| A. | Pre-test cold measurements after ambient soak: Inflation Pressure kPa | | | | |
| | Tire Sidewall Temp °C | | | | |
| | Roadway Temp °C | | | | |
| B. | Adjusted pre-test inflation pressure to recommended cold pressure (kPa) | | | | |

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label and Vehicle Placard:

GVWR: _____ kg GAWR (front): _____ kg GAWR (rear): _____ kg

Vehicle Capacity Weight _____ kg

Measured Unloaded Vehicle Weight

LF _____ kg

LR _____ kg

RF _____ kg

RR _____ kg

Front Axle _____ kg

Rear Axle _____ kg

Total Vehicle _____ kg

Measured Test Weight: () LLVW (+50, -0 kg) () GVWR (+0, -50 kg) () UVW+VCW

LF _____ kg

LR _____ kg

RF _____ kg

RR _____ kg

Front Axle _____ kg (≤ GAWR)

Rear Axle _____ kg (≤ GAWR)

Vehicle _____ kg (not greater than UVW + VCW)

16. DATA SHEETS....continued

DATA SHEET 4 (Sheet 2 of 7)

TPMS LOW INFLATION PRESSURE PERFORMANCE-GRADUAL DEFLATION TEST

TIRE INFLATION PRESSURES AND TIRE/ROADWAY TEMPERATURES:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|--|---------|---------|---------|---------|
| G. | After loading vehicle to lightly loaded vehicle weight or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Vehicle cool-down period: _____ minutes | | | | |
| | Re-adjusted Inflation Pressure kPa | | | | |
| | Tire Sidewall Temp °C | | | | |
| | Roadway Temp °C | | | | |

SYSTEM CALIBRATION/LEARNING PHASE

J. Driving in first direction:

Starting point: _____; Direction: _____
 Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of ≥ 25 km/h excluding time periods when brake pedal is applied.
 _____ minutes (a) _____ distance (km)

K. Driving in opposite direction:

Starting point: _____; Direction: _____
 Cumulative vehicle driving time (5 - 10 minutes) at a vehicle speed of ≥ 25 km/h excluding time periods when brake pedal is applied.
 _____ minutes (b) _____ distance (km)

Max speed: _____ km/hr **Total Driving Time (a) + (b) _____ minutes**
 (total cumulative time should be 20 minutes)

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|--|---------|---------|---------|---------|
| L. | Immediately, after vehicle is stopped, engine off; Inflation Pressure kPa | | | | |
| | Tire Sidewall Temp °C | | | | |
| | Roadway Temp °C | | | | |

16. DATA SHEETS....continued

DATA SHEET 4 (Sheet 3 of 7)

TPMS LOW INFLATION PRESSURE PERFORMANCE-GRADUAL DEFLATION TEST

TIRE PRESSURE & TEMPERATURE DURING LOW INFLATION PRESSURE TEST

| | | | | | |
|---|---|----------------|----------------|----------------|----------------|
| Location of Deflated Tire(s): () LF () LR () RF () RR | | | | | |
| Original Tire Pressures (kPa) LF _____ LR _____ RF _____ RR _____ | | | | | |
| Execution Procedure and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
| M. | First 14 kPa Deflation Increment (kPa) | | | | |
| O. | Driving in first direction: Cumulative driving time (target 10 – 15 min) _____ min (a) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, proceed to P. below] | | | | |
| P. | Driving in opposite direction: Cumulative driving time (target 5 – 10 min) _____ min (b) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, proceed to Q. below] | | | | |
| | Total Driving time (not less than 20 min) _____ min (a + b) | | | | |
| | Tire Pressures and Temperatures | LF Tire | LR Tire | RF Tire | RR Tire |
| | Inflation Pressure (kPa) | | | | |
| | Temperature | | | | |
| Execution Procedure and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
| Q. | Second 14 kPa Deflation Increment (kPa) | | | | |
| | Driving in first direction: Cumulative driving time (target 10 – 15 min) _____ min (a) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, drive in opposite direction] | | | | |
| | Driving in opposite direction: Cumulative driving time (target 5 – 10 min) _____ min (b) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, proceed with next 14 kPa deflation increment] | | | | |
| | Total Driving time (not less than 20 min) _____ min (a + b) | | | | |
| | Tire Pressures and Temperatures | LF Tire | LR Tire | RF Tire | RR Tire |
| | Inflation Pressure (kPa) | | | | |
| | Temperature | | | | |

16. DATA SHEETS....continued

DATA SHEET 4 (Sheet 4 of 7)

TPMS LOW INFLATION PRESSURE PERFORMANCE-GRADUAL DEFLATION TEST

TIRE PRESSURE & TEMPERATURE DURING LOW INFLATION PRESSURE TEST

| Execution Procedure and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|------------------------------|--|---------|---------|---------|---------|
| Q. | Third 14 kPa Deflation Increment (kPa) | | | | |
| | Driving in first direction: Cumulative driving time (target 10 – 15 min) _____ min (a) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, drive in opposite direction increment] | | | | |
| | Driving in opposite direction: Cumulative driving time (target 5 – 10 min) _____ min (b) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, proceed to next 14 kPa deflation increment] | | | | |
| | Total Driving time (not less than 20 min) _____ min (a + b) | | | | |
| | Tire Pressures and Temperatures | | LF Tire | LR Tire | RF Tire |
| Inflation Pressure (kPa) | | | | | |
| Temperature | | | | | |
| Execution Procedure and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
| Q. | Fourth 14 kPa Deflation Increment (kPa) | | | | |
| | Driving in first direction: Cumulative driving time (target 10 – 15 min) _____ min (a) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, drive in opposite direction] | | | | |
| | Driving in opposite direction: Cumulative driving time (target 5 – 10 min) _____ min (b) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, proceed with next 14kPa deflation increment] | | | | |
| | Total Driving time (not less than 20 min) _____ min (a + b) | | | | |
| | Tire Pressures and Temperatures | | LF Tire | LR Tire | RF Tire |
| Inflation Pressure (kPa) | | | | | |
| Temperature | | | | | |

16. DATA SHEETS....continued

DATA SHEET 4 (Sheet 5 of 7)
 TPMS LOW INFLATION PRESSURE PERFORMANCE-GRADUAL DEFLATION TEST

TIRE PRESSURE & TEMPERATURE DURING LOW INFLATION PRESSURE TEST

| Execution Procedure and Item | LF Tire | LR Tire | RF Tire | RR Tire | | | | | | | | | | | | | | | |
|--|---------------------------------|---------|---------|---------|---------|--------------------------|--|--|--|--|-------------|--|--|--|--|--|--|--|--|
| <p>Q. Fifth 14 kPa Deflation Increment (kPa)</p> <p>Driving in first direction: Cumulative driving time (target 10 – 15 min) _____ min (a) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, drive in opposite direction increment]</p> <p>Driving in opposite direction: Cumulative driving time (target 5 – 10 min) _____ min (b) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, proceed to next 14 kPa deflation increment]</p> <p>Total Driving time (not less than 20 min) _____ min (a + b)</p> <table style="width: 100%; margin-top: 10px;"> <tr> <td style="text-align: center;">Tire Pressures and Temperatures</td> <td style="text-align: center;">LF Tire</td> <td style="text-align: center;">LR Tire</td> <td style="text-align: center;">RF Tire</td> <td style="text-align: center;">RR Tire</td> </tr> <tr> <td style="text-align: center;">Inflation Pressure (kPa)</td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">Temperature</td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> </table> | Tire Pressures and Temperatures | LF Tire | LR Tire | RF Tire | RR Tire | Inflation Pressure (kPa) | | | | | Temperature | | | | | | | | |
| Tire Pressures and Temperatures | LF Tire | LR Tire | RF Tire | RR Tire | | | | | | | | | | | | | | | |
| Inflation Pressure (kPa) | | | | | | | | | | | | | | | | | | | |
| Temperature | | | | | | | | | | | | | | | | | | | |
| Execution Procedure and Item | LF Tire | LR Tire | RF Tire | RR Tire | | | | | | | | | | | | | | | |
| <p>Q. Sixth 14 kPa Deflation Increment (kPa)</p> <p>Driving in first direction: Cumulative driving time (target 10 – 15 min) _____ min (a) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, drive in opposite direction]</p> <p>Driving in opposite direction: Cumulative driving time (target 5 – 10 min) _____ min (b) Did low inflation pressure telltale illuminate? Yes _____ No _____ [If Yes, proceed to R. below; If No, proceed with next 14 kPa deflation increment]</p> <p>Total Driving time (not less than 20 min) _____ min (a + b)</p> <table style="width: 100%; margin-top: 10px;"> <tr> <td style="text-align: center;">Tire Pressures and Temperatures</td> <td style="text-align: center;">LF Tire</td> <td style="text-align: center;">LR Tire</td> <td style="text-align: center;">RF Tire</td> <td style="text-align: center;">RR Tire</td> </tr> <tr> <td style="text-align: center;">Inflation Pressure (kPa)</td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">Temperature</td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> </table> | Tire Pressures and Temperatures | LF Tire | LR Tire | RF Tire | RR Tire | Inflation Pressure (kPa) | | | | | Temperature | | | | | | | | |
| Tire Pressures and Temperatures | LF Tire | LR Tire | RF Tire | RR Tire | | | | | | | | | | | | | | | |
| Inflation Pressure (kPa) | | | | | | | | | | | | | | | | | | | |
| Temperature | | | | | | | | | | | | | | | | | | | |

16. DATA SHEETS....continued

DATA SHEET 4 (Sheet 6 of 7)

TPMS LOW INFLATION PRESSURE PERFORMANCE-GRADUAL DEFLATION TEST

TELLTALE ILLUMINATION:

| Execution Procedure Paragraph and Item | |
|--|--|
| R. | <p>Did the low inflation pressure warning telltale illuminate before the inflation pressures in the deflated tire(s) reached the low inflation pressure(s) threshold calculated in 12.K.?</p> <p style="text-align: right;">___ YES (pass) ___ NO</p> |
| | <p>If NO above, did the low inflation pressure warning telltale illuminate within 20 minutes of cumulative driving time after the deflated tire(s) inflation pressure(s) was(were) dropped to the first 14 kPa increment below the activate threshold pressure calculated in 12.K.?</p> <p style="text-align: right;">___ YES (pass) ___ NO (fail)</p> |

S. Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?

YES NO

If yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?

YES NO

Tire Locations Verified: ()LF ()LR ()RF ()RR

U. After 5 minutes with the ignition locking system in the "Off" or "Lock" position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position (i.e. Key-on-Engine-off)?

YES NO

V. Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position (i.e. Key-on-Engine-on)?

YES NO (fail)

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

| Execution Procedure Paragraph and Item | LF Tire | LR Tire | RF Tire | RR Tire |
|---|---------|---------|---------|---------|
| W. After vehicle cool down period. Vehicle cool-down period: _____ minutes | | | | |
| Inflation Pressure kPa | | | | |
| Tire Sidewall Temp °C | | | | |
| Roadway Temp °C | | | | |

16. DATA SHEETS....continued

DATA SHEET 4 (Sheet 7 of 7)

TPMS LOW INFLATION PRESSURE PERFORMANCE-GRADUAL DEFLATION TEST

X. After the cool down period of approximately one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position?

YES NO (fail)

TELLTALE EXTINGUISHMENT:

RE-ADJUSTED TIRE INFLATION PRESSURES:

| Execution Procedure Paragraph and Item | | LF Tire | LR Tire | RF Tire | RR Tire |
|--|---|---------|---------|---------|---------|
| Y. | After cool down period; Re-adjusted Inflation Pressure kPa | | | | |

Z. If vehicle is equipped with a manual reset control, does activation of this control extinguish the telltale?

YES NO N/A

Is it necessary to drive the vehicle to extinguish the telltale? YES NO

Driving direction:

Starting point: _____ **Direction:** _____
 Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied for telltale to extinguish.

_____ minutes _____ distance (km)

TPMS PERFORMANCE TEST RESULTS (PASS/FAIL) _____

REMARKS:

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

16. DATA SHEETS....continued

DATA SHEET 5 (Sheet 1 of 4)
MALFUNCTION DETECTION TEST

TEST DATE: _____; LAB: _____; VEHICLE NHTSA NO.: _____

Ambient Temperature (°C): Start: _____; End _____

Odometer Reading (km): Start: _____; End _____

Fuel Level: Start: _____; End _____

TPMS TYPE: () Direct () Indirect () Other Describe _____

TPMS MALFUNCTION TELLTALE:

() Dedicated stand-alone () Combination low tire pressure warning/malfunction telltale

METHOD OF MALFUNCTION SIMULATION:

Describe method of malfunction simulation: _____

MALFUNCTION TELLTALE ILLUMINATION (after ignition locking system is activated to "On" ("Run") position):

Dedicated Malfunction Telltale

Dedicated telltale illuminates immediately YES NO If no, proceed to driving portion.

E. Driving in first direction:

Starting point: _____; Direction: _____

Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 15-17 minutes or until the telltale illuminates, whichever occurs first.

Did the telltale illuminate? YES NO ; _____minutes (a) _____distance (km)

F. Driving in opposite direction (if required):

Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 5-10 minutes or until the telltale illuminates, whichever occurs first.

Did the telltale illuminate? YES NO ; _____minutes (b) _____distance (km)

Max speed: _____km/hr **Total Driving Time (a) + (b):** _____minutes

If the telltale did not illuminate within 20 minutes, note the additional driving time it took for it to illuminate. (Subtract 20 minutes from Total Driving Time above.)

_____minutes _____distance (km)

DEDICATED MALF. TELLTALE ILLUMINATES WITHIN 20 MINUTES: YES NO (fail)

16. DATA SHEETS....continued

DATA SHEET 5 (Sheet 2 of 4)
MALFUNCTION DETECTION TEST

Dedicated Malfunction Telltale

I. After 5 minutes with the ignition locking system in the "Off" or "Lock" position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position?

YES NO (fail)

J. Deactivate the ignition locking system and then re-start the vehicle engine. When the ignition locking system is activated to the "On" or "Run" position, does the telltale re-illuminate and stay illuminated?

YES NO (fail)

Combination Low Tire Pressure Warning/Malfunction Telltale

E. Driving in first direction:

Starting point: _____; Direction: _____
Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 15-17 minutes or until the telltale illuminates, whichever occurs first.

Did the telltale illuminate? YES NO ; _____minutes (a) _____distance (km)

F. Driving in opposite direction (if required):

Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 5-10 minutes or until the telltale illuminates, whichever occurs first.

Did the telltale illuminate? YES NO ; _____minutes (b) _____distance (km)

Max speed: _____km/hr **Total Driving Time (a) + (b):** _____minutes

If the telltale did not illuminate within 20 minutes, note the additional driving time it took for it to illuminate. (Subtract 20 minutes from Total Driving Time above.)

_____minutes _____distance (km)

COMBINATION MALFUNCTION TELLTALE ILLUMINATES

(FLASHING AND ILLUMINATION SEQUENCE) WITHIN 20 MINUTES: YES NO (fail)

16. DATA SHEETS....continued

DATA SHEET 5 (Sheet 3 of 4)
MALFUNCTION DETECTION TEST

Combination Low Tire Pressure Warning/Malfunction Telltale

I. After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the combination low tire pressure/malfunction telltale flash for a period of at least 60 seconds but no longer than 90 seconds, and then remain illuminated when the ignition locking system is activated to the “On” or “Run” position?

YES NO (fail)

Time it takes before telltale starts flashing _____seconds

Time telltale remains flashing _____seconds

Time telltale remains illuminated _____seconds
(Verify this for a minimum of 60 seconds)

J. Deactivate the ignition locking system and then re-start the vehicle engine. When the ignition locking system is activated to the “On” or “Run” position, does the telltale’s flashing and illumination sequence repeat?

YES NO (fail)

MALFUNCTION TELLTALE EXTINGUISHMENT

K. After the TPMS is restored to normal operation and reset if necessary, is the malfunction telltale extinguished?

YES NO

Is it necessary to drive the vehicle to extinguish the telltale indicator?

YES NO

Driving direction:

Starting point: _____; Direction: _____

Cumulative vehicle driving time at a vehicle speed of 75+ 25 km/h excluding time periods when brake pedal was applied for telltale to extinguish.

_____minutes _____distance (km)

16. DATA SHEETS....continued

DATA SHEET 5 (Sheet 4 of 4)
MALFUNCTION DETECTION TEST

TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL) _____

REMARKS:

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

DATA SHEET 6 (Sheet 1 of 2)
TPMS WRITTEN INSTRUCTIONS

TEST DATE: _____; LAB: _____; VEHICLE NHTSA NO.: _____

Photocopy or photograph pages from Owner's manual or separate document.

Does the Owner's Manual provide an image of the Low Tire Pressure Warning Telltale symbol (and an image of the TPMS Malfunction Telltale warning ("TPMS")), if a dedicated telltale is utilized for this function)?

YES NO (fail)

The following verbatim statement, in the English language, is provided in the Owner's Manual.

YES NO (fail)

"Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label. (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should determine the proper tire inflation pressure for those tires.)

"As an added safety feature, your vehicle has been equipped with a tire pressure monitoring system (TPMS) that illuminates a low tire pressure telltale when one or more of your tires is significantly under-inflated. Accordingly, when the low tire pressure telltale illuminates, you should stop and check your tires as soon as possible, and inflate them to the proper pressure. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.

"Please note that the TPMS is not a substitute for proper tire maintenance, and it is the driver's responsibility to maintain correct tire pressure, even if under-inflation has not reached the level to trigger illumination of the TPMS low tire pressure telltale.

16. DATA SHEETS....continued

DATA SHEET 6 (Sheet 2 of 2)
TPMS WRITTEN INSTRUCTIONS

The following verbatim statement, in the English language, is provided in the Owner's Manual. [YES] [NO]

[The following paragraph is required for all vehicles certified to the standard starting on September 1, 2007 and for vehicles voluntarily equipped with a compliant TPMS MIL before that time.] "Your vehicle has also been equipped with a TPMS malfunction indicator to indicate when the system is not operating properly. [For vehicles with a dedicated MIL telltale, add the following statement: The TPMS malfunction indicator is provided by a separate telltale, which displays the symbol "TPMS" when illuminated.] [For vehicles with a combined low tire pressure/MIL telltale, add the following statement: The TPMS malfunction indicator is combined with the low tire pressure telltale. When the system detects a malfunction, the telltale will flash for approximately one minute and then remain continuously illuminated. This sequence will continue upon subsequent vehicle start-ups as long as the malfunction exists.] When the malfunction indicator is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of replacement or alternate tires or wheels on the vehicle that prevent the TPMS from functioning properly. Always check the TPMS malfunction telltale after replacing one or more tires or wheels on your vehicle to ensure that the replacement or alternate tires and wheels allow the TPMS to continue to function properly."

DATA INDICATES COMPLIANCE: PASS/FAIL _____

Does the Owner's Manual include the following (allowable) information?

- [] Significance of the low tire pressure warning telltale illuminating [] A description of corrective action to be undertaken
[] Whether the tire pressure monitoring system functions with the vehicle's spare tire (if provided) [] How to use a reset button, if one is provided
[] The time for the TPMS telltale(s) to extinguish once the low tire pressure condition or the malfunction is corrected

REMARKS:

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

17. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 138

TEST DATE: _____

LABORATORY: _____

CONTRACT NO.: _____; DELV. ORDER NO: _____

LAB. PROJECT ENGINEER'S NAME: _____

TEST SPECIMEN DESCRIPTION:

VEHICLE NHTSA NO.: _____; VIN: _____

PART NO.: _____ MFR: _____

TEST FAILURE DESCRIPTION:

FMVSS REQUIREMENT, PARAGRAPH § _____:

NOTIFICATION TO NHTSA (COR: _____

DATE: _____ BY: _____

REMARKS:

MONTHLY TEST STATUS REPORT

FMVSS No. 138

DATE OF REPORT: _____

| NO. | VEHICLE NHTSA NO., MAKE & MODEL | COMPLIANCE TEST DATE | PASS/ FAIL | DATE REPORT SUBMITTED | DATE INVOICE SUBMITTED | INVOICE PAYMENT DATE |
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MONTHLY VEHICLE STATUS REPORT

FMVSS No. 138

DATE OF REPORT: _____

| NO. | VEHICLE NHTSA NO., MAKE & MODEL | DATE OF DELIVERY | ODOM. READING | TEST COMPLETE DATE | VEHICLE SHIPMENT DATE | ODOM. READING |
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