

TP-204-08
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U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 204

Steering Control Rearward Displacement



SAFETY ASSURANCE
Office of Vehicle Safety Compliance
Room 6115, NSA-30
400 Seventh Street, SW
Washington, DC 20590

OVSC LABORATORY TEST PROCEDURE NO. 204

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1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contracted laboratories with Laboratory Test Procedures (TPs) which serve 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 TPs is to present a uniform testing and data recording format, and provide suggestions for the use of specific equipment and procedures. Any contractor interpreting any part of an OVSC Laboratory TP to be in conflict with a Federal Motor Vehicle Safety Standard or observing any deficiencies in a Laboratory TP is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Contractors are required to submit a detailed TP 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 OVSC Laboratory TPs 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.

NOTE:

The OVSC Laboratory Test Procedures, prepared for use by independent laboratories under contract to conduct compliance tests for the OVSC, 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. Sometimes, recognizing applicable test tolerances, the Test Procedures specify test conditions which are less severe than the minimum requirements of the standards themselves. Therefore, compliance of a vehicle is not necessarily guaranteed if the manufacturer limits certification tests to those described in the OVSC Laboratory Test Procedures.

2. GENERAL REQUIREMENTS

This standard specifies requirements limiting the rearward horizontal displacement of the steering control into the passenger compartment to reduce the likelihood of chest, neck or head injury.

When a passenger car or a truck, bus, or multipurpose passenger vehicle with a GVWR of 10,000 pounds or less and an UVW of 5,500 pounds or less is tested in a 30 mile per hour perpendicular impact into a fixed collision barrier, the upper end of the steering column and shaft in the vehicle shall not be displaced more than 5 inches in a horizontal rearward direction parallel to the longitudinal axis of the vehicle. The amount of displacement shall be measured relative to an undisturbed point on the vehicle and shall represent the maximum dynamic movement of the upper end of the steering column and shaft during the crash test.

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 Property Management Specialist, Office of Property Management (NAD-61), within two working days after the incident. A letter containing specific details of the security problem will be sent to the Property Management Specialist (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 OVSC management.

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 four 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)

ACCEPTANCE OF TEST VEHICLE

The Contractor has the responsibility of accepting the test vehicle from either a new car dealer or a vehicle transporter. In both instances, the contractor acts in the OVSC's behalf when signing an acceptance of the test vehicle. If the vehicle is delivered by a dealer, the contractor must check to verify the following:

- 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.
- E. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys.
- F. Proper fuel filler cap is supplied on the test vehicle.

If the test vehicle is delivered by a government contracted transporter, the contractor should check for damage which may have occurred during transit.

A "Vehicle Condition" form (shown on the next page) will be supplied to the contractor by the COTR when the test vehicle is transferred from the new car dealer or between test contracts. The upper half of the form describes the vehicle in detail, and the lower half provides space for a detailed description of the post test condition. Vehicle Condition forms must be returned to the COTR with the copies of the Final Test Report or the reports will NOT be accepted.

NOTIFICATION OF COTR

The COTR must be notified within 24 hours after a vehicle has been delivered.

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 Property Management Specialist (NAD-61), 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:

<input type="checkbox"/>	Air Conditioning	<input type="checkbox"/>	Traction Control	<input type="checkbox"/>	Clock
<input type="checkbox"/>	Tinted Glass	<input type="checkbox"/>	All Wheel Drive	<input type="checkbox"/>	Roof Rack
<input type="checkbox"/>	Power Steering	<input type="checkbox"/>	Speed Control	<input type="checkbox"/>	Console
<input type="checkbox"/>	Power Windows	<input type="checkbox"/>	Rear Window Defroster	<input type="checkbox"/>	Driver Air Bag
<input type="checkbox"/>	Power Door Locks	<input type="checkbox"/>	Sun Roof or T-Top	<input type="checkbox"/>	Passenger Air Bag
<input type="checkbox"/>	Power Seat(s)	<input type="checkbox"/>	Tachometer	<input type="checkbox"/>	Front Disc Brakes
<input type="checkbox"/>	Power Brakes	<input type="checkbox"/>	Tilt Steering Wheel	<input type="checkbox"/>	Rear Disc Brakes
<input type="checkbox"/>	Antilock Brake System	<input type="checkbox"/>	AM/FM/Cassette Radio	<input type="checkbox"/>	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. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system will be implemented and maintained in accordance with established calibration practices. Guidelines for setting up and maintaining such calibration systems are described in MIL-C-45662A, Calibration System Requirements. The calibration system shall be set up and maintained as follows:

- A. Standards for calibrating the measuring and test equipment will be stored and used under appropriate environmental conditions to assure their accuracy and stability.
- B. All measuring instruments and standards shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals NOT TO EXCEED 12 MONTHS! Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.
- C. All measuring and test equipment and measuring standards will be labeled with the following information:
 - (1) Date of calibration
 - (2) Date of next scheduled calibration
 - (3) Name of the technician who calibrated the equipment
- D. A written calibration procedure shall be provided by the contractor which includes as a minimum the following information for all measurement and test equipment:
 - (1) Type of equipment, manufacturer, model number, etc.
 - (2) Measurement range
 - (3) Accuracy
 - (4) Calibration interval
 - (5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)
- E. Records of calibration for all test instrumentation shall be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when requested by the COTR. The calibration procedure must be approved by the COTR before the test program commences.

9. PHOTOGRAPHIC DOCUMENTATION

Pretest and post test still photographs shall be color, 8 x 10 inches minimum, and properly focused for clear images. A tag, label or placard identifying the test vehicle year, make and model, NHTSA number, "FMVSS 204", and date shall appear in each photograph and must be legible. Each still photograph shall be labeled as to the subject matter.

STILL PHOTOGRAPHS

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. Views of steering column, underdash mechanisms, under the hood mechanisms
- H. Steering column movement measuring devices
- I. Full view of windshield and windshield mounting
- J. Underbody view of fuel tank area and fuel system components
- K. Underbody view of engine area and fuel system components
- L. Vehicle's certification label (pretest only)
- M. Vehicle's tire information label (pretest only)
- N. Other photographs requested by COTR

9. PHOTOGRAPHIC DOCUMENTATION....Continued

PHOTOGRAPHIC TARGETS

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 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.

STROBE LIGHT IMPACT INDICATOR

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 "time zero" when the most forward component of the test vehicle contacts the barrier face. Light from the strobe units should not cover more than 3 frames of high speed film.

16 MM COLOR MOVIE FILM

Motion pictures of the crash event shall be recorded on 16 mm color film at a minimum speed of 1000 frames per second (fps). Timing marks shall be registered on the film edge every 5 milliseconds (ms), in order to permit vehicle kinematic analysis. Camera positions are shown on the next page.

INTERIOR VIEW HIGH SPEED CAMERA

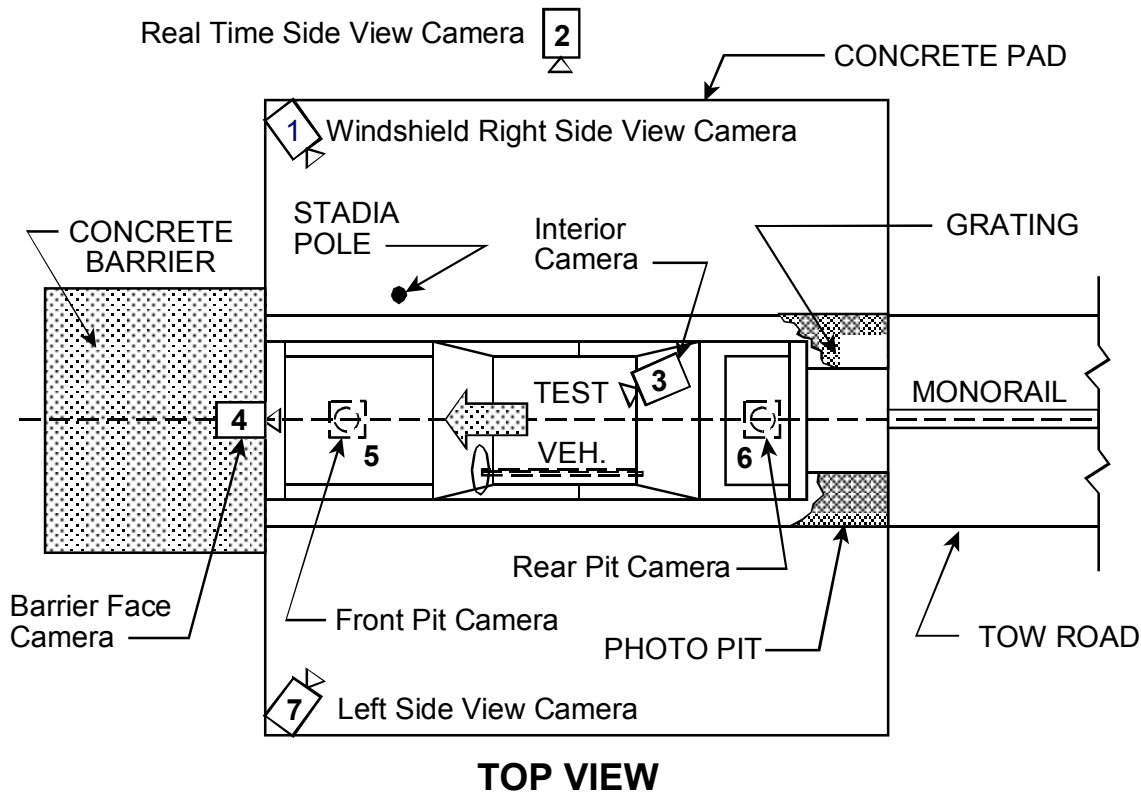
The movement of the upper end of the steering column must be recorded on high speed film (1000 fps). The camera shall be mounted inside the vehicle on a surface or stand which can be considered "undisturbed" with respect to the steering column. Extreme care must be taken to assure that the camera is rigidly mounted. The interior of the vehicle should be painted flat white in order to aid in photographing the movement of the scratch tubes.

OVERHEAD VIEW HIGH SPEED CAMERA MOUNTED ON BARRIER FACE

The windshield and windshield mounting must be included in the major portion of the overhead or barrier face camera's field-of-view. No obstructions, such as photographic targets, shall be placed on the windshield mounting. A circle of contrasting color should be painted or pasted to the upper end of the steering column in view of the overhead camera. The barrier face plane must also be included in the camera field of view. A person viewing the film must be able to see the point of contact of the vehicle and the barrier. An identification placard stating the vehicle NHTSA number must be visible in each camera view.

9. PHOTOGRAPHIC DOCUMENTATION....Continued

CAMERA POSITIONS FOR S204 FRONTAL IMPACT



SIDE VIEW CAMERAS

Pretest and post test front, left side, right side, and rear views of the vehicle. Views of the vehicle at 0°, 90°, 180°, and 270° on the static rollover fixture with a slow pan close-up of the vehicle under carriage at 90°.

A "real time" motion picture camera (24 fps) will be used to record the installation of the fuel filler cap onto the filler neck and the rotation of the cap to the installed position. The installation of the filler cap 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 test vehicle 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 and its collection after the impact or during static rollover.

A high speed camera (1000 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.

An optional high speed camera (1000 fps) may be used to record the left side of the vehicle during the crash event.

9. PHOTOGRAPHIC DOCUMENTATION....Continued

UNDERBODY VIEW CAMERAS

Two (2) high speed cameras (minimum of 1000 fps) shall be placed in the photographic pit area to record any Stoddard solvent spillage from the test vehicle after the impact event. 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, fuel filter, fuel and vapor lines, etc., and another camera will record the occurrences around the vehicle's fuel tank and filler pipe 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, etc., painted in contrasting colors such as red, green, orange, etc., to aid photography and identification placards used as previously noted.

10. DEFINITIONS

FIXED COLLISION BARRIER

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 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.

GROSS VEHICLE WEIGHT RATING (GVWR)

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

STEERING COLUMN

Structural housing that surrounds a steering shaft.

STEERING SHAFT

Component that transmits steering torque from the steering wheel to the steering gear.

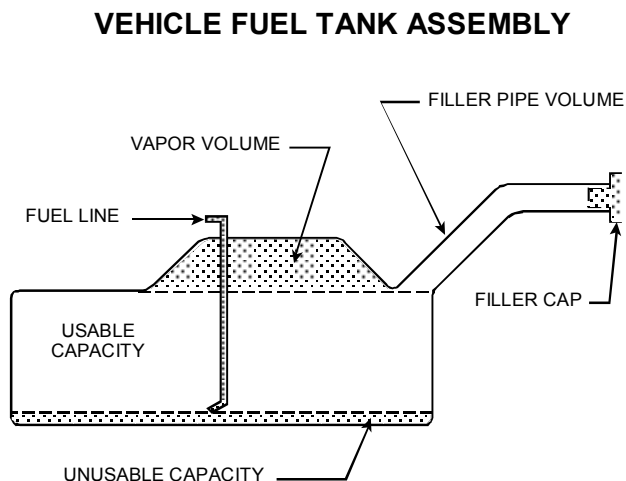
10. DEFINITIONS....Continued

UNLOADED VEHICLE WEIGHT (UVW)

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

VEHICLE FUEL TANK CAPACITY

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) 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.



NOTE: The "usable capacity" and "unusable capacity" figures 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 test vehicle and the service costs for conducting the retest.

STEERING COLUMN DISPLACEMENT MEASUREMENT

The displacement of the upper end of the steering column is usually measured by 3 redundant devices, all of which are associated with the scratch tubes shown in Figure 1. Each scratch tube assembly is constructed of two tubes, one inserted inside the other. The larger tube is anchored to the vehicle at a point considered "undisturbed" with respect to deformation of the vehicle and the smaller tube is connected to the steering hub through a universal joint.

The three measuring devices of each tube assembly are as follows:

A. Scratch Device

A pointed extension is attached to the large tube and rests on the smaller tube. As the smaller tube moves with the steering hub a scratch is produced by the pointer in the machinist bluing painted on the smaller tube.

B. Painted Bands

One inch wide bands of alternating colors are painted on the smaller tubes. As the smaller tubes are pushed into the larger tubes the movements are recorded by motion picture photography.

11. PRETEST REQUIREMENTS....Continued

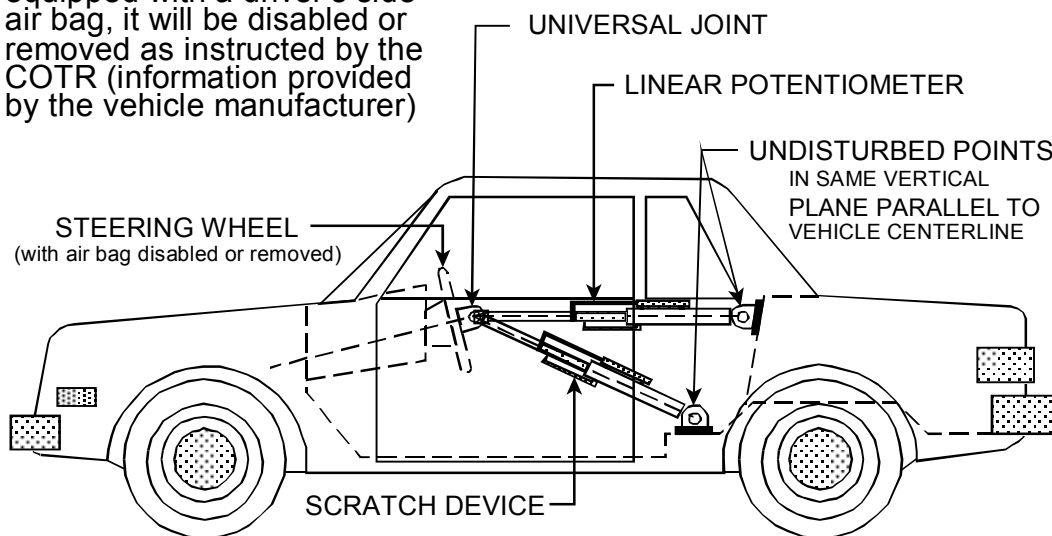
C. Linear Potentiometers

A linear potentiometer or other mechanical-electrical measuring device is attached between the large and small tubes to record the relative motion between them. A worst case analysis of the electrical measurement system must show accuracy within ± 0.05 inches.

The OVSC requires that all of the 3 devices, or measurement systems which are at least equivalently redundant are used for measuring the steering control displacement. The COTR must approve measuring devices other than those suggested above.

STEERING CONTROL REARWARD DISPLACEMENT MEASURING APPARATUS

NOTE: If test vehicle is equipped with a driver's side air bag, it will be disabled or removed as instructed by the COTR (information provided by the vehicle manufacturer)



LEFT SIDE VIEW

FIGURE 1

WINDSHIELD PERIPHERY MEASUREMENT

Measurement of the windshield periphery will be recorded both pretest and post test for determination of apparent compliance with the requirements of FMVSS 212, Windshield Mounting. Since the test parameters of this procedure differ from those of FMVSS 204, the results of this testing will be used to identify vehicles with failure potential (an **indicant** noncompliance).

11. PRETEST REQUIREMENTS....Continued

Most vehicle windshields are either bonded in place with an adhesive or held to the flange by a rubber retainer, or a combination. In most instances it is difficult to determine the exact periphery of the windshield glazing since the glazing edges are covered by either an exterior molding or a rubber retainer. The test engineer shall record the perimeter inside of the glazing edge covering and the width of the covering, in order that the original glazing periphery can be calculated, if necessary, in the case of an **indicant** failure.

PHOTOGRAPHIC PIT

A photographic pit shall be located in the tow road at the fixed collision barrier face so that any possible Stoddard solvent spillage can be photographed during a frontal barrier 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 GUIDANCE

A guidance system is required to assure that the test vehicle impacts the barrier 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 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 free wheels into the barrier face. The monorail should not extend over the photographic pit. The release of the test vehicle should take place between 6 and 24 inches from the fixed barrier. 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.

IMPACT SPEED RANGES

Frontal impact compliance tests shall be conducted within an impact speed range of 28.9 to 29.9 mph. The reported impact speed must take into consideration the response characteristics of the entire system utilized in its determination. **NOTE: THE CONTRACTOR MAY BE HELD LIABLE FOR RETEST (INCLUDING PROCURE- MENT OF A LIKE TEST VEHICLE) AT THE CONTRACTOR'S EXPENSE IF THE COMPLIANCE TEST IMPACT SPEED FALLS OUTSIDE OF THE RANGES LISTED ABOVE!**

11. PRETEST REQUIREMENTS....Continued

IMPACT SPEED MEASUREMENT

Test vehicle 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 ± 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 and permit a test abort if necessary.

TEST ABORT SYSTEM

The test vehicle shall be equipped with an onboard brake abort system. The OVSC recommends the use of redundant brake abort systems.

GENERAL TEST CONDITIONS

A. Vehicle Test Weight

After receipt of the vehicle, fluids will be added to capacity and the unloaded vehicle weight (UVW) recorded at each wheel. In the event the unloaded delivered vehicle weight exceeds 5500 pounds, the COTR will be promptly notified and vehicle preparation will cease until further authorized by the COTR.

The vehicle interior will be modified (seats and carpet removed) to accommodate the test equipment and ballast added to bring test weight within - 20 lbs to - 40 lbs of unloaded vehicle weight (UVW). Scale accuracy is to be calibrated within ± 5 lbs. Ballast must be securely anchored to the floorpan of the vehicle. Lead weights are preferable to sand or shot bags.

B. Fuel System Capacity

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

11. PRETEST REQUIREMENTS....Continued

- (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

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 but not during static rollover.

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.

E. Vehicle Test Attitude

Record the distance between the flat roadway and a standard reference point above each wheel as the vehicle attitude. The delivered vehicle must have full fluid levels and the tires inflated to manufacturer's specifications when the vehicle attitude is recorded. When adding ballast to bring vehicle weight within - 20 to - 40 lbs of delivered weight, position the ballast to achieve test attitude of the vehicle body that is approximately that of the delivered vehicle body. Ballast must be securely anchored to the vehicle floorpan.

F. 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

G. Movable Window Placement

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

H. Door Latch Placement

Doors are fully closed and latched but not locked.

I. Parking Brake and Transmission Placement

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

J. 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.

K. Vehicle Fluids Other Than Stoddard Solvent

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 red) leakage from the vehicle's fuel system will be evident and to protect test personnel (reason for draining acid from battery).

NOTE: If vehicle is equipped with **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.

L. Pretest Vehicle Measurements

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

M. Collection of Stoddard Solvent Spillage

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.

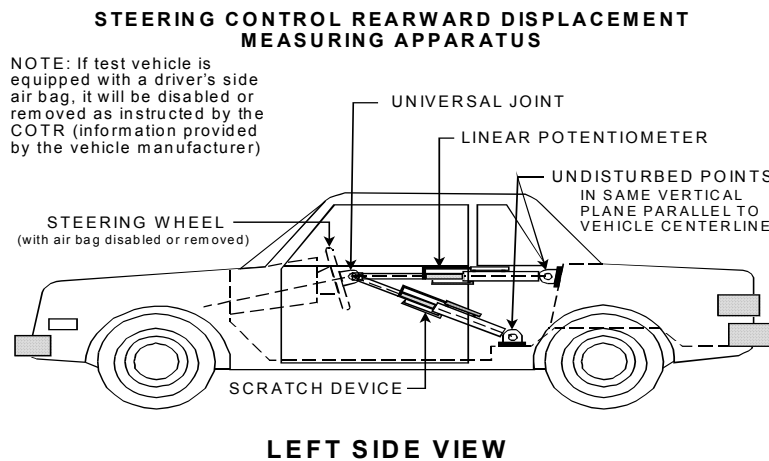
11. PRETEST REQUIREMENTS....Continued**N. Movement of Test Vehicle**

After an impact test, the vehicle shall be transported from the impact area to the static rollover test fixture (and then to the vehicle storage area) using a technique that will not damage or displace any component of the vehicle's fuel system.

12. COMPLIANCE TEST EXECUTION

TEST REQUIREMENTS FOR FMVSS 204, STEERING CONTROL REARWARD DISPLACEMENT

When a passenger car or a truck, bus, or multipurpose passenger vehicle with a GVWR of 10,000 pounds or less and an UVW of 5,500 pounds or less is subjected to a 28.9 to 29.9 mph frontal impact into a fixed collision barrier, the upper end of the steering column and shaft in the vehicle shall not be displaced more than 5 inches in a horizontal rearward direction parallel to the longitudinal axis of the vehicle. The amount of displacement shall be measured relative to an undisturbed point on the vehicle and shall represent the maximum dynamic movement of the upper end of the steering column and shaft during the crash test.



The vehicle, including test devices and instrumentation, is loaded to its unloaded vehicle weight (UVW). Adjustable steering controls are adjusted so that a tilting steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. A telescoping steering control is set at the adjustment position midway between the forwardmost and rearwardmost position.

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

Doors are fully closed and latched but not locked. COTR will advise if side windows are opened or closed.

The fuel tank is filled to any level from 91 to 94 percent of usable capacity.

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

Tires are inflated to the vehicle manufacturer's specifications.

12. COMPLIANCE TEST EXECUTION....Continued

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** UVW of 5,500 pounds) traveling longitudinally forward at 29.4 mph \pm 0.5 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 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.
- B. Vehicles NOT equipped with automatic occupant restraint systems shall retain not less than 75% of the windshield periphery.

NOTE: FMVSS 212 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 15(F and 110(F. Temperature measurement shall be made 15 minutes before the frontal impact test.

12. COMPLIANCE TEST EXECUTION....Continued

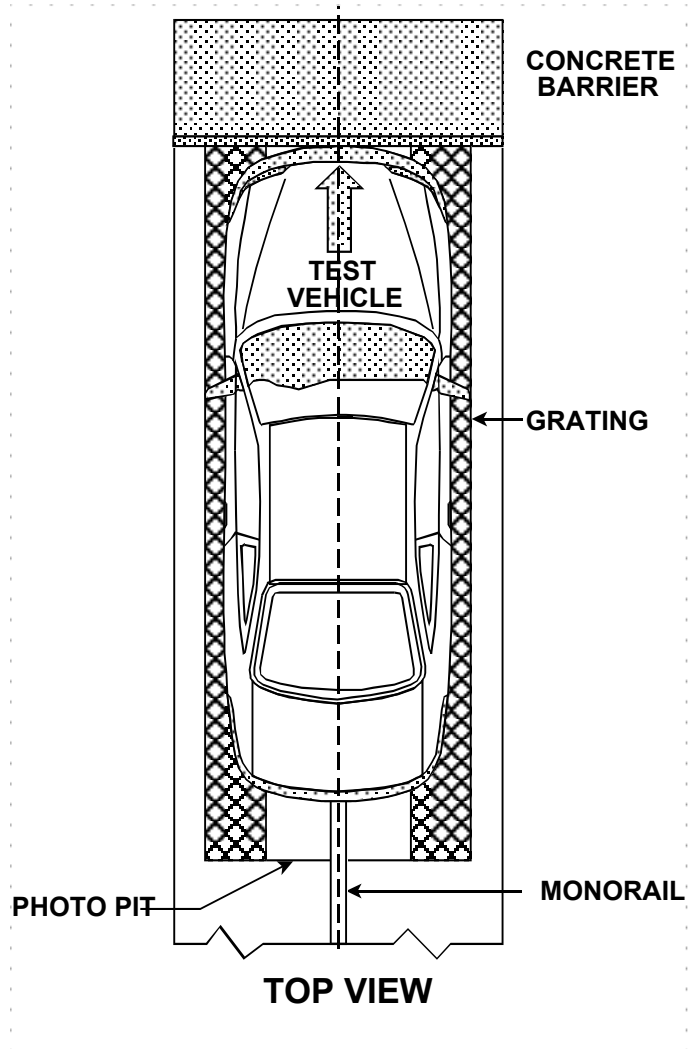
TEST REQUIREMENTS FOR FMVSS 301, FUEL SYSTEM INTEGRITY

Each vehicle with a GVWR of 10,000 pounds or less shall be capable of meeting the requirements of a frontal impact barrier crash test without alteration of the vehicle during the test sequence.

FRONTAL BARRIER CRASH

When the test vehicle is traveling longitudinally forward at a speed of 29.4 mph \pm 0.5 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, Stoddard solvent spillage shall not exceed —

- (1) 1 ounce by weight from impact until motion of the vehicle has ceased
- (2) A total of 5 ounces by weight in the 5-minute period following cessation of motion
- (3) For the subsequent 25-minute period, fuel spillage during any 1-minute interval shall not exceed 1 ounce by weight.



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.

13. POST TEST REQUIREMENTS

The contractor shall re-verify all instrumentation and check photographs. In addition, the contractor shall —

- A. Collect the data necessary to complete the blanks on the data sheets. Add any other information which is pertinent to the test. Provide narrative details in all descriptions.
- B. If a test vehicle has an apparent noncompliance, protect the affected areas of the vehicle from weather elements.
- C. Store the test vehicle.
- D. Prepare the test report.

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 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. REPORTS...Continued

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 document capable of standing by itself. The contractor should use **detailed** descriptions of all compliance test events. Any events that are not directly associated with the standard but are of technical interest should also be included. The contractor should include as much **detail** as possible in the report. Instructions for the preparation of the first three pages of the final test report are provided below for the purpose of standardization.

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 204-ABC-9X-001 where —

204 is the FMVSS tested
 ABC are the initials for the laboratory
 9X is the Fiscal Year of the test program
 001 is the Group Number (001 for the 1st test,
 002 for the 2nd test, etc.)

- (2) Final Report Title And Subtitle such as

SAFETY COMPLIANCE TESTING FOR FMVSS 204
 Steering Control Rearward Displacement
 * * * * *

World Motors Corporation
 199X 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

14. REPORTS....Continued

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

- (4) Date of Final Report completion
- (5) The words "FINAL REPORT"
- (6) The sponsoring agency's name and address as follows

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6115 (NSA-30)
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

204-ABC-9X-001

Block 2 — GOVERNMENT ACCESSION NUMBER

Leave blank

Block 3 — RECIPIENT'S CATALOG NUMBER

Leave blank

Block 4 — TITLE AND SUBTITLEFinal Report of FMVSS 204 Compliance Testing of 199X World
XYZ 4-door sedan, NHTSA No. CX0401**Block 5 — REPORT DATE**

March 1, 199X

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

DTNH22-9X-D-12345

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

US Department of Transportation
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance (NSA-30)
400 Seventh Street, SW, Room 6115
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Feb. 15 to Mar. 15, 199X

Block 14 — SPONSORING AGENCY CODE

NSA-31

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 199X World XYZ 4-door sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-204-0X for the determination of FMVSS 204 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 204

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from —

NHTSA Technical Reference Division
Room 5108 (NAD-52)
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. REPORTS....Continued

14.3.4 TABLE OF CONTENTS

Final test report Table of Contents shall include the following:

- A. Section 1 — Purpose of Compliance Test
- B. Section 2 — Compliance Test Results Summary
- C. Section 3 — Compliance Test Data
- D. Section 4 — Noncompliance Data (if applicable)
- E. Section 5 — Photographs

15. DATA SHEETS

SUMMARY OF RESULTS

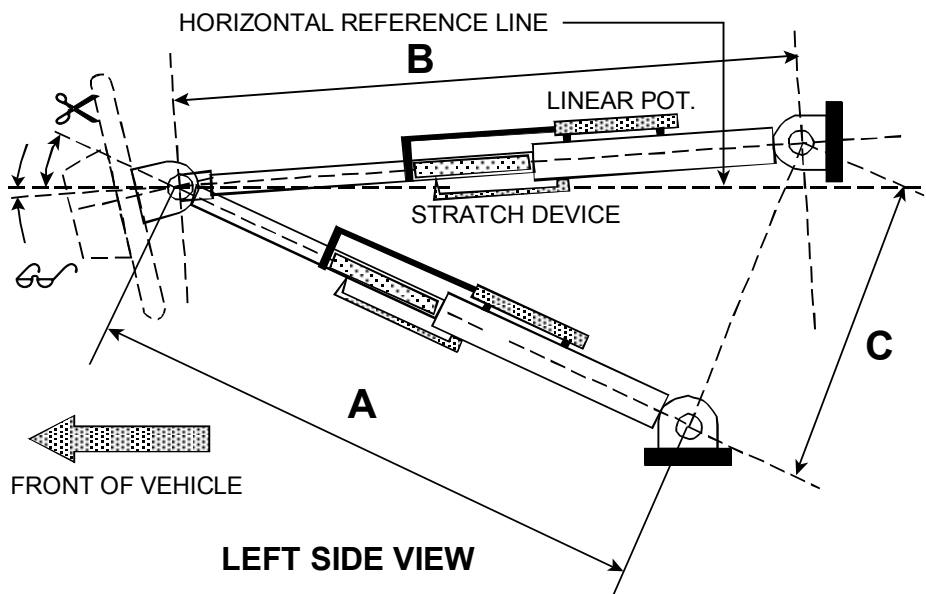
Vehicle Description: _____

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

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

Steering Control Static Displacement:

STATIC DISPLACEMENT MEASUREMENT



	PRETEST	POST TEST
A		
B		
C		
α		
β		

Description of Steering Control Reaction:

15. DATA SHEETS....Continued

Static Crush: Left Side = _____ in.

Right Side = _____ in.

Centerline = _____ in.

Average Crush: _____ in.

Vehicle Rebound: _____ in.

Loss of Windshield Retention (if applicable): _____

Stoddard Solvent Spillage from Vehicle's Fuel System (if applicable):

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

Recommended Tire Size: _____

Recommended Load Range: _____

Recommended Cold Tire Pressure: Front = _____ psi; Rear = _____ psi

15. DATA SHEETS....Continued

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.

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.

Weight of Ballast secured in cargo area = _____ lbs.

Type of Ballast: _____

Method of Securing Ballast: _____

Vehicle Components Removed for Weight Reduction —

15. DATA SHEETS....Continued

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:

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: _____ ("red" is preferred)

Type of Vehicle Fuel Pump: _____

15. DATA SHEETS....Continued

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

Details of Fuel System: _____

REMARKS:

RECORDED BY: _____ ; DATE: + _____

APPROVED BY: _____

15. DATA SHEETS....Continued

SUMMARY OF FMVSS 204 DATA

VEHICLE DESCRIPTION: _____

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

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

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

Average Impact Speed = _____ mph

STEERING COLUMN DISPLACEMENT:

Rearward Static Displacement = _____ inches

Rearward Dynamic* Displacement = _____ inches

Diagonal Static Displacement = _____ inches

Diagonal Dynamic* Displacement = _____ inches

Resolved Horizontal Dynamic* Displacement = _____ inches
(Maximum of 5 inches is allowed)

* Contractor must present the steering hub dynamic displacement data in a form that is easily understood by the report reader. The outputs of the linear potentiometers have usually been illustrated either on oscillograph strip charts or on output sheets from the computer program used to process the raw data. A strip chart must show the calibration, have all axes labeled, and indicate where the maximum measurements were recorded. If the data is processed by computer, a plot of steering hub movement shall be included in the test report.

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.

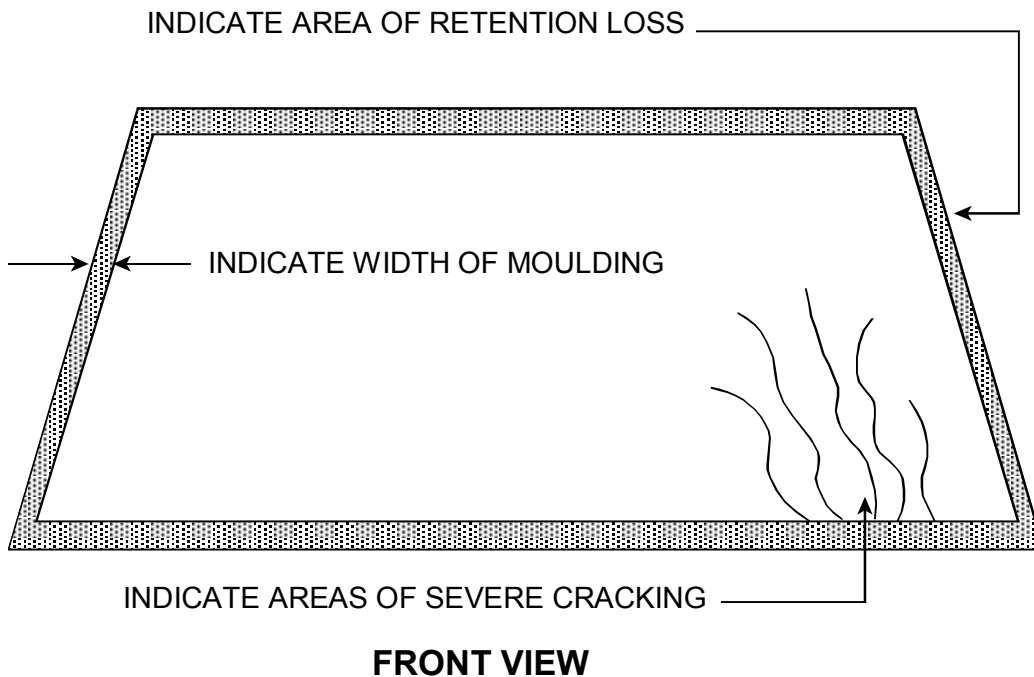
TEMPERATURE OF WINDSHIELD MOLDING DURING TEST = _____ °F

AREA OF RETENTION FAILURES:

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

REMARKS:

15. DATA SHEETS....Continued



REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

SUMMARY OF FMVSS 301 DATA

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

VEHICLE YEAR/MAKE/MODEL/BODY STYLE:

STODDARD SOLVENT SPILLAGE MEASUREMENT:

A. From impact until vehicle motion ceases —

Actual = _____ oz. Maximum Allowable = 1 ounce

B. For 5 minute period after vehicle motion ceases —

Actual = _____ oz. Maximum Allowable = 5 ounces

C. For next 25 minutes —

Actual = _____ oz. Maximum Allowable = 1 oz./minute

D. Provide Spillage Details: _____

REMARKS:

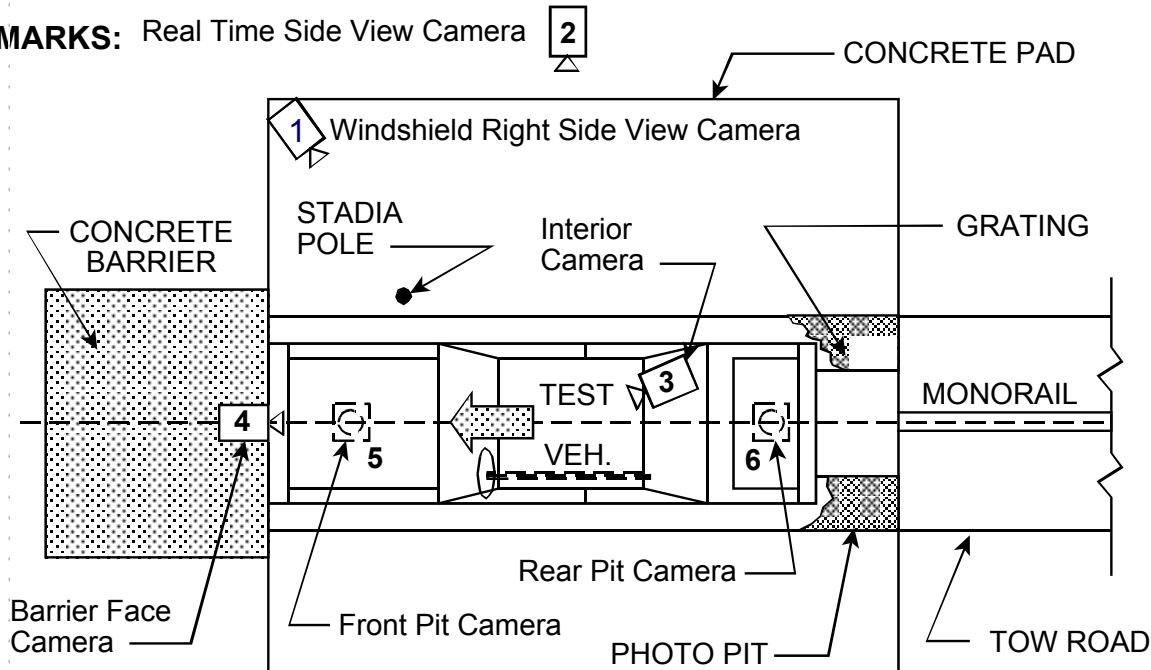
15. DATA SHEETS....Continued

CAMERA LOCATIONS

VEHICLE NHTSA NO.: _____; TEST DATE: _____

CAMERA POSITIONS FOR S204 FRONTAL IMPACT

REMARKS: Real Time Side View Camera 2



16. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 204 ; 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, PARAGRAPH S ____ : _____

NOTIFICATION TO NHTSA (COTR): _____

DATE: _____ ; BY: _____

REMARKS:

16. FORMS....Continued

MONTHLY TEST STATUS REPORT

FMVSS 204

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						
11						
12						
13						
14						

16. FORMS...Continued

MONTHLY VEHICLE STATUS REPORT

FMVSS 204

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						
11						
12						
13						
14						

APPENDIX 1

MOTOR VEHICLE SAFETY STANDARD NO. 204 Steering Control Rearward Displacement — Passenger Cars Multipurpose Passenger Vehicles, Trucks and Buses (Docket No. 3)

S1 PURPOSE AND SCOPE

This standard specifies requirements limiting the rearward displacement of the steering control into the passenger compartment to reduce the likelihood of chest, neck, or head injury.

S2 APPLICATION

This standard applies to passenger cars and to multipurpose passenger vehicles, trucks and buses.

S3 DEFINITIONS

STEERING COLUMN

Structural housing that surrounds a steering shaft.

STEERING SHAFT

Component that transmits steering torque from the steering wheel to the steering gear.

S4 REQUIREMENTS

S4.1 Vehicle manufactured before September 1, 1991.

When a passenger car or a truck, bus, or multipurpose passenger vehicle with a gross vehicle weight rating of 10,000 pounds or less and an unloaded vehicle weight of 4,000 pounds or less is tested under the conditions of S5 in a 30 mile per hour perpendicular impact into a fixed collision barrier, the upper end of the steering column and shaft in the vehicle shall not be displaced more than 5 inches in a horizontal rearward direction parallel to the longitudinal axis of the vehicle. The amount of displacement shall be measured relative to an undisturbed point on the vehicle and shall represent the maximum dynamic movement of the upper end of the steering column and shaft during the crash test.

S4.2 Vehicle manufactured on or after September 1, 1991.

When a passenger car or a truck, bus, or multipurpose passenger vehicle with a gross vehicle weight rating of 10,000 pounds or less and an unloaded vehicle weight of 5,500 pounds or less is tested under the conditions of S5 in a 30 mile per hour perpendicular impact into a fixed collision barrier, the upper end of the steering column and shaft in the vehicle shall not be displaced more than 5 inches in a horizontal rearward direction parallel to the longitudinal axis of the vehicle. The amount of displacement shall be measured relative to an undisturbed point on the vehicle and shall represent the maximum dynamic movement of the upper end of the steering column and shaft during the crash test.

S5 TEST CONDITIONS

The requirements of S4 shall be met when the vehicle is tested in accordance with the following conditions.

- S5.1 The vehicle, including test devices and instrumentation, is loaded to its unloaded vehicle weight.
- S5.2 Adjustable steering controls are adjusted so that a tilting steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. A telescoping steering control is set at the adjustment position midway between the forwardmost and rearwardmost position.
- S5.3 Convertibles and open-body type vehicle have the top, if any, in place in the closed passenger compartment configuration.
- S5.4 Doors are fully closed and latched but not locked.
- S5.5 The fuel tank is filled to any level from 90 to 95 percent of capacity.
- S5.6 The parking brake is disengaged and the transmission is in neutral.
- S5.7 Tires are inflated to the vehicle manufacturer's specifications.