TP111V-00
October 28, 1999

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 111 – Rearview Mirrors (Other Than School Buses)

SAFETY ASSURANCE
Office of Vehicle Safety Compliance
Room 6111, NSA-30
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Washington, DC 20590

OVSC LABORATORY TEST PROCEDURE NO. 111V
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Rev.No.	Date	Amendment	Effective Date	
00	10/28/99	63FR51000	5/27/99	Revised Table 1 - Conversions
01				
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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

1. PURPOSE AND APPLICATION....Continued

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 111 specifies requirements for the performance and location of rearview mirrors.

REQUIREMENTS FOR PASSENGER CARS

Each passenger car shall have an inside rearview mirror of unit magnification with the required field-of-view and a driver's side outside rearview mirror of unit magnification with the required field-of-view. If the inside rearview mirror does not meet the field-of-view requirements, an outside rearview mirror of unit magnification or a convex mirror (with required markings) is required on the passenger's side. The average radius of curvature of the convex mirror shall be not less than 889 millimeters (mm) and not more than 1,651 mm. All the required mirrors must be adjustable in both the vertical and horizontal directions and have a stable mounting.

REQUIREMENTS FOR MPVs, TRUCKS AND BUSES (OTHER THAN SCHOOL BUSES) WITH A GVWR 4,536 KILOGRAMS

A. Mirrors as described for passenger cars, OR

B. Unit magnification outside mirrors on both sides of the vehicle with stable supports, adjustable in both the vertical and horizontal directions, and with reflective surface of at least 126 square centimeters (cm^2).

2. GENERAL REQUIREMENTS....Continued

REQUIREMENTS FOR MPVs, TRUCKS AND BUSES (OTHER THAN SCHOOL BUSES) WITH A GVWR > 4,536 KILOGRAMS (Kg)

Each vehicle shall have outside mirrors of unit magnification, each with not less than 323 cm^2 of reflective surface, installed with stable supports on both sides of the vehicle. The mirrors shall be located so as to provide the driver a view to the rear along both sides of the vehicle and shall be adjustable both in the horizontal and vertical directions to view the rearward scene.

REQUIREMENTS FOR SCHOOL BUSES

Refer to the latest version of **TP-111SB-00** for testing school bus mirror systems.

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 in the manner outlined in the applicable OVSC Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs will include the cost of leasing a replacement vehicle and all costs associated with conducting the retest. The original test specimen (vehicle or equipment item) used for the invalid test shall remain the property of OVSC, and the retest specimen shall remain the property of the contractor. If there is a test failure, the contractor shall retain the retest specimen for a period not exceeding 180 days. If there is no test failure, the Contractor may dispose of the test specimen upon notification from the COTR that the final test report has been accepted.

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

3. SECURITY

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

NOTE: 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 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 five 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 VEHICLES

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

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

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. Owner's Manual, warranty document, consumer information, and extra set of keys are present, and

F. Proper fuel filler cap is supplied on the vehicle.

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

7. GOVERNMENT FURNISHED PROPERTY (GFP)....Continued

A “Vehicle Condition” form 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 condition prior to test in detail, and the lower half provides space for a description of the post test condition. The Vehicle Condition form must be completed and delivered to the COTR with the Final Test Report or the report will NOT be accepted.

NOTIFICATION OF COTR

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

8. CALIBRATION OF TEST INSTRUMENTS

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

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

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

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

(1) Date of calibration

(2) Date of next scheduled calibration

(3) Name of the technician who calibrated the equipment

8. CALIBRATION OF TEST INSTRUMENTS....Continued

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 system will need the acceptance of the COTR before the test program commences.

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

9. PHOTOGRAPHIC DOCUMENTATION

Photographs shall be glossy black and white, 8 x 10 inches, and properly focused for clear images. A label or placard identifying the test vehicle model, NHTSA number and date or item of equipment part number and date shall appear in each photograph and must be legible. Each photograph shall be labeled as to the subject matter.

As a minimum the following photographs shall be included in each final test report, where applicable:

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

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

9. PHOTOGRAPHIC DOCUMENTATION....Continued

C. Closeup view of vehicle's certification label

D. Closeup view of vehicle's tire information placard or label

E. All rearview mirrors and mirror mountings

F. Field-of-view test setups, including viewing instrument

G. Reflectance test setup

H. Break-away test setup

I. Photos required to document test results

J. Photos to document any apparent test failure

10. DEFINITIONS

CONVEX MIRROR

Mirror having a curved reflective surface whose shape is the same as that of the exterior surface of a section of a sphere.

EFFECTIVE MIRROR SURFACE

The portions of a mirror that reflect images, excluding the mirror rim or mounting brackets.

PLAN VIEW REFERENCE LINE

For vehicles with bench-type seats, a line parallel to the vehicle longitudinal centerline located outboard of the steering wheel centerline at a distance 0.15 times the difference between one-half of the shoulder room dimension and the steering wheel centerline-to-car-centerline dimension.

For vehicles with individual-type seats, a line parallel to the vehicle longitudinal centerline which passes through the center of the driver's designated seating position.

10. DEFINITIONS....Continued

PROJECTED EYE POINT

Point on a horizontal plane forward of the mirror at a distance equal to the true distance from the eye to the mirror.

SEATING REFERENCE POINT (SRP)

Vehicle manufacturer's design H-point with the seat in the rearmost driving position, which for purposes of this procedure simulates the position of the pivot center of the human torso and thigh.

STANDARD PRODUCTION ITEMS

Items installed during the assembly of the test vehicle.

UNIT MAGNIFICATION MIRROR

Plane or flat mirror with a reflective surface through which the angular height and width of the image of an object is equal to the angular height and width of the object when viewed directly at the same distance, except for flaws that do not exceed normal manufacturing tolerances. For the purposes of this regulation a prismatic day night adjustment rearview mirror, one of whose positions provides unit magnification, is considered a unit magnification mirror.

95TH PERCENTILE EYELLIPSE CONTOUR

Passenger car driver's eye range in the form of contours developed by analyzing statistical data of eye point locations.

11. PRETEST REQUIREMENTS

Prior to conducting a compliance test, the contractor shall:

A. Verify COTR approval of contractor’s In-house Test Procedure,

B. Verify the training of technicians for performance of this test,

C. Verify the calibration status of test equipment,

D. Review applicable revision of FMVSS 111

11. PRETEST REQUIREMENTS....Continued

TEST AREA

The compliance test area must be level and approximately 6 to 12 meters wide and 15 to 67 meters long. The test area floor should be marked to aid in locating the test vehicles on axes that are perpendicular to a screen or wall.

To reduce the required length, the test area may include a vertical screen or wall behind the test vehicle that is approximately 2.4 meters high and 4.5 to 6 meters wide, and marked with a square grid of vertical over horizontal intervals every 15 to 30 centimeters (6 inches to 12 inches), or other marker devices that provide for accurate measurement of the field-of-view. Unless specified otherwise, all tests shall be performed within a temperature range of 15.6ºC to 37.8ºC (60ºF to 100ºF) and a relative humidity of not more than 90 percent.

VEHICLE PREPARATION

A. Clean all mirrors and both sides of all glazing involved in the compliance test with a non-abrasive cleaner.

B. The fuel tank shall be full.

C. All tire pressures shall be set cold according to the vehicle manufacturer's recommendation.

PERMANENT RECORDING OF DATA

Where permanent trace recording is not required, data shall be recorded on standard report forms. Changes or corrections shall be made by drawing a line through the original entry, which must remain legible, adding the change above or alongside, and initialed.

11. PRETEST REQUIREMENTS....Continued

METRIC UNITS

As a general rule, use of the metric system of weights and measures is preferred. Performance parameters and test conditions in FMVSS 111 are now specified in metric units. In this Laboratory Test Procedure metric values are followed by English units only for reference (not necessarily equal). If test equipment is not available for direct measurement in metric units, the test laboratory shall calculate the exact metric equivalent by means of a conversion factor carried out to at least 5 significant digits before rounding consistent with the specified metric requirement. Metric units shall be used in Final Test Reports.

12. COMPLIANCE TEST EXECUTION

A passenger car shall be subjected to testing in the order below:

A. Inspection

B. Mounting Adequacy Test

C. Field-of-View Test, Inside Rearview Mirror

D. Field-of-View Test, Driver's Side Outside Mirror

E. Reflectance Test

F. Break-Away Test

G. Unit Magnification and Convex Mirror Tests

A multipurpose passenger vehicle, truck or bus (other than school bus) shall be subjected to the passenger car tests, if certified to such by the manufacturer as indicated by the COTR, or the tests listed in procedure H.

12. COMPLIANCE TEST EXECUTION....Continued

A. INSPECTION

Inspect the installation of the inside and outside rearview mirrors. Note any evidence of defects or imperfections which could influence the test. Operate the inside and outside rearview mirrors in all modes and directions to verify that the devices meet the manufacturer's specifications in the Vehicle Owner's Manual.

A car is not required to have an outside mirror on the passenger's side unless its inside rearview mirror does NOT meet the field-of-view requirements of S5.1.1

Record the results on Data Sheet 1.

B. MOUNTING ADEQUACY TEST – ALL REARVIEW MIRRORS

(1) INSIDE MIRROR (S5.1.2)

Determine that the mirror is securely mounted and determine the positive and negative angles of adjustment for both the vertical and horizontal directions as shown in Figure 1. Record the results on Data Sheet 2.

(2) OUTSIDE MIRROR(S) (S5.2.2 and S5.3)

Determine that the mirror(s) is(are) securely mounted. Determine that the driver's side mirror can be tilted in both horizontal and vertical directions from the driver's seated position. Determine that the passenger's side mirror is capable of adjustment by tilting in both the horizontal and vertical directions. Determine the positive and negative angles of adjustment for both horizontal and vertical directions for all outside mirrors. Determine that all outside mirrors are free of sharp points or edges that could contribute to pedestrian injury. Record the results on Data Sheet 2.

12. COMPLIANCE TEST EXECUTION....Continued

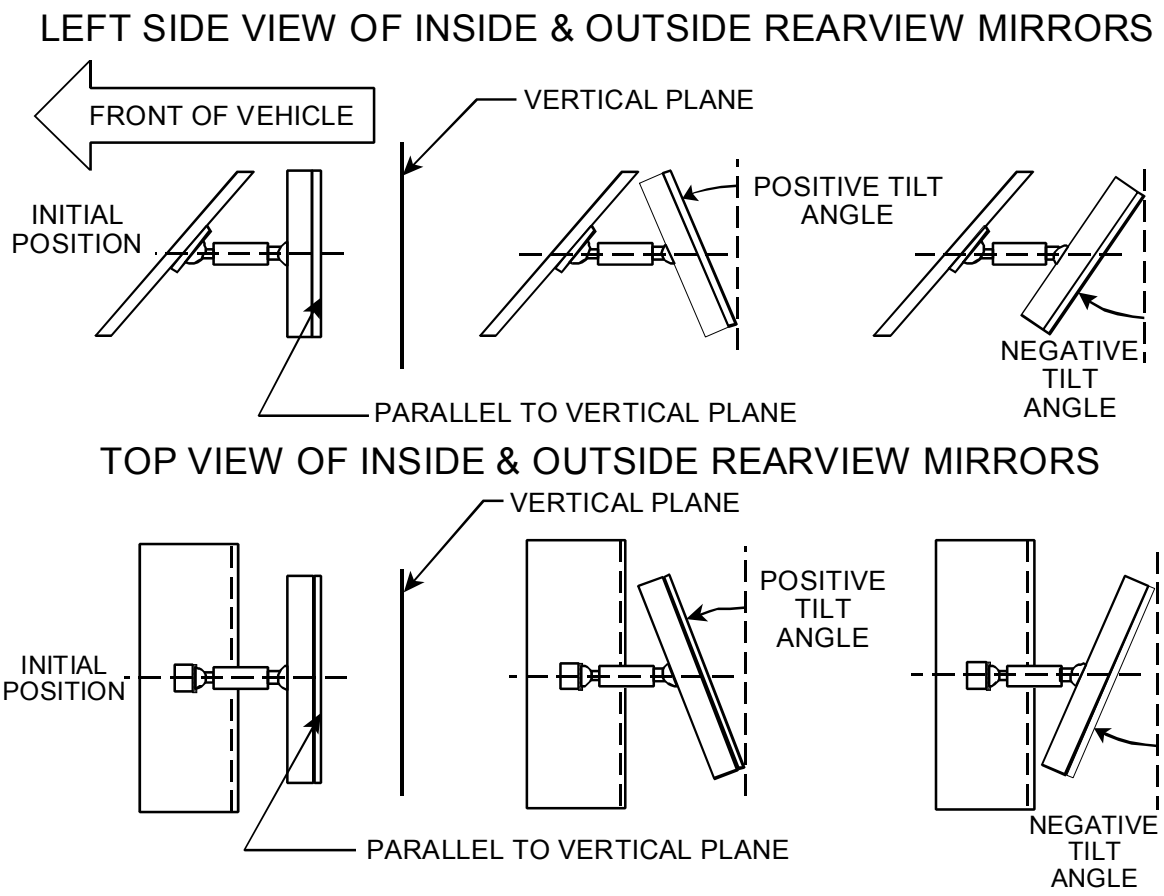


FIGURE 1

C. FIELD-OF-VIEW TEST – INSIDE REARVIEW MIRROR

(1) REQUIREMENTS (S5.1.1)

Mirror shall provide a field of view with an included horizontal angle measured from the projected eye point of at least 20 degrees, and sufficient vertical angle to provide a view of a level road surface extending to the horizon beginning at a point not greater than 61m (200 feet) to the rear of the vehicle when the vehicle is occupied by the driver and four passengers or the designated occupant capacity, if less. The line of sight may be partially obscured by seated occupants or by head restraints.

Each car whose inside mirror does not meet the field of view requirements of S5.1.1 shall have an outside mirror of unit magnification or a convex mirror installed on the passenger's side. (S5.3)

12. COMPLIANCE TEST EXECUTION....Continued

(2) PROCEDURE

The general procedure is to position the viewing instrument using an appropriate fixture at the left and right eye point locations respectively and to view the field-of-view grid and markers placed at a specified distance behind the vehicle. The required field-of-view measurements are then made and calculations performed as required to evaluate compliance with the standard. Refer to Figure 2.

(A) Maneuver the vehicle onto a predetermined location on the level floor of the test laboratory. This location will also be used for the driver side and passenger side outside mirror testing.

(B) Establish a vertical longitudinal plane tangent to the widest point of the test vehicle on the driver's side (parallel to the centerline of the vehicle) and locate its intersection with the floor.

(C) Measure 10.7 meters (35 feet) to rear of the driver's eye location provided by the COTR and set up a field-of-view test screen perpendicular to the tangent plane. Screen should be grid format with lines equally spaced and delineated with letters and numbers for reference purposes.

(D) Load the vehicle to simulate the driver and four passengers (unless capacity is less) with ballast of 68 kilograms (150 pounds) per occupant.

(E) Block and secure the vehicle in place to eliminate vertical or horizontal motion during the test and to maintain vehicle position when the load is removed. Measure and record in the general test log the vehicle orientation for future reference.

12. COMPLIANCE TEST EXECUTION....Continued

INSIDE REARVIEW MIRROR FIELD OF VIEW
TEST GRID AND MARKER SETUP

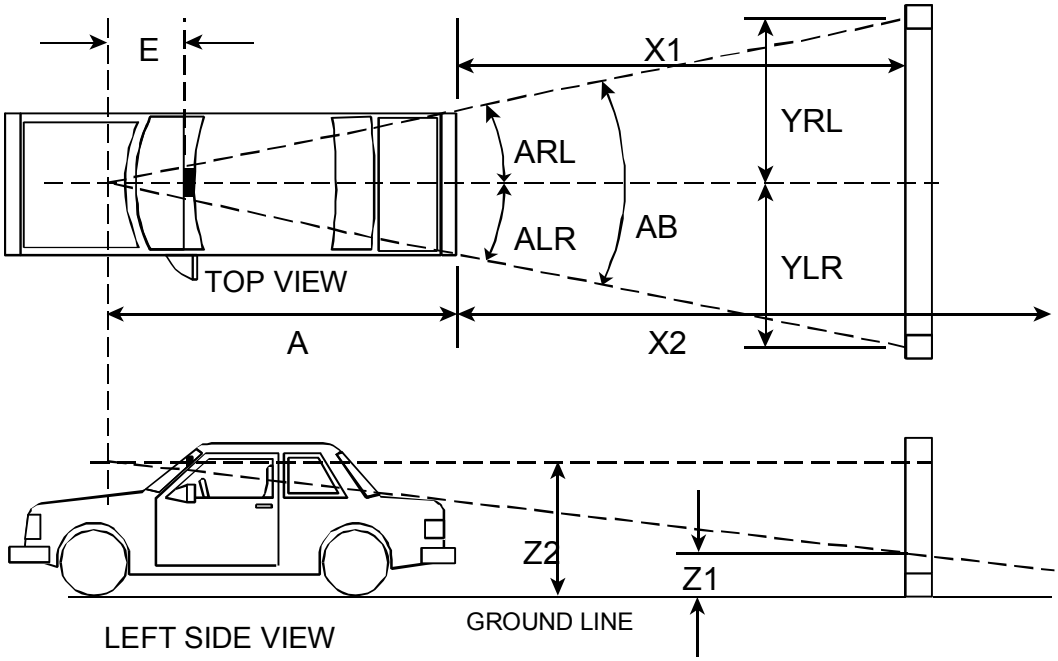


FIGURE 2

WHERE –

E = Distance from center of the mirror to the projected eye point. The distance to this imaginary point is equal to the distance from the mid-point between the driver eye locations to the center of the mirror surface.

X1= Distance to field-of-view grid from rear of vehicle.

X2= CALCULATED distance where a 95th percentile male driver would first see a level road surface behind vehicle (calculated as shown on Data Sheet 3). Must be 61 meters (200 feet) or less.

AB= Included horizontal am-binocular angle. Must be at least 20 degrees.

Z1= Vertical distance to lowest target on field-of-view grid.

Z2= Height of center of mirror.

12. COMPLIANCE TEST EXECUTION....Continued

(F) Remove the front seat(s) and install the viewing instrument positioning fixture. The viewing instrument shall be located using the fixture such that the focal point of the instrument is in the position of the driver eye point location provided by the COTR. The viewing instrument and fixture shall be designed such that the viewing instrument can be rotated about the vertical axis.

(G) Measure the vertical height of the center of the mirror Z2. Place a target on the field-of view grid at this height at the centerline of the vehicle.

(H) While observing through the viewing instrument, adjust the inside mirror both horizontally and vertically such that the Z2 target is visible on the TOP EDGE of the mirror on the mirror centerline. Once the mirror is adjusted it should not be altered until the end of the inside mirror test.

(I) While observing through the viewing instrument, have an assistant place a target on the vehicle centerline on the field-of-view screen at a vertical height Z1 at a location where the target appears at the LOWER edge of the mirror. This point will be used to calculate the distance at which the level road surface would be first visible.

(J) While observing through the instrument in the driver's left eye location, have an assistant place markers on the field-of-view screen at the extreme left and right sides of the mirror view. Repeat while observing from the driver's right eye location. Take photographs of the left and right eye views through the viewing instrument. In addition, photograph the field-of-view grid with all markers shown.

Record the following on Data Sheet 3.

YRR - The maximum lateral distance to the driver's right of the center line that is viewed on the grid with the instrument in the right eye location.

12. COMPLIANCE TEST EXECUTION....Continued

YLL - The maximum lateral distance to the driver's left of the center line that is viewed on the grid with the instrument in the left eye location.

YRL - The maximum lateral distance to the driver's right of the center line that is viewed on the grid with the instrument in the left eye location.

YLR - The maximum lateral distance to the driver's left that is viewed with the instrument in the right eye location.

NOTE: The YRL and YLR lateral distances provide the widest field-of-view.

(K) With the positioning fixture still in position, measure the distance from the midpoint between the driver eye point locations to the center of the mirror surface. Establish the location of the imaginary projected eye point on a horizontal plane forward of the mirror surface at a distance E equal to the measured distance.

(L) Calculate distance X2 using the formula on Data Sheet 3. Measure and record other variables.

(M) Inspect outside mirror on passenger's side of car, if installed either by requirement S5.3 or by manufacturer's option. Record the results on Data Sheet 3.

D. FIELD-OF-VIEW TEST, DRIVER'S SIDE OUTSIDE REARVIEW MIRROR

(1) REQUIREMENTS (S5.2)

Each passenger car shall have an outside mirror of unit magnification. The mirror shall provide the driver a view of a level road surface extending to the horizon from a line, perpendicular to a longitudinal plane tangent to the driver's side of the vehicle at the widest point, extending 2.4 meters (8 feet) out from the tangent plane 10.7 meters (35 feet) behind the driver's eyes, with the seat in the rearmost position. The line of sight may be partially obscured by rear body or fender contours. (S5.2.1)

12. COMPLIANCE TEST EXECUTION....Continued

Neither the mirror nor the mounting shall protrude farther than the widest part of the vehicle body except to the extent necessary to produce a field of view meeting or exceeding the requirements of S5.2.1. The mirror shall not be obscured by the un-wiped portion of the windshield. (S5.2.2)

(2) PROCEDURE (Refer to Figures 3A, 3B, 3C, and 3D)

(A) Maintain the vehicle, field-of-view grid and test equipment positions as established for the inside rearview mirror test.

(B) Place a small target disc, approximately 6 millimeters (0.25 inches) in diameter, on upper inboard quadrant of mirror reflecting surface.

(C) Measure distance X between the tangent plane at widest point on vehicle and the center of the target on the mirror reflecting surface. Note whether distance is inboard or outboard of tangent plane. Enter result on Data Sheet 3.

(D) Measure the height H above ground of the center of the target on the mirror surface.

12. COMPLIANCE TEST EXECUTION....Continued

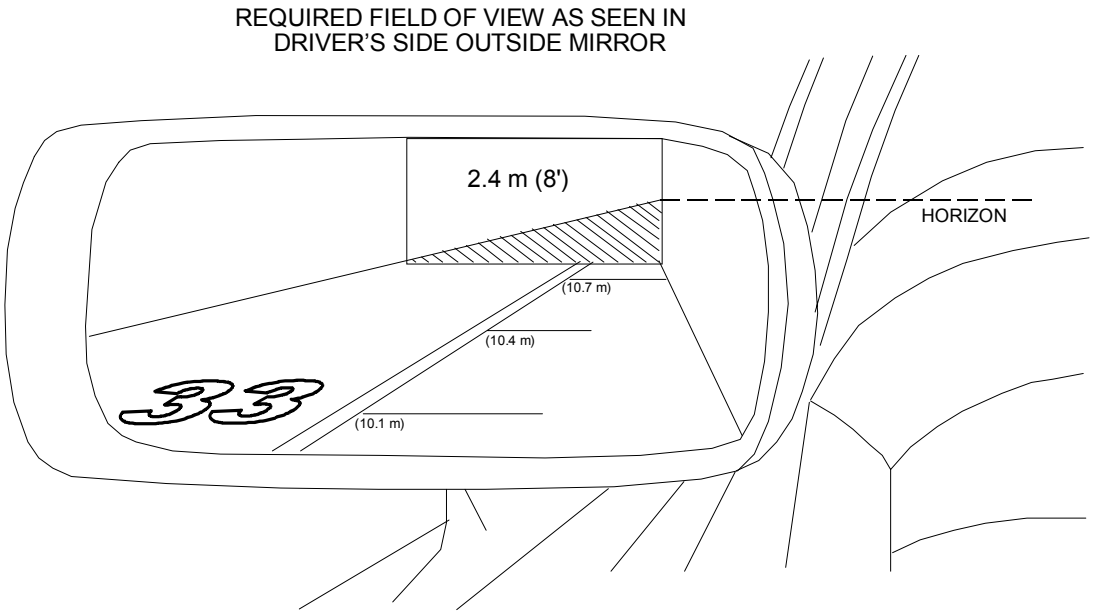


FIGURE 3A

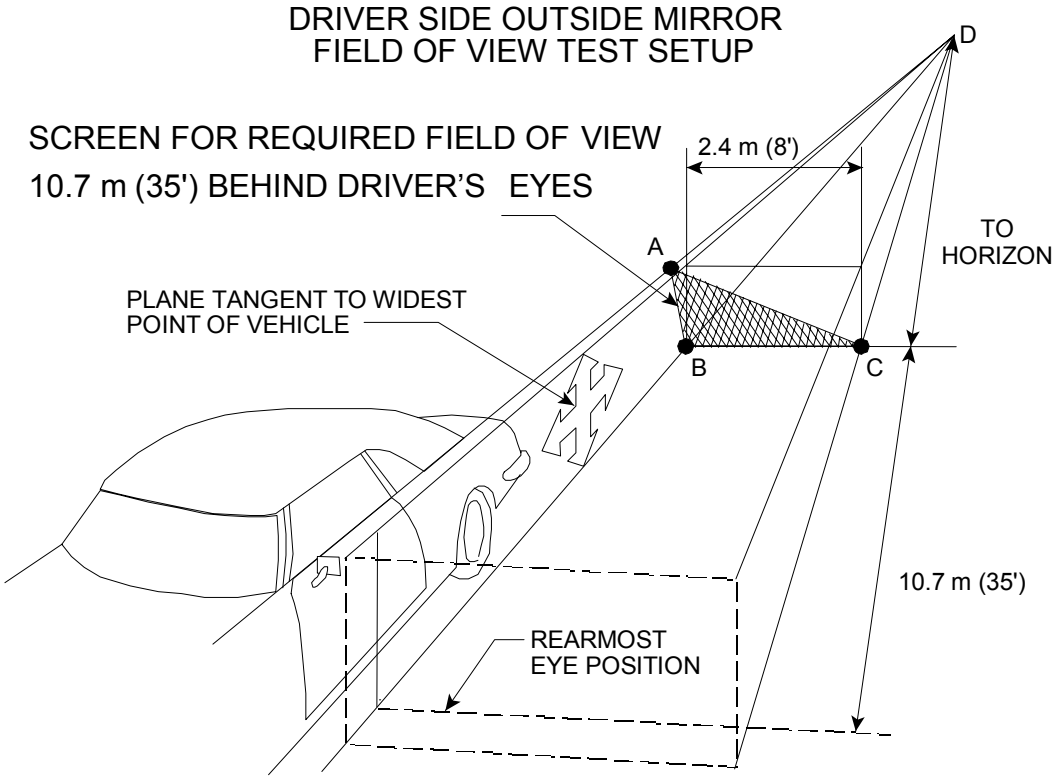


FIGURE 3B

12. COMPLIANCE TEST EXECUTION....Continued

DRIVER SIDE OUTSIDE MIRROR TARGET DISC LOCATION WITH X AND H DIMENSIONS

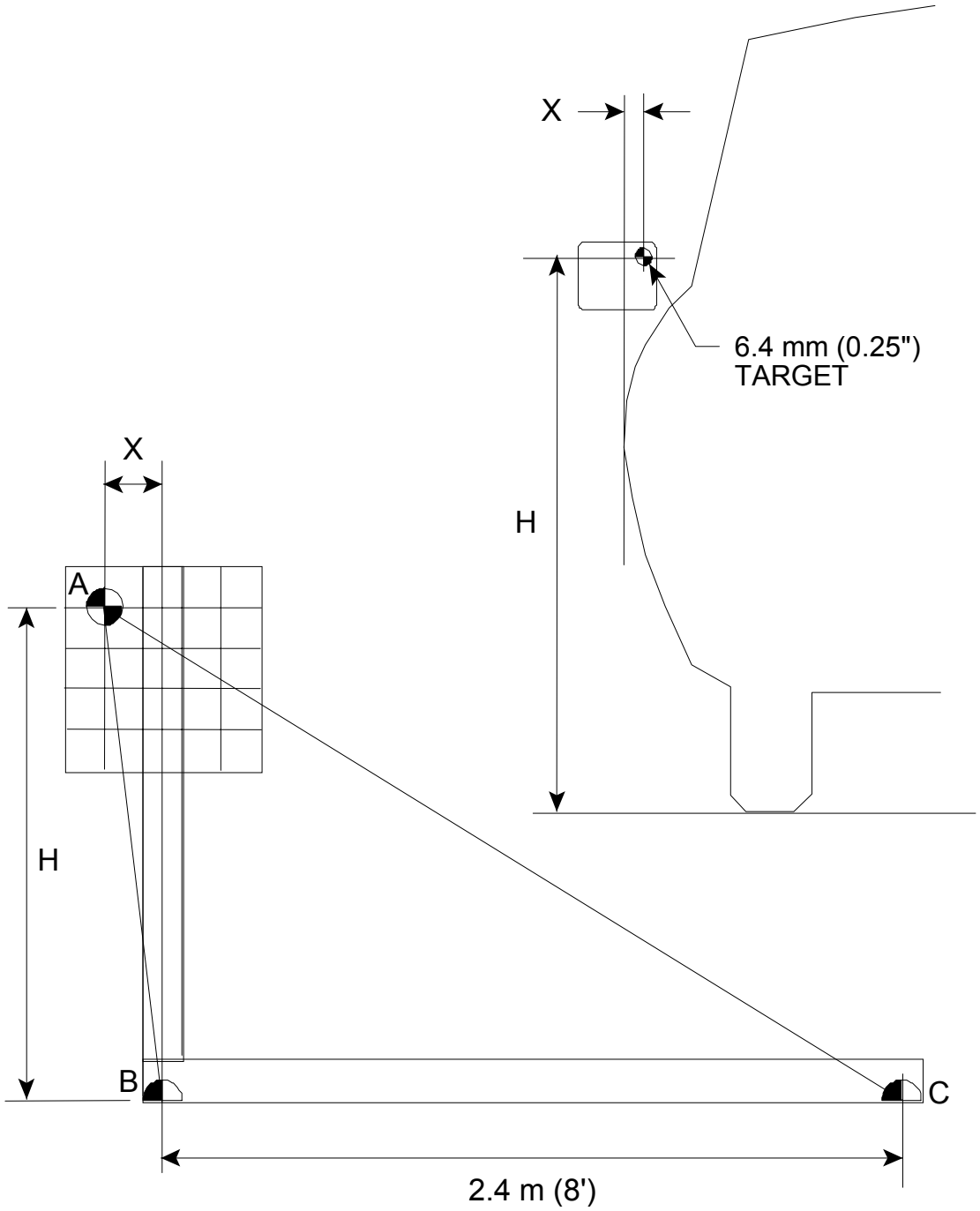


FIGURE 3C

12. COMPLIANCE TEST EXECUTION....Continued

DRIVER SIDE OUTSIDE MIRROR REQUIRED
FIELD OF VIEW TRIANGLE

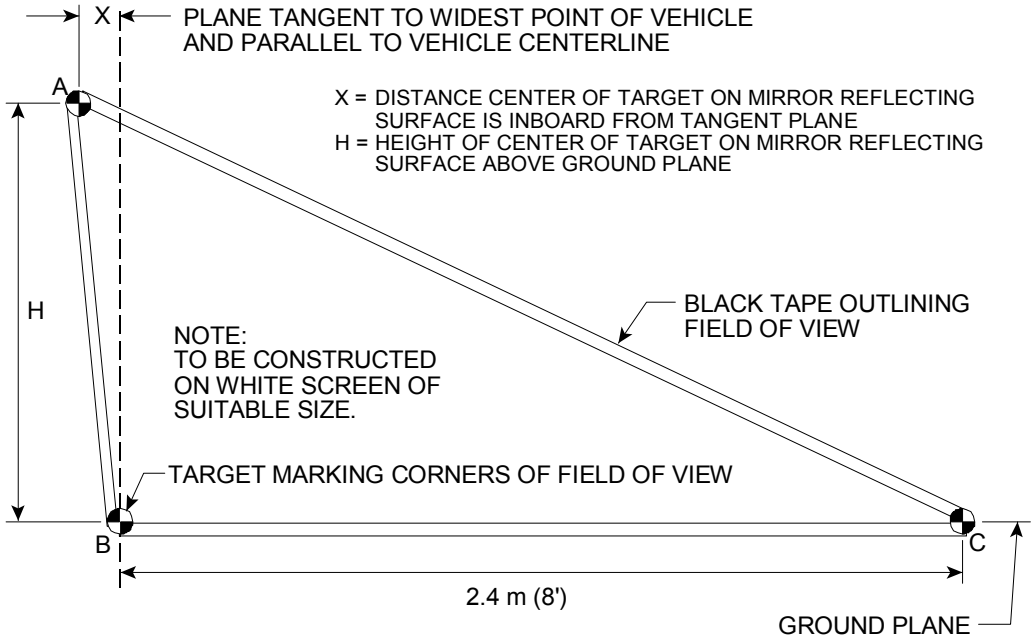


FIGURE 3D

(E) Construct a triangular-shaped driver's side view mirror test target area on the field-of-view screen using 3 points (A, B, and C) according to the following:

Point A: At a vertical height from ground equal to the vertical height of the center of the target on the mirror (dimension H) and a distance (Dimension X) equal to the distance from the center of the target on the mirror to the plane tangent to the widest part of the vehicle on the driver's side,

Point B: At ground level, on the plane tangent to the driver's side of the vehicle at the widest point, and

Point C: At ground level, 2.4 m (8 ft) outboard on a plane parallel to the plane tangent to the driver's side of the vehicle at the widest point.

12. COMPLIANCE TEST EXECUTION....Continued

(F) Adjust the mirror such that the entire triangle area defined by points A, B, and C is visible with the combined view taken from the left and right eyellipse locations. Initially adjust mirror such that the roadway extending from point B to point C is visible at the mirror base. The field-of-view requirement is met if the triangle is visible in its entirety with the combined left and right eyellipse views.

NOTE: The right eye sees the widest outboard distance. The left sees the most inboard distance.

(G) Photograph the left and right eyellipse views. Record measurements in Data Sheet 3 for height of view and lateral distance visible from widest point of the vehicle body.

(H) Observe and record if mirror is obscured by unwiped area of windshield.

(I) Observe and record any protrusion of the side view mirror or its support beyond a plane tangent to widest part of the vehicle. Record whether the protrusion, if any, is required to meet the field-of-view requirements.

(J) Enter results on Data Sheet 3.

E. REFLECTANCE TEST – ALL MIRRORS

(1) REQUIREMENT (S11)

All single reflectance mirrors shall have an average reflectance of at least 35 percent. If a mirror is capable of multiple reflectance levels, the minimum reflectance level in the day mode shall be at least 35 percent and the minimum reflectance level in the night mode shall be at least 4 percent. The average reflectance of any mirror required by this standard shall be determined in accordance with SAE Recommended Practice J964, OCT 84.

A multiple reflectance mirror shall either be equipped with a means for the driver to adjust the mirror to a reflectance level of at least 35 percent in the event of electrical failure, or achieve such reflectance level automatically in the event of electrical failure.

12. COMPLIANCE TEST EXECUTION....Continued

(2) APPARATUS DESCRIPTION, SETUP, AND PREPARATION

The apparatus shall consist of a light source, a sample holder, a receiver unit with a photodetector and an indicating meter as shown in Figure 4, and means for negating the effects of extraneous light. The receiver may incorporate a light integrating sphere to facilitate measuring reflectance of nonflat (convex) mirrors as shown in Figure 5.

(A) Characteristic of Light Source and Photoreceptor

The light source shall consist of an incandescent tungsten filament lamp operating at a nominal color temperature of 2,856 K (CIE Illuminant A) and associated optics to provide a near collimated light beam. A voltage stabilizer is recommended for maintaining a fixed lamp voltage during instrument operation. The photoelectric receptor shall have a spectral response proportional to the photopic luminosity function of the standard CIE observer. Any other combination of illuminant-filters-receptor which gives the overall equivalent of illuminant A and average visual response may be used.

When an integrating sphere is used in the receiver, the interior surface of the sphere shall be coated with a matt (diffusive) spectrally nonselective white coating.

(B) Geometric Conditions

The angle of the incident beam (A1) shall preferably be 25º ± 5º (0.44 ± 0.09 radian) and shall not exceed 30º (0.53 radians) from the perpendicular to the test surface, and the axis of the receptor shall make an angle (A2) with this perpendicular equal to that of the incident beam. The incident beam upon arrival to the test surface, shall have a diameter of 19 mm (0.75 inch) or larger and shall not exceed the sample test area. The reflected beam upon arrival at the photoreceptor, shall not be larger than the photo-sensitive area and shall not cover less than 50 percent of such area. The reflected beam should strike that area of the photoreceptor used for calibration.

12. COMPLIANCE TEST EXECUTION....Continued

When an integrating sphere is used in the receiver section, the sphere shall have a minimum diameter of 127 millimeters (5 inches). The sample and incident beam apertures in the sphere wall shall be of such a size as to admit the entire incident and reflected light beams. The photodetector shall be so located as not to receive direct light from either the incident or the reflected beams.

(C) Receptor-Indicator Unit

The photoreceptor output as read on the indicating meter shall be a linear function of the light intensity on the photosensitive area of the receptor. Further, means (electrical and/or optical) shall be provided for calibration and zeroing adjustments. Such means shall not affect the linearity or the spectral characteristics of the instrument. The accuracy of the receptor-indicator unit shall be within ± 2 percent of full scale, or ± 10 percent of the magnitude of the reading, whichever is smaller.

(D) Sample Holder

The mechanism shall be capable of locating the test sample such that the axes of the source arm and receptor arm intersect at the reflecting surface. The reflecting surface may lie within or at either face of the mirror sample depending on whether it is a first-surface, second-surface, or prismatic "flip" type mirror.

12. COMPLIANCE TEST EXECUTION....Continued

GENERALIZED REFLECTOMETER SHOWING GEOMETRIES
FOR THE TWO CALIBRATION METHODS

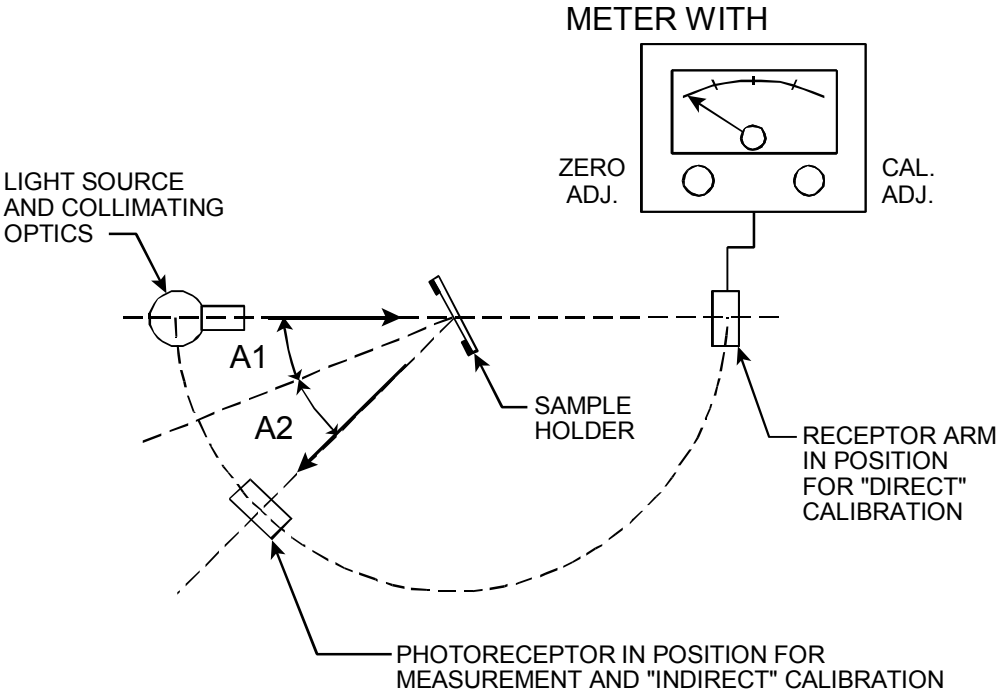


FIGURE 4

GENERALIZED REFLECTOMETER, INCORPORATING
AN INTEGRATING SPHERE IN RECEIVER

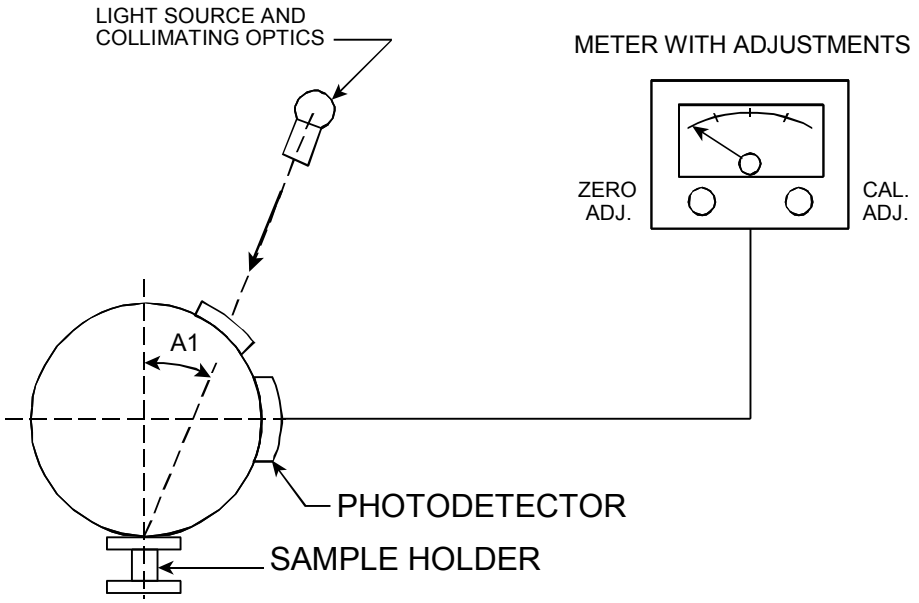


FIGURE 5

12. COMPLIANCE TEST EXECUTION....Continued

(E) Direct Calibration Method

The direct calibration method is for those instruments which are so constructed as to permit calibration at the 100% point by swinging the photoreceptor arm to a position directly on the axis of the light source.

It may be desired in some cases (such as, when measuring low reflective surfaces) to use an intermediate calibration point neutral density filter of known transmission value inserted in the optical path. The calibrate control will then be adjusted until the meter reads the percent transmission of the neutral density filter. This filter must be removed before making any reflectivity measurement.

(F) Indirect Calibration Method

The indirect calibration method is for those instruments with a fixed photoreceptor arm and thus requires a properly calibrated and maintained reference mirror standard.

(G) Flat Mirror Measurement

Reflectance of flat mirror samples is measured on instruments which employ either the direct or indirect calibration method. The reflectance value is read directly from the instrument indicator meter.

(H) Nonflat (Convex) Mirror Measurement

Reflectance of nonflat (convex) mirror measurement requires the use of instruments which incorporate an integrating sphere in the receiver unit. The reflectance value is read directly from the instrument indicating meter.

(3) REFLECTANCE TEST PROCEDURE

(A) Conduct test with mirror in the day mode.

(B) The mirror is mounted in a special holder.

12. COMPLIANCE TEST EXECUTION....Continued

(C) The photoreceptor is mounted such that light from the light source is directly received as shown in Figure 6.

(D) Five measurements are made. After each measurement, the photoreceptor is moved and then realigned such that the meter reading is a maximum.

(E) The mirror in the sample holder is placed to receive the light beam as shown in Figure 4.

(F) The photoreceptor is located such that only light reflected from the mirror is received, normal to the photoreceptor surface.

(G) Five measurements are made, each time adjusting the photoreceptor to maximize the reading.

(H) The direct light readings are averaged.

(I) The reflected light readings are averaged.

(J) The percentage of light reflected is computed and the reflectance determined.

(K) Repeat test with the mirror in the night mode, if so equipped.

(L) If a multiple reflectance mirror remove all electrical power and adjust manually to day mode position, if so equipped. Repeat test for the day mode requirement. (For multiple reflectance mirrors obtain instructions from the COTR concerning the manufacturer's recommended procedure for obtaining "day mode" and "night mode" position settings.)

(M) All measurements shall be recorded and calculations performed as called for on Data Sheet 4. An average reflectance value is calculated for each single reflectance mirror and for the daytime and nighttime modes of the inside rearview mirror.

12. COMPLIANCE TEST EXECUTION....Continued

F. BREAK-AWAY TEST – INSIDE REARVIEW MIRROR

(1) REQUIREMENTS (S5.1.2)

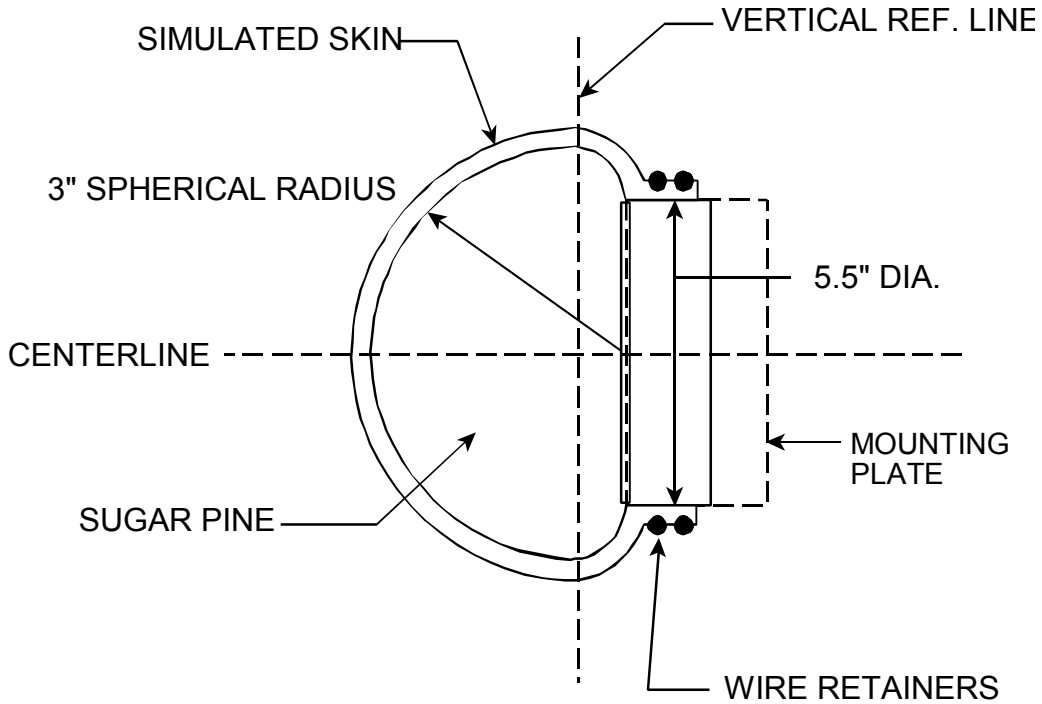
If the mirror is in the head impact area, the mounting shall deflect, collapse, or break away without leaving sharp edges when the reflective surface of the mirror is subjected to a force of 400 N (90 lb) in any forward direction that is not more than 45 degrees from the longitudinal direction.

(2) SUGGESTED TEST EQUIPMENT

(A) Head Form

The head form used shall conform to the specifications shown in Figure 6.

HEADFORM



LEFT SIDE CROSS-SECTIONAL VIEW

FIGURE 6

12. COMPLIANCE TEST EXECUTION....Continued

NOTE: Skin and Underlayer Characteristics — Animal skin such as Napa goat skin or wet chamois may be used. When this type of skin is used the skin thickness requirement does not apply. Headform specifications:

Simulated Skin —
Thickness = 0.030 inches, ± 0.003 inches
Tensile Strength = 1,000 psi ± 5 percent
Elongation = 100 percent, ± 5 percent
Penetremeter = 16 to 18

Synthetic Underlayer —
Thickness = 0.250 inches, ± 0.025 inches
Tensile Strength = 250 psi, ± 10 percent
Elongation = 50 percent, ± 10 percent
Penetremeter = Not Applicable

Sugar Pine shall have grain direction perpendicular to base, 4,000 to 5,000 lb on 1 in^2 parallel to grain to appreciable crush.

(B) Loading Ram

The loading ram shall produce a load of up to 534 N (120 pounds) over a stroke length of a minimum of 25.4 cm (10 inches), and provide a displacement rate of 5.08 cm (2 inches) per minute, plus or minus 5.08 mm (0.2 inch) per minute.

(C) Displacement Transducer

Capable of measuring displacement over a range from 0 to at least 30.5 cm (12 inches) of continuous stroke.

(D) Force Transducer

Capable of measuring force over a range from 0 to at least 534 N (120 pounds) with the load continuously applied.

(E) Vernier Protractor

12. COMPLIANCE TEST EXECUTION....Continued

(F) Recorder

Oscillograph or computer system capable of permanently recording r force-displacement plots.

(3) BREAK-AWAY TEST PROCEDURE

(A) The inside mirror assembly shall be examined for possible modes of failure to be utilized in the breakaway test. Describe on Data Sheet 5, and photograph these positions that differ from the general positions.

(B) Mount the attachment plate to a firmly supported rigid plate as shown in Figure 8. The plate will be positioned in a plane that is within ± 1º of the angle of the windshield (at the mirror attach location) relative to a horizontal plane.

(C) In conjunction with the COTR, select seven (7) directions for application of the 400 n (90 lb) load. The load directions including the possible failure modes selected from the examination of the mirror assembly will be selected to ensure that the mirror support is evaluated in the most critical mode. If selected directions provide no advantage to the evaluation of compliance, the following general load directions will be used:

[1] 0º / 90º — vertical angle is 0º
horizontal angle is 90º
through the centerline
of the support shaft

[2] 45º / 90º — vertical angle is 45º
horizontal angle is 90º

[3] -45º / 90º — vertical angle is -45º
horizontal angle is 90º

[4] 45º / 45º — vertical angle is 45º
horizontal angle is 45º

12. COMPLIANCE TEST EXECUTION....Continued

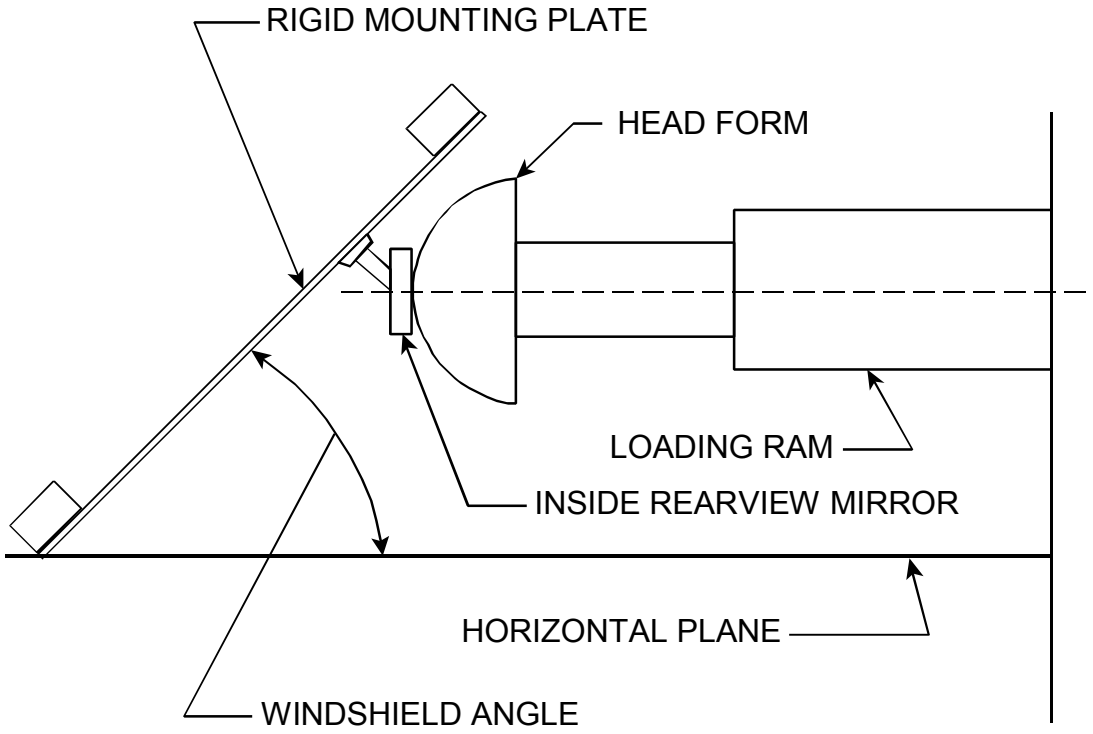
[5] -45º / 45º — vertical angle is -45º
horizontal angle is 45º

[6] 45º / -45º — vertical angle is 45º
horizontal angle is -45º

[7] -45º/-45º — vertical angle is -45º
horizontal angle is -45º

NOTE: For reference, when the centerline of the ram has an horizontal angle of 90º it parallels with the vehicle's longitudinal center line.

SCHEMATIC OF MIRROR LOADING TEST SETUP



LEFT SIDE VIEW

FIGURE 7

12. COMPLIANCE TEST EXECUTION....Continued

(D) For each of the 7 selected load directions, apply the load as follows:

[1] Tilt the mirror such that the reflective surface is in a vertical plane perpendicular to the horizontal plane as shown in Figure 7. Note that the mirror is not tested in vehicle.

[2] Position the loading ram with the ram centerline in the required direction and place the head form in contact with the reflective surface at the center of the mirror as shown in Figures 8 and 9.

[3] Actuate the ram to apply load to the mirror at a rate not to exceed 5.08 cm (2 inches) per minute. Test force is not to exceed 534 n (120 pounds) in the event of a failure i.e. mirror does not break-away. Record the displacement and force as the load is applied.

[4] Display displacement vs time and force vs time, on an oscillograph or computer system. Place the input of the displacement and force time histories to an X-Y plotter for evaluation and reporting purposes as shown in Figure 11.

12. COMPLIANCE TEST EXECUTION....Continued

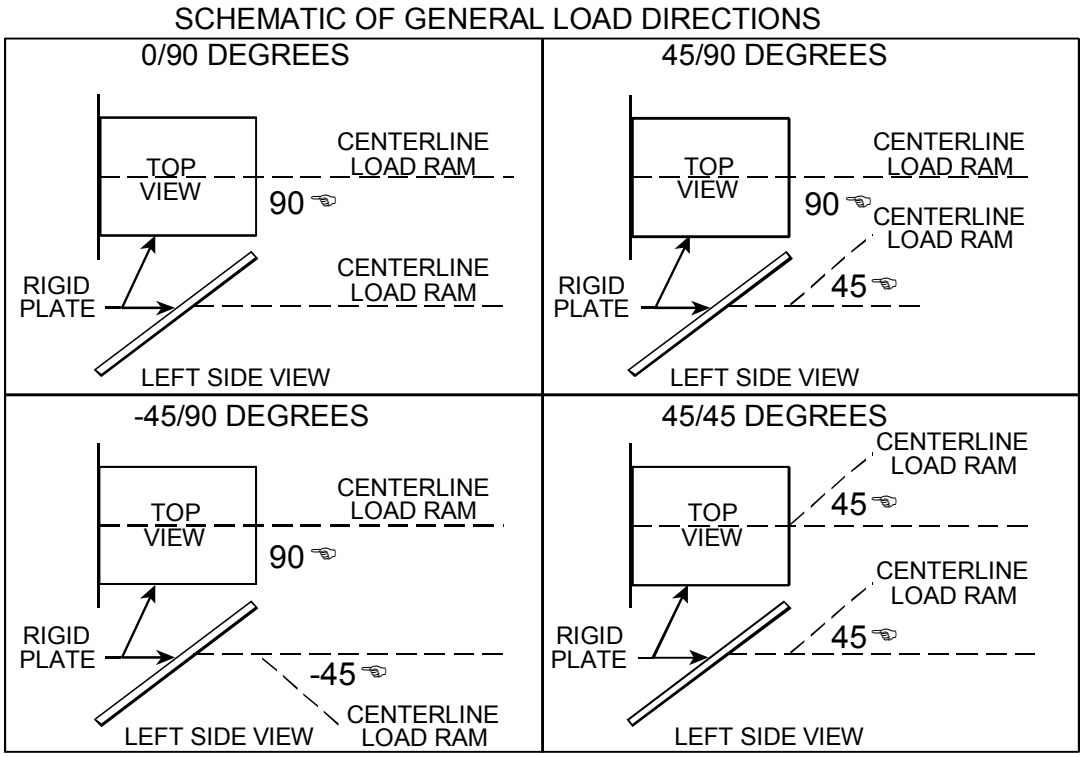


FIGURE 8

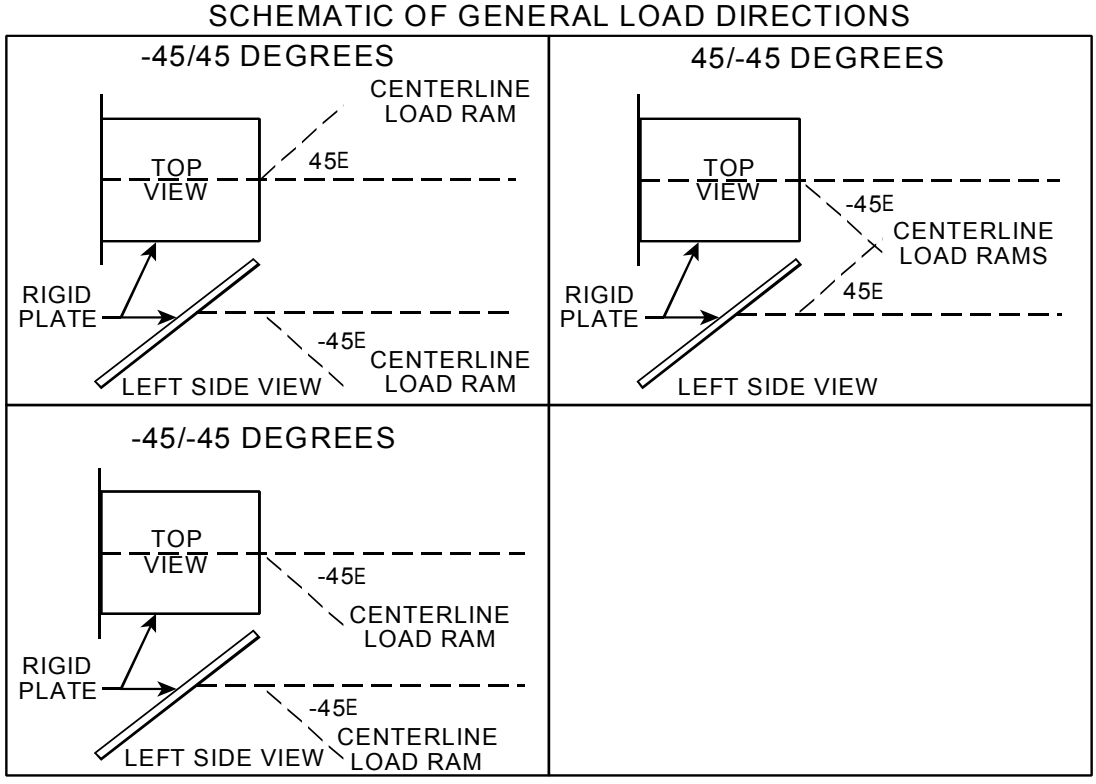


FIGURE 9

12. COMPLIANCE TEST EXECUTION....Continued

[5] Continue to apply the load until a decrease in force with further displacement is noted or until the 400 N (90 pounds) force is exceeded (up to 534N) without the mounting deflecting, collapsing or breaking away.

FORCE-DISPLACEMENT ON-LINE PLOT

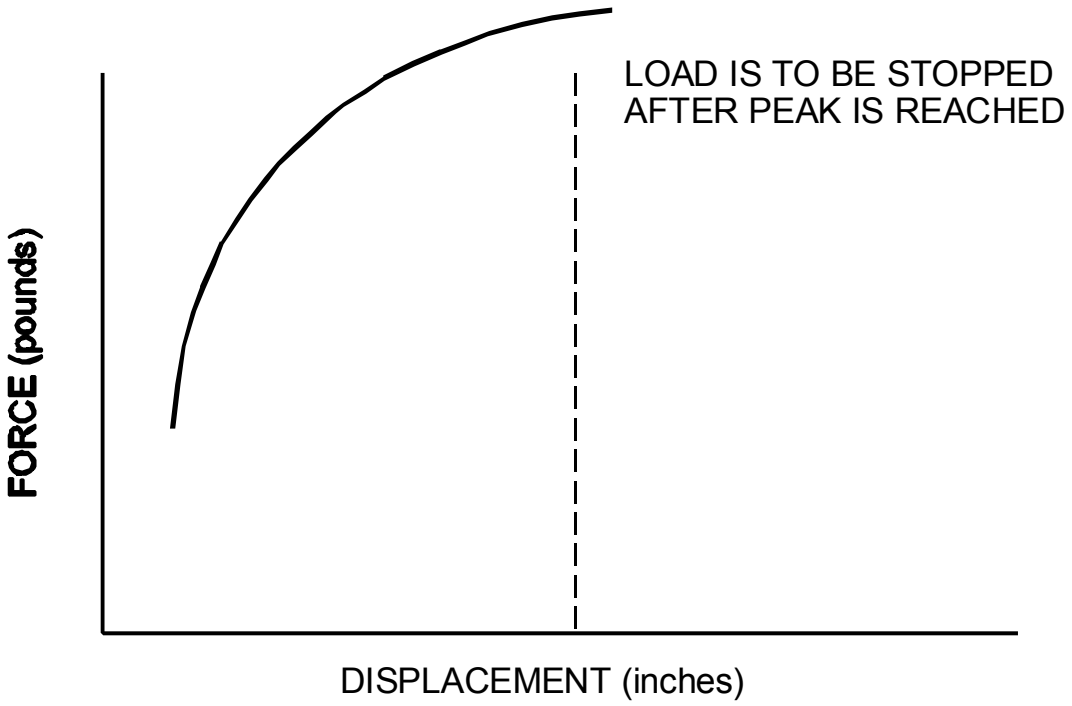


FIGURE 10

(E) Record all data called for on Data Sheet 5.

G. UNIT MAGNIFICATION AND CONVEX MIRROR TESTS

(1) REQUIREMENTS FOR PASSENGER CARS (S5.3 and S5.4)

The driver's side rearview mirror and the inside rearview mirror shall be unit magnification. If the field-of-view requirements are not met with the inside rearview mirror then the passenger's side rearview mirror is required. It can be either unit magnification or convex.

12. COMPLIANCE TEST EXECUTION....Continued

If the passenger's side mirror is convex, the average radius of curvature shall be not less than 889 mm (35 inches) and not more than 1651 millimeters (65 inches) and shall not deviate from the average by more than plus or minus 12.5 percent. The convex mirror shall have permanently and indelibly marked at the lower edge of the mirror's reflective surface in letters not less than 4.8 mm (3/16 inch) nor more than 6.4 mm (0.25 inch) high the words, "**Objects in Mirror Are Closer Than They Appear**."

(2) SUGGESTED TEST EQUIPMENT

A 3-point linear spherometer with two outer fixed legs 38 mm (1.5 inches apart and one inner movable leg at the mid-point. The spherometer should have a dial indicator with a scale that can be read accurately to 0.0025mm (0.0001 inches), with the zero reading being a flat surface.

NOTE: English units are necessary to enable use of Table 1.

(3) RADIUS OF CURVATURE TEST PROCEDURE (S12.)

Steps (A) thru (F) apply to convex mirrors. Only steps (A) and (B) apply to unit magnification mirrors.

(A) Visually inspect mirror for any discontinuities.

(B) Using a 3-point linear spherometer measure the radius of curvature at the 10 test points indicated in Figure 11. The 10 test positions consist of two positions at right angles to each other at each of five locations. The locations are at the center of the mirror, at the left and right ends of a horizontal line that bisects the mirror and at the top and bottom ends of a vertical line that bisects the mirror. None of the readings are within a 6.4 mm (0.25 inch) border on the edge of the image display. At each position, hold the spherometer perpendicular to the mirror surface and record the reading on the dial indicator to the nearest 0.0025 mm (0.0001 inch).

12. COMPLIANCE TEST EXECUTION....Continued

(C) Convert the dial reading data for each of the 10 test positions to radius of curvature measurements in millimeters using Table 1 of this procedure. Consider the changes as linear for dial readings that fall between two numbers in Table 1.

NOTE: If dial indicator is graduated in metric units, all the radius of curvature values in Table 1 are invalid.

(D) Calculate the average radius of curvature by adding the 10 radius of curvature measurements and dividing by 10.

(E) Determine the numerical difference between the average radius of curvature and each of the 10 individual radius of curvature measurements in (C) above.

(F) Calculate the greatest percentage deviation by dividing the greatest numerical difference determined in (E) by the average radius of curvature and multiply by 100.

(G) Inspect the convex mirror on the lower edge of the mirror's reflective surface for the words,
"**Objects in Mirror Are Closer Than They Appear**."

(H) Measure the height of the words on the convex mirror with a finely graduated ruler.

(I) Record results of both flat and convex mirror tests on Data Sheet 6.

12. COMPLIANCE TEST EXECUTION....Continued

LOCATION OF TEN CONVEX MIRROR TESTING POSITIONS

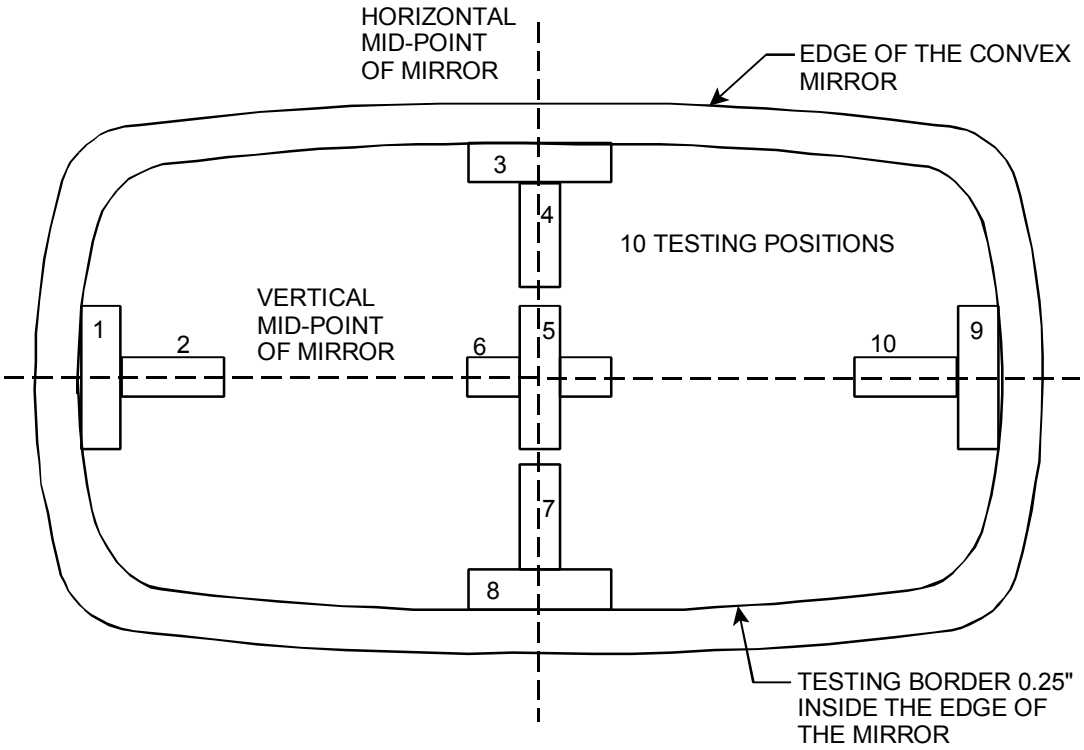


FIGURE 11

12. COMPLIANCE TEST EXECUTION....Continued

TABLE I
CONVERSION TABLE FROM SPHEROMETER DIAL READING TO RADIUS OF CURVATURE

Dial Reading (inches)	Radius of Curvature (inches)	Radius of curvature (mm)
.00330	85.2	2164.1
.00350	80.4	2042.9
.00374	75.2	1910.1
.00402	70.0	1778.0
.00416	67.6	1717.0
.00432	65.1	1653.5
.00450	62.5	1587.5
.00468	60.1	1526.5
.00476	59.1	1501.1
.00484	58.1	1475.7
.00492	57.2	1452.9
.00502	56.0	1422.4
.00512	54.9	1394.5
.00522	53.9	1369.1
.00536	52.5	1333.5
.00544	51.7	1313.2
.00554	50.8	1290.3
.00566	49.7	1262.4

TABLE CONTINUED ON NEXT PAGE

12. COMPLIANCE TEST EXECUTION....Continued

Dial Reading (inches)	Radius of Curvature (inches)	Radius of curvature (mm)
.00580	48.5	1231.9
.00592	47.5	1206.5
.00606	46.4	1178.6
.00622	45.2	1148.1
.00636	44.2	1122.7
.00654	43.0	1092.2
.00668	42.1	1069.3
.00686	41.0	1041.4
.00694	40.5	1028.7
.00720	39.1	993.1
.00740	38.0	965.2
.00760	37.0	939.8
.00780	36.1	916.9
.00802	35.1	891.5
.00822	34.2	868.7
.00850	33.1	840.7
.00878	32.0	812.8
.00906	31.0	787.4
.00922	30.5	774.7
.00938	30.0	762.0
.00960	29.3	744.2

TABLE CONTINUED ON NEXT PAGE

12. COMPLIANCE TEST EXECUTION....Continued

Dial Reading (inches)	Radius of Curvature (inches)	Radius of curvature (mm)
.00980	28.7	729.0
.01004	28.0	711.2
.01022	27.5	698.5
.01042	27.0	685.8
.01060	26.5	673.1
.01080	26.0	660.4
.01110	25.3	642.6
.01130	24.9	632.5
.01170	24.0	609.6
.01200	23.4	594.4
.01240	22.7	576.6
.01280	22.0	558.8
.01310	21.5	546.1
.01360	20.7	525.8
.01400	20.1	510.5
.01430	19.7	500.4
.01480	19.0	482.6
.01540	18.3	464.8
.01570	17.9	454.7
.01610	17.5	444.5
.01650	17.1	434.3

TABLE CONTINUED ON NEXT PAGE

12. COMPLIANCE TEST EXECUTION....Continued

Dial Reading (inches)	Radius of Curvature (inches)	Radius of curvature (mm)
.01700	16.6	421.6
.01750	16.1	408.9
.01800	15.6	396.2
.01860	15.1	383.5
.01910	14.7	373.4
.01980	14.2	360.7
.02040	13.8	350.5
.02100	13.4	340.4
.02160	13.0	330.2
.02250	12.5	317.5
.02340	12.0	304.8
.02450	11.5	292.1
.02560	11.0	279.4
.02680	10.5	266.7
.02810	10.0	254.0
.02960	9.5	241.3
.03130	9.0	228.6
.03310	8.5	215.9

12. COMPLIANCE TEST EXECUTION....Continued

H. MPVs, TRUCKS & BUSES (Other Than School Buses)

(1) REQUIREMENTS

(S6.1) Each multipurpose passenger vehicle, truck and bus, other than a school bus, with a GVWR of 4,536 kg or less shall have either:

(A) Mirrors conforming to the passenger car requirements, or

(B) Outside mirrors of unit magnification, each with not less than 126 sq cm (19.5 sq in) of reflective surface, installed with stable supports on both sides of the vehicle, located so as to provide the driver a view to the rear along both sides of the vehicle, and adjustable in both the horizontal and vertical directions to view the rearward scene.

(S7.1 and S8.1) Each MPV, truck and bus, other than a school bus, with a GVWR of more than 4,536 kg shall have outside mirrors of unit magnification, each with not less than 323 sq cm (50 sq in) of reflective surface, installed with stable supports on both sides of the vehicle. The mirrors shall be located so as to provide the driver a view to the rear along both sides of the vehicle and shall be adjustable both in the horizontal and vertical directions to view the rearward scene.

(2) PROCEDURE

Consult the COTR for concurrence in application of the passenger car mirror test procedures or the alternative steps which follow:

(A) Inspect mirror installations on the vehicle. Record the results on Data Sheet 1.

(B) Perform the Mounting Adequacy and Adjustability Test. Record the results on Data Sheet 2.

(C) Perform the Reflectance Test. Record the results on Data Sheet 4.

12. COMPLIANCE TEST EXECUTION....Continued

(D) Perform items (A and B) of the Unit Magnification/Convex Mirror Test procedure to verify that the mirrors are unit magnification. Record the results on Data Sheet 6.

(E) Measure the surface area of each outside rearview mirror on both sides of the vehicle. Record the results on Data Sheet 7.

(F) Verify driver view to the rear along both sides of the vehicle. Record the results on Data Sheet 7.

(G) Use Data Sheet 8 for summary of test data

13. POST TEST REQUIREMENTS

After the required tests are completed, the contractor shall:

A. Verify all instrumentation, data sheets and photographs

B. Complete the Vehicle Condition report form including a word description of its post test condition

C. Copy applicable pages of the vehicle Owner's Manual for attachment to the final test report

D. Move the test vehicle to a secure area

E. Place all original records in a secure and organized file awaiting test data disposition.

14. REPORTS

14.1 MONTHLY STATUS REPORTS

The contractor shall submit a monthly Test Status Report and a Stop Signal Arm Status Report to the COTR. The Stop Signal Arm Status report shall be submitted until all stop signal arms are disposed of. Samples of the required reports are found in the report forms section.

14.2 APPARENT TEST FAILURE

Any indication of a test failure shall be communicated by telephone or to the COTR within 24 hours with written notification mailed within 48 hours (Saturday and Sunday hours 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. If possible repeat that portion of the test where the failure was noted to ensure that there is a test failure. 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 an apparent test failure, **SEVEN (7)** copies of the Final Test Report shall be submitted to the COTR for acceptance within 3 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 an apparent noncompliance, **THREE (3)** copies of each Final Test Report shall be submitted to the COTR for acceptance within 3 weeks of test completion. No payment of contractor's invoices for conducting compliance tests will be made prior to the Final Test Report acceptance by the COTR. Contractors are requested to NOT submit invoices before the COTR is provided with copies of the Final Test Report. Contractors are required to submit the first Final Test Report in draft form within 1 week 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.

14. REPORTS....Continued

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 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 for 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 111-ABC-0X-001, where –

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

14. REPORTS....Continued

(2) Final Report Title And Subtitle such as

SAFETY COMPLIANCE TESTING FOR FMVSS 111
Rearview Mirrors
* * * * * * * * * * * * * * * * * *
XYZ Bus manufacturer.
200X Carrier
NHTSA No. CX1401

(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
Safety Assurance
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6111 (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

111-ABC-0X-001

Block 2 — GOVERNMENT ACCESSION NUMBER

Leave blank

Block 3 — RECIPIENT'S CATALOG NUMBER

Leave blank

Block 4 — TITLE AND SUBTITLE

Final Report of FMVSS 111 Compliance Testing of 200X XYZ Carrier, NHTSA No. CX1401

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
Safety Assurance
Office of Vehicle Safety Compliance (NSA-30)
400 Seventh Street, SW, Room 6111
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Feb. 15 to Mar. 15, 20XX

Block 14 — SPONSORING AGENCY CODE

NSA-30

Block 15 — SUPPLEMENTARY NOTES

Leave blank

14. REPORTS....Continued

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 200X XYZ Carrier in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP111V0X for the determination of FMVSS 111 compliance.

Test failures identified were as follows:

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 111

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from —

NHTSA Technical Information Services (TIS)
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400 Seventh St., SW
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Telephone No.: 202-366-4946

Block 19 — SECURITY CLASSIFICATION OF REPORT

Unclassified

Block 20 — SECURITY CLASSIFICATION OF PAGE

Unclassified

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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

Section 2 — Test Procedure and Discussion of Results

Section 3 — Compliance Test Data

Section 4 — Test Equipment List and Calibration Information

Section 5 — Photographs

Section 6 — Notice of Test Failure (if applicable)

Section 7 — Applicable pages from vehicle owner's manual

15. DATA SHEETS

DATA SUMMARY SHEET
FMVSS 111 - REARVIEW MIRRORS

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____; VEH. TYPE: _____; VIN: _____

TEST LABORATORY: _____; CONTRACT NO.: _____

OUTSIDE DRIVER SIDE MIRROR

	PASS	FAIL	COMMENTS
STABLE SUPPORT			
DOES NOT PROTRUDE BEYOND VEHICLE BODY			
NOT OBSCURED BY UNWIPED PORTION OF WINDSHIELD			
ADJUSTABLE BY TILTING			
ADJUSTABLE FROM DRIVER SEAT			
FREE OF SHARP EDGES			
FIELD-OF-VIEW			
REFLECTANCE			
UNIT MAGNIFICATION			

INSIDE REARVIEW MIRROR

	PASS	FAIL	COMMENTS
STABLE SUPPORT			
ADJUSTABLE BY TILTING			
FIELD-OF-VIEW			
REFLECTANCE			
BREAK AWAY			
UNIT MAGNIFICATION			

15. DATA SHEETS....Continued

FMVSS 111 DATA SUMMARY SHEET CONTINUED

OUTSIDE PASSENGER SIDE MIRROR (if required)

	PASS	FAIL	COMMENTS
STABLE SUPPORT			
ADJUSTABLE BY TILTING			
REFLECTANCE			
FREE OF SHARP EDGES			
UNIT MAGNIFICATION or			
CONVEX			

REMARKS:

15. DATA SHEETS....Continued

DATA SHEET 1 (1 of 2)
VEHICLE INSPECTION AND IDENTIFICATION

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____; DATE OF MFG.: _____

TYPES OF REARVIEW MIRRORS:

INSIDE REARVIEW: _____

DRIVER'S SIDE OUTSIDE: _____

PASSENGER'S SIDE OUTSIDE: _____

OTHER: _____

DESIGNATED SEATING CAPACITY: _____

PASSENGER CARS AND MPVs, TRUCKS, AND BUSES, OTHER THAN SCHOOL BUSES, WITH GVWR 4,536 KG (10,000 LB), USING OPTIONAL PASSENGER CAR REQUIREMENTS:

LOCATION AND DESCRIPTION OF MANUFACTURER PROVIDED REFERENCE POINT FOR EYE POINT MEASUREMENT: _____

_____

LOCATION OF DRIVER SEATING REFERENCE POINT (SRP): _____

_____

REMARKS:

15. DATA SHEETS....Continued

DATA SHEET 1 (2 of 2)

COORDINATES (FROM MANUFACTURER REFERENCE POINT) OF DRIVER EYE POINTS:

	X	Y	Z
LEFT EYE			
RIGHT EYE			

RESULTS OF RECEIVING INSPECTION:

PASS _____

FAIL _____

CONDITIONAL _____

CONDITIONS:

GENERAL VEHICLE INFORMATION:

GVWR: _____ kg

FRONT GAWR: _____ kg

REAR GAWR: _____ kg

UNLOADED WEIGHT: _____ kg

CARGO WEIGHT: _____ kg

TOTAL RATED LOAD: _____ kg

DISPOSITION/ACTION/REMARKS:

RECORDED BY: _____ APPRVD BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 2 (1 OF 2)
FMVSS 111 MOUNTING ADEQUACY TEST

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____

DATE OF TEST: _____

MIRROR MOUNTING PROVIDES A STABLE SUPPORT:

	PASS	FAIL	CONDITIONAL
INSIDE REARVIEW MIRROR			
DRIVER'S SIDE OUTSIDE MIRROR			
PASS. SIDE OUTSIDE MIRROR			

CONDITIONS:

OUTSIDE MIRRORS FREE OF SHARP POINTS OR EDGES (PASS/FAIL): _____

MIRROR IS ADJUSTABLE IN BOTH THE VERTICAL AND HORIZONTAL DIRECTIONS:

	PASS	FAIL	CONDITIONAL
INSIDE REARVIEW MIRROR			
DRIVER'S SIDE OUTSIDE MIRROR			
PASSENGER SIDE OUTSIDE MIRROR			

CONDITIONS:

DRIVER’S SIDE OUTSIDE MIRROR ADJUSTABLE FROM THE DRIVER’S SEATED POSITION (PASS/FAIL):_____

15. DATA SHEETS....Continued

DATA SHEET 2 (2 of 2)

ADJUSTMENT ANGLE	V+	V—	H+	H—
INSIDE REARVIEW MIRROR				
DRIVER'S SIDE OUTSIDE MIRROR				
PASS. SIDE OUTSIDE MIRROR				

CONDITIONS:

MPVs, TRUCKS AND BUSES, OTHER THAN SCHOOL BUSES, **NOT** CONFORMING TO PASSENGER CAR REQUIREMENTS

MIRROR PROVIDES A VIEW TO THE REAR ALONG BOTH SIDES OF THE VEHICLE:

	PASS	FAIL	CONDITIONAL
DRIVER'S SIDE OUTSIDE MIRROR			
PASS. SIDE OUTSIDE MIRROR			

CONDITIONS:

TEST RESULTS: PASS _____ FAIL _____

REMARKS:

RECORDED BY: _____ APPROVED BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 3 (1 of 2)
FMVSS 111 FIELD-OF-VIEW TEST

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____

DATE OF TEST_____

INSIDE REARVIEW MIRROR (S5.1.1)

E. Distance from center of mirror to projected eye point _____

A = Distance from rear of vehicle to projected eye point location = _____

X1 = Distance from rear of vehicle to field of view grid = _____

Z1 = Vertical distance to lowest point of field of view at distance X1. _____

Z2 = Height of center of mirror = _____

X2 = Distance from rear of vehicle where the road surface is first visible:

X2 = [(Z2 x X1) + (Z1 x A)]/(Z2 - Z1) = _____(61 m maximum)

YL, YR = Distance to driver's left or right of vehicle's centerline at the location of the field of view grid or markers

MONOCULAR DATA (ALR & ARL Are Angles)				
EYE LOCATION	YL	YR	ALR	ARL
LEFT EYE POINT	(YLL)	(YLR)		
RIGHT EYE POINT	(YRL)	(YRR)		

REMARKS:

15. DATA SHEETS....Continued

DATA SHEET 3 (2 of 2)

CALCULATED HORIZONTAL AMBINOCULAR VIEW ANGLE (AB)

ALR = TAN - [1YLR/(X1 + A)] ARL = TAN - [1YRL/(X1 + A)]

ANGLE AB = ANGLE ALR + ANGLE ARL. _____ (20 degrees minimum)

TEST RESULTS: PASS _____ ; FAIL _____

DRIVER SIDE MIRROR (S5.2)

MIRROR OBSCURED BY UNWIPED PORTION OF WINDSHIELD? (Y/N): _____

HEIGHT OF TARGET DISC ON MIRROR: _____

DISTANCE OF TARGET DISC ON MIRROR FROM VEH. TANGENT PLANE: _____

TARGET DISC LOCATION RELATIVE TO VEH. TANGENT PLANE: □ Outboard
□ Inboard

ENTIRE TRIANGULAR TEST TARGET AREA ON SCREEN VISIBLE? (Y/N): _____

MIRROR PROTRUDES BEYOND VEH. TANGENT PLANE? (Y/N): _____

PROTRUSION REQUIRED TO MEET FIELD OF VIEW REQUIREMENTS? (Y/N): ___

TEST RESULTS: PASS _____ ; FAIL _____

PASSENGER SIDE MIRROR (S5.3 or MFG. OPTION)

PASSENGER SIDE MIRROR TYPE (convex or unit magnification): _____
REMARKS:

RECORDED BY: _____ APPROVED BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 4 (1 OF 4)
FMVSS 111 REFLECTANCE TEST – ALL MIRRORS

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____

DATE OF TEST: _____

INSIDE MIRROR:

TYPE OF MIRROR:

2 POSITION PRISMATIC _____ ; ELECTROCHROMATIC _____

ELECTRO/MECHANICAL _____ ; LIQUID CRYSTAL _____

OTHER: (Specify)_____

DESCRIPTION OF TEST APPARATUS: _____

_____

_____

MIRROR DESCRIPTION: _____

_____

VOLTAGE READING FROM CALIBRATION (Average Value): _____

VOLTAGE READING FROM LIGHT REFLECTED BY DAY MIRROR (Average Value):

_____

REFLECTANCE (Day) = Voltage (Refl)/Voltage (Cal) = 0.___ x 100 = ___ percent
(Minimum Requirement = 35 percent)

VOLTAGE READING FROM CALIBRATION (Average Value) = _____

15. DATA SHEETS....Continued

DATA SHEET 4 (2 OF 4)

VOLTAGE READING FROM LIGHT REFLECTED BY NIGHT MIRROR (Average Value):

_____

REFLECTANCE (Night) = Voltage (Refl)/Voltage (Cal) = 0.___ x 100 = ___ percent
(Minimum Requirement = 4 percent)

NOTE: If meter reading directly in percent is used, record only percent

INSIDE MIRROR WITH MULTIPLE REFLECTANCE LEVELS:

Does the mirror have a manual adjustment to achieve day mode operation?

YES _____ NO _____

If "NO" above, test for reflectance in the event of electrical failure:

VOLTAGE READING FROM CALIBRATION (Average Value) = _____

VOLTAGE READING FROM LIGHT REFLECTED BY ELECTRICALLY FAILED MIRROR (Average Value):

_____

REFLECTANCE (Failed electrical, manually adjusted)
= Voltage (Refl)/Voltage (Cal) = 0.___ x 100 = ___ percent
(Minimum Requirement = 35 percent)

NOTE: If meter reading directly in percent is used, record only percent

OBSERVATIONS: _____

_____

TEST RESULTS FOR INSIDE MIRROR:

PASS _____ FAIL _____

RECORDED BY: _____ APPROVED BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 4 (3 OF 4)

DRIVER'S SIDE MIRROR:

DATE OF TEST: _____

TYPE OF MIRROR: UNIT MAGNIFICATION _____

OTHER (Specify): _____

MIRROR DESCRIPTION_____

_____

_____

VOLTAGE READING FROM CALIBRATION (Average Value):_____

VOLTAGE READING FROM LIGHT REFLECTED BY MIRROR (Average Value):

_____

REFLECTANCE = Voltage (Refl)/Voltage (Cal) = 0.___ x 100 = ___ percent
(Minimum Requirement = 35 percent)

NOTE: If meter reading directly in percent is used, record only percent

OBSERVATIONS_____

_____

TEST RESULTS FOR DRIVER SIDE MIRROR:

PASS _____ FAIL _____

REMARKS:

RECORDED BY: _____ APPROVED BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 4 (4 OF 4)

PASSENGER'S SIDE MIRROR (if required):

DATE OF TEST: _____

TYPE OF MIRROR: UNIT MAGNIFICATION _____ CONVEX _____

OTHER (Specify): _____

DESCRIPTION OF TEST APPARATUS: _____

_____

_____

MIRROR DESCRIPTION: _____

_____

_____

VOLTAGE READING FROM CALIBRATION (Average Value): _____

VOLTAGE READING FROM LIGHT REFLECTED BY DAY MIRROR (Average Value):

_____

REFLECTANCE (Day) = Voltage (Refl)/Voltage (Cal) = 0.___ x 100 = _____ percent
(Minimum Requirement = 35 percent)

NOTE: If meter reading directly in percent is used, record only percent

OBSERVATIONS: _____

_____

TEST RESULTS FOR PASSENGER SIDE MIRROR:

PASS _____ FAIL _____

RECORDED BY: _____ APPROVED BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 5 (1 OF 2)

FMVSS 111 BREAKAWAY TEST - INSIDE REARVIEW MIRROR

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____

DATE OF TEST: _____

MOUNTING OF MIRROR (INSIDE) DESCRIPTION:

_____

_____

_____

_____

(Requirement: the mirror shall deflect, collapse or break away when it is subjected to a force of 400 N or less)

TEST NO.	LOAD DIRECTION (Vertical/Horizontal)	MAXIMUM FORCE (N)	PASS	FAIL
1				
2				
3				
4				
5				
6				
7				

REMARKS:

15. DATA SHEETS....Continued

DATA SHEET 5 (2 OF 2)

FAILURE TYPE - DESCRIPTION:

X-Y PLOTTER DATA I.D. NUMBER: _____

TEST RESULTS: PASS _____ FAIL _____

REMARKS:

RECORDED BY: _____ APPROVED BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 6 (1 of 3)
FMVSS 111 UNIT MAGNIFICATION AND CONVEX MIRROR TESTS

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____

DATE OF TEST: _____

DESCRIPTION OF TEST APPARATUS: _____

_____

DRIVER'S SIDE and INSIDE REARVIEW MIRRORS:

DRIVER SIDE MIRROR:

TEST POSITION	DIAL READINGS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

INSIDE MIRROR:

TEST POSITION	DIAL READINGS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

All dial indicator readings for unit magnification mirrors must be zero.

TEST RESULTS: PASS____ FAIL_____

15. DATA SHEETS....Continued

DATA SHEET 6 (2 OF 3)

PASSENGER'S SIDE REARVIEW MIRROR:

CONVERSION DATA TABLE FROM SPHEROMETER DIAL READING TO RADIUS OF CURVATURE

TEST POSITION	DIAL READINGS (inches)	RADIUS OF CURVATURE (mm)	DEVIATION BETWEEN THE AVERAGE RADIUS OF CURVATURE AND THE TEST POSITION RADIUS OF CURVATURE (mm)	PERCENT DEVIATION FROM THE AVERAGE RADIUS OF CURVATURE
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Average Radius of Curvature - A summation of Column 3 divided by 10: (mm)			Greatest percent Deviation From the Average Radius of Curvature - From Column 5: _____%	

REMARKS:

15. DATA SHEETS....Continued

DATA SHEET 6 (3 OF 3)

PASSENGER'S SIDE REARVIEW MIRROR

IF CONVEX, ARE THERE ANY DISCONTINUITIES IN THE SLOPE OF THE SURFACE OF THE MIRROR:

YES _____ NO _____

IF CONVEX, ARE THE WORDS, "**OBJECTS IN THE MIRROR ARE CLOSER THAN THEY APPEAR**" PRESENT?

YES _____ NO _____

IF CONVEX, MEASURE LETTER HEIGHT OF ABOVE WORDS: _____ mm

IF CONVEX, LETTERS ARE NOT LESS THAN 4.8 mm OR MORE THAN 6.4 mm HIGH

YES _____ NO _____

IF CONVEX, THE AVERAGE RADIUS OF CURVATURE IS NOT LESS THAN 889 mm AND NOT MORE THAN 1651 mm:

YES _____ NO _____

IF CONVEX, THE GREATEST PERCENT DEVIATION FROM THE AVERAGE RADIUS OF CURVATURE IS ± 12.5 PERCENT:

YES _____ NO _____

IF UNIT MAGNIFICATION, ALL DIAL READINGS ARE ZERO +/_ 0.

YES_____ NO_____

TEST RESULTS:

PASS _____ FAIL _____

RECORDED BY: _____ APPROVED BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 7

FMVSS 111 MIRROR REFLECTIVE SURFACE AREA TEST

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____

DATE OF TEST: _____

DATA TABLE FOR SURFACE AREA

MIRRORS	AREA	REQUIREMENT MPVs, TRUCKS, BUSES (OTHER THAN SCHOOL), GVWR. 4536 kg	REQUIREMENT MPVs, TRUCKS, BUSES (OTHER THAN SCHOOL), GVWR. 4536 kg	PASS/ FAIL
Driver Outside		126 cm^2	323 cm^2	
Passenger Outside		126 cm^2	323 cm^2	

MIRRORS LOCATED SO AS TO PROVIDE DRIVER A VIEW TO THE REAR:
LEFT SIDE (Y/N): _____
RIGHT SIDE (Y/N): _____

TEST RESULTS: PASS _____ FAIL _____

REMARKS:

RECORDED BY: _____ APPRVD BY: _____ DATE: _____

15. DATA SHEETS....Continued

DATA SHEET 8
FMVSS 111 TEST SUMMARY –
MPV'S, BUSES (NOT SCHOOL), AND TRUCKS
NOT TESTED TO PASSENGER CAR REQUIREMENTS

VEH. MY/MAKE/MODEL/BODY STYLE: _____

NHTSA NO.: _____ ; VIN: _____

DATE OF TEST: _____

A. OUTSIDE DRIVER SIDE MIRROR

	PASS	FAIL	COMMENTS
STABLE SUPPORT			
ADJUSTABLE BY TILTING			
VIEW TO REAR			
SURFACE AREA			
REFLECTANCE			
UNIT MAGNIFICATION			

B. OUTSIDE PASSENGER SIDE MIRROR

	PASS	FAIL	COMMENTS
STABLE SUPPORT			
ADJUSTABLE BY TILTING			
VIEW TO REAR			
SURFACE AREA			
REFLECTANCE			
UNIT MAGNIFICATION			

RECORDED BY:_____ APPRVD BY:_____ DATE: _____

16. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 111 TEST DATE: _____

LABORATORY: _____

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

LABORATORY PROJECT ENGINEER'S NAME: _____

TEST VEHICLE DESCRIPTION: _____

_____

VEH. NHTSA NO.: _____ VIN: _____

VEHICLE MANUFACTURER: _____

TEST FAILURE DESCRIPTION: _____

_____

_____

FMVSS 111 REQUIREMENT, PARAGRAPH ____ : _____

_____

_____

NOTIFICATION TO NHTSA (COTR): _____

DATE: _____ BY: _____

REMARKS:

16. FORMS....Continued

MONTHLY TEST STATUS REPORT
FMVSS 111
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 111
DATE OF REPORT: _____

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