

to 20.0 degrees as possible while keeping the transverse instrumentation platform of the head as level as possible by adjustments specified in S12.3.2(a)(9).

(1) If the dummy is contacting the vehicle interior after these adjustments, move the seat rearward until there is a maximum of 5 mm (0.2 in) between the contact point of the dummy and the interior of the vehicle or if it has a manual seat adjustment, to the next rearward detent position. If after these adjustments, the dummy contact point is more than 5 mm (0.2 in) from the vehicle interior and the seat is still not in its forwardmost position, move the seat forward until the contact point is 5 mm (0.2 in) or less from the vehicle interior, or if it has a manual seat adjustment, move the seat to the closest detent position without making contact, or until the seat reaches its forwardmost position, whichever occurs first.

(b) *Passenger foot positioning.*

\* \* \* \* \*

(3) If either foot does not contact the floor pan, place the foot parallel to the floor pan and place the lower leg as perpendicular to the thigh as possible.

\* \* \* \* \*

S12.3.4 *5th percentile female in rear outboard seating positions.*

\* \* \* \* \*

(h) *Head leveling.*

(1) Vehicles with fixed seat backs. Adjust the lower neck bracket to level the transverse instrumentation platform angle of the head to within ± 0.5 degrees. If it is not possible to level the transverse instrumentation platform to within ± 0.5 degrees, select the neck bracket adjustment position that minimizes the difference between the transverse instrumentation platform angle and level.

(2) Vehicles with adjustable seat backs. While holding the thighs in place, rotate the seat back forward until the transverse instrumentation platform angle of the head is level to within ± 0.5 degrees, making sure that the pelvis does not interfere with the seat bight. If it is not possible to level the transverse instrumentation platform to within ± 0.5 degrees, select the seat back adjustment position that minimizes the difference between the transverse instrumentation platform angle and level, then adjust the neck bracket to level the transverse instrumentation platform angle to within ± 0.5 degrees if possible. If it is still not possible to level the transverse instrumentation platform to within ± 0.5 degrees, select the neck bracket angle position that minimizes the

difference between the transverse instrumentation platform angle and level.

\* \* \* \* \*

§ 571.215 [Reserved]

§ 571.216 **Standard No. 216; Roof crush resistance; Applicable unless a vehicle is certified to § 571.216a.**

S1. *Scope.* This standard establishes strength requirements for the passenger compartment roof.

S2. *Purpose.* The purpose of this standard is to reduce deaths and injuries due to the crushing of the roof into the occupant compartment in rollover crashes.

S3. *Application.* (a) This standard applies to passenger cars, and to multipurpose passenger vehicles, trucks and buses with a GVWR of 2,722 kilograms (6,000 pounds) or less. However, it does not apply to—

(a) School buses;

(b) Vehicles that conform to the rollover test requirements (S5.3) of Standard No. 208 (§ 571.208) by means that require no action by vehicle occupants;

(c) Convertibles, except for optional compliance with the standard as an alternative to the rollover test requirements in S5.3 of Standard No. 208; or

(d) Vehicles certified to comply with § 571.216a.

S4. *Definitions.*

*Altered roof* means the replacement roof on a motor vehicle whose original roof has been removed, in part or in total, and replaced by a roof that is higher than the original roof. The replacement roof on a motor vehicle whose original roof has been replaced, in whole or in part, by a roof that consists of glazing materials, such as those in T-tops and sunroofs, and is located at the level of the original roof, is not considered to be an altered roof.

*Raised roof* means, with respect to a roof which includes an area that protrudes above the surrounding exterior roof structure, that protruding area of the roof.

*Roof over the front seat area* means the portion of the roof, including windshield trim, forward of a transverse vertical plane passing through a point 162 mm rearward of the SgRP of the rearmost front outboard seating position.

*Windshield trim* means molding of any material between the windshield glazing and the exterior roof surface, including material that covers a part of either the windshield glazing or exterior roof surface.

S5. *Requirements.* Subject to S5.1, when the test device described in S6 is used to apply a force to either side of the forward edge of a vehicle's roof in accordance with the procedures of S7, the lower surface of the test device must not move more than 127 millimeters. The applied force in Newtons is equal to 1.5 times the unloaded vehicle weight of the vehicle, measured in kilograms and multiplied by 9.8, but does not exceed 22,240 Newtons for passenger cars. Both the left and right front portions of the vehicle's roof structure must be capable of meeting the requirements. A particular vehicle need not meet further requirements after being tested at one location.

S5.1 For multipurpose passenger vehicles, trucks and buses that have a raised roof or altered roof, manufacturers have the option of using the test procedures of S8 instead of the procedures of S7 until October 25, 2000. The option of using the test procedures of S8 ceases to be available on that date.

S6. *Test device.* The test device is a rigid unyielding block whose lower surface is a flat rectangle measuring 762 millimeters by 1,829 millimeters.

S7. *Test procedure.* Each vehicle must be capable of meeting the requirements of S5 when tested in accordance with the procedure in S7.1 through 7.6.

S7.1 Place the sills or the chassis frame of the vehicle on a rigid horizontal surface, fix the vehicle rigidly in position, close all windows, close and lock all doors, and secure any convertible top or removable roof structure in place over the occupant compartment. Remove roof racks or other non-structural components.

S7.2 Orient the test device as shown in Figure 1 of this section, so that—

(a) Its longitudinal axis is at a forward angle (in side view) of 5 degrees below the horizontal, and is parallel to the vertical plane through the vehicle's longitudinal centerline;

(b) Its transverse axis is at an outboard angle, in the front view projection, of 25 degrees below the horizontal.

S7.3 Maintaining the orientation specified in S7.2—

(a) Lower the test device until it initially makes contact with the roof of the vehicle.

(b) Position the test device so that—

(1) The longitudinal centerline on its lower surface is on the initial point of contact, or on the center of the initial contact area, with the roof; and

(2) Except as specified in S7.4, the midpoint of the forward edge of the lower surface of the test device is within 10 mm of the transverse vertical plane 254 mm forward of the forwardmost point on the exterior surface of the roof, including windshield trim, that lies in the longitudinal vertical plane passing through the vehicle's longitudinal centerline.

S7.4 If the vehicle being tested is a multipurpose passenger vehicle, truck, or bus that has a raised roof or altered roof, and the initial contact point of the test device is on the raised roof or altered roof to the rear of the roof over the front seat area, the plate is positioned so that the midpoint of the rearward edge of the lower surface of the test device is within 10 mm of the transverse vertical plane located at the rear of the roof over the front seat area.

S7.5 Apply force so that the test device moves in a downward direction perpendicular to the lower surface of the test device at a rate of not more than 13 millimeters per second until reaching the force level specified in S5. Guide the test device so that throughout the test it moves, without rotation, in a straight line with its lower surface oriented as specified in S7.2(a) and S7.2(b). Complete the test within 120 seconds.

S7.6 Measure the distance that the test device moved, i.e., the distance between the original location of the lower surface of the test device and its location as the force level specified in S5 is reached.

S8 *Alternate test procedure for multipurpose passenger vehicles, trucks and buses that have a raised roof or altered roof manufactured until October 25, 2000 (see S5.1).* Each vehicle shall be capable of meeting the requirements of S5 when tested in accordance with the following procedure.

S8.1 Place the sills or the chassis frame of the vehicle on a rigid horizontal surface, fix the vehicle rigidly in position, close all windows, close and lock all doors, and secure any convertible top or removable roof structure in place over the passenger compartment.

S8.2 Orient the test device as shown in Figure 2, so that—

(a) Its longitudinal axis is at a forward angle (side view) of 5° below the horizontal, and is parallel to the vertical plane through the vehicle's longitudinal centerline;

(b) Its lateral axis is at a lateral outboard angle, in the front view projection, of 25° below the horizontal;

(c) Its lower surface is tangent to the surface of the vehicle; and

(d) The initial contact point, or center of the initial contact area, is on the longitudinal centerline of the lower surface of the test device and 254 milli-

meters from the forwardmost point of that centerline.

S8.3 Apply force in a downward direction perpendicular to the lower surface of the test device at a rate of not more than 13 millimeters per second until reaching a force in Newtons of 1½ times the unloaded vehicle weight of the tested vehicle, measured in kilograms and multiplied by 9.8. Complete the test within 120 seconds. Guide the test device so that throughout the test it moves, without rotation, in a straight line with its lower surface oriented as specified in S8.2(a) through S8.2(d).

S8.4 Measure the distance that the test device moves, *i.e.*, the distance between the original location of the lower surface of the test device and its location as the force level specified in S8.3 is reached.

FIGURE 1 TO § 571.216

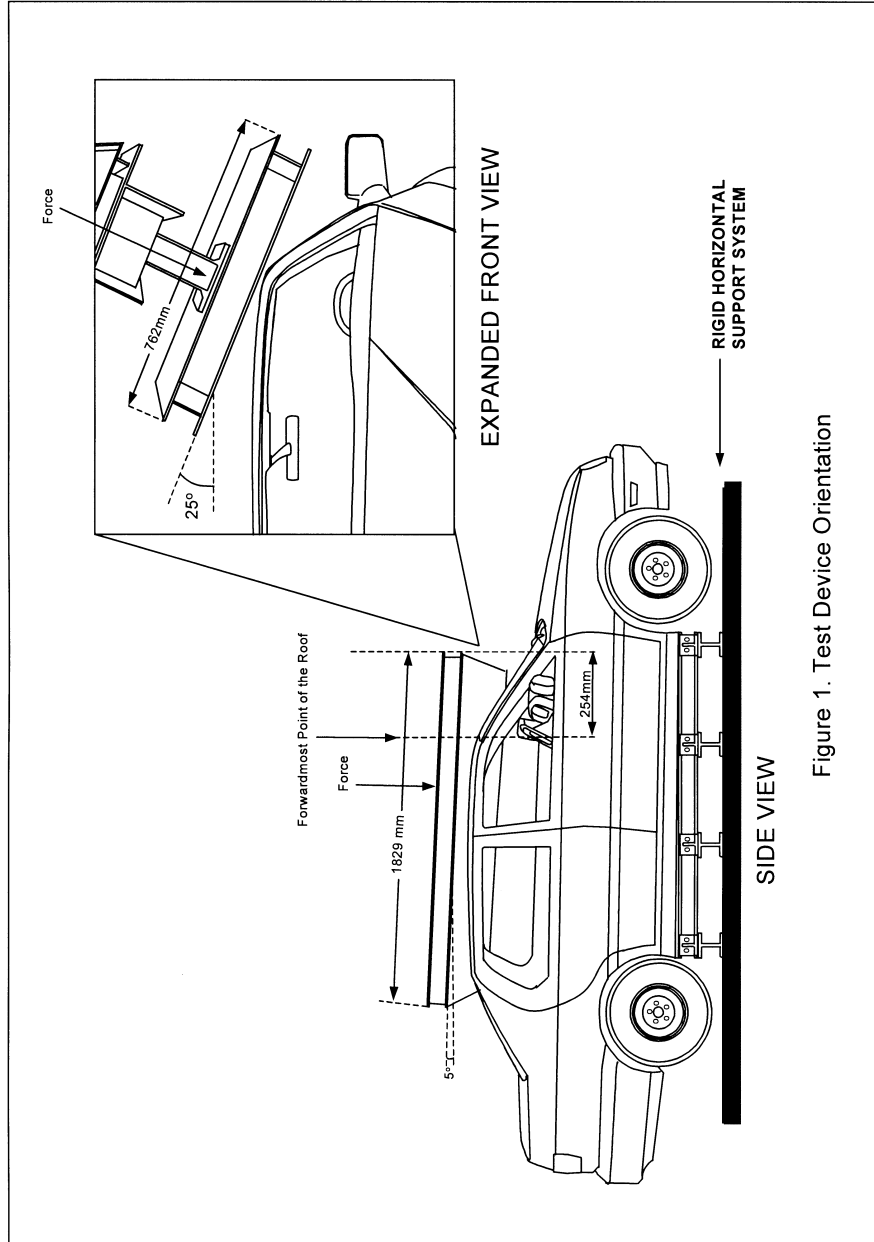
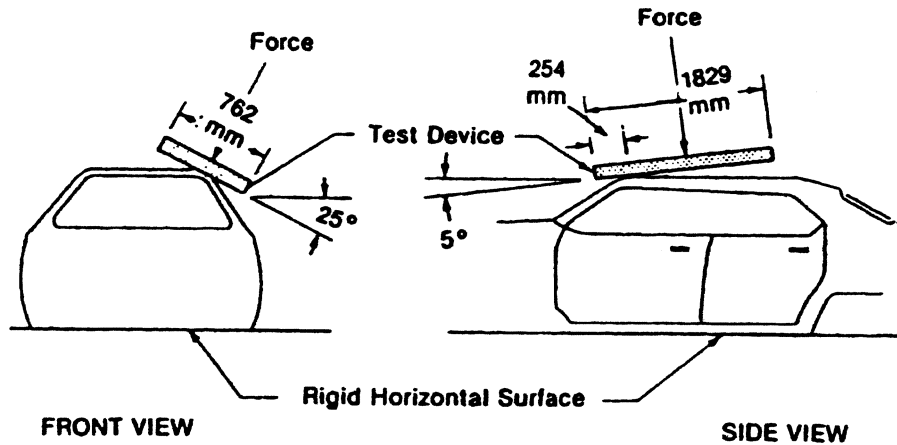


Figure 1. Test Device Orientation

FIGURE 2 TO §571.216



**Figure 2.- Test Device Location And Application To The Roof**

[36 FR 23300, Dec. 8, 1971, as amended at 38 FR 21930, Aug. 14, 1973; 56 FR 15517, Apr. 17, 1991; 58 FR 5633, Jan. 22, 1993; 60 FR 13647, Mar. 14, 1995; 64 FR 22578, Apr. 27, 1999; 65 FR 4581, Jan. 31, 2000; 74 FR 22384, May 12, 2009]

EDITORIAL NOTE: At 74 FR 22384, May 12, 2009, §571.216 was amended by revising S3; however, the amendment included two paragraphs (a).

**§571.216a Standard No. 216a; Roof crush resistance; Upgraded standard.**

S1. *Scope.* This standard establishes strength requirements for the passenger compartment roof.

S2. *Purpose.* The purpose of this standard is to reduce deaths and injuries due to the crushing of the roof into the occupant compartment in rollover crashes.

S3. *Application, incorporation by reference, and selection of compliance options.*

**S3.1 Application.**

(a) This standard applies to passenger cars, and to multipurpose passenger vehicles, trucks and buses with a GVWR of 4,536 kilograms (10,000 pounds) or less, according to the implementation schedule specified in S8 and S9 of this section. However, it does not apply to—

- (1) School buses;
- (2) Vehicles that conform to the rollover test requirements (S5.3) of Stand-

ard No. 208 (§571.208) by means that require no action by vehicle occupants;

(3) Convertibles, except for optional compliance with the standard as an alternative to the rollover test requirement (S5.3) of Standard No. 208; or

(4) Trucks built in two or more stages with a GVWR greater than 2,722 kilograms (6,000 pounds) not built using a chassis cab or using an incomplete vehicle with a full exterior van body.

(b) At the option of the manufacturer, vehicles within either of the following categories may comply with the roof crush requirements (S4) of Standard No. 220 (§571.220) instead of the requirements of this standard:

- (1) Vehicles built in two or more stages, other than vehicles built using a chassis cab;
- (2) Vehicles with a GVWR greater than 2,722 kilograms (6,000 pounds) that have an altered roof as defined by S4 of this section.