TP-303-00
June 30, 1995

U. S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE FOR

FMVSS 212
Windshield Mounting

FMVSS 219
Windshield Zone Intrusion

FMVSS 303
Fuel System Integrity of Compressed
Natural Gas (CNG) Vehicles

ENFORCEMENT
Office of Vehicle Safety Compliance
Room 6115, NVS-220
400 Seventh Street, SW
Washington, DC 20590

REVISION CONTROL LOG
FOR OVSC LABORATORY
TEST PROCEDURES

TP-303
Fuel System Integrity for Compressed Natural Gas Vehicles

TEST PROCEDURE		FMVSS 303		DESCRIPTION
REV. No.	DATE	AMENDMENT	EFFECTIVE DATE	
00	06/30/95	59FR19659	06/30/95	Original release signed by O.D.
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OVSC LABORATORY TEST PROCEDURE NO. 303
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1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contractor laboratories with Laboratory Test Procedures as guidelines for obtaining compliance test data. The data are used to 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. If any contractor views any part of an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard (FMVSS) or observes deficiencies in a Laboratory Test Procedure, the contractor is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Every contractor is required to submit a detailed test procedure to the COTR before initiating the compliance test program. The procedure must include a step-by-step description of the methodology to be used. The contractor's test procedure shall contain a complete listing of test equipment with make and model number and a detailed check-off sheet. The list of test equipment shall include instrument accuracy and calibration dates. All equipment shall be calibrated in accordance with the manufacturer's instructions. There shall be no contradictions between the Laboratory Test Procedure and the contractor's in-house test procedure. Written approval of the in-house test procedures shall be obtained from the COTR before initiating the compliance test program. The OVSC Laboratory Test Procedures are not intended to limit or restrain a contractor from developing or utilizing any testing techniques or equipment which will assist in procuring the required compliance test data. These Laboratory Test Procedures do not constitute an endorsement or recommendation for use of any product or method. However, the application of any such testing technique or equipment is subject to prior approval of the COTR.

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 COTR 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 303

FMVSS 303 sets the minimum performance requirements relative to the integrity of CNG fuel systems in passenger vehicles, trucks and buses that have a gross vehicle weight rating (GVWR) of 10,000 pounds or less. For all applicable vehicles, the maximum fuel system pressure drop (P_{drop}) in the high pressure portion of the fuel system through the 60 minutes following impact by a 4,000 pound moving barrier traveling 30 mph shall NOT exceed the greater of P_{drop} = 1,062 kPa (154 psi) or $P_{drop} = 895*(T/V_{FS})$ kPa; where T is the average temperature of the test gas (in Kelvin), and V_{FS} is the internal volume of the fuel container and fuel lines up to the first pressure regulator (in liters).

The purpose of this standard is to reduce deaths and injuries occurring from fires that result from fuel leakage during and after motor vehicle crashes. The standard applies to passenger vehicles, trucks and buses that have a gross vehicle weight rating (GVWR) of 10,000 pounds or less that use CNG as a motor fuel. The standard also applies to school buses of any weight that use CNG as a motor fuel. The Test Procedure for testing school buses over 10,000 lb GVWR is detailed in OVSC TP-303S-00.

FMVSS 212

When the vehicle traveling longitudinally forward at any speed up to and including 30 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, the windshield mounting of the vehicle shall retain not less than 50 percent of the portion of the windshield periphery on each side of the vehicle longitudinal centerline for vehicles equipped with front occupant automatic restraints, and 75 percent of the windshield periphery for vehicles not equipped with automatic restraints.

The purpose of the standard is to reduce crash injuries and fatalities by providing for retention of the vehicle windshield during a crash, thereby utilizing fully the penetration-resistance and injury-avoidance properties of the windshield glazing material and preventing the ejection of the occupants from the vehicle. The standard applies to passenger cars and to multipurpose passenger vehicles (MPVs), trucks, and buses having a gross vehicle weight rating (GVWR) of 10,000 pounds OR LESS. However, it DOES NOT APPLY to forward control vehicles, walk-in van-type vehicles, or to open-body-type vehicles with fold-down or removable windshields.

2. GENERAL REQUIREMENTS…Continued

FMVSS 219

When the vehicle traveling longitudinally forward at any speed up to and including 30 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, no part of the vehicle outside the occupant compartment, except windshield molding and other components designed to be normally in contact with the windshield, shall penetrate the protected zone template to a depth of more than 0.25 inch, and no such part of a vehicle shall penetrate the inner surface of that portion of the windshield, within the daylight opening (DLO), below the protected zone.

The purpose of the standard is to reduce crash injuries and fatalities that result from occupants contacting vehicle components displaced near or through the windshield. The standard applies to passenger cars and to MPVs, trucks and buses of 10,000 pounds OR LESS GVWR. However, it DOES NOT APPLY to forward control vehicles, walk-in van-type vehicles, or to open-body-type vehicles with fold-down or removable windshields.

3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test vehicles and Government Furnished Property (GFP) such as test dummies 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 and GFP. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of Contracts and Procurement, within 2 working days after the incident. A letter containing specific details of the security problem will be sent to the IPM (with copy to the COTR) within 48 hours.

The contractor shall protect and segregate the data that evolves from compliance testing before and after each vehicle test. No information concerning the vehicle safety compliance testing program shall be released to anyone except the COTR, unless specifically authorized by the COTR or the COTR's Branch Chief or Division Chief.

NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL DIRECTLY INVOLVED IN THE COMPLIANCE TESTING PROGRAM OR OVSC PERSONNEL, SHALL BE ALLOWED TO WITNESS ANY VEHICLE COMPLIANCE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COTR.

4. GOOD HOUSEKEEPING

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

5. TEST SCHEDULING AND MONITORING

The contractor shall submit a vehicle test schedule to the COTR prior to conducting the first compliance test. Tests shall be completed as required in the contract.

Scheduling of vehicle tests shall be adjusted to permit vehicles to be tested to other FMVSSs as may be required by the OVSC. All vehicle compliance testing shall be coordinated with the COTR in order to allow monitoring by the COTR and/or other OVSC personnel if desired.

6. TEST DATA DISPOSITION

The contractor shall make all vehicle preliminary compliance test data available to the COTR at the test site within 4 hours after the test. Final test data, including digital printouts and computer generated plots (if applicable), shall be furnished to the COTR within 5 working days. Additionally, the contractor shall analyze the preliminary test results as directed by the COTR.

All backup data sheets, strip charts, recordings, plots, technician's notes, etc., shall be either sent to the COTR or destroyed at the conclusion of each delivery order, purchase order, etc.

7. GOVERNMENT FURNISHED PROPERTY (GFP)

GFP shall consist of test dummies and vehicles.

TEST DUMMIES

The OVSC shall furnish an adequate number of Part 572B or 572E 50th-percentile adult male test dummies. These dummies shall be stored in chairs in the seated position in a secured area which is temperature controlled between 50ºF and 85ºF. The contractor will inspect the dummies for component damage after each crash test usage. The COTR will be kept informed of the need for dummy replacement components which will be ordered from suppliers by the COTR.

7. GOVERNMENT FURNISHED PROPERTY (GFP)…Continued

ACCEPTANCE OF TEST VEHICLE

In general, the OVSC will notify the contractor in advance of the arrival of test vehicles assigned to the contract. New test vehicles are usually delivered by or for a manufacturer, distributor, or dealer. Vehicles may also be reassigned from one OVSC contract to another, which sometimes involves the use of a government-contracted transporter. When possible, a "Vehicle Condition" form, shown on page 7, for each vehicle will be supplied to the Contractor before the vehicle is delivered, alternately, blank forms are available from the COTR. The upper half of the form describes the vehicle in detail. The lower half provides space for a detailed description of the vehicle condition after each FMVSS test performed by the Contractor.

NOTE: A completed (upper and lower halves) "Vehicle Condition" form must be submitted with the final test reports for each FMVSS or the reports will NOT be accepted.

The Contractor has the responsibility of accepting these test vehicles. The COTR must be notified by telephone or FAX within 24 hours after each vehicle arrives at the contractor's facility, unless otherwise specified below.

In accepting a vehicle, the contractor must visually examine it and must verify that it contains all of the items in the list of requirements shown below before signing any delivery form, receipt, etc. or providing any such record to the person delivering the vehicle. During the examination, check for obvious defects or flaws not previously identified by OVSC. If these defects or flaws are serious enough to question the suitability of a vehicle for the intended testing, the contractor must attempt to consult with the COTR by telephone as soon as possible and preferably before the vehicle is accepted. If this is not possible, make a record of the defects or flaws, including photographs as necessary, and request that the person delivering the vehicle sign the record (a copy may be provided to this person or to his/her company). Mail and, if possible, FAX these documents to the COTR within 48 hours of vehicle arrival.

Requirements for all test vehicles:

A. All options listed on the "window sticker" are present on the test vehicle.

B. Tires and wheel rims are new and the same as listed.

C. There are no dents or other interior or exterior flaws.

D. The vehicle has been properly prepared and is in running condition.

7. GOVERNMENT FURNISHED PROPERTY (GFP)…Continued

E. The glove box contains an owner's manual, warranty document, consumer information, and an extra set of keys.

F. If applicable, proper fuel filler cap is supplied on the test vehicle.

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

CONTRACT NO.: DTNH22-_____ DATE: _____
FROM: _____
TO: _____

The following vehicle has been subjected to compliance testing for FMVSS No. _____

The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrial Property Manager (NPO-220), with a copy to the OVSC COTR. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

MODEL YEAR/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ BODY COLOR: _____ VIN: _____

ODOMETER READINGS: ARRIVAL - _____ miles DATE - _____

COMPLETION - _____ miles DATE - _____

PURCHASE PRICE: $_____ DEALER'S NAME: _____

ENGINE DATA: ____ Cylinders ____ Liters ____ Cubic Inches

TRANSMISSION DATA: ____ Automatic ____ Manual ____ No. of Speeds

FINAL DRIVE DATA: ____ Rear Drive ____ Front Drive ____ 4 Wheel Drive

TIRE DATA: Size - _____ Mfr. - _____

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT:

	Air Conditioning		Traction Control		Clock
	Tinted Glass		All Wheel Drive		Roof Rack
	Power Steering		Speed Control		Console
	Power Windows		Rear Wdo Defroster		Driver Air Bag
	Power Door Locks		Sun Roof or T-Top		Passenger Air Bag
	Power Seat(s)		Tachometer		Front Disc Brakes
	Power Brakes		Tilt Steering Wheel		Rear Disc Brakes
	Antilock Brake System		AM/FM/Cassette Radio		Other-

LIST OTHER PERTINENT OPTIONAL EQUIPMENT ON NEXT PAGE (REMARKS SECTION)

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING....Continued

REMARKS:

Equipment that is no longer on the test vehicle as noted on previous page:

Explanation for equipment removal:

Test Vehicle Condition:

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

8. TEST INSTRUMENTS

Before the Contractor initiates the safety compliance test program, a list of measuring and test equipment and a description of the test instrument calibration system shall be provided to and approved by the COTR. The measuring and test equipment list shall include the following information:

A. Type of instrument, manufacturer, model number, etc.

B. Measurement range

C. Accuracy

D. Calibration interval

E. Calibration facility

A test instrument calibration system will be implemented and maintained in accordance with established calibration practices. Guidelines for setting up and maintaining such calibration systems are described in MIL-C-45662A, "Calibration System Requirements." In addition, the calibration system must meet the following conditions:

A. All measuring and test equipment shall be calibrated by the contractor or a commercial facility against a higher order standard at periodic intervals not to exceed 12 months. The contractor's written procedure must list the information A through E above for each standard and include the details of how the standard will be used to calibrate the test instruments. The procedure shall also include, for each measuring and test equipment item, an assessment of the as-used environment (i.e., shock, temperature, moisture, high measurements indicating failure, etc.) and define how these and other factors will affect the interval between calibrations.

B. Each higher order standard must have a calibration history traceable to the National Institute of Standards and Technology (NIST) within 12 months of its use to calibrate the measuring and test equipment. The standards will be stored and used under appropriate environmental conditions to assure their accuracy and stability.

C. Records of calibrations for all standards, measuring and test equipment shall be kept by the Contractor in a manner which permits inspection by the COTR or copies to be provided upon request, and assures the maintenance of established calibration schedules. In addition, all measuring and test equipment must be labeled as to date of present calibration, date of next scheduled calibration and the name or initials of the person who last calibrated it.

9. PHOTOGRAPHIC DOCUMENTATION

Pretest and post test still photographs shall be glossy black and white, 8-1/2 x 11 inches, and properly focused and exposed for clear images. A tag, label or placard identifying the test vehicle year, make and model, NHTSA number and date shall appear in each photograph and must be legible. Each still photograph shall be labeled as to the subject matter.

As a minimum the following pretest and post test still photographs shall be included in each vehicle final test report:

A. Front view of vehicle

B. Left side view of vehicle

C. Right side view of vehicle

D. Rear view of vehicle

E. 3/4 frontal view from left side of vehicle

F. 3/4 rear view from right side of vehicle

G. Underbody view of fuel tank area and fuel system components including valves, regulators, fittings, etc.

H. Underbody view of engine area and fuel system components

I. Vehicle's certification label (pretest only)

J. Vehicle's tire information label (pretest only)

K. Full view of windshield with and without zone template (frontal test only)

L. Other photographs requested by COTR

M. View of Refueling area including refueling fittings/attachments

Motion pictures of the crash event shall be recorded on 16 mm color film at a minimum speed of 500 frames per second (fps). Timing marks shall be clearly registered on the film edge every 5 milliseconds (ms), in order to permit vehicle kinematic analysis.

NOTE: A strobe light shall be placed in the field-of-view (FOV) of each motion picture camera to mark "time zero" for the impact event. The contractor will mark

9. PHOTOGRAPHIC DOCUMENTATION....Continued

"time zero" when the most forward component of the test vehicle (or most rearward component for rear impacts or most side edge component for side impacts) contacts or is contacted by the barrier face. Light from the strobe units should cover 3 frames of high speed film.

NOTE: Parts of the driver and passenger dummies shall be coated with colored chalk/water solutions to show contact points with the vehicle's interior, with their own components (such as head to knee contact), and with each other. The chalk/water solution shall be applied after final dummy positioning.

CHALK COLORS TO BE USED ON DUMMIES

DUMMY PART	DRIVER	PASSENGER
Nose	Red	Yellow
Lips	Red	Yellow
Face	Blue	Red
Top of Head	Yellow	Blue
Back of Head	Red	Yellow
Left Knee	Red	Yellow
Right Knee	Blue	Red

A minimum of 1 camera in each of the following locations will be used to record impact events.

A. TOP OF BARRIER FACE CAMERA

Field-of-View (FOV) shall concentrate on the test vehicle's windshield and Styrofoam windshield zone template. The Styrofoam may be lightly sprayed with a paint of a contrasting color so that if an object penetrates through the exterior layer of the foam, the white interior will show through. The paint must be only a light spray so that a hard film shall not be formed and desensitize the foam surface. No obstructions, such as photographic targets or Styrofoam adhesive, shall be placed on the windshield mounting. The barrier face must be included in the camera's FOV so that the time of barrier contact can be observed.

9. PHOTOGRAPHIC DOCUMENTATION....Continued

NOTE: A tag, label or placard identifying the test vehicle year, make and model, NHTSA number and date shall appear in the FOV of EACH motion picture camera and must be legible.

B. SIDE VIEW CAMERAS

Pretest and Post test front, left side, right side, and rear views of the vehicle.

A "real time" motion picture camera (24 fps) will be used to record the condition of the fuel fill area and fittings. The closing of any access doors in the fuel fill area and/or attaching fuel caps will appear in the final version of the 16 mm motion picture. This camera will also be used to record the right side of the vehicle or moving barrier as it travels down the tow road and through the impact event. A hand held "real time" camera (24 fps) will be used to record any fluid spillage (from bi or dual fueled vehicles) and its collection after the impact or during static rollover.

For FRONTAL tests, a high speed motion picture camera (minimum of 500 fps) shall be used to record the impact event from the left front side of the test vehicle. The camera shall be positioned so that any penetration of the windshield zone Styrofoam template shall be recorded.

For FRONTAL tests, a high speed camera (minimum of 500 fps) shall be used to record the impact event from the right front side of the test vehicle. The camera shall be positioned so that the entire windshield is photographed.

For FRONTAL and REAR tests, a high speed camera (minimum of 500 fps) shall be used to record the left side of the vehicle during the crash event.

For REAR tests, a high speed camera (minimum of 500 fps) shall be used to record the right side of the vehicle during the crash event.

For LATERAL tests, a high speed camera (minimum of 500 fps) shall be used to record the front side of the vehicle during the crash.

For LATERAL tests, a high speed camera (minimum of 500 fps) shall be used to record the rear side of the vehicle during the crash.

NOTE: Photographic targets shall be placed at 12 inch intervals along a straight horizontal line which extends through the upper area of the front fender, door(s) and rear quarter panel on both sides of the test vehicle. A

9. PHOTOGRAPHIC DOCUMENTATION....Continued

stadia pole shall be positioned on the concrete test surface adjacent to the test vehicle and aligned with one of the photographic targets placed on the left front door of the undeformed test vehicle. A gross approximation of test vehicle dynamic crush should be possible by observing the photographic targets as they travel past the stadia pole.

C. UNDERBODY VIEW CAMERAS

For FRONTAL tests, 2 high speed cameras (minimum of 500 fps) shall be placed in the photographic pit area to record any fuel system breaches and fuel system damage to the test vehicle (or fuel stoddard leakage from liquid fuel systems of bi or dual fueled vehicles) during and after the impact event. For FRONTAL impacts, one camera shall record the structural deformation of the vehicle's front longitudinal frame rails and crossmembers as related to fuel system components such as a fuel pump, pressure regulators, shut-off valves, etc., and another camera will record the occurrences around the vehicle's fuel tank(s) and fill line assembly. The underbody of the test vehicle shall be painted flat white and the various fuel system components such as the fuel tank, filler pipe, supply line, return line, pressure regulators, shut-off valves, etc., painted in contrasting colors such as red, green, orange, etc., to aid photography and identification placards used as previously noted.

For REAR tests, a 3rd high speed pit camera shall be placed between the other 2 cameras in order to record the vehicle's fuel tank area after the Rear impact event.

For LATERAL tests, only 1 high speed pit camera is required and shall be placed under the fuel tank area.

D. OVERHEAD CAMERAS

For REAR and LATERAL Tests —

One (1) high speed camera shall be placed on the centerline of the moving barrier approximately 6 feet above the barrier face in order to record the entire impact event.

A second high speed camera shall be suspended above the impact area to record the entire impact event.

10. DEFINITIONS

AVERAGE TEMPERATURE

For calculating fuel system pressure drop, the average temperature measurement, either ambient air near the vehicle, or, when possible, fuel system (N_2) temperature (in degrees Kelvin), is made at the start of fuel leakage test time (just following the cessation of motion) and every 15 minutes following the cessation of motion until the test time of 60 minutes is complete. The sum of the temperatures taken, divided by 5, yields the average temperature.

BI-FUEL CNG VEHICLE

A vehicle equipped with two independent fuel systems, one of which is designed to supply CNG and the second to supply a fuel other than CNG.

CNG FUEL CONTAINER or CNG FUEL TANK

A tank or container designed to store CNG as motor fuel onboard a motor vehicle.

CNG FUEL SYSTEM

All components used to store, direct, control, and/or supply CNG to a vehicle engine.

DAYLIGHT OPENING (DLO)

Maximum unobstructed opening through the glazing surface (windshield), including reveal or garnish moldings adjoining the surface, as measured parallel to the outer surface of the glazing material.

DEDICATED CNG VEHICLE

A vehicle equipped with one fuel system designed to operate only on CNG.

DUAL FUEL CNG VEHICLE

A vehicle which is fueled by two fuels simultaneously, one of which is CNG and the second of which is a fuel other than CNG.

DESIGNATED SEATING CAPACITY (DSC)

Number of Designated Seating Positions (DSPs) provided.

10. DEFINITIONS....Continued

DESIGNATED SEATING POSITION (DSP)

Any plan view location capable of accommodating a person at least as large as a 5th-percentile adult female (hip breadth of 12.3 inches and shoulder breadth of 14.1 inches), if the overall seat configuration and design and vehicle design is such that the position is likely to be used as a seating position while the vehicle is in motion, except for auxiliary seating accommodations such as temporary or folding jump seats. Any bench or split-bench seat in a passenger car, truck or multipurpose passenger vehicle (MPV) with a GVWR less than 10,000 pounds, having greater than 50 inches of hip room (measured in accordance with SAE J1100a) shall have not less than 3 designated seating positions, unless the seat design or vehicle design is such that the center position cannot be used for seating.

FIXED COLLISION BARRIER
(used for perpendicular Frontal and 1º to 30º Oblique impacts)

A flat, vertical, unyielding surface with the following characteristics —

A. The surface is sufficiently large that when struck by a tested vehicle, no portion of the vehicle projects or passes beyond the surface.

B. The approach or tow road is a horizontal surface that is large enough for the vehicle to attain a stable attitude during its approach to the barrier, and that does not restrict vehicle motion during impact.

C. When struck by a vehicle, the surface and its supporting structure absorb no significant portion of the vehicle's kinetic energy, so that a performance requirement described in terms of impact with a fixed collision barrier must be met no matter how small an amount of energy is absorbed by the barrier.

D. At a minimum, the barrier should consist of a reinforced concrete structure 6 feet high, 6 feet thick and 12 feet wide, weighing approximately 100,000 pounds. The barrier face shall be adjustable for conducting 30º oblique impact tests. The barrier face should be faced with a sheet of 0.75 inch thick exterior plywood which is 4 feet high by 8 feet wide. The plywood shall be replaced as necessary during the compliance testing program.

FORWARD CONTROL VEHICLE (FCV)

Configuration in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub is in the forward quarter of the vehicle length.

10. DEFINITIONS....Continued

FUEL LEAKAGE (CNG FUEL SYSTEMS)

Fuel system pressure drop due to system breaches, loss of fitting integrity, etc. other then pressure losses due to variations in ambient temperature.

FUEL SPILLAGE (LIQUID FUEL SYSTEMS)

The fall, flow, or run of fuel from the vehicle but does not include wetness resulting from capillary action.

FUEL SYSTEM VOLUME V_{FS}

The internal volume (in liters) of the fuel container and the fuel lines up to the first pressure regulator.

GROSS AXLE WEIGHT RATING (GAWR)

Value specified by the vehicle manufacturer as the load-carrying capacity of a single axle system, as measured at the tire-ground interfaces.

GROSS VEHICLE WEIGHT RATING (GVWR)

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

HIGH PRESSURE PORTION OF A FUEL SYSTEM

All the components from and including each CNG fuel container up to, but not including, the first pressure regulator.

LONGITUDINAL OR LONGITUDINALLY

Parallel to the longitudinal (fore-aft) centerline of the vehicle.

MULTIPURPOSE PASSENGER VEHICLE (MPV)

Motor vehicle with motive power, except a trailer, designed to carry 10 persons or less which is constructed either on a truck chassis or with special features for occasional off-road operation.

PASSIVE OR AUTOMATIC RESTRAINT SYSTEM

System meeting the occupant crash protection requirements of FMVSS 208, Occupant Crash Protection, by means that require no action by vehicle occupants.

10. DEFINITIONS....Continued

SHUT OFF VALVE

Valve used to stop the flow of fuel system lading from one portion of the fuel system to another. These devices may be operated either manually or automatically and are, regardless of type, to be in the open (allowing flow) position during testing. The COTR will provide the test laboratory with any pertinent manufacturer-derived information as to vehicle-particular procedures and/or additional test apparatus or equipment that is required to ensure that all shutoff valves are in the open position during the FMVSS 303 test.

SERVICE PRESSURE

The internal pressure of a CNG fuel container (as specified by the manufacturer) when filled to design capacity with CNG at 20ºC (68ºF).

UNLOADED VEHICLE WEIGHT (UVW)

Weight of a vehicle with maximum capacity of all fluids (and maximum capacity of **ALL** fuels) 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 FUEL TANK CAPACITY (LIQUID FUEL SYSTEMS)

For Bi-fuel or Dual-fuel vehicles where the second fuel is a liquid, the fuel tank's unusable capacity (i.e., the volume of fuel left at the bottom of the tank when the vehicle's fuel pump can no longer draw fuel from the tank as shown in Figure 1) plus its usable capacity (i.e., the volume of fuel that can be pumped into the tank through the filler pipe with the vehicle on a level surface and with the unusable capacity already in the tank). The term does not include the vapor volume of the tank (i.e., the space above the fuel tank filler neck) nor the volume of the fuel tank filler neck.

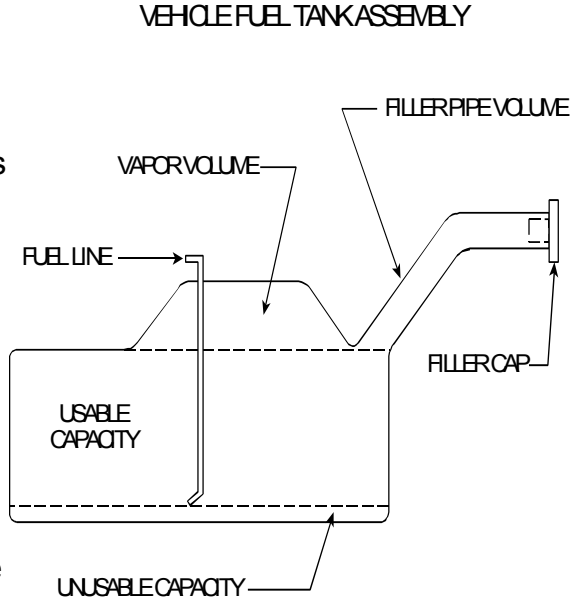


FIGURE 1

NOTE: "Usable capacity" and "unusable capacity" data will be furnished by the COTR. This information is obtained from the vehicle manufacturers.

11. PRETEST REQUIREMENTS

Prior to conducting any compliance tests, contractors are required to submit a detailed in-house compliance test procedure to the COTR which includes a step-by-step description of the methodology to be used. Written approval must be obtained from the COTR before initiating the compliance test program so that all parties are in agreement.

The contractor's test procedure shall contain a complete listing of test equipment and a detailed check-off list. There shall be no contradiction between the OVSC Laboratory Test Procedure (TP) and the contractor's in-house test procedure. The list of test equipment shall include instrument accuracy and calibration dates.

TEST DATA LOSS

A compliance test is not to be conducted unless all of the various test conditions specified in the applicable OVSC Laboratory Test Procedure have been met. Failure of a contractor to obtain the required test data and to maintain acceptable limits on test parameters (such as impact velocity) in the manner outlined in the applicable OVSC Laboratory Test Procedure shall require a retest at the expense of the contractor. The retest costs will include the cost of the replacement vehicle or item of motor vehicle equipment and the service costs for conducting the retest. The original GFP will remain the property of NHTSA, the retest vehicle shall remain the property of the Contractor. The contractor shall retain the retest vehicle for up to 180 days if the test is a failure. If the retest vehicle passes the test, the contractor may dispose of the vehicle upon notification from the COTR that the retest report has been accepted.

PHOTOGRAPHIC PITS

Photographic pits shall be located in the tow road both at the fixed collision barrier face and at mid-range so that any possible fuel system damage or breaches can be photographed (or Stoddard solvent spillage can be photographed for bi/dual fuel vehicles) during a frontal, oblique, rear or lateral impact event. Pit obstructions such as cross supports, excessive grating (applies to frontal and oblique impacts only), monorail, etc. shall be removed from the field of view of the 2 or 3 pit high speed motion picture cameras.

TEST VEHICLE AND MOVING BARRIER GUIDANCE

A guidance system is required to assure that the test vehicle or the moving barrier impacts the target at the proper angle. Normally the monorail which extends along the center of the tow road is used for lateral guidance with a small dolly or guide shoe "riding" on the monorail and engaging the drive cable through a set of jaws which grip the cable. SOLID CONNECTIONS between the guide shoe and the test vehicle or moving barrier ARE NOT ALLOWED — cables with

11. PRETEST REQUIREMENTS,,,,Continued

tensioning turnbuckles extending from the test vehicle's left and right side lower control arms to the guide shoe should be used. The guide shoe is normally released from the monorail at the entrance to the photographic pit and the test vehicle or moving barrier free wheels into the barrier face or target vehicle. The monorail should not extend over the photographic pit. The release of the barrier should take place between 6 and 24 inches from the impacted side of the test vehicle. The actual impact shall be within ±2 inches of the target impact location.

There should be a minimum amount of steel grating over the fixed collision barrier photographic pit in order to allow for maximum photographic coverage of the test vehicle's underbody area.

NOTE: Per the requirements of FMVSS 301, steel grating is NOT allowed for lateral or rear impact tests. The test vehicle must be placed on a concrete test surface.

IMPACT SPEED RANGES

Frontal, oblique and rear impact compliance tests shall be conducted within an impact speed range of 28.9 mph to 29.9 mph. Lateral impact compliance tests shall be conducted within a range of 18.9 mph to 19.9 mph. The reported impact speed must take into consideration the response characteristics of the entire system utilized in its determination.

NOTE: THE CONTRACTOR SHALL BE HELD LIABLE FOR RETEST (INCLUDING PROCUREMENT OF A LIKE TEST VEHICLE) AT THE CONTRACTOR'S EXPENSE IF THE COMPLIANCE TEST IMPACT SPEED FALLS OUTSIDE OF THE RANGES LISTED ABOVE!

IMPACT SPEED MEASUREMENT

Test vehicle or moving barrier impact speed or velocity shall be measured by 2 timing devices (photocells, break wires, laser beams, etc.) located within 5 feet of the impact plane. Both timing devices shall be accurate within plus or minus 0.05 mph and shall be calibrated by an instrument traceable to the National Institute of Standards and Technology (NIST). The impact speed shall be permanently recorded (photograph of the digital readout from the timing device will suffice). A third timing device shall be placed at a sufficient distance from the impact plane for monitoring the speed of the test vehicle or moving barrier and permit a test abort if necessary.

CNG FUEL STORAGE SYSTEM PRESSURE MEASUREMENT

11. PRETEST REQUIREMENTS....Continued

Test vehicle fuel storage system pressure shall be measured by at least one electronic pressure transducer with an accuracy of at least 0.1% over the pressure range of at least 0 to 4,000 psi and together with the recording equipment, shall have a potential error of no greater than ± 15.4 psi under test conditions. The transducer(s) must further be capable of making pressure measurements prior to, during and post vehicle-barrier impacts of up to 30 mph (including shock loads of 50 Gs). The pressure measurement system shall be calibrated by an instrument traceable to the National Institute of Standards and Technology (NIST). A permanent record of the test pressure readings, continuous or discrete, shall be made during the test and filed.

TEST ABORT SYSTEM

Test vehicles and the moving barrier shall be equipped with an onboard brake abort system. For rear impact compliance tests, the target vehicle and the moving barrier brake systems shall not be activated until after the final vehicle/barrier separation has occurred unless the vehicle rear wheels are jammed by deformed sheet metal and the vehicle remains against the moving barrier's face throughout the braking process. Moving barrier brakes shall be applied in advance of test vehicle brakes in order to preclude secondary impacts. The OVSC recommends the use of redundant brake abort systems.

GENERAL TEST CONDITIONS

A. Vehicle Loading —

(1) Passenger car is loaded to its Unloaded Vehicle Weight (UVW) plus its Rated Cargo and Luggage Capacity Weight (RCLW), secured in the luggage area, plus two 50th-percentile adult male test dummies (Part 572B or 572E), the weigh of which will be measured and recorded prior to conduct of the test, located at the front outboard designated seating positions. Both dummies are restrained only by means that are installed for protection at the front outboard seating positions. The RCLW is determined by using the information contained on the vehicle's tire placard (required by FMVSS 110, Tire Selection and Rims, and usually affixed to the vehicle's left B post). Standard 110 requires that the Vehicle Capacity Weight (VCW) and the Designated Seating Capacity (DSC) or number of occupants be recorded on the tire placard. This information is used to determine the RCLW as follows:

RCLW = VCW - (DSC x 150 lbs./occupant)

The Vehicle Test Weight (VTW) can now be calculated as follows:

11. PRETEST REQUIREMENTS....Continued

VTW = UVW + RCLW + (weight of 2 dummies)

The Actual Vehicle Test Weight (VTW) can now be calculated as follows:

ATW = UVW + RCLW + (weight of 2 dummies) - (10-20 lbs)

Note: Due to the difference in the physical properties between N_2 and CNG, the actual unloaded vehicle weight measurement taken from a vehicle with an N_2 pressurized fuel system may be greater than that of the vehicle with a CNG pressurized fuel system. Correction for this difference must be made to ensure proper vehicle test weight. Reweighing and verification of the actual vehicle test weight with the fuel system filled with N_2 is required to ensure that the vehicle is loaded to the correct test weight, calculated for the vehicle loaded (filled) with CNG.

(2) MPV, light truck or bus is calculated test weight is the vehicle loaded to its UVW (vehicles are tested to a MAXIMUM UVW of 5,500 pounds), plus 300 pounds or its RCLW (furnished by the COTR), whichever is LESS, secured to the vehicle, plus a Part 572B or 572E dummy at each front outboard seating position. The actual test weight will be the calculated test weight, minus 10 to 20 pounds. Each dummy is restrained only by means that are installed for protection at the seating position. The load is distributed so that the weight on each axle as measured at the tire-ground interfaces is in proportion to its GAWR. If the weight on any axle when the vehicle is loaded to its UVW plus dummy weight (as measured and recorded for each dummy prior to the test) exceeds the axle's proportional share of the VTW, the remaining weight is placed so that the weight on that axle remains the same. NOTE: UVW does not include the weight of work-performing accessories.

NOTE: Due to the difference in the physical properties between N_2 and CNG, the actual unloaded vehicle weight measurement taken from a vehicle with an N_2 pressurized fuel system may be greater than that of the vehicle with a CNG pressurized fuel system. Correction for this difference must be taken to ensure proper vehicle test weight. Reweighing and verification of the actual vehicle test weight with the fuel system filled with N_2 is required to ensure that the vehicle is loaded to the correct test weight, calculated for the vehicle loaded (filled) with CNG.

11. PRETEST REQUIREMENTS....Continued

B.1 Fuel System Capacity (Pressure - CNG Fuel System) —

(1) Prior to beginning the actual fuel system preparation and N_2 fill procedure, fill the fuel system to the service pressure with CNG (corrected accordingly for the ambient fill temperature). Check the fuel system for leakage via any method(s) available (acoustic detection, fuel odorant sniffers, pressure hold periods, visual inspections with soapy water solutions, etc.) to ensure that the system contains no inherent leaks or breaches as delivered . If any fuel system leaks are detected in the fuel system, contact the COTR immediately before beginning any further test preparation.

(2) With the vehicle on a level surface and all manual and automatic shutoff valves open (utilizing all manufacturer derived shut off valve information provided by the COTR), remove the fuel from the vehicle fuel system by depressurizing the high pressure side of the fuel system to atmospheric pressure, then operate the engine until the engine stops and will not again start.

(3) Install pressure transducer(s) (with the properties specified in "CNG FUEL SYSTEM PRESSURE MEASUREMENT") on the high pressure side of the fuel system in location(s) specified by the manufacturer in a manner as to ensure that there is no leakage through the transducer(s) or the fuel system/transducer interface. If the fuel storage cylinder(s) is equipped with an unused second (rear) fitting and plug, at this time, install plug mounted temperature transducer(s) in a manner as to ensure that there is no leakage through the transducer(s) or the fuel system/transducer interface. Also ensure that all transducers are attached in such a manner as to maintain the fuel system integrity at the transducer and transducer/fuel system interface during the crash (i.e. ensure that there will be no leakage from the fuel system caused by the transducers or their connection to the fuel system during or after the crash).

(4) Prior to beginning the actual fuel system equilibration procedure, with the fuel system filled to the service pressure with N_2 (corrected accordingly for the ambient fill temperature) and all pressure and temperature transducers installed, ensure that there is no leakage in any sensor, sensor-fuel system interface or any fuel system connection or fitting affected by the test preparation via the application of a soapy water solution to these areas.

11. PRETEST REQUIREMENTS....Continued

(5) Fill each fuel storage container between 90% to 120% of its service pressure with Nitrogen (N_2) gas (correcting the fill pressure accordingly for the ambient temperature at the time of filling). A slow fill rate is preferable to limit the temperature rise in the tank and fill gas and to reduce the number of iterative fill-equilibration cycles required to obtain final test pressurization. Crank the engine several times to pressurize the low pressure side of the system. Recheck fuel container pressure to ensure the system is still pressurized to 90% to 120% of service pressure. Equilibrate (stabilize) the vehicle to the target ambient test temperature (with the associated ± 5º range) for a minimum of 12 hours, recording ambient temperature and fuel container pressure measurements at a minimum of every 15 minutes. The system can be considered stabilized if —

(A) After the first 9 hours, the pressure measurements taken over any 3 hour stabilization period changes less then 60 psi, or

(B) If a temperature sensing device(s) has been mounted in a fuel storage container(s), then the system can be considered in equilibrium when the temperature reading in the tank is within ± 5ºF of the ambient test (stabilization) temperature and the temperature change within the tank is less then 3ºF/hour for a time period of at least 3 hours.

The fuel system cannot be considered stabilized until one or both of these conditions are met.

(6) After completing the stabilization period specified in step 5, and with all electric (automatic) shutoff valves that are normally open when the electrical system is activated open, all manual shutoff valves normally open when the vehicle is in operation open, and any shutoff valve on the fuel container open as well, ensure that the fuel storage system is pressurized to no less than 96% and no greater than 98% of its service pressure (corrected accordingly for the ambient test temperature).

(A) If the pressure is not within this range, but is between 91% and 103% percent of the service pressure, add or remove gas from the system and stabilize for a minimum of 4 hours, checking the pressure reading every 15 minutes. The system can be considered stabilized and filled if —

11. PRETEST REQUIREMENTS....Continued

[1] The pressure change during any 3 hour period following the first hour of this stabilization is less than 60 psi and the pressure reading at the end of the period is between 96% and 98% of service pressure (corrected accordingly for the ambient test temperature), or

[2] If a temperature sensing device is placed in a fuel storage container and there is less then a 3ºF/hour temperature change within the tank for a minimum period of 3 hours and the temperature within the tank is within ± 5ºF of the ambient test (stabilization) temperature and the pressure reading at the end of the period is between 96% to 98% of service pressure (corrected accordingly for the ambient test temperature).

If not, then repeat step (6).

(B) If the pressure is not within this range, and is not between 91% and 103% of the service pressure, add or remove gas from the system and stabilize for a minimum of 6 hours, checking the pressure reading every 15 minutes. The system can be considered stabilized and filled if —

[1] The pressure change during any 3 hour period following the first 3 hours of this stabilization is less than 60 psi and the pressure reading at the end of this stabilization period is between 96% and 98% of service pressure (corrected accordingly for the ambient test temperature), or

[2] If a temperature sensing device is placed in a fuel storage container and there is no more than a 3ºF/hour temperature change within the tank for at least a 3 hour period and the temperature within the tank is within ± 5ºF of the ambient test (stabilization) temperature and the pressure reading at the end of this stabilization period is between 96% to 98% of service pressure (corrected accordingly for the ambient test temperature)

If not, then repeat step (6).

11. PRETEST REQUIREMENTS....Continued

B.2 Fuel System Capacity (for liquid fuel system of bi/dual fuel vehicles) —

(1) With the test vehicle on a level surface, pump the fuel from the vehicle's fuel tank and then operate the engine until it stops, simultaneous with step (1) of B.1.

(2) Add Stoddard solvent (which has been dyed purple) to the test vehicle's fuel tank in an amount which is equal to not less than 91% and not more than 94% of the fuel tank's USABLE CAPACITY as stated by the vehicle's manufacturer (value furnished by COTR).

(3) Add the amount of Stoddard solvent needed to fill the entire fuel system from the fuel tank through the engine's induction system. Prior to the test, operate the engine to assure that Stoddard solvent is present throughout the entire fuel system.

C. Electric Fuel Pump Operation and Shutoff Valve Operation —

If the vehicle has an electrically driven fuel pump that normally runs when the vehicle's electrical system is activated, it shall be operating at the time of the barrier crash.

If the vehicle has any electric shutoff valves that are normally open when the electrical system is activated, they (and all manually operated shutoff valves) are to be open at the time of the barrier crash. Further, any electric shutoff valve that prevents sensing of system pressure by the pressure transducer when closed must remain open for both the initial pressure measurement and the pressure measurement 60 minutes after the impact. Any valve shall be open for a period of one minute to equalize system pressure.

NOTE: Since acid is drained from vehicle's battery prior to impact test (for protection of test personnel), it may be necessary to install a 12 volt dry cell battery in the test vehicle to be connected to the vehicle's battery terminals. The vehicle's ignition switch shall be placed in the "ON" position prior to the impact test.

D. Securing Ballast —

Canvas bags filled with sand, lead shot, or steel plates shall be secured in the luggage or cargo area (at the centroid of luggage mass if possible) using seat belt assemblies or steel straps attached to the vehicles rear floorpan.

11. PRETEST REQUIREMENTS....Continued

E. Vehicle Test Attitude —

Determine the distance between a level surface and a standard reference point on the test vehicle's body, directly above each wheel opening, when the vehicle is in its "as delivered" condition. The "as delivered" condition is the vehicle as received at the contractor's test facility, with 100 percent of all fluid and fuel capacities and all tires inflated to the manufacturer's specifications as listed on the vehicle's tire placard. Determine the distance between the same level surface and the same standard reference points in the vehicle's "fully loaded condition." The "fully loaded condition" is the test vehicle loaded in accordance with item A. The load placed in the cargo area shall be centered over the longitudinal centerline of the vehicle. The pretest vehicle attitude shall be equal to either the "as delivered" or "fully loaded" attitude or between the "as delivered" attitude and the "fully loaded" attitude.

F. Front Seat Cushion Adjustment —

Adjustable front seats are in the adjustment position MIDWAY between the forwardmost and rearmost positions, and if separately adjustable in a vertical direction, are at the LOWEST position. If an adjustment position does not exist midway between the forwardmost and rearmost positions, the closest adjustment position to the REAR of the midpoint is used. Record the extremes of seat cushion adjuster fore and aft travel and the midpoint on the vehicle's rocker panel or side sill cover plate using a black marker after placing a vertical reference line on the outboard side of the front seat(s).

G. Front Seat Back Adjustment —

Place adjustable front seat backs in the vehicle manufacturer's NOMINAL DESIGN RIDING POSITION in the manner specified by the manufacturer (information to be furnished by COTR). Place each adjustable head restraint in its highest adjustment position. Adjustable lumbar supports are positioned so that the lumbar support is in its LOWEST adjustment position.

H. Steering Column Adjustment —

Adjustable steering controls are adjusted so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions unless specific adjustment information is furnished by the COTR (using information furnished by the vehicle manufacturer).

11. PRETEST REQUIREMENTS....Continued

I. Movable Window Placement —

Movable vehicle windows and vents are placed in the fully open position.

J. Convertible Top Placement —

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

K. Door Latch Placement —

Doors are fully closed and latched but not locked.

L. Parking Brake and Transmission Placement —

The parking brake is disengaged and the transmission is in neutral.

M. Tire Inflation Pressure —

All tires (including spare if it is a full sized type) are inflated to the vehicle manufacturer's specifications as listed in the owner's manual for the test vehicle and also listed on the vehicle's tire placard.

N. Vehicle Fluids (Other Than Stoddard Solvent in Bi/Dual Fuel Vehicles) —

Prior to an impact test, drain all vehicle fluids such as battery acid, cooling system antifreeze, windshield washer fluid, power steering fluid, automatic transmission fluid, etc. so that any Stoddard solvent (dyed purple) leakage from the liquid fuel system of a bi or dual fuel vehicle will be evident and to protect test personnel (reason for draining acid from battery).

NOTE: If vehicle is equipped with an electric fuel pump which operates when the vehicle's engine is not operating, it may be necessary to install a 12 volt dry cell battery in the vehicle and connect it to the vehicle's battery terminals since the fluid has been drained from the battery.

O. Pretest Vehicle Measurements —

Record vehicle length (right side, left side and center) and width measurements for post test calculation of vehicle crush.

11. PRETEST REQUIREMENTS....Continued

P. Collection of Stoddard Solvent Spillage (Bi/Dual Fuel Vehicles) —

After vehicle impact, fuel system Stoddard solvent spillage shall be collected by hand and documented with a "real time" (24 fps) motion picture camera and stop watch. Collected Stoddard solvent samples shall be measured and spillage rates calculated.

Q. Movement of Test Vehicle —

After an impact test and associated post-impact leak detection period, the vehicle shall be transported from the impact area to the vehicle storage area using a technique that will not damage or displace any component of the vehicle's fuel system. The forks of a fork lift truck may be placed through the vehicle's side windows when lifting the vehicle if a FMVSS 212 test failure is NOT recorded.

S. Pretest Temperature —

The crash site ambient test temperature, measured at the fixed barrier or at the vehicle for moving barrier impacts, shall be measured and recorded just prior to and just after the test crash.

R. Pretest Fuel System Pressure —

Fuel system pressure shall be measured and recorded just prior to impact. The pressure shall be between 96% and 98% of the rated system operating pressure (corrected for ambient test temperature).

TEST TEMPERATURE CONDITIONS

The Contractor must verify that the ambient temperature surrounding the vehicle from the execution of the pretest soak, through the crash, and through the completion of the ensuing leak detection period does not vary by more than 10ºF. The target range for the test temperature shall be within 66ºF and 78ºF. At least one primary and one secondary temperature sensor must be used. The temperature sensors shall be accurate to within ± 0.5ºF. The ambient temperature must be monitored and continuously recorded from the time of initiating the pretest equilibration temperature soak until the conclusion of the post crash leak detection period. The ambient air temperature measurement must be continuously taken within 36 inches of the test vehicle.

The contractor shall mark the ambient air temperature recordings with the date, time, and technician name at the beginning and end of the pretest equilibration soak, the beginning of barrier or vehicle motion, the cessation of vehicle motion,

11. PRETEST REQUIREMENTS....Continued

and the beginning and the end of the post crash leak detection period. Any excursions from the specified temperature must be noted on the recording along with the reason(s) for the excursion.

PART 572B OR 572E TEST DUMMIES

50th-percentile adult male Part 572B or 572E test dummies shall be used as BALLAST ONLY (no instrumentation required) in each front outboard seating position. The following instructions apply to dummy usage:

A. As furnished by the OVSC, each test dummy shall be clothed in formfitting cotton stretch garments with short sleeves and midcalf length pants. Each foot of the test dummy is equipped with a size 11EE shoe which meets the configuration size, sole, and heel thickness specifications of MIL S-131192 and weighs 1.25 pounds ± 0.2 pounds.

B. Limb joints are set at 1g, barely restraining the weight of the limb when extended horizontally. Leg joints are adjusted with the torso in the supine position.

C. During vehicle impact tests, dummies shall be restrained only by means that are installed in the test vehicles. Consult vehicle's owners manual for proper usage of occupant restraints.

D. Dummies shall not be removed from the test vehicle until after the impact event and subsequent leak detection period is complete.

12. COMPLIANCE TEST EXECUTION

TEST REQUIREMENTS FOR FMVSS 212, WINDSHIELD MOUNTING

When a passenger car, multipurpose passenger vehicle (MPV), light truck or bus (GVWR of 10,000 pounds or less and MAXIMUM unloaded vehicle weight or UVW of 5,500 pounds) traveling longitudinally forward at 29.4 mph ± 0.5 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle (PERPENDICULAR FRONTAL IMPACT TEST), the windshield mounting of the vehicle shall retain NOT less than the minimum portion of the windshield periphery as follows:

A. Vehicles equipped with automatic occupant restraint systems shall retain not less than 50% of the portion of the windshield periphery on each side of the vehicle longitudinal centerline.

12. COMPLIANCE TEST EXECUTION....Continued

B. Vehicles NOT equipped with automatic occupant restraint systems shall retain not less than 75% of the windshield periphery.

NOTE: The standard does NOT apply to vehicles with a UVW greater than 5,500 pounds or to forward control vehicles, walk-in van-type vehicles, or to open-body-type vehicles with fold-down or removable windshields.

The following test condition shall apply —

The windshield mounting material and all vehicle components in direct contact with the mounting material are at any temperature between 15ºF and 110ºF. Temperature measurement shall be made 15 minutes before the frontal impact test.

TEST REQUIREMENTS FOR FMVSS 219, WINDSHIELD ZONE INTRUSION

When a passenger car, multipurpose passenger vehicle (MPV), light truck or bus (GVWR of 10,000 pounds or less) traveling longitudinally forward at 29.4 mph plus or minus 0.5 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle (PERPENDICULAR FRONTAL IMPACT TEST), no part of the vehicle outside the occupant compartment, except windshield molding and other components designed to be normally in contact with the windshield, shall penetrate the protected zone template, affixed to the windshield, to a depth of more than 0.25 inch, and no such part of the vehicle shall penetrate the inner surface of that portion of the windshield, within the daylight opening (DLO) below the protected zone.

NOTE: The standard does NOT apply to forward control vehicles, walk-in van-type vehicles, or to open-body-type vehicles with fold-down or removable windshields.

Protected Zone Template — The lower edge of the protected zone is determined by the following (see Figure 1):

A. Place a 6.5 inch diameter rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield glazing and the surface of the instrument panel, including padding. If any accessories or equipment such as the steering control system obstruct positioning of the sphere, remove them, and then replace them prior to barrier impact testing.

B. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the

12. COMPLIANCE TEST EXECUTION....Continued

outermost contactable points, extend the locus line horizontally to the edges of the glazing material.

NOTE: DO NOT SCRATCH GLAZING AS A METHOD OF MARKING THE CONTACT BETWEEN SPHERE AND WINDSHIELD.

C. Draw a line on the inner surface of the windshield below and 0.5 inch distant from the locus line.

D. The lower edge of the protected zone is the longitudinal projection onto the outer surface of the windshield on the line determined in item C.

The Protected Zone is the space enclosed by the following surfaces (see Figures 2 & 3) —

A. The outer surface of windshield in the precrash configuration.

B. The locus of points 3 inches outward along perpendiculars drawn to each point on the outer surface of the windshield.

C. The locus of lines forming a 45º angle with the outer surface of the windshield at each point along the top and side edges of the outer surface of the windshield and the lower edge of the protected zone previously determined, in the plane perpendicular to the edge at that point.

A Windshield Zone Template (WZT), see Figure 3, is cut or formed from Styrofoam, type DB, cut cell, to the dimensions of the protected zone previously determined. The WZT is affixed to the windshield so that it delineates the protected zone and remains affixed throughout the frontal barrier impact compliance test. The following test conditions shall apply —

FRONT VIEW OF WINDSHIELD

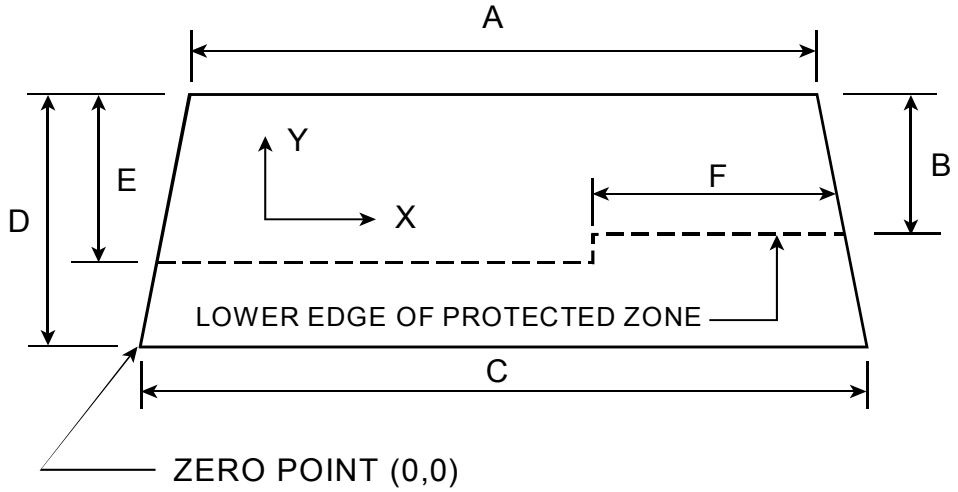
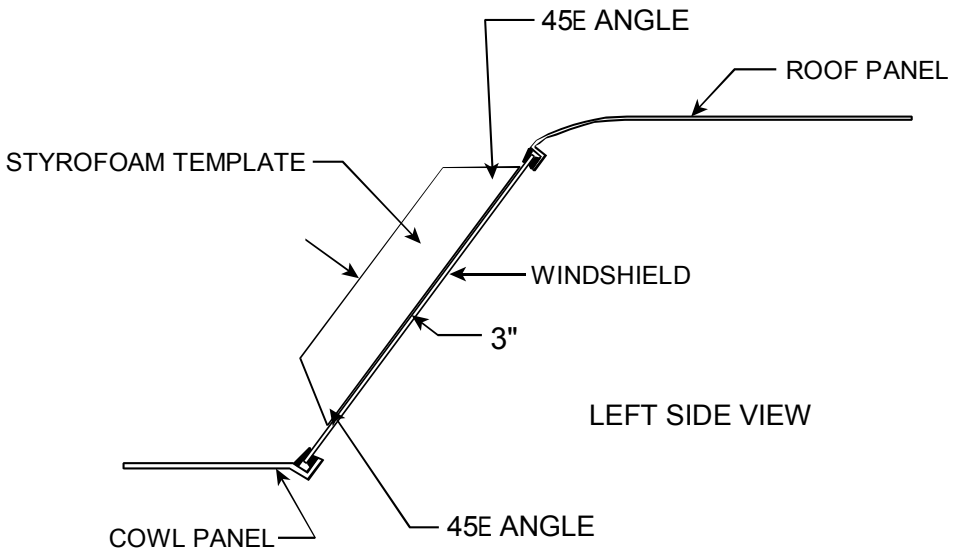


FIGURE 2

12. COMPLIANCE TEST EXECUTION....Continued

CROSS-SECTIONAL VIEW OF PROTECTED ZONE TEMPLATE



NOTE: VERTICAL SLOTS CUT IN FOAM TEMPLATE
ON SIDE WHICH IS PLACED AGAINST WINDSHIELD

FIGURE 3

A. The protected zone template is affixed to the windshield in a manner previously determined.

B. The hood, hood latches, and any other hood retention components are engaged prior to the frontal barrier impact test.

C. Adjustable cowl tops or other adjustable panels in front of the windshield are in the position used under normal operating conditions when windshield wiping systems are not in use.

TEST REQUIREMENTS FOR FMVSS 303, FUEL SYSTEM INTEGRITY

Each vehicle with a GVWR of 10,000 pounds or less shall be capable of meeting the requirements of any applicable barrier crash test followed by a post test leak detection period, without alteration of the vehicle during the test sequence. A particular vehicle need not meet further requirements after having been subjected to a single barrier crash test and post test leak detection period.

12. COMPLIANCE TEST EXECUTION....Continued

A. FRONTAL BARRIER CRASH. When the test vehicle is traveling longitudinally forward at a speed of 29.4 mph ± 0.5 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle (FRONTAL IMPACT TEST, see Figure 4), or at any angle up to 30º in either direction from the perpendicular to the line of travel of the vehicle (OBLIQUE IMPACT TEST), with 50th-percentile adult male test dummies as specified in Regulation Part 572, Subpart B or E (Part 572B or 572E dummies), at each front outboard designated seating position, fuel system leakage (measured via pressure drop) for the time period from vehicle impact until 60 minutes following cessation of motion, shall not exceed the greater of either:—

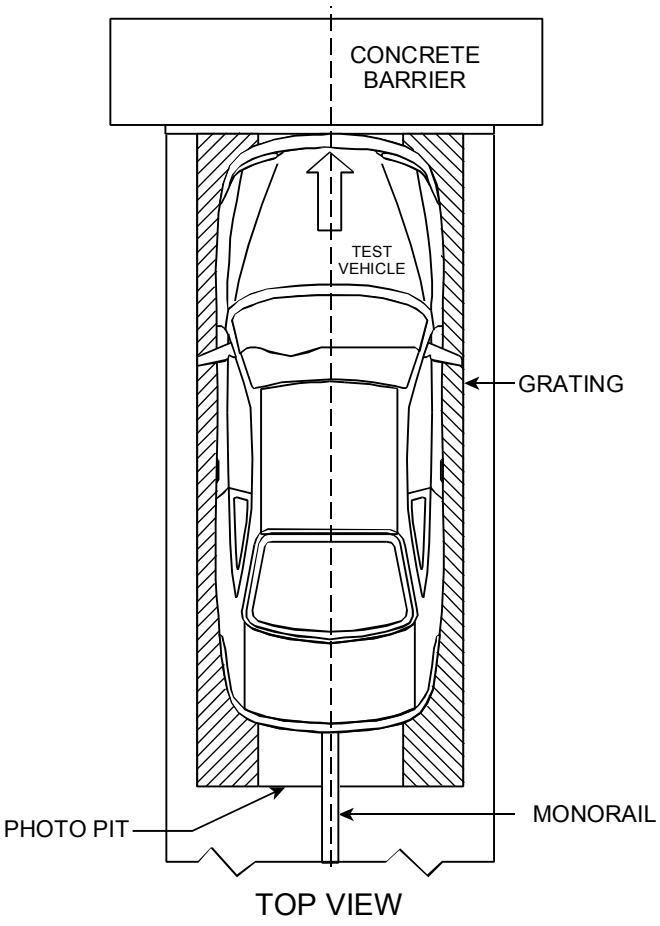


FIGURE 4

(1) 1,062 kPa (154 psi), or

(2) 895 x (T/V_{FS}) where T is the average test temperature (Kelvin) and V_{FS} is the Fuel System Volume (liters)

The nonyielding barrier should consist of a reinforced concrete surface 6 feet high, 6 feet thick and 12 feet wide, weighing approximately 100,000 pounds. The barrier face shall be adjustable for conducting 30 degree oblique impact tests.

12. COMPLIANCE TEST EXECUTION....Continued

B. REAR MOVING BARRIER CRASH. When the test vehicle is impacted from the rear by a barrier moving (see Figure 5) at a speed of 29.4 mph ± 0.5 mph, with Part 572B or 572E dummies at each front outboard designated seating position, fuel leakage shall not exceed the limits as specified in item A.

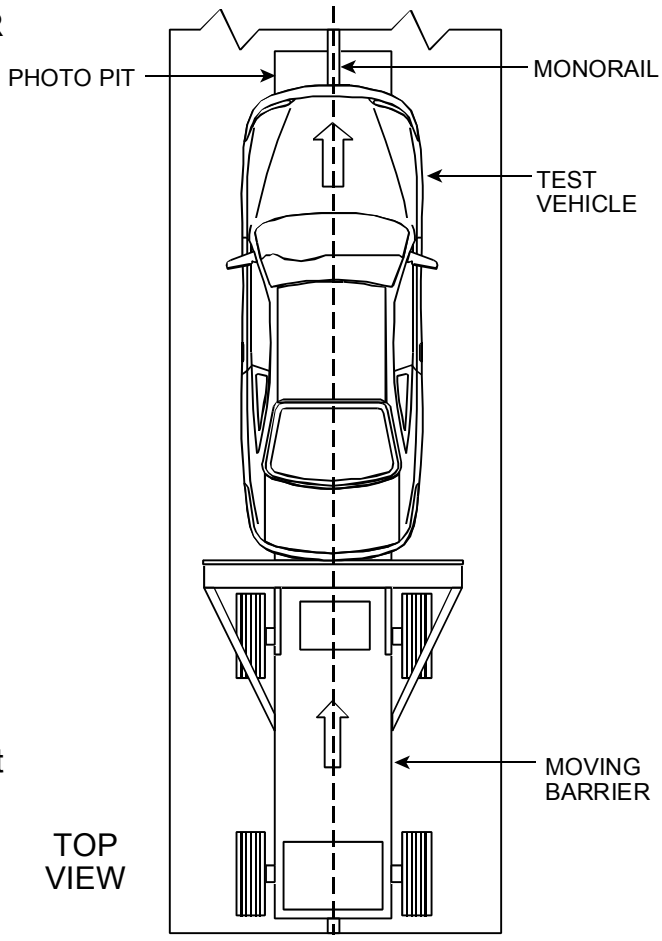


FIGURE 5

The following test conditions apply to the rear moving barrier crash test—

(1) The moving barrier, including the impact surface, supporting structure, and carriage (FMVSS 301, Figure 1, Common Carriage For Moving Barriers), weighs 3,960 pounds ± 10 pounds.

NOTE: General conditions for moving barrier common carriage —

(A) Rigid construction, symmetrical about longitudinal-vertical plane, solid nonsteerable front axle and fixed rear axle attached directly to frame rails with no spring or other type suspension system on any wheel.

(B) Total weight (including impact barrier face and carriage) distribution shall be 890 pounds at each rear wheel and 1090 pounds at each front wheel.

(C) Shall have braking device capable of stopping it.

12. COMPLIANCE TEST EXECUTION....Continued

(D) Tread width of 60 inches ± 1 inch, front and rear tires.

(E) Wheelbase of 120 inches ± 2 inches.

(F) Pneumatic tires on all wheels, G78-15 or equivalent, inflated to 24 psi minimum.

(G) The center of gravity shall be located at —

X = 54 inches ± 1.5 inches rearward of front wheel axis

Y = at the longitudinal-vertical plane of symmetry

Z = 15.8 inches ± 0.5 inch above ground

NOTE: the specifications for the moving barrier to be used by the contractor should be provided to NHTSA prior to the test in the laboratory test procedure.

(2) The impact surface of the moving barrier is a vertical, rigid, flat rectangle, 78 inches wide and 60 inches high, perpendicular to its direction of movement, with its lower edge horizontal and 5 inches above the ground surface. The impact surface shall be faced with a sheet of 0.75 inch thick exterior plywood which is 78 inches wide and 60 inches high. The plywood shall be replaced as necessary during the compliance testing program.

(3) During the entire impact sequence the moving barrier undergoes no significant amount of dynamic or static deformation, and absorbs no significant portion of the energy resulting from the impact, except for energy that results in translational rebound movement of the barrier.

(4) During the entire impact sequence (prior to release) the moving barrier is guided so that it travels in a straight line, with no significant lateral, vertical or rotational movement. The barrier release from the towing system shall be accomplished between 6 and 24 inches from impacted side of the vehicle. The barrier shall be aligned so that a vertical plane passing through the geometric longitudinal centerline of the carriage (perpendicular to the impact surface of the barrier face) will contact within ± 2 inches of either the test vehicle longitudinal centerline for rear tests or a line perpendicular to the longitudinal center line passing through the driver SRP for lateral tests.

12. COMPLIANCE TEST EXECUTION....Continued

(5) The concrete surface upon which the vehicle is tested is level, rigid and of uniform construction, with a skid number of 75 when measured in accordance with ASTM Method E-274-65T at 40 mph, omitting water delivery as specified in paragraph 7.1 of that method.

(6) The moving barrier's brakes should not be applied until after barrier/vehicle separation.

(7) The moving barrier and the test vehicle are positioned so that at impact

(A) The vehicle is at rest on a concrete surface (NOT STEEL GRATING) in its normal attitude

(B) The moving barrier is traveling at 29.4 mph ± 0.5 mph with its impact face perpendicular to the longitudinal centerline of the vehicle

(C) A vertical plane through the geometric center of the barrier impact surface and perpendicular to that surface coincides with the longitudinal centerline of the vehicle

12. COMPLIANCE TEST EXECUTION....Continued

C. LATERAL MOVING BARRIER CRASH When the test vehicle is impacted laterally on EITHER SIDE by a barrier (see Figure 6) moving at a speed of 19.4 mph ± 0.5 mph with Part 572B or 572E dummies located at the front outboard seating positions, fuel leakage shall not exceed the limits as specified in item A.

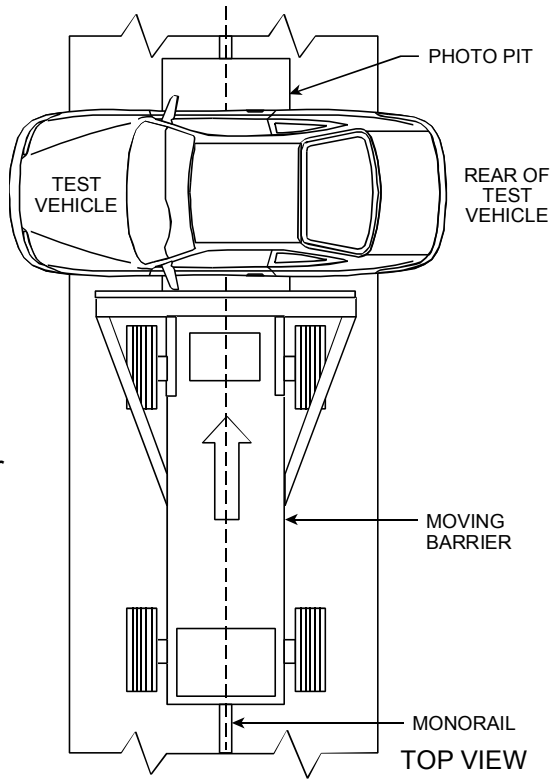


FIGURE 6

The following test conditions apply to the lateral moving barrier crash test:

Test conditions (1) through (6) are the same as those listed previously for rear moving barrier impact tests, Item B.

(1) The barrier and the test vehicle are positioned so that at impact —

(A) The vehicle is at rest in its normal attitude

(B) The barrier is traveling in a direction perpendicular to the longitudinal axis of the vehicle at 19.4 mph ± 0.5 mph

(C) A vertical plane through the geometric center of the barrier impact surface and perpendicular to that surface passes through the driver's Seating Reference Point (SRP) in the tested vehicle

13. POST TEST REQUIREMENTS

The contractor shall re-verify all instrumentation and check data sheets and photographs.

The contractor will visually and audibly inspect the fuel system for leakage from the fuel system or fuel systems of bi-fuel and dual fuel vehicles.

14. REPORTS

14.1 MONTHLY STATUS REPORTS

The contractor shall submit a monthly Test Status Report and a Vehicle Status Report to the COTR. The Vehicle Status Report shall be submitted until all vehicles are disposed of. Samples of the required Monthly Status Reports are contained in the report forms section.

14.2 APPARENT NONCOMPLIANCE

A test failure shall be communicated by telephone to the COTR 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) shall be included. In the event of a test failure, a post test calibration check of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration shall be at the COTR's discretion and shall be performed without additional costs to the OVSC.

14.3 FINAL TEST REPORTS

14.3.1 COPIES

In the case of a test failure, SEVEN copies of the Final Test Report shall be submitted to the COTR for acceptance within three weeks of test completion. The Final Test Report format to be used by all contractors can be found in the Report Section.

Where there has been no indication of a test failure, FOUR copies of each Final Test Report shall be submitted to the COTR within three weeks of test completion. Payment of contractor's invoices for completed compliance tests may be withheld until the Final Test Report is accepted by the COTR. Contractors are requested to NOT submit invoices before the COTR is provided copies of the Final Test Report.

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 COTR

14. REPORTS....Continued

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 COTR. 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.

14.3.2 REQUIREMENTS

The Final Test Report, 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 COTR. For these reasons, each final report must be a complete stand-alone document.

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.

14.3.3 FIRST THREE PAGES

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

(1) Final Report Number such as 303-ABC-0X-001, where --
303 is the FMVSS tested
ABC are the initials for the laboratory
0X is the Fiscal Year of the test program (after year 1999)
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 303
Fuel System Integrity
for CNG Vehicles
* * * * * * * * * * * * * * * *

14. REPORTS....Continued

World Motors Corporation
200X XYZ 4-door sedan
NHTSA No. CX0401

(3) Contractor's Name and Address such as

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

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
400 Seventh Street, SW
Room 6111 (NVS-220)
Washington, DC 20590

14. REPORTS....Continued

B. FIRST PAGE AFTER FRONT COVER —

A disclaimer statement and an acceptance signature block for the COTR shall be provided as follows

This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By: _____

Approved By: _____

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: _____

Acceptance Date: _____

14. REPORTS....Continued

C. SECOND PAGE AFTER FRONT COVER —

A completed Technical Report Documentation Page (Form DOT F1700.7) shall be completed for those items that are applicable with the other spaces left blank. Sample data for the applicable block numbers of the title page follows.

Block 1 — REPORT NUMBER

303-ABC-9X-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 303 Compliance Testing of 200X World XYZ 4-door sedan, NHTSA No. CX0401

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-XXX-001

14. REPORTS....Continued

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070

Block 10 — WORK UNIT NUMBER

Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

DTNH22-0X-D-12345

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

US Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
400 Seventh Street, SW, Room 6111 (NVS-220)
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-221

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 200X World XYZ 4-door sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-303-0X for the determination of FMVSS 303 compliance. Test failures identified were as follows:

14. REPORTS....Continued

None

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

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 303

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from —

NHTSA Technical Information Services (TIS)
Room 5108 (NPO-230)
400 Seventh St., SW
Washington, DC 20590
Telephone No.: 202-366-4946

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

14.3.4 TABLE OF CONTENTS

Final test report Table of Contents shall include the following:

Section 1 — Purpose of Compliance Test

14. REPORTS....Continued

Section 2 — Compliance Test Results Summary

Section 3 — Compliance Test Data

Section 4 — Noncompliance Data (if applicable)

Section 5 — Photographs

15. DATA SHEETS

SUMMARY OF RESULTS

Vehicle's NHTSA No.: _____; Test Mode: _____

Test Date: _____; Time: _____; Temperature: _____ ºF

Vehicle Model Year, Make, Model and Body Style:

_____

Vehicle Test Weight: _____ lbs. ; Impact Velocity: _____ mph

Static Crush: Left Side = _____ in.

Right Side = _____ in.

Centerline = _____ in.

Average Crush: _____ in.

Vehicle Rebound: _____ in. (FRONTAL IMPACTS ONLY)

Type of Front Occupant Restraint System Installed in Test Vehicle:

Driver's DSP: _____

Right Passenger's DSP: _____

Visible Dummy Contact Points:

Driver: _____

_____

Passenger: _____

_____

15. DATA SHEETS....Continued

Front Door Opening Data:

Left: _____

Right: _____

Loss of Windshield Retention (if applicable): _____

_____

_____

Penetration of Windshield Zone Template (if applicable) : _____

_____

_____

Fuel leakage Vehicle's Fuel System: _____

_____

_____

Schematic of Vehicle Fuel System(s):

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

VEHICLE DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: _____

NHTSA No.: _____; VIN: _____

Engine Data: _____

Transmission Data: _____

Final Drive Data: _____

Major Options: _____

Date Received: _____; Odometer Reading: _____ miles

Selling Dealer: _____

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: _____

Date of Manufacture: _____

VIN: _____

GVWR: _____ lbs. GAWR — Front: _____ lbs.

GAWR — Rear: _____ lbs.

DATA FROM VEHICLE'S TIRE PLACARD:

Location of Placard on Vehicle: _____

Tire Pressure With Maximum Capacity Vehicle Load —

Front: _____ psi Rear: _____ psi

15. DATA SHEETS....Continued

Recommended Tire Size: _____

Recommended Load Range: _____

Recommended Cold Tire Pressure — Front: _____ psi

Rear: _____ psi

Size of Tires on Test Vehicle: _____

Type of Spare Tire: _____

Vehicle Capacity Data —

Type of Front Seat(s) : _____

Number of Occupants — Front: _____

Rear: _____

TOTAL: _____

A. VEHICLE CAPACITY WEIGHT (VCW) = _____ lbs.

B. Number of Occupants x 150 lbs. = _____ lbs.

RATED CARGO AND LUGGAGE WEIGHT (RCLW) = A - B = _____ lbs.

15. DATA SHEETS....Continued

WEIGHT OF TEST VEHICLE:

A. As Received At Laboratory (Maximum Fluids) —

Right Front = _____ lbs. Right Rear = _____ lbs.

Left Front = _____ lbs. Left Rear = _____ lbs.

TOTAL FRONT = _____ lbs. TOTAL REAR = _____ lbs.

% of TOTAL = _____ % % of TOTAL = _____ %

TOTAL DELIVERED WEIGHT = _____ lbs.

B. Calculation of Target Test Weight —

1. Total Delivered Weight = _____ lbs.

2. Rated Cargo & Lugg. Weight (RCLW) = _____ lbs.

3. Weight of 2 Dummies (____ lbs. each) = _____ lbs.

TARGET TEST WEIGHT = 1 + 2 + 3 = _____ lbs.

C. Vehicle, Dummies and _____ lbs. of Cargo Weight —

Right Front = _____ lbs. Right Rear = _____ lbs.

Left Front = _____ lbs. Left Rear = _____ lbs.

TOTAL FRONT = _____ lbs. TOTAL REAR = _____ lbs.

% of TOTAL = _____ % % of TOTAL = _____ %

TOTAL TEST WEIGHT = _____ lbs.

15. DATA SHEETS....Continued

Weight of Ballast secured in cargo area = _____ lbs.

Type of Ballast: _____

Method of Securing Ballast: _____

Vehicle Components Removed for Weight Reduction —

_____

TEST VEHICLE ATTITUDE:

As Delivered — Right Front: _____ inches

Left Front: _____ inches

Right Rear: _____ inches

Left Rear: _____ inches

As Tested — Right Front: _____ inches

Left Front: _____ inches

Right Rear: _____ inches

Left Rear: _____ inches

Vehicle's Wheelbase = _____ inches

FUEL SYSTEM DATA:

CNG Fuel System Capacity Listed in Owner's Manual = _____ psi @ ___º F

Usable Capacity Figure Furnished By COTR = _____ psi @ ___º F

Test Volume Range (96 to 98% of Usable Capacity) —

_____ psi TO _____ psi @ ____º F

15. DATA SHEETS....Continued

ACTUAL TEST PRESSURE = _____ psi (with entire fuel system filled) @ ___º F

Test Fluid Type: Nitrogen _____

Type of Vehicle Fuel Pump: _____

Electric Fuel Pump Operation with Ignition Switch ON and Engine OFF —

_____

Liquid Fuel System Capacity Listed in Owner's Manual = _____ gallons

Usable Capacity Figure Furnished By COTR = _____ gallons

Test Volume Range (91 to 94% of Usable Capacity) —

_____ gallons TO _____ gallons

ACTUAL TEST VOLUME = _____ gallons (with entire fuel system filled)

Test Fluid Type: Stoddard solvent _____

Test Fluid Specific Gravity: _____

Test Fluid Kinematic Viscosity: _____ centistokes

Test Fluid Color: _____ ("purple" is preferred)

Type of Vehicle Fuel Pump: _____

Electric Fuel Pump Operation with Ignition Switch ON and Engine OFF —

_____

Details of Fuel System:

15. DATA SHEETS....Continued

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

POST IMPACT DATA

TYPE OF TEST: _____

TEST DATE: _____; TIME: _____; TEMP.: _____ ºF

VEH. NHTSA NO.: _____; VIN: _____

REQUIRED IMPACT VELOCITY RANGE: _____ to _____ mph

ACTUAL IMPACT VELOCITY: (speed traps located within 5 feet of impact plane)

Trap No. 1 = _____ mph Trap No. 2 = _____ mph

Average Impact Speed = _____ mph

VEHICLE STATIC CRUSH: (for Frontal and Rear Impacts ONLY)

Pretest Vehicle Length —

Right Side = _____ inches

Centerline = _____ inches

Left Side = _____ inches

Post Test Vehicle Length —

Right Side = _____ inches

Centerline = _____ inches

Left Side = _____ inches

STATIC CRUSH —

Right Side = _____ inches

Centerline = _____ inches

Left Side = _____ inches

AVERAGE = _____ inches

15. DATA SHEETS....Continued

VEHICLE REBOUND: (from fixed collision barrier test ONLY)

Distance from Front of Test Vehicle to Impact Point —

Right Side = _____ inches

Centerline = _____ inches

Left Side = _____ inches

AVERAGE = _____ inches

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

SUMMARY OF FMVSS 212 DATA

DETAILS OF WINDSHIELD MOUNTING (method of retention, type of trim, etc.)

WINDSHIELD PERIPHERY:

Pretest Measurement —	Right Side =	_____ inches
	Left Side =	_____ inches
	TOTAL =	_____ inches
Post Test Measurement —	Right Side =	_____ inches
	Left Side =	_____ inches
	TOTAL =	_____ inches

NOTE: Post Test Measurement shall be minimum of 75% of Pretest Measurement for vehicle NOT equipped with automatic front occupant restraints. Post Test Measurement shall be a minimum of 50% for each side of the windshield for vehicles equipped with automatic front occupant restraints.

TEMPERATURE OF WINDSHIELD MOLDING DURING TEST = _____º F

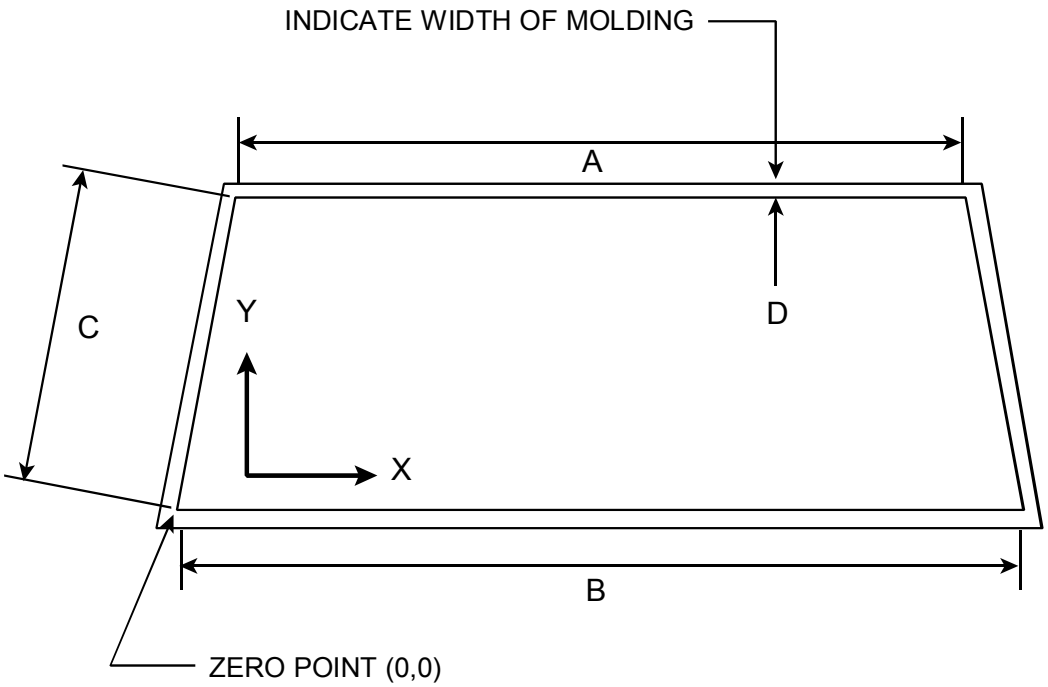
AREA OF RETENTION FAILURES:

Indicate area of retention loss and width of molding on sketch shown on next page.

REMARKS:

15. DATA SHEETS....Continued

FRONT VIEW OF WINDSHIELD



REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

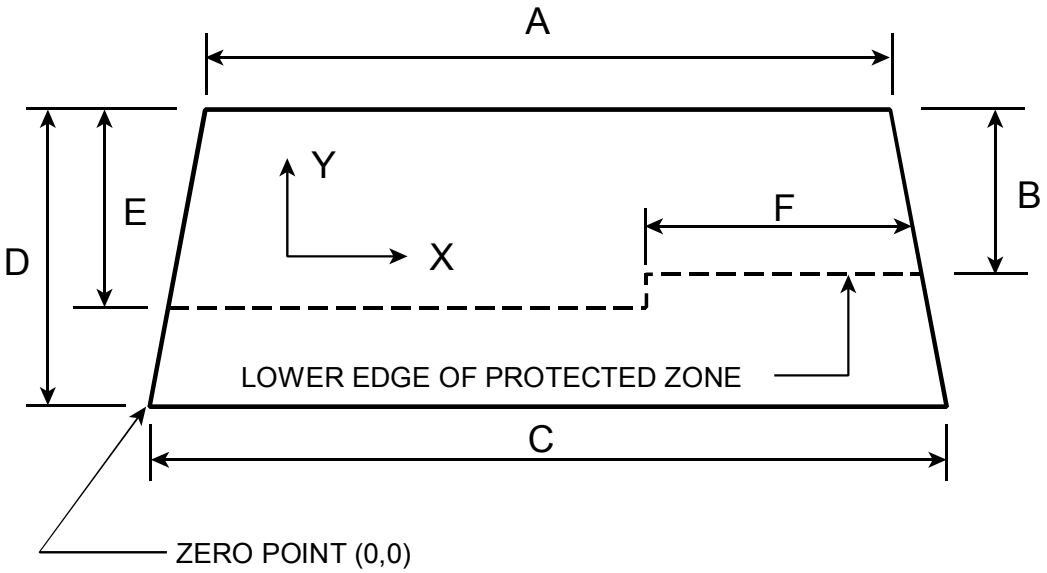
SUMMARY OF FMVSS 219 DATA

METHOD OF ADHERING STYROFOAM TEMPLATE TO WINDSHIELD:

SKETCH OF FRONT VIEW OF WINDSHIELD:

Provide all dimensions necessary to reproduce the protected area

FRONT VIEW OF WINDSHIELD



15. DATA SHEETS....Continued

AREA OF PROTECTED ZONE FAILURES:

A. Provide coordinates of the area that the protected zone template was penetrated more than 0.25 inches by a vehicle component other than one which is normally in contact with the windshield

_____

_____

B. Provide coordinates of the area beneath the protected zone template that the inner surface of the windshield was penetrated by a vehicle component

_____

_____

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

SUMMARY OF FMVSS 303 DATA

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

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: _____

_____

TYPE OF IMPACT: _____

FUEL LEAKAGE MEASUREMENT:

A. Initial pressure and temperature reading at start of test —

Pressure reading = _____ psi

Temperature reading = _____ ºF

B. For 60 minute period after vehicle motion ceases —

0 minute readings:	Pressure =	_____ psi
	Temperature =	_____ ºF
15 minute readings:	Pressure =	_____ psi
	Temperature =	_____ ºF
30 minute readings:	Pressure =	_____ psi
	Temperature =	_____ ºF
45 minute readings:	Pressure =	_____ psi
	Temperature =	_____ ºF
60 minute readings:	Pressure =	_____ psi
	Temperature =	_____ ºF

15. DATA SHEETS....Continued

For 60 minutes: Total Pressure Drop = _____ psi

Average Temperature = _____ ºF

C. Pressure drop from initial reading to end of 60 minutes:

Actual = _____ psi

Maximum Allowable = The greater of 154 psi or 129.8(T/V_{FS}) psi (where T is in degrees Kelvin and V_{FS} is in liters) = _____ psi

D. Provide Leakage Details:

REMARKS:

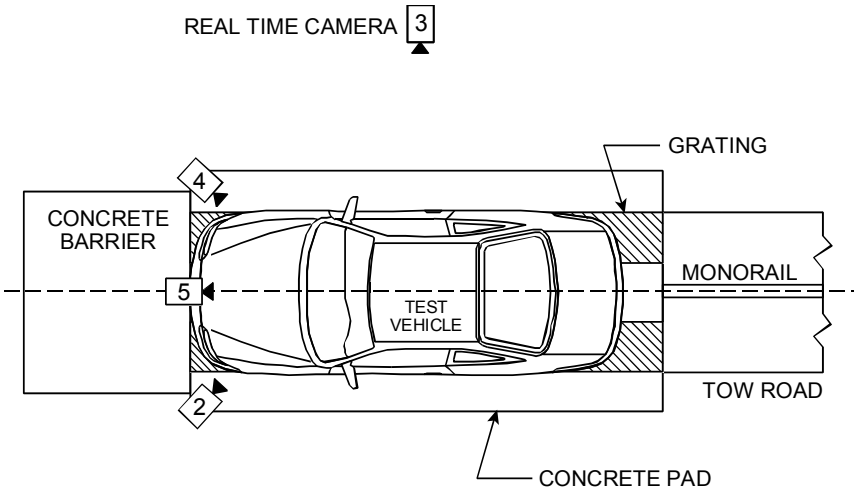
RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

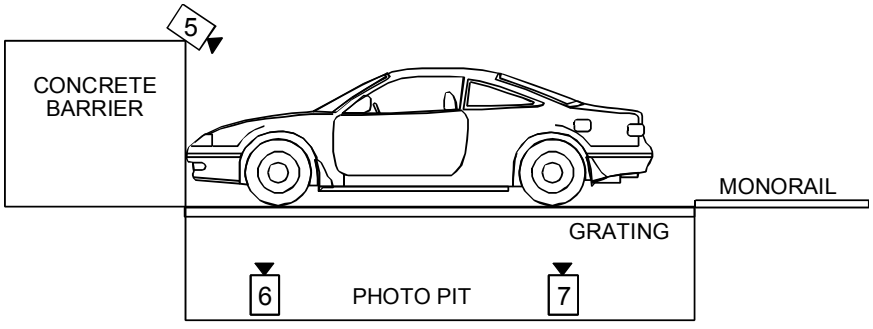
15. DATA SHEETS....Continued

CAMERA LOCATIONS (Sheet 1 of 3)

VEHICLE NHTSA NO.: _____; TEST DATE: _____



1
TOP VIEW

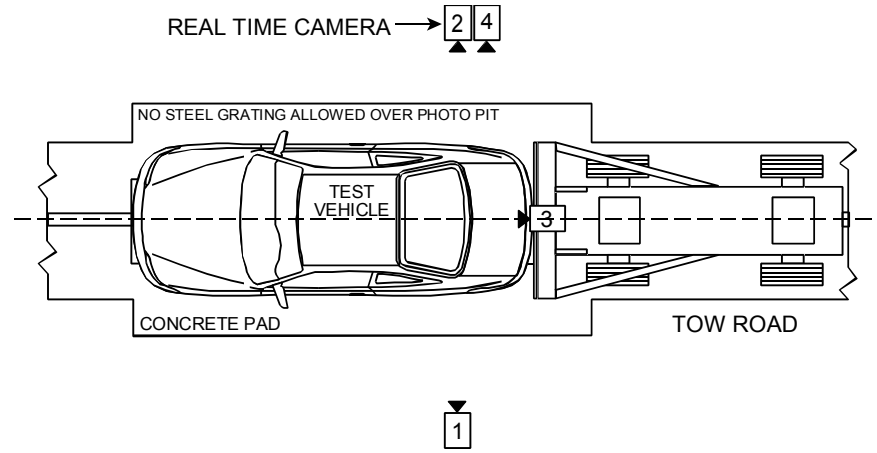


LEFT SIDE VIEW

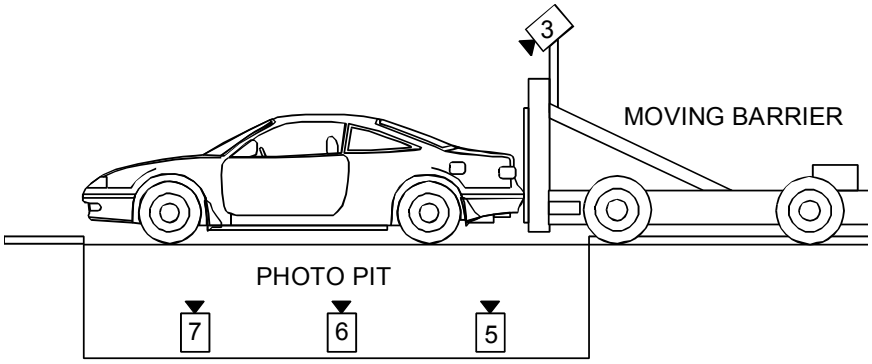
15. DATA SHEETS....Continued

CAMERA LOCATIONS (Sheet 2 of 3)

VEHICLE NHTSA NO.: _____; TEST DATE: _____



TOP VIEW

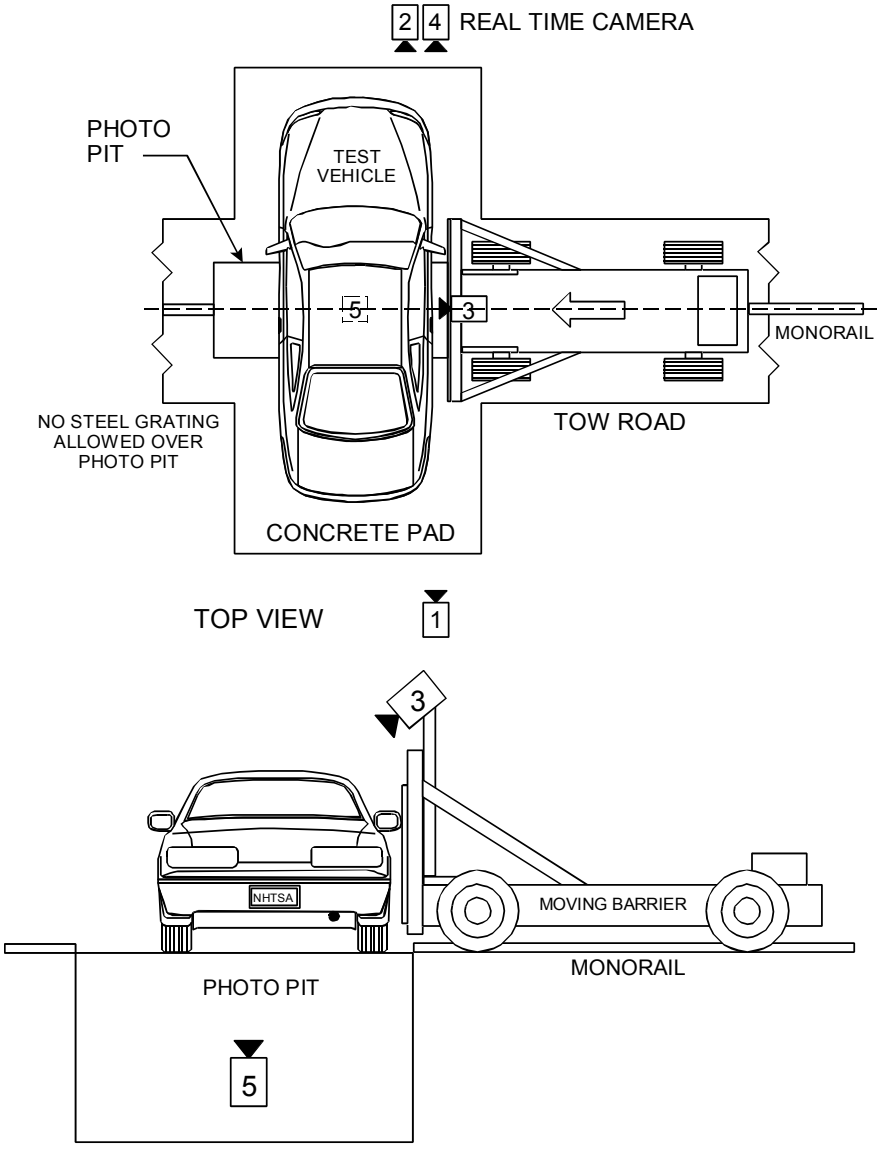


LEFT SIDE VIEW

15. DATA SHEETS....Continued

CAMERA LOCATIONS (Sheet 3 of 3)

VEHICLE NHTSA NO.: _____; TEST DATE: _____



LEFT SIDE VIEW

16. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 303 TEST DATE: _____

LABORATORY: _____

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

LAB.PROJECT ENGINEER'S NAME: _____

TEST VEHICLE YEAR/MAKE/MODEL/BODY STYLE:

_____

VEH. NHTSA NO.: _____; VIN: _____

MFR: _____

TEST FAILURE DESCRIPTION: _____

_____

_____

_____

FMVSS REQUIREMENT, PARAGRAPHS ___ : _____

_____

_____

_____

NOTIFICATION TO NHTSA (COTR) : _____

DATE: _____ ; BY: _____

REMARKS:

16. FORMS....Continued

MONTHLY TEST STATUS REPORT
FMVSS 303
DATE OF REPORT: _____

NO.	VEHICLE NHTSA NO., MAKE & MODEL	COMPLIANCE TEST DATE	PASS/ FAIL	DATE REPORT SUBMITTED	DATE INVOICE SUBMITTED	INVOICE PAYMENT DATE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

16. FORMS....Continued

MONTHLY VEHICLE STATUS REPORT
FMVSS 303
DATE OF REPORT: _____

NO.	VEHICLE NHTSA NO., MAKE & MODEL	DATE OF DELIVERY	ODOMETER READING	TEST COMPLETE DATE	VEHICLE SHIPMENT DATE	ODOMETER READING
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

APPENDIX A
MODIFIED FMVSS 303 TEST, REAR IMPACT ONLY

FOR THE PURPOSE OF ACQUIRING INFORMATION FOR RESEARCH AND DEVELOPMENT, FMVSS 303, FUEL SYSTEM INTEGRITY TEST FOR CNG VEHICLES — REAR IMPACT, IS MODIFIED WITH THE FOLLOWING ADDITIONAL TEST AND DATA ACQUISITION REQUIREMENTS:

A.1 TEST EQUIPMENT DESCRIPTION

The following is a list of the minimum additional test equipment needed to perform the modified FMVSS 303 test.

A. An anthropomorphic test dummy, Part 572E (Hybrid III).

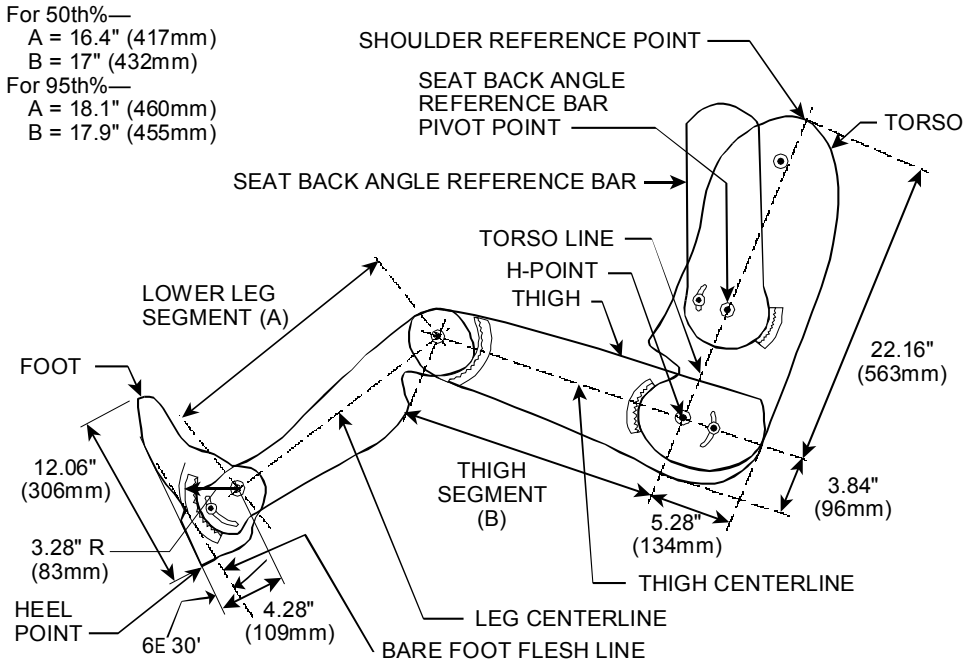
B. Head Center of Gravity (C.G.) Triaxial Accelerometers for the test dummy specified above.

C. Chest C.G. Triaxial Accelerometers for the test dummy specified above.

D. Pelvis C.G. Triaxial Accelerometers for the test dummy specified above.

E. A H-Point machine (H-Point Template shown below).

H-POINT TEMPLATE



APPENDIX A....Continued

F. Sensors to measure vehicle acceleration, driver seat back angular displacement and acceleration, driver seat belt motion (playout), and driver seat belt load.

G. Data recording equipment having sufficient channels to record the necessary time history. Each data channel shall consist of a sensor, signal conditioner, data acquisition device, and all interconnecting cables and must conform to the requirements of SAE Recommended Practice J211.

A.2 ADDITIONAL INSTRUMENTATION

Instrument the Hybrid III dummy as follows:

A. Head C.G. Triaxial Accelerometers

B. Chest C.G. Triaxial Accelerometers

C. Pelvis C.G. Triaxial Accelerometers

D. Upper Neck

1. 3-axis Neck Force Transducers (GFE*)

2 3-axis Neck Moment Transducers (GFE*)
* Government furnished item

Dummy calibration, according to Part 572E Dummy Performance Calibration Procedure, to be performed prior to the start of testing, after every fifth test, and at the completion of testing.

Instrument the test vehicle to record the following:

A. Primary and redundant accelerometers to record occupant compartment acceleration

B. Driver seat back angular displacement

C. Driver seat back angular acceleration

D. Driver seat belt motion (playout)

E. Driver seat belt load

APPENDIX A....Continued

NOTE: Location of transducers will be determined in coordination with the Office of Vehicle Safety Compliance (OVSC) and the Office of Crashworthiness Research (OCR).

Onboard Camera Requirement

One high speed camera (1,000 frames/second) placed in the vehicle to acquire improved film coverage of seat/dummy/belt dynamics in a rear crash. Actual camera location will be chosen in coordination with OVSC and OCR.

Final Report and Film Requirements

A. Plots to be included in test report —

Head X,Y,Z resultant acceleration vs. time

Chest X,Y,Z resultant acceleration vs. time

Pelvis X,Y,Z resultant acceleration vs. time

Upper neck X,Y,Z force vs. time

Upper neck X,Y,Z moment vs. time

Vehicle acceleration vs. time

Seat back angular displacement vs. time

Seat back angular acceleration vs. time

Seat belt force vs. time

Seat belt playout vs. time

B. Two copies of high speed film delivered with Final Test Report

A.3 DUMMY POSITIONING AND MEASUREMENTS

Anthropomorphic Test Dummy (not furnished by the Government)(Amending Section 10.8 Part 572B Test Dummies) - Seat a Part 572E (Hybrid III) test dummy in the driver location and measure its seating according to Appendix C and Pages 75-83 of Test Procedure TP-208-09 dated March 15, 1993. An H-point machine not be furnished by the Government. An uninstrumented Part 572B Test Dummy shall be placed in the front passenger location as ballast.

APPENDIX A....Continued

A.4 DATA TAPES FOR ALL STANDARDS

NHTSA Tape Reference Guide dated August 1993.

APPENDIX B
FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 212
WINDSHIELD MOUNTING

S1 SCOPE

This standard establishes windshield retention requirements for motor vehicles during crashes.

S2 PURPOSE

The purpose of this standard is to reduce crash injuries and fatalities by providing for retention of the vehicle windshield during a crash, thereby utilizing fully the penetration-resistance and injury-avoidance properties of the windshield glazing material and preventing the ejection of occupants from the vehicle.

S3 APPLICATION

This standard applies to passenger cars and to multipurpose passenger vehicles (MPV), trucks, and buses having a gross vehicle weight rating of 10,000 pounds or less. However, it does not apply to forward control vehicles, walk-in van-type vehicles, or to open-body-type vehicles with fold-down or removable windshields.

S4 DEFINITION

PASSIVE RESTRAINT SYSTEM

A system meeting the occupant crash protection requirements of S5 of Standard No. 208, Occupant Crash Protection, by means that require no action by vehicle occupants.

S5 REQUIREMENTS

When the vehicle traveling longitudinally forward at any speed up to and including 30 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, under the conditions of S6, the windshield mounting of the vehicle shall retain not less than the minimum portion of the windshield periphery specified in S5.1 and S5.2.

APPENDIX B....Continued

S5.1 VEHICLES EQUIPPED WITH PASSIVE RESTRAINTS

Vehicles equipped with passive restraint systems shall retain not less than 50 percent of the portion of the windshield periphery on each side of the vehicle longitudinal centerline.

S5.2 VEHICLES NOT EQUIPPED WITH PASSIVE RESTRAINTS
Vehicles not equipped with passive restraint systems shall retain not less than 75 percent of the windshield periphery.

S6 TEST CONDITIONS

The requirements of S5 shall be met under the following conditions:

S6.1 The vehicle, including test devices and instrumentation, is loaded as follows:

(a) Except as specified in S6.2, a passenger car is loaded to its unloaded vehicle weight plus its cargo and luggage capacity weight, secured in the luggage area, plus a 50th-percentile test dummy as specified in Part 572 of this chapter at each front outboard designated seating position and at any other position whose protection system is required to be tested by a dummy under the provisions of Standard No. 208. Each dummy is restrained only by means that are installed for protection at its seating position.

(b) Except as specified in S6.2, a multipurpose passenger vehicle, truck, or bus is loaded to its unloaded vehicle weight plus 300 pounds or its rated cargo and luggage capacity, whichever is less, secured to the vehicle, plus a 50th-percentile test dummy as specified in Part 572 of this chapter at each front outboard designated seating position and at any other position whose protection system is required to be tested by a dummy under the provisions of Standard No. 208. Each dummy is restrained only by means that are installed for protection at its seating position. The load is distributed so that the weight on each axle as measured at the tire-ground interface is in proportion to its GAWR. If the weight on any axle when the vehicle is loaded to its unloaded vehicle weight plus dummy weight exceeds the axle's proportional share of the test weight, the remaining weight is placed so that the weight on that axle remains the same. For the purposes of this section, unloaded vehicle weight does not include the weight of workperforming accessories. Vehicles are tested to a maximum unloaded vehicle weight of 5,500 pounds.

S6.2 The fuel tank is filled to any level from 90 to 95 percent of capacity.

APPENDIX B....Continued

S6.3 The parking brake is disengaged and the transmission is in neutral.

S6.4 Tires are inflated to the vehicle manufacturer's specifications.

S6.5 The windshield mounting material and all vehicle components in direct contact with the mounting material are at any temperature between 15ºF and 110ºF.

APPENDIX C
FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 219
WINDSHIELD ZONE INTRUSION

S1 SCOPE

This standard specifies limits for the displacement into the windshield area of motor vehicle components during a crash.

S2 PURPOSE

The purpose of this standard is to reduce crash injuries and fatalities that result from occupants contacting vehicle components displaced near or through the windshield.

S3 APPLICATION

This standard applies to passenger cars and to multipurpose passenger vehicles (MPV), trucks and buses of 10,000 pounds or less gross vehicle weight rating. However, it does not apply to forward control vehicles, walk-in van-type vehicles, or to open body-type vehicles with fold-down or removable windshields.

S4 DEFINITIONS

DAYLIGHT OPENING (DLO)

The maximum unobstructed opening through the glazing surface, including reveal or garnish moldings adjoining the surface, as measured parallel to the outer surface of the glazing material.

WINDSHIELD OPENING

The outer surface of the windshield glazing material.

APPENDIX C....Continued

S5 REQUIREMENT

When the vehicle traveling longitudinally forward at any speed up to and including 30 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, under the conditions of S7, no part of the vehicle outside the occupant compartment, except windshield molding and other components designed to be normally in contact with the windshield, shall penetrate the protected zone template, affixed according to S6, to a depth of more than one-quarter inch (1/4"), and no such part of a vehicle shall penetrate the inner surface of that portion of the windshield, within the DLO, below the protected zone defined in S6.

S6 PROTECTED ZONE TEMPLATE

S6.1 The lower edge of the protected zone is determined by the following procedure (see Figure 1).

WINDSHIELD PROTECTED ZONE

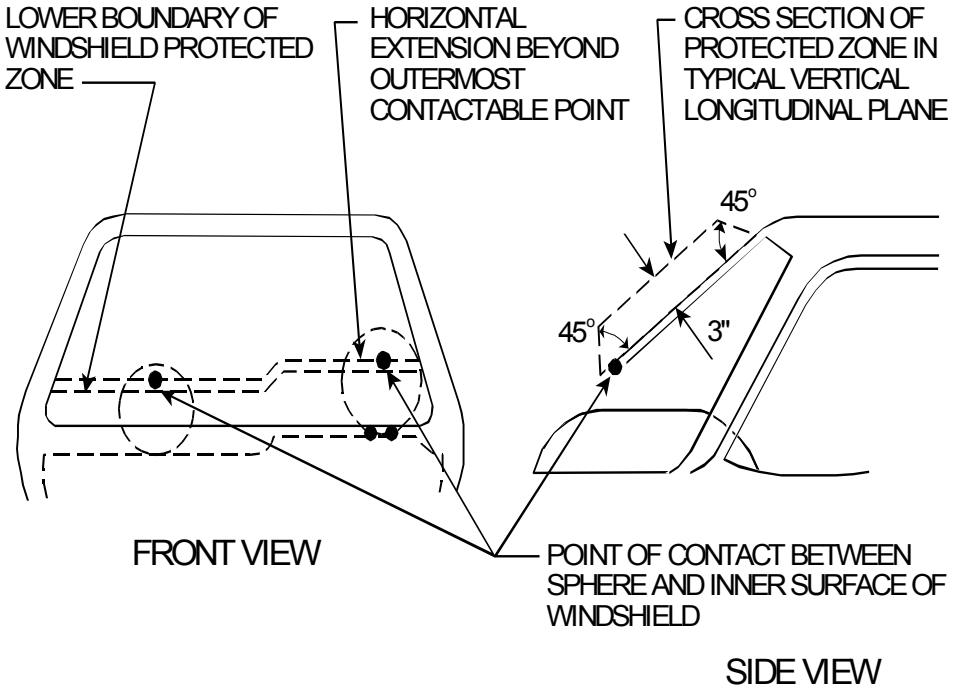


FIGURE 1

(a) Place a 6.5-inch diameter rigid sphere, weighing 15 pounds, in a position such that it simultaneously contacts the inner surface of the windshield glazing and the surface of the instrument panel, including padding. If any

APPENDIX C....Continued

accessories or equipment such as the steering control system obstruct positioning of the sphere, remove them for the purposes of this procedure.

(b) Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the glazing material.

(c) Draw a line on the inner surface of the windshield below and one-half inch (1/2") distant from the locus line.

(d) The lower edge of the protected zone is the longitudinal projection onto the outer surface of the windshield of the line determined in S6.1(c).

S6.2 The protected zone is the space enclosed by the following surfaces, as shown in Figure 1:

(a) The outer surface of the windshield in its precrash configuration.

(b) The locus of points 3 inches outward along perpendiculars drawn to each point on the outer surface of the windshield.

(c) The locus of lines forming a 45º angle with the outer surface of the windshield at each point along the top and side edges of the outer surface of the windshield and the lower edge of the protected zone determined in S6.1, in the plane perpendicular to the edge at that point.

S6.3 A template is cut or formed from Styrofoam, type DB, cut cell, to the dimensions of the zone as determined in S6.2. The template is affixed to the windshield so that it delineates the protected zone and remains affixed throughout the crash test.

S7 TEST CONDITIONS

The requirement of S5 shall be met under the following conditions:

S7.1 The protected zone template is affixed to the windshield in the manner described in S6.

S7.2 The hood, hood latches, and any other hood retention components are engaged prior to the barrier crash.

APPENDIX C....Continued

S7.3 Adjustable cowl tops or other adjustable panels in front of the windshield are in the position used under normal operating conditions when windshield wiping systems are not in use.

S7.4 The parking brake is disengaged and the transmission is in neutral.

S7.5 Tires are inflated to the vehicle manufacturer's specifications.

S7.6 The fuel tank is filled to any level from 90 to 95 percent of capacity.

S7.7 The vehicle, including test devices and instrumentation, is loaded as follows:

(a) Except as specified in S7.6, a passenger car is loaded to its unloaded vehicle weight plus its rated cargo and luggage capacity weight, secured in the luggage area, plus a 50th-percentile test dummy as specified in Part 572 of this chapter at each front outboard designated seating position (DSP) and at any other position whose protection system is required to be tested by a dummy under the provisions of Standard No. 208. Each dummy is restrained only by means that are installed for protection at its seating position.

(b) Except as specified in S7.6, a multipurpose passenger vehicle (MVP), truck or bus is loaded to its unloaded vehicle weight, plus 300 pounds or its rated cargo and luggage capacity, whichever is less, secured to the vehicle, plus a 50th-percentile test dummy as specified in Part 572 of this chapter at each front outboard designated seating position and at any other position whose protection system is required to be tested by a dummy under the provisions of Standard No. 208. Each dummy is restrained only by means that are installed for protection at its seating position. The load is distributed so that the weight on each axle as measured at the tire-ground interface is in proportion to its GAWR. If the weight on any axle when the vehicle is loaded to its unloaded vehicle weight plus dummy weight exceeds the axle's proportional share of the test weight, the remaining weight is placed so that the weight on that axle remains the same. For the purposes of this section, unloaded vehicle weight does not include the weight of workperforming accessories.

APPENDIX D
FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 303
FUEL SYSTEM INTEGRITY OF COMPRESSED NATURAL GAS (CNG) VEHICLES

S1 SCOPE

This standard specifies requirements for the integrity of motor vehicle fuel systems using compressed natural gas (CNG), including the CNG fuel systems of bi-fuel, dedicated, and dual fuel CNG vehicles.

S2 PURPOSE

The purpose of this standard is to reduce deaths and injuries occurring from fires that result from fuel leakage during and after motor vehicle crashes.

S3 APPLICATION

This standard applies to passenger cars, multipurpose passenger vehicles, trucks and buses that have a gross vehicle weight rating (GVWR) of 10,000 pounds or less and use CNG as a motor fuel. This standard also applies to school buses regardless of weight that use CNG as a motor fuel.

S4 DEFINITIONS

BI-FUEL CNG VEHICLE

A vehicle equipped with two independent fuel systems, one of which is designed to supply CNG and the second to supply a fuel other than CNG.

CNG FULL CONTAINER

A container designed to store CNG as motor fuel onboard a motor vehicle.

CNG FUEL SYSTEM

All components used to store or supply CNG to a vehicle's engine.

DEDICATED CNG VEHICLE

A vehicle equipped with one fuel system and designed to operate on CNG.

DUAL-FUEL CNG VEHICLE

A vehicle which is fueled by two fuels simultaneously, one of which is CNG and the second is a fuel other than CNG.

APPENDIX D....Continued

HIGH PRESSURE PORTION OF A FUEL SYSTEM

All the components from and including each CNG fuel container up to, but not including, the first pressure regulator.

SERVICE PRESSURE

The internal pressure of a CNG fuel container when filled to design capacity with CNG at 20º Celsius (68º Fahrenheit).

S5 GENERAL REQUIREMENTS

S5.1 VEHICLE REQUIREMENTS

S5.1.1 VEHICLES WITH A GVWR OF 10,000 POUNDS OR LESS

Each passenger car, multipurpose passenger vehicle, truck, and bus with a GVWR of 10,000 pounds or less that uses CNG as a motor fuel and that is manufactured on or after September 1, 1995 shall meet the requirements of S6, except S6.4.

S5.1.2 SCHOOL BUSES WITH A GVWR GREATER THAN 10,000 POUNDS

Each school bus with a GVWR greater than 10,000 pounds that uses CNG as a motor fuel and that is manufactured on or after September 1, 1995 shall meet the requirements of S6.4.

S5.2 FUEL SYSTEM PRESSURE DROP — BARRIER CRASH

(a) For all vehicles, the pressure drop in the high pressure portion of the fuel system, expressed in kiloPascals (Kpa), in any fixed or moving barrier crash from vehicle impact through the 60 minute period following cessation of motion shall not exceed:

(1) 1,062 Kpa (154 psi), or

(2) $895(T/V_{FS})$; whichever is higher, where --

T = Average Temperature of the test gas in degrees Kelvin, stabilized to ambient temperature before testing.
Average Temperature (T) is calculated value by measuring ambient temperature at the start of the test time and then every 15 minutes until the test time of 60 minutes is completed.

APPENDIX D....Continued

The sum of the ambient temperatures is then divided by 5 to yield the Average Temperature (T).

V_{FS} = Internal volume (in liters) of the fuel container and the fuel lines up to the first pressure regulator.

(b) For bi-fuel or dual fuel CNG vehicles, the test requirement in S5.2(a) shall apply to the CNG fuel system, and the test requirement of Standard No. 301, Fuel System Integrity, shall apply to the other fuel system, if that standard is applicable.

S6 TEST REQUIREMENTS — FUEL SYSTEM INTEGRITY

Each vehicle with a GVWR of 10,000 pounds or less shall meet the requirements of any applicable barrier crash test. A particular vehicle need not meet further requirements after having been subjected to a single barrier crash test.

S6.1 FRONTAL BARRIER CRASH

When the vehicle traveling longitudinally forward at any speed up to and including 30 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, or at any angle up to 30 degrees in either direction from the perpendicular to the line of travel of the vehicle, with 50th percentile test dummies as specified in Part 572 of this chapter at each front outboard designated seating position (DSP) and at any other position whose protection system is required to be tested by a dummy under the provisions of Standard No. 208, Occupant Crash Protection, under the applicable conditions of S7, the fuel pressure drop shall not exceed the limits of S5.2.

S6.2 REAR MOVING BARRIER CRASH

When the vehicle is impacted from the rear by a barrier moving at any speed up to and including 30 mph, with test dummies as specified in Part 572 of this chapter at each front outboard designated seating position, under the applicable conditions of S7, the fuel pressure drop shall not exceed the limits of S5.2.

S6.3 LATERAL MOVING BARRIER CRASH

When the vehicle is impacted laterally on either side by a barrier moving at any speed up to and including 20 mph with 50th percentile test dummies

APPENDIX D....Continued

as specified in Part 572 of this chapter at positions required for testing to Standard No. 208, under the applicable conditions of S7, the fuel pressure drop shall not exceed the limits of S5.2.

S6.4 MOVING CONTOURED BARRIER CRASH

When the moving contoured barrier assembly traveling longitudinally forward at any speed up to and including 30 mph impacts the test vehicle (school bus with a GVWR exceeding 10,000 pounds) at any point and angle, under the applicable conditions of S7, the fuel pressure drop shall not exceed the limits of S5.2.

S7 TEST CONDITIONS

The requirements of S5 and S6 shall be met under the following conditions. Where a range of conditions is specified, the vehicle must be capable of meeting the requirements at all points within the range.

S7.1 GENERAL TEST CONDITIONS

The following conditions apply to all tests.

S7.1.1 Each fuel storage container is filled to 100 percent of service pressure with nitrogen, N_2. The gas pressure shall stabilize to ambient temperature before testing may be conducted.

S7.1.2 After each fuel storage container is filled as specified in S7.1.1, the fuel system other than each fuel storage container is filled with nitrogen, N_2, to normal operating pressures. Any shutoff valve at the fuel container is in the open position.

S7.1.3 In meeting the requirements of S6.1 through S6.4, if the vehicle has an electrically driven fuel pump that normally runs when the vehicle's electrical system is activated, it is operating at the time of the barrier crash. If the vehicle has any high pressure electric shutoff valve that is normally open when the electrical system is activated, it is open at the time of the barrier crash. Furthermore, if any electric shutoff valve prevents sensing of system pressure by the pressure transducer when closed, it must be open for both the initial pressure measurement 60 minutes after the vehicle ceases motion from impact. Any valve shall be open for a period of 1 minute to equalize the system pressure.

S7.1.4 The parking brake is disengaged and the transmission is in neutral, except that in meeting the requirements of S6.4, the parking brake is set.

APPENDIX D....Continued

S7.1.5 Tires are inflated to manufacturer's specifications.

S7.1.6 The vehicle, Including test devices and instrumentation, is loaded as follows:

(a) A passenger car, with its fuel system filled as specified In S7.1.1 and S7.1.2, is loaded to its unloaded vehicle weight plus its rated cargo and luggage capacity weight, secured in the luggage area, plus the necessary test dummies as specified in S6, restrained only by means that are Installed in the vehicle for protection at its seating position.

(b) A multipurpose passenger vehicle (MPV), truck, or bus with a GVWR of 10,000 pounds or less, whose fuel system is filled as specified in S7.1,1 and S7.1.2, plus the necessary test dummies as Standard No. 208, specified in S6, plus 136.1 kilograms (300 pounds, lbs), or its rated cargo and luggage capacity weight, whichever is less, secured to the vehicle and distributed so that the weight on each axle as measured at the tire-ground interface is in proportion to its GAWR. Each dummy shall be restrained only by means that are installed in the vehicle for protection at its seating position.

(c) A school bus with a GVWR greater than 10,000 pounds, whose fuel system is filled as specified in S7,1.1 and S7,1.2, is loaded to its unloaded vehicle weight, plus 54.4 kg. (120 lbs) of unsecured weight at each designated seating position (DSP).

S7.1.7 The ambient temperature is not to vary more than 5.6ºC (10ºF) during the course of the test.

S7.2 LATERAL MOVING BARRIER CRASH TEST CONDITIONS

The lateral moving barrier crash test conditions are those specified in S8.2 of Standard No. 208.

S7.3 REAR MOVING BARRIER TEST CONDITIONS

The rear moving barrier test conditions are those specified in S8.2 of Standard No. 208, except for the positioning of the barrier and the vehicle. The barrier and test vehicle are positioned so that at impact —

(a) The vehicle is at rest in its normal attitude;

APPENDIX D....Continued

(b) The barrier is traveling at any speed up to and including 30 mph with its face perpendicular to the longitudinal centerline of the vehicle; and

(c) A vertical plane through the geometric center of the barrier impact surface and perpendicular to that surface coincides with the longitudinal centerline of the vehicle.

S7.4 MOVING CONTOURED BARRIER TEST CONDITIONS

The moving contoured barrier crash test conditions are those specified in S7.5 of Standard No. 301.

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