Rear Door Opening

Dimensions in millimeters

1143

A

GVWR	A
>4536 kg	305
<=4536 kg	152

Floor Line

Wheelchair anchorages

Figure 6 D. Rear Door Emergency Exit - No Wheelchair Anchorages
within the shaded region

§ 571.218 Standard No. 218; Motorcycle helmets.

S1. *Scope.* This standard establishes minimum performance requirements for helmets designed for use by motorcyclists and other motor vehicle users.

S2. *Purpose.* The purpose of this standard is to reduce deaths and injuries to motorcyclists and other motor vehicle users resulting from head impacts.

S3. *Application.* This standard applies to all helmets designed for use by motorcyclists and other motor vehicle users.

S4. *Definitions.*

Basic plane means a plane through the centers of the right and left external ear openings and the lower edge of

the eye sockets (Figure 1) of a reference headform (Figure 2) or test headform.

Helmet positioning index means the distance in inches, as specified by the manufacturer, from the lowest point of the brow opening at the lateral midpoint of the helmet to the basic plane of a reference headform, when the helmet is firmly and properly positioned on the reference headform.

Midsagittal plane means a longitudinal plane through the apex of a reference headform or test headform that is perpendicular to the basic plane (Figure 3).

Reference headform means a measuring device contoured to the dimensions of one of the three headforms described in Table 2 and Figures 5 through 8 with surface markings indicating the locations of the basic, midsagittal, and reference planes, and the centers of the external ear openings.

Reference plane means a plane above and parallel to the basic plane on a reference headform or test headform (Figure 2) at the distance indicated in Table 2.

Retention system means the complete assembly by which the helmet is retained in position on the head during use.

Test headform means a test device contoured to the dimensions of one of the three headforms described in Table 2 and Figures 5 through 8 with surface markings indicating the locations of the basic, mid-sagittal, and reference planes.

S5. *Requirements.* Each helmet shall meet the requirements of S5.1, S5.2, and S5.3 when subjected to any conditioning procedure specified in S6.4, and tested in accordance with S7.1, S7.2, and S7.3.

S5.1 *Impact attenuation.* When an impact attenuation test is conducted in accordance with S7.1, all of the following requirements shall be met:

(a) Peak accelerations shall not exceed 400g;

(b) Accelerations in excess of 200g shall not exceed a cumulative duration of 2.0 milliseconds; and

(c) Accelerations in excess of 150g shall not exceed a cumulative duration of 4.0 milliseconds.

S5.2 *Penetration.* When a penetration test is conducted in accordance with S7.2, the striker shall not contact the surface of the test headform.

S5.3 *Retention system.*

S5.3.1 When tested in accordance with S7.3:

(a) The retention system or its components shall attain the loads specified without separation; and

(b) The adjustable portion of the retention system test device shall not move more than 1 inch (2.5 cm) measured between preliminary and test load positions.

S5.3.2 Where the retention system consists of components which can be independently fastened without securing the complete assembly, each such component shall independently meet the requirements of S5.3.1.

S5.4 *Configuration.* Each helmet shall have a protective surface of continuous contour at all points on or above the test line described in S6.2.3. The helmet shall provide peripheral vision clearance of at least 105° to each side of the mid-sagittal plane, when the helmet is adjusted as specified in S6.3. The vertex of these angles, shown in Figure 3, shall be at the point on the anterior surface of the reference headform at the intersection of the mid-sagittal and basic planes. The brow opening of the helmet shall be at least 1 inch (2.5 cm) above all points in the basic plane that are within the angles of peripheral vision (see Figure 3).

S5.5 *Projections.* A helmet shall not have any rigid projections inside its shell. Rigid projections outside any helmet's shell shall be limited to those required for operation of essential accessories, and shall not protrude more than 0.20 inch (5 mm).

S5.6 *Labeling.*

S5.6.1 Each helmet shall be labeled permanently and legibly, in a manner such that the label(s) can be read easily without removing padding or any other permanent part, with the following:

(a) Manufacturer's name or identification.

(b) Precise model designation.

(c) Size.

(d) Month and year of manufacture. This may be spelled out (for example,

June 1988), or expressed in numerals (for example, 6/88).

(e) The symbol DOT, constituting the manufacturer's certification that the helmet conforms to the applicable Federal motor vehicle safety standards. This symbol shall appear on the outer surface, in a color that contrasts with the background, in letters at least ⅜ inch (1 cm) high, centered laterally with the horizontal centerline of the symbol located a minimum of 1⅛ inches (2.9 cm) and a maximum of 1⅜ inches (3.5 cm) from the bottom edge of the posterior portion of the helmet.

(f) Instructions to the purchaser as follows:

(1) "Shell and liner constructed of (identify type(s) of materials).

(2) "Helmet can be seriously damaged by some common substances without damage being visible to the user. Apply only the following: (Recommended cleaning agents, paints, adhesives, etc., as appropriate).

(3) "Make no modifications. Fasten helmet securely. If helmet experiences a severe blow, return it to the manufacturer for inspection, or destroy it and replace it."

(4) Any additional relevant safety information should be applied at the time of purchase by means of an attached tag, brochure, or other suitable means.

S5.7 *Helmet positioning index.* Each manufacturer of helmets shall establish a positioning index for each helmet he manufactures. This index shall be furnished immediately to any person who requests the information, with respect to a helmet identified by manufacturer, model designation, and size.

S6. *Preliminary test procedures.* Before subjecting a helmet to the testing sequence specified in S7., prepare it according to the procedures in S6.1, S6.2, and S6.3.

S6.1 *Selection of appropriate headform.*

S6.1.1 A helmet with a manufacturer's designated discrete size or size range which does not exceed 6¾ (European size: 54) is tested on the small headform. A helmet with a manufacturer's designated discrete size or size range which exceeds 6¾, but does not exceed 7½ (European size: 60) is tested on the medium headform. A helmet with a manufacturer's designated discrete size or size range which exceeds 7½ is tested on the large headform.

S6.1.2 A helmet with a manufacturer's designated size range which includes sizes falling into two or all three size ranges described in S6.1.1 is tested on each headform specified for each size range.

S6.2 *Reference marking.*

S6.2.1 Use a reference headform that is firmly seated with the basic and reference planes horizontal. Place the complete helmet to be tested on the appropriate reference headform, as specified in S6.1.1 and S6.1.2.

S6.2.2 Apply a 10-pound (4.5 kg) static vertical load through the helmet's apex. Center the helmet laterally and seat it firmly on the reference headform according to its helmet positioning index.

S6.2.3 Maintaining the load and position described in S6.2.2, draw a line (hereinafter referred to as "test line") on the outer surface of the helmet coinciding with portions of the intersection of that service with the following planes, as shown in Figure 2:

(a) A plane 1 inch (2.5 cm) above and parallel to the reference plane in the anterior portion of the reference headform;

(b) A vertical transverse plane 2.5 inches (6.4 cm) behind the point on the anterior surface of the reference headform at the intersection of the mid-sagittal and reference planes;

(c) The reference plane of the reference headform;

(d) A vertical transverse plane 2.5 inches (6.4. cm) behind the center of the external ear opening in a side view; and

(e) A plane 1 inch (2.5 cm) below and parallel to the reference plane in the posterior portion of the reference headform.

S6.3 *Helmet positioning.*

S6.3.1 Before each test, fix the helmet on a test headform in the position that conforms to its helmet positioning index. Secure the helmet so that it does not shift position before impact or before application of force during testing.

S6.3.2 In testing as specified in S7.1 and S7.2, place the retention system in

a position such that it does not interfere with free fall, impact or penetration.

S6.4 *Conditioning.*

S6.4.1 Immediately before conducting the testing sequence specified in S7, condition each test helmet in accordance with any one of the following procedures:

(a) *Ambient conditions.* Expose to a temperature of 70 °F (21 °C) and a relative humidity of 50 percent for 12 hours.

(b) *Low temperature.* Expose to a temperature of 14 °F (−10 °C) for 12 hours.

(c) *High temperature.* Expose to a temperature of 122 °F (50 °C) for 12 hours.

(d) *Water immersion.* Immerse in water at a temperature of 77 °F (25 °C) for 12 hours.

S6.4.2 If during testing, as specified in S7.1.3 and S7.2.3, a helmet is returned to the conditioning environment before the time out of that environment exceeds 4 minutes, the helmet is kept in the environment for a minimum of 3 minutes before resumption of testing with that helmet. If the time out of the environment exceeds 4 minutes, the helmet is returned to the environment for a minimum of 3 minutes for each minute or portion of a minute that the helmet remained out of the environment in excess of 4 minutes or for a maximum of 12 hours, whichever is less, before the resumption of testing with that helmet.

S7. *Test conditions.*

S7.1 *Impact attenuation test.*

S7.1.1 Impact attenuation is measured by determining acceleration imparted to an instrumented test headform on which a complete helmet is mounted as specified in S6.3, when it is dropped in guided free fall upon a fixed hemispherical anvil and a fixed flat steel anvil.

S7.1.2 Each helmet is impacted at four sites with two successive identical impacts at each site. Two of these sites are impacted upon a flat steel anvil and two upon a hemispherical steel anvil as specified in S7.1.10 and S7.1.11. The impact sites are at any point on the area above the test line described in paragraph S6.2.3, and separated by a distance not less than one-sixth of the maximum circumference of the helmet in the test area.

S7.1.3 Impact testing at each of the four sites, as specified in S7.1.2, shall start at two minutes, and be completed by four minutes, after removal of the helmet from the conditioning environment.

S7.1.4 (a) The guided free fall drop height for the helmet and test headform combination onto the hemispherical anvil shall be such that the minimum impact speed is 17.1 feet/second (5.2 m/sec). The minimum drop height is 54.5 inches (138.4 cm). The drop height is adjusted upward from the minimum to the extent necessary to compensate for friction losses.

(b) The guided free fall drop height for the helmet and test headform combination onto the flat anvil shall be such that the minimum impact speed is 19.7 ft./sec (6.0 m/sec). The minimum drop height is 72 inches (182.9 cm). The drop height is adjusted upward from the minimum to the extent necessary to compensate for friction losses.

S7.1.5 Test headforms for impact attenuation testing are constructed of magnesium alloy (K–1A), and exhibit no resonant frequencies below 2,000 Hz.

S7.1.6 The monorail drop test system is used for impact attenuation testing.

S7.1.7 The weight of the drop assembly, as specified in Table 1, is the combined weight of the test headform and the supporting assembly for the drop test. The weight of the supporting assembly is not less than 2.0 lbs. and not more than 2.4 lbs. (0.9 to 1.1 kg). The supporting assembly weight for the monorail system is the drop assembly weight minus the combined weight of the test headform, the headform's clamp down ring, and its tie down screws.

S7.1.8 The center of gravity of the test headform is located at the center of the mounting ball on the supporting assembly and lies within a cone with its axis vertical and forming a 10° included angle with the vertex at the point of impact. The center of gravity of the drop assembly lies within the rectangular volume bounded by x = −0.25 inch (−0.64 cm), x = 0.85 inch (2.16 cm), y = 0.25 inch (0.64 cm), and y = −0.25 inch (−0.64 cm) with the origin located at the center of gravity of the test headform. The rectangular volume has no boundary along the z-axis. The

x-y-z axes are mutually perpendicular and have positive or negative designations in accordance with the right-hand rule (See Figure 5). The origin of the coordinate axes also is located at the center of the mounting ball on the supporting assembly (See Figures 6, 7, and 8). The x-y-z axes of the test headform assembly on a monorail drop test equipment are oriented as follows: From the origin, the x-axis is horizontal with its positive direction going toward and passing through the vertical centerline of the monorail. The positive z-axis is downward. The y-axis also is horizontal and its direction can be decided by the z- and x-axes, using the right-hand rule.

S7.1.9 The acceleration transducer is mounted at the center of gravity of the test headform with the sensitive axis aligned to within 5° of vertical when the test headform assembly is in the impact position. The acceleration data channel complies with SAE Recommended Practice J211 JUN 80, Instrumentation for Impact Tests, requirements for channel class 1,000.

S7.1.10 The flat anvil is constructed of steel with a 5-inch (12.7 cm) minimum diameter impact face, and the hemispherical anvil is constructed of steel with a 1.9 inch (4.8 cm) radius impact face.

S7.1.11 The rigid mount for both of the anvils consists of a solid mass of at least 300 pounds (136.1 kg), the outer surface of which consists of a steel plate with minimum thickness of 1 inch (2.5 cm) and minimum surface area of 1 ft ^{2} (929 cm ^{2}).

S7.1.12 The drop system restricts side movement during the impact attenuation test so that the sum of the areas bounded by the acceleration-time response curves for both the x- and y-axes (horizontal axes) is less than five percent of the area bounded by the acceleration-time response curve for the vertical axis.

S7.2 *Penetration test.*

S7.2.1 The penetration test is conducted by dropping the penetration test striker in guided free fall, with its axis aligned vertically, onto the outer surface of the complete helmet, when mounted as specified in S6.3, at any point above the test line, described in S6.2.3, except on a fastener or other rigid projection.

S7.2.2 Two penetration blows are applied at least 3 inches (7.6 cm) apart, and at least 3 inches (7.6 cm) from the centers of any impacts applied during the impact attenuation test.

S7.2.3 The application of the two penetration blows, specified in S7.2.2, starts at two minutes and is completed by four minutes, after removal of the helmet from the conditioning environment.

S7.2.4 The height of the guided free fall is 118.1 inches (3 m), as measured from the striker point to the impact point on the outer surface of the test helmet.

S7.2.5 The contactable surface of the penetration test headform is constructed of a metal or metallic alloy having a Brinell hardness number no greater than 55, which will permit ready detection should contact by the striker occur. The surface is refinished if necessary before each penetration test blow to permit detection of contact by the striker.

S7.2.6 The weight of the penetration striker is 6 pounds, 10 ounces (3 kg).

S7.2.7 The point of the striker has an included angle of 60°, a cone height of 1.5 inches (3.8 cm), a tip radius of 0.02 inch (standard 0.5 millimeter radius) and a minimum hardness of 60 Rockwell, C-scale.

S7.2.8 The rigid mount for the penetration test headform is as described in S7.1.11.

S7.3 *Retention system test.*

S7.3.1 The retention system test is conducted by applying a static tensile load to the retention assembly of a complete helmet, which is mounted, as described in S6.3, on a stationary test headform as shown in Figure 4, and by measuring the movement of the adjustable portion of the retention system test device under tension.

S7.3.2 The retention system test device consists of both an adjustable loading mechanism by which a static tensile load is applied to the helmet retention assembly and a means for holding the test headform and helmet stationary. The retention assembly is fastened around two freely moving rollers, both of which have a 0.5 inch (1.3 cm) diameter and a 3-inch (7.6 cm) center-

to-center separation, and which are mounted on the adjustable portion of the tensile loading device (Figure 4). The helmet is fixed on the test headform as necessary to ensure that it does not move during the application of the test loads to the retention assembly.

S7.3.3 A 50–pound (22.7 kg) preliminary test load is applied to the retention assembly, normal to the basic plane of the test headform and symmetrical with respect to the center of the retention assembly for 30 seconds, and the maximum distance from the extremity of the adjustable portion of the retention system test device to the apex of the helmet is measured.

S7.3.4 An additional 250–pound (113.4 kg) test load is applied to the retention assembly, in the same manner and at the same location as described in S7.3.3, for 120 seconds, and the maximum distance from the extremity of the adjustable portion of the retention system test device to the apex of the helmet is measured.

APPENDIX TO § 571.218

TABLE 1—WEIGHTS FOR IMPACT ATTENUATION TEST DROP ASSEMBLY

Test headform size	Weight [1]—1b(kg)
Small	7.8 (3.5 kg).
Medium	11.0 (5.0 kg).
Large	13.4 (6.1 kg).

[1] Combined weight of instrumented test headform and supporting assembly for drop test.

Figure 1

707

Vertical Transverse
Plane As Determined
by S6.2.3(d)

2.5 inches
(6.4 cm)

Test Line 1 Inch (2.5 cm)
Above Reference
Plane

Test Line 1 Inch (2.5 cm)
Below Reference
Plane

Reference Plane

Basic Plane

2.5 inches
(6.4 cm)

Vertical Transverse
Plane As Determined
by S6.2.3.(b)

Center of External
Ear Opening
(See Table 2)
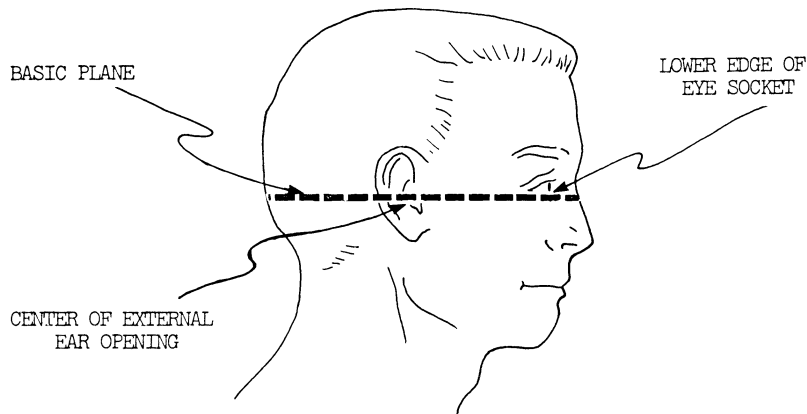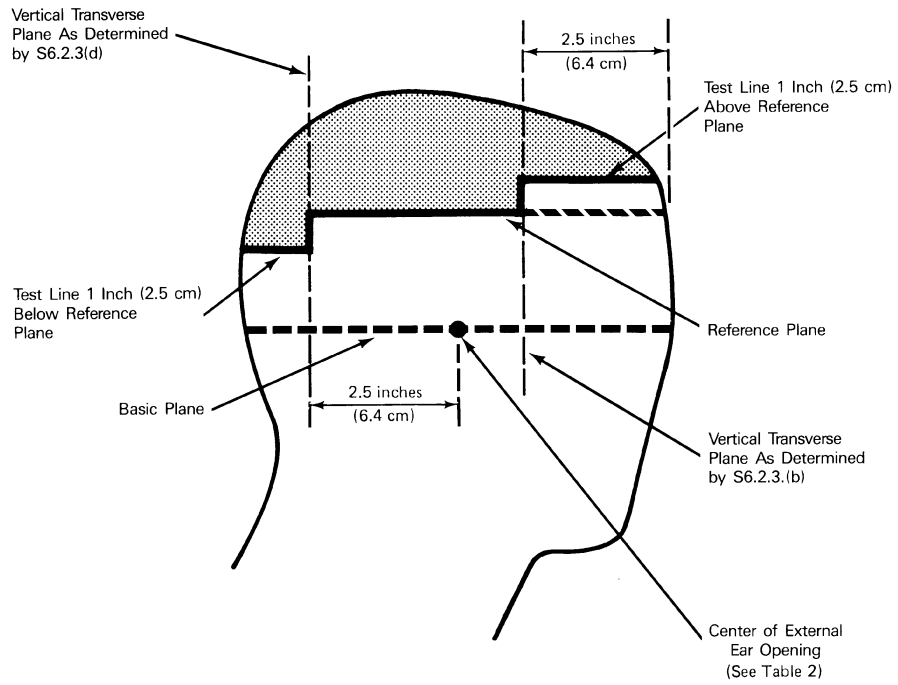
Note: Solid lines would correspond to
the test line on a test helmet.

Test Surface

Figure 2

SECTION THROUGH THE BASIC PLANE

TOP VIEW

HELMET

REFERENCE
HEADFORM

MID-SAGITTAL
PLANE

105° 105° MINIMUM ANGLE
PERIPHERAL VISION
CLEARANCE

Figure 3

STATIONARY TEST
HEADFORM

TEST HELMET

RETENTION ASSEMBLY

FREELY MOVING ROLLERS
MOUNTED ON ADJUSTABLE
PORTION OF RETENTION
SYSTEM TEST DEVICE WITH
DIAMETERS 0.5 INCH; AND
CENTER-TO-CENTER SEPARA-
TION 3 INCHES.

APPLICATION OF STATIC
TENSILE LOAD

RETENTION SYSTEM TEST DEVICE

Figure 4

Figure 5

HEADFORM SECTIONS

Mid-Sagittal Plane (Symmetrical Plane)
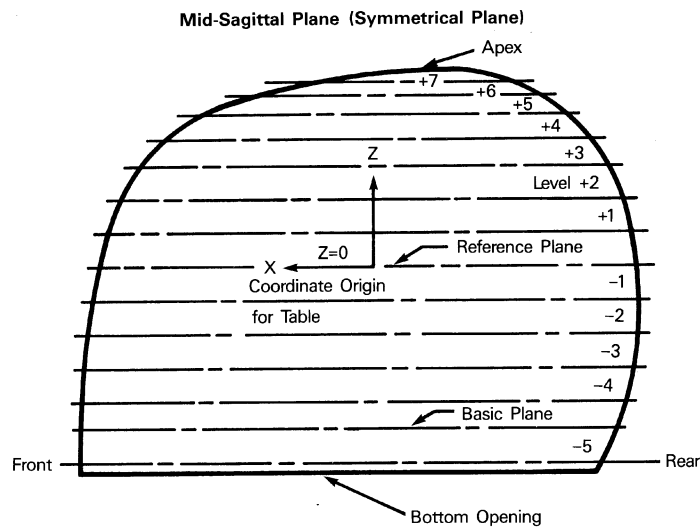
Headform Coordinate Systems
(Right-hand Rule)

711
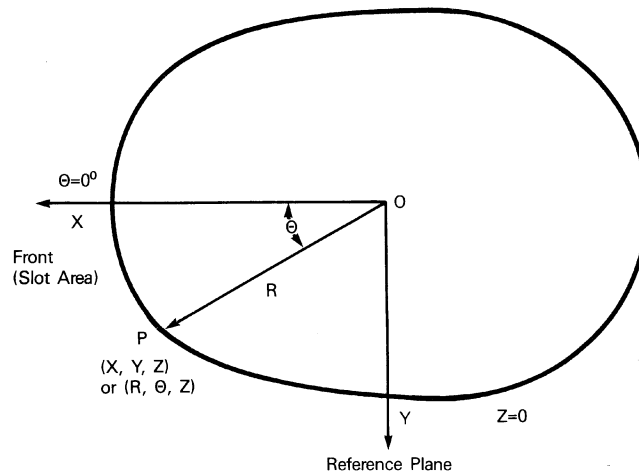
Table 2

Medium Headform — Exterior Dimensions

Θ	Bottom Opening Z= -3.02			Level—5 Z= -2.900		
	R	X	Y	R	X	Y
0	4.292	4.292	0	4.293	4.293	0
10	4.266	4.201	0.741	4.270	4.205	0.742
20	4.159	3.908	1.423	4.172	3.920	1.427
30	3.967	3.436	1.984	3.961	3.430	1.981
40	3.660	2.804	2.353	3.670	2.811	2.359
50	3.332	2.142	2.553	3.352	2.155	2.568
60	3.039	1.520	2.632	3.067	1.534	2.656
70	2.839	0.971	2.668	2.869	0.981	2.696
80	2.720	0.472	2.679	2.772	0.481	2.730
90	2.675	0	2.675	2.709	0	2.709
100	2.703	-0.469	2.662	2.724	-0.473	2.683
110	2.764	-0.945	2.597	2.794	-0.956	2.626
120	2.888	-1.444	2.501	2.917	-1.459	2.526
130	2.985	-1.919	2.287	3.040	-1.954	2.329
140	3.100	-2.375	1.993	3.175	-2.432	2.041
150	3.175	-2.750	1.588	3.232	-2.799	1.616
160	3.186	-2.994	1.090	3.246	-3.050	1.110
170	3.177	-3.129	0.552	3.237	-3.188	0.562
180	3.187	-3.187	0	3.246	-3.246	0

Θ	Basic Plane Z= -2.360			Level—4 Z= -2.000		
	R	X	Y	R	X	Y
0	4.272	4.272	0	4.247	4.247	0
10	4.248	4.184	0.738	4.223	4.159	0.733
20	4.147	3.897	1.418	4.120	3.872	1.409
30	3.961	3.430	1.981	3.940	3.412	1.970
40	3.687	2.824	2.370	3.683	2.821	2.367
50	3.384	2.175	2.592	3.392	2.180	2.598
60	3.111	1.556	2.694	3.132	1.566	2.712
70	2.927	1.001	2.751	2.960	1.012	2.782
80	2.815	0.489	2.772	2.860	0.497	2.817
90	2.779	0	2.779	2.838	0	2.838
100	2.802	-0.487	2.759	2.861	-0.497	2.818
110	2.887	-0.987	2.713	2.958	-1.012	2.780
120	3.019	-1.510	2.615	3.098	-1.549	2.683
130	3.180	-2.044	2.436	3.260	-2.096	2.497
140	3.306	-2.533	2.125	3.405	-2.608	2.189
150	3.398	-2.943	1.699	3.516	-3.045	1.758
160	3.458	-3.250	1.183	3.585	-3.369	1.226
170	3.475	-3.422	0.603	3.612	-3.557	0.627
180	3.472	-3.472	0	3.609	-3.609	0

Table 2

Medium Headform — Exterior Dimensions (Continued)

Θ	Level—3 Z= −1.500			Level—2 Z= −1.000		
	R	X	Y	R	X	Y
0	4.208	4.208	0	4.148	4.148	0
10	4.179	4.116	0.726	4.112	4.050	0.714
20	4.075	3.829	1.394	4.013	3.771	1.373
30	3.902	3.379	1.951	3.844	3.329	1.922
40	3.654	2.799	2.349	3.609	2.765	2.320
50	3.377	2.171	2.587	3.352	2.155	2.568
60	3.094	1.547	2.680	3.137	1.569	2.717
70	2.982	1.020	2.802	2.989	1.022	2.809
80	2.891	0.502	2.847	2.902	0.504	2.858
90	2.876	0	2.876	2.884	0	2.884
100	2.918	−0.507	2.874	2.943	−0.511	2.898
110	3.021	−1.033	2.839	3.052	−1.044	2.868
120	3.170	−1.585	2.745	3.225	−1.613	2.793
130	3.337	−2.145	2.556	3.397	−2.184	2.602
140	3.483	−2.668	2.239	3.536	−2.709	2.273
150	3.604	−3.121	1.802	3.657	−3.167	1.829
160	3.682	−3.460	1.259	3.751	−3.525	1.283
170	3.725	−3.668	0.647	3.807	−3.749	0.661
180	3.741	−3.741	0	3.822	−3.822	0

Θ	Level—1 Z= −0.500			Reference Plane Z=0.0		
	R	X	Y	R	X	Y
0	4.067	4.067	0	3.971	3.971	0
10	4.033	3.972	0.700	3.935	3.875	0.683
20	3.944	3.706	1.349	3.853	3.621	1.318
30	3.777	3.271	1.889	3.701	3.205	1.851
40	3.552	2.721	2.283	3.491	2.674	2.244
50	3.323	2.136	2.546	3.279	2.108	2.512
60	3.126	1.563	2.707	3.101	1.551	2.686
70	2.987	1.022	2.807	2.979	1.019	2.799
80	2.912	0.506	2.868	2.910	0.505	2.866
90	2.893	0	2.893	2.890	0	2.890
100	2.895	−0.503	2.851	2.945	−0.511	2.900
110	3.064	−1.048	2.879	3.062	−1.047	2.877
120	3.231	−1.616	2.798	3.228	−1.614	2.796
130	3.411	−2.193	2.613	3.413	−2.194	2.615
140	3.560	−2.727	2.288	3.563	−2.729	2.290
150	3.682	−3.189	1.841	3.681	−3.188	1.841
160	3.783	−3.555	1.294	3.773	−3.546	1.290
170	3.885	−3.826	0.675	3.832	−3.774	0.665
180	3.857	−3.857	0	3.844	−3.844	0

Table 2

Medium Headform — Exterior Dimensions (Continued)

Θ	Level+1 Z=0.500			Level +2 Z=1.000		
	R	X	Y	R	X	Y
0	3.830	3.830	0	3.665	3.665	0
10	3.801	3.743	0.660	3.613	3.558	0.627
20	3.725	3.500	1.274	3.554	3.340	1.216
30	3.587	3.106	1.794	3.436	2.976	1.718
40	3.399	2.604	2.185	3.271	2.506	2.103
50	3.205	2.060	2.455	3.102	1.994	2.376
60	3.044	1.522	2.636	2.959	1.480	2.563
70	2.927	1.001	2.751	2.854	0.976	2.682
80	2.861	0.497	2.818	2.792	0.485	2.750
90	2.855	0	2.855	2.783	0	2.783
100	2.897	−0.503	2.853	2.832	−0.492	2.789
110	3.007	−1.029	2.826	2.938	−1.005	2.761
120	3.176	−1.588	2.751	3.102	−1.551	2.686
130	3.372	−2.168	2.583	3.294	−2.117	2.523
140	3.520	−2.697	2.263	3.450	−2.643	2.218
150	3.643	−3.155	1.822	3.564	−3.087	1.782
160	3.728	−3.503	1.275	3.637	−3.418	1.244
170	3.777	−3.720	0.656	3.675	−3.619	0.638
180	3.782	−3.782	0	3.670	−3.670	0

Θ	Level +3 Z=1.450			Level +4 Z=1.860		
	R	X	Y	R	X	Y
0	3.419	3.419	0	3.061	3.061	0
10	3.382	3.331	0.587	3.035	2.989	0.527
20	3.299	3.100	1.128	2.966	2.787	1.014
30	3.197	2.769	1.599	2.872	2.487	1.436
40	3.052	2.338	1.962	2.754	2.110	1.770
50	2.911	1.871	2.230	2.642	1.698	2.024
60	2.786	1.393	2.413	2.522	1.261	2.184
70	2.700	0.924	2.537	2.477	0.847	2.328
80	2.647	0.460	2.607	2.442	0.424	2.405
90	2.636	0	2.636	2.442	0	2.442
100	2.691	−0.467	2.650	2.492	−0.433	2.454
110	2.796	−0.956	2.627	2.599	−0.889	2.442
120	2.961	−1.481	2.564	2.758	−1.379	2.389
130	3.147	−2.023	2.411	2.936	−1.887	2.249
140	3.301	−2.529	2.122	3.081	−2.360	1.980
150	3.408	−2.951	1.704	3.176	−2.751	1.588
160	3.479	−3.269	1.190	3.230	−3.035	1.105
170	3.514	−3.461	0.610	3.270	−3.220	0.568
180	3.502	−3.502	0	3.271	−3.271	0

Table 2

Medium Headform — Exterior Dimensions (Continued)

Θ	Level +5 Z=2.250			Level +6 Z=2.560		
	R	X	Y	R	X	Y
0	2.526	2.526	0	1.798	1.798	0
10	2.521	2.483	0.483	1.798	1.771	0.312
20	2.464	2.315	0.843	1.757	1.651	0.601
30	2.387	2.067	1.194	1.719	1.489	0.860
40	2.305	1.766	1.482	1.678	1.285	1.079
50	2.232	1.435	1.710	1.652	1.062	1.266
60	2.174	1.087	1.883	1.641	0.821	1.421
70	2.144	0.733	2.015	1.645	0.563	1.546
80	2.132	0.370	2.100	1.673	0.291	1.648
90	2.147	0	2.147	1.712	0	1.712
100	2.213	−0.384	2.179	1.809	−0.314	1.782
110	2.316	−0.792	2.176	1.925	−0.658	1.809
120	2.463	−1.232	2.133	2.066	−1.033	1.789
130	2.624	−1.687	2.010	2.213	−1.423	1.695
140	2.763	−2.117	1.776	2.358	−1.806	1.516
150	2.863	−2.479	1.432	2.469	−2.138	1.235
160	2.919	−2.743	0.988	2.536	−2.383	0.867
170	2.954	−2.909	0.513	2.561	−2.522	0.445
180	2.958	−2.958	0	2.556	−2.556	0

Θ	Level +7 Z=2.750			Notes:
	R	X	Y	
0	1.081	1.081	0	1. Apex is located at (-0.75, 0, 3.02) for (X,Y,Z) or (0.75, 180, 3.02) for (R, Θ, Z).
10	1.088	1.072	0.189	
20	1.055	0.991	0.361	
30	1.039	0.900	0.520	2. Center of ear opening is located at (0.40, 2.78, -2.36) for (X,Y,Z) or (2.80, 81.8, -2.36) for (R,Θ,Z).
40	1.039	0.796	0.668	
50	1.052	0.676	0.806	
60	1.068	0.534	0.925	3. Scale all dimensions by 0.8941 for small headform.
70	1.106	0.378	1.039	
80	1.171	0.203	1.153	
90	1.242	0	1.242	4. Scale all dimensions by 1.069 for large headform.
100	1.422	−0.247	1.400	
110	1.489	−0.509	1.399	
120	1.683	−0.842	1.458	5. Headform is symmetrical about the mid-sagittal plane.
130	1.801	−1.158	1.380	
140	1.954	−1.497	1.256	6. Units: R,X,Y,Z — inches. Θ— degrees.
150	2.083	−1.804	1.042	
160	2.138	−2.009	0.731	
170	2.175	−2.142	0.378	7. To obtain metric equivalents in centimeters, multiply each figure by 2.54.
180	2.175	−2.175	0	

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Figure 6

Small Headform — Interior Design

Section A-A
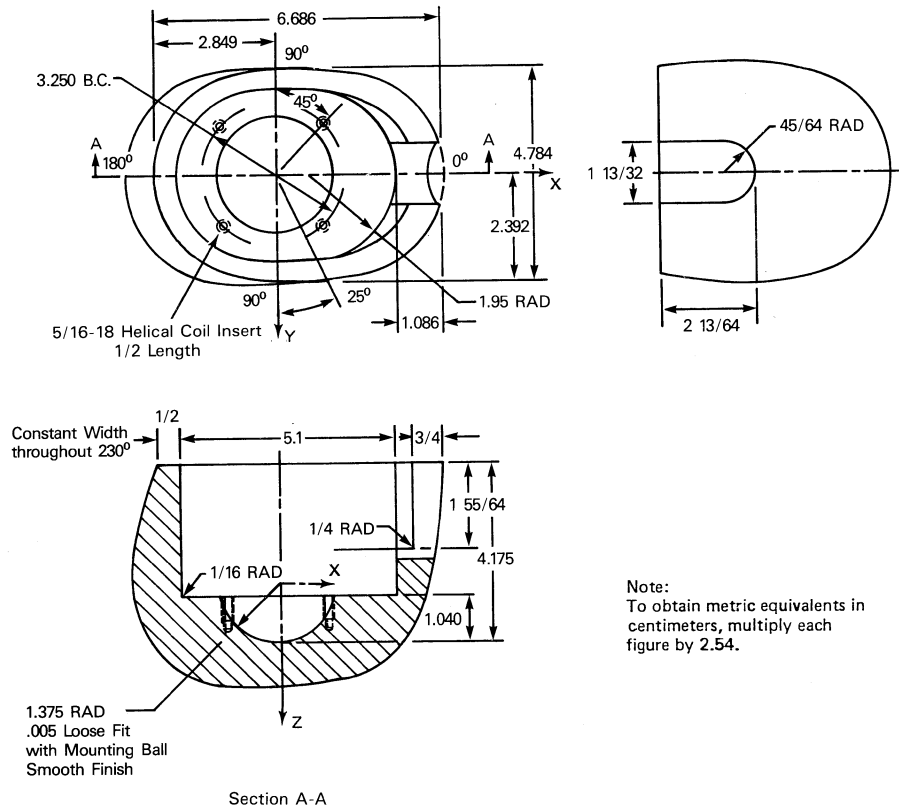
Note:
To obtain metric equivalents in
centimeters, multiply each
figure by **2.54.**

Figure 7

Medium Headform — Interior Design

SECTION B-B

Note:
To obtain metric equivalents in
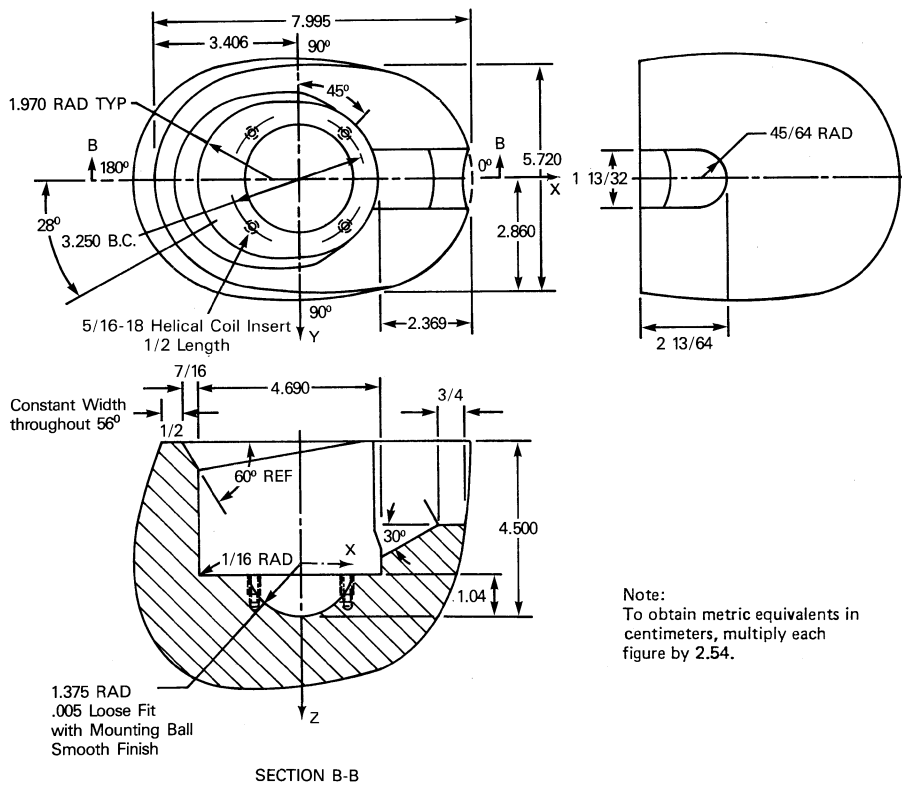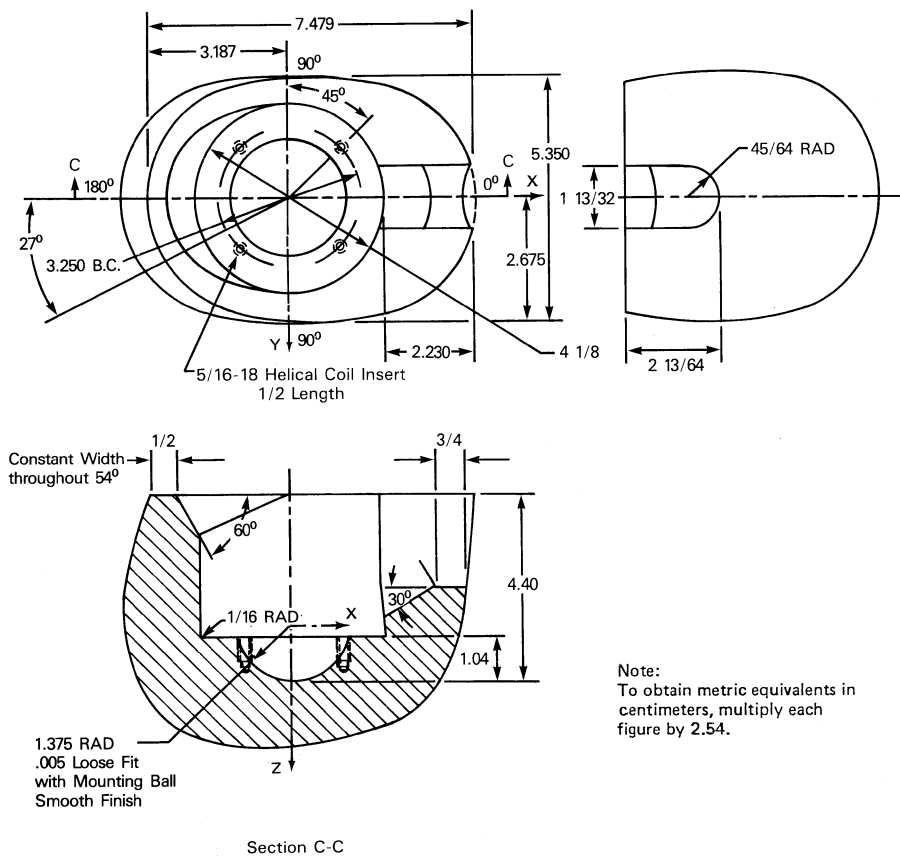centimeters, multiply each
figure by 2.54.

Figure 8

Large Headform — Interior Design

Section C-C

[38 FR 22391, Aug. 20, 1973, as amended at 39 FR 3554, Jan. 28, 1974; 45 FR 15181, Mar. 10, 1980; 53 FR 11288, Apr. 6, 1988; 53 FR 12529, Apr. 15, 1988]

§ 571.219 Standard No. 219; Windshield zone intrusion.

S1. *Scope.* This standard specifies limits for the displacement into the windshield area of motor vehicle components during a crash.

S2. *Purpose.* The purpose of this standard is to reduce crash injuries and fatalities that result from occupants contacting vehicle components displaced near or through the windshield.

S3. *Application.* This standard applies to passenger cars and to multipurpose passenger vehicles, trucks and buses of 4,536 kilograms or less gross vehicle weight rating. However, it does not apply to forward control vehicles,