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LAND SEA AIR SPACE

TECHNICAL REPORT J140

SEAT BELT HARDWARE TEST PROCEDURE - SAE J140

SAE Recommended Practice

Report of Motor Vehicle Seat Belt Committee approved April 1970.

1. SCOPE

This SAE Recommended Practice describes test procedures for evaluating hardware used in Type 1 and Type 2 motor vehicle seat belt assemblies.

NOTE: The hardware test procedures covered in this report are intended to supercede those now reported in SAE J4c. Related hardware performance requirements are under development and will be covered in a separate SAE Recommended Practice. Test procedures and performance requirements for seat belt retractors will likewise be covered in separate SAE Recommended Practices to be issued later.

2. DEFINITIONS

2.1 SEAT BELT ASSEMBLY - Any strap, webbing, or similar device designed to secure a person in a motor vehicle with the intention of mitigating the results of a collision, including all buckles and other fasteners and all hardware designed for installing the assembly in a motor vehicle.

2.2 PELVIC RESTRAINT - A seat belt assembly or portion thereof intended to restrain movement of the pelvis.

2.3 UPPER TORSO RESTRAINT - A portion of a seat belt assembly intended to restrain movement of the chest and shoulder regions.

2.4 TYPE 1 - A seat belt assembly which provides pelvic restraint.

2.5 TYPE 2 - A seat belt assembly which provides both pelvic and upper torso restraint.

2.6 TYPE 2A - A seat belt assembly consisting of either a separate upper torso restraint intended for use only with a Type 1 seat belt assembly or an upper torso restraint which may be connected to a Type 1 seat belt assembly for use as a Type 2 seat belt assembly.

2.7 HARDWARE - Any metal or rigid plastic part of the seat belt assembly.

2.7.1 Buckle - A quick release connector which fastens a person in a seat belt assembly.

2.7.2 Attachment Hardware - All hardware designed for securing the webbing of a seat belt assembly to a motor vehicle.

2.7.3 Adjustment Hardware - All hardware designed for adjusting the size of a seat belt assembly to fit the user, including such hardware that may be integral with a buckle, attachment hardware or retractor.

Table 1 - Test Sequence

Test Method	SAE J140 Paragraph Ref.	Sequence of Tests Group 1	2	3	4
Conditioning - General	3.1	1	1	1	-
Corrosion	3.2	5	-	2	1
Temperature Resistance	3.3	6	-	3	-
Strength	3.4	11	-	5	2
Hook Retention	3.4.3	-	-	4	-
Buckle Release - Loop Test	3.5	12	-	-	-
- Access	—	2	-	-	-
- Compression	3.6	10	-	-	-
Buckle Latch - Cycle & False Latch	3.7	7	-	-	-
Tilt Lock	4.2	3,8	3,5	-	-
Adjustment	4.1	4,9	2,6	-	-
Abrasion - System	—	-	4	-	-
Webbing Tensile Strength	—	-	7	-	-

Group 1 - Components from three assemblies for evaluation of a buckle or other adjustment means excluding retractors.

Group 2 - Components from three assemblies which are normally used to adjust the size of a seat belt assembly, excluding retractors for system abrasion, as described in the SAE Recommended Practice - SEAT BELT ASSEMBLY WEBBING ABRASION TEST PROCEDURE - SAE J339.

Group 3 - Components from three assemblies for evaluation of attachment hardware.

Group 4 - Bolts, bolt systems or any substitute attachment means.

3. TEST PROCEDURE

3.1 GENERAL - All components shall be conditioned for four hours under laboratory ambient conditions, prior to conducting the test sequence outlined in Table 1.

NOTE: Humidity requirement not applicable for Group 3 and 4 components.

3.2 CORROSION RESISTANCE - Three seat belt assemblies shall be tested by Standard Method of Salt Spray (Fog) Testing, ASTM Designation: B 117-64, published by the American Society for Testing Materials. The period of test shall be 50 hours for all attachment hardware at or near the floor, consisting of two periods of 24 hours exposure to salt spray each followed by one hour drying. The period of test shall be 25 hours for all other hardware, consisting of one period of 24 hours exposure to salt spray followed by one hour drying. In the salt spray test chamber, the parts from the three assemblies shall be oriented differently, selecting those orientations most likely to develop corrosion on the larger areas. At the

end of the one hour drying interval at the conclusion of the test, the seat belt assembly shall be washed thoroughly with water to remove the salt. After drying for at least 24 hours under ambient laboratory conditions attachment hardware shall be examined for ferrous corrosion on significant surfaces, that is, all surfaces that can be contacted by a sphere 0.75 in. (2cm) in diameter, and other hardware shall be examined for ferrous and nonferrous corrosion which may be transferred, either directly or by means of the webbing, to a person or his clothing during use of a seat belt assembly incorporating the hardware.

3.3 TEMPERATURE RESISTANCE - Three seat belt assemblies having plastic or nonmetallic hardware shall be subjected to the conditions prescribed in Procedure IV of ASTM D 756-56, Standard Methods of Test for Resistance of Plastics to Accelerated Service Conditions. The dimension and weight measurements shall be omitted. Buckles shall be unlatched during conditioning. The hardware parts after conditioning shall be used for all applicable assembly tests in SAE J4.

3.4 ATTACHMENT HARDWARE -

3.4.1 Pelvic Restraint - Attachment bolts or other substitute attachment means used to secure the pelvic restraint of a seat belt assembly to a motor vehicle shall be tested in a manner similar to that shown in Fig. 1. The load shall be applied at an angle of 45 deg to the axis of the bolt through attachment hardware from the seat belt assembly, or through a special fixture which simulates the loading applied by the attachment hardware. When bolts are used, the attachment hardware or simulated fixture shall be fastened by the bolt to the anchorage shown in Fig. 1, which has a standard 7/16-20 UNF-2B or 1/2-13 UNC-2B threaded hole in a hardened steel plate at least 0.4 in. (1 cm) in thickness. The bolt shall be tested two full turns from the fully seated position (see Fig. 1). The appropriate force required by SAE J4c shall be applied. The bolts or other attachment means from each of three seat belt assemblies shall be tested. Other attachment means shall be tested in a manner to simulate usage.

3.4.2 Upper Torso Restraint - Attachment bolts or other attachment means used to secure the upper torso portion of a seat belt assembly to a motor vehicle shall be tested in a manner similar to that shown in Fig. 1. The load shall be applied at an angle of 45 deg to the axis of the fastener or bolt through attachment hardware from the seat belt assembly or through a special fixture which simulates that loading applied by the attachment hardware as installed in the vehicle. The attachment hardware or simulated fixture shall be fastened by the bolt(s) or fastener(s) to the anchorage shown in Fig. 1 which has the appropriate mating hole(s) or attachment(s) in a hardened steel plate at least 0.4 in. (1 cm) in thickness. Bolt(s) shall be tested two full turns from the fully seated position. The appropriate force required by SAE J4c shall be applied. Bolts and/or fasteners from each of three seat belt assemblies shall be tested.

3.4.3 Single Attachment Hooks Retention - Single attachment hooks for connecting webbing to an eye bolt shall be tested in the following manner: the hook shall be held rigidly so that the retainer latch or keeper, with cotter pin or other locking device in place, is in a horizontal position as shown in Fig. 2. A force of 150 ± 2 lb (68 ± 1 kg) shall be applied vertically as near as possible to the free end of the retainer latch, and the movement of the latch by this force at the point of application shall be measured. The vertical force shall be released, and a force of 150 ± 2 lb (68 ± 1 kg) shall be applied horizontally as near as possible to the free end of the retainer latch. The movement of the latch by this force at the point of load application shall be measured. Alternatively, the hook

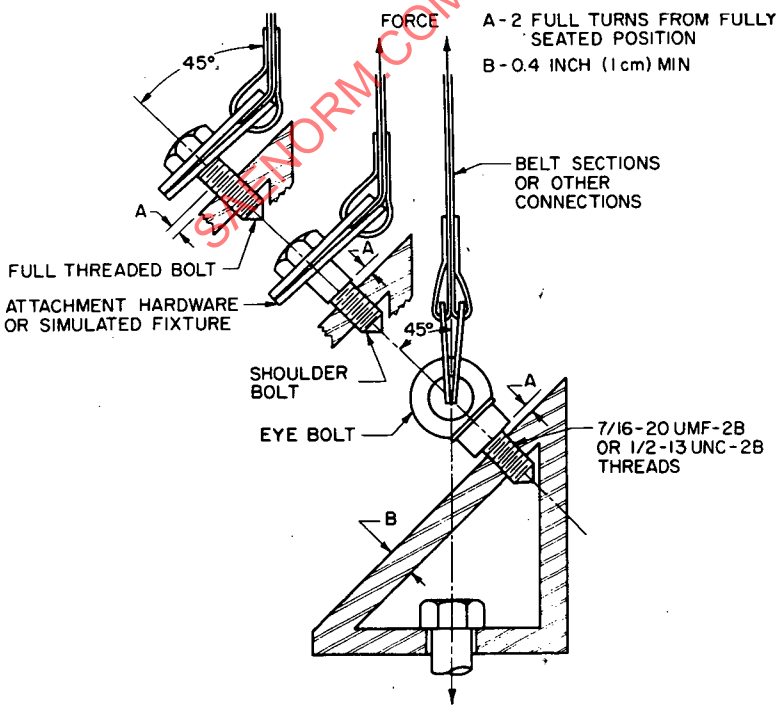

Fig. 1

may be held in other positions, provided the forces and the movements of the latch are measured at the points indicated in Fig. 2.

3.5 BUCKLE RELEASE - Three seat belt buckle assemblies shall be tested to determine compliance with the maximum buckle release force requirements. After subjection to the force applicable for the seat belt assembly being tested, the force shall be reduced and maintained at a residual tensile load of 75 ± 5 lb (68 ± 4 kg).

3.5.1 For push button buckles the release force shall be measured at the point of maximum mechanical advantage but no closer than .15 in. (3.8 mm) from the edge of the release button opening.

3.5.2 For lift cover buckles, the force shall be applied on the centerline of the buckle lever or finger tab in such direction as to produce maximum releasing effect. A hole 0.1 in. (2.5 mm) in diameter may be drilled through the buckle tab or lever on the centerline between 0.12-0.13 in. (3.0-3.3 mm) from its edge, and a small loop of soft wire may be used as the connecting link between the buckle tab or lever and the force measuring device.

3.5.3 For buckles of other types the release force shall be applied in a manner to simulate usage.

3.6 BUCKLE COMPRESSION - The buckle of a Type 1 or Type 2 seat belt assembly shall be subjected to a specified compressive force applied anywhere on the longitudinal centerline of the buckle and anywhere along lines at approximately 60 deg to this centerline, with the point of intersection of these lines centered over the release mechanism. The force shall be applied through a cylindrical bar 0.75 in. (2 cm) in diameter, at least 4 in. (10 cm) long, and curved to a radius of 6 in. (15 cm). The bar shall be placed with the longitudinal centerline of the bar directly above the lines through the longitudinal centerline of the buckle and at 60 deg to it (see Fig. 3). Buckles from three seat belt assemblies shall be tested to determine compliance.

3.6.1 The buckle shall be engaged and a tensile force of 75 ± 5 lb (35 kg ± 2.5 kg) shall be applied to the connected assembly during the application of the compressive force.

3.6.2 The metal mating part shall be disengaged from the buckle and the compressive load applied to the buckle again.

3.7 BUCKLE LATCH OPERATION -

3.7.1 The buckles from three seat belt assemblies shall be fully latched with their metal mating plates and unlatched at least ten times. Then the buckle, with the metal mating plate (metal-to-metal buckles) or webbing end (metal-to-webbing buckles) withdrawn from the buckle, shall be clamped or firmly held against a solid surface so as to permit normal movement of buckle parts without movement of the buckle assembly. The release mechanism shall be moved 200 times through the maximum possible travel against its stop with a force of 30 ± 3 lb (14 ± 1 kg) at a rate not to exceed 30 cpm, actuating the mechanism in a manner which simulates actual usage. After completion of this portion of the test, the 30 lb force shall be reduced to a force of just sufficient magnitude to assure full travel to the stop for an additional 10,000 cycles. The buckle shall then be examined to determine compliance with specified performance requirements.

3.7.2 A metal-to-metal buckle shall be examined to determine whether partial engagement is possible by means of any technique representative of actual use. If partial engagement is possible, the maximum force of separation when in such partial engagement shall be determined.

4. SYSTEM TEST PROCEDURES RELATED TO HARDWARE

4.1 ADJUSTMENT FORCE - Three buckles or other manual adjusting devices, normally used to adjust the size of the assembly shall be tested for adjustment force on the webbing intended for use in the adjusting device. This test shall be conducted within 1 hour after conditioning the webbing for 4 hours under laboratory ambient conditions. With no load on the anchor end, the webbing shall be drawn through

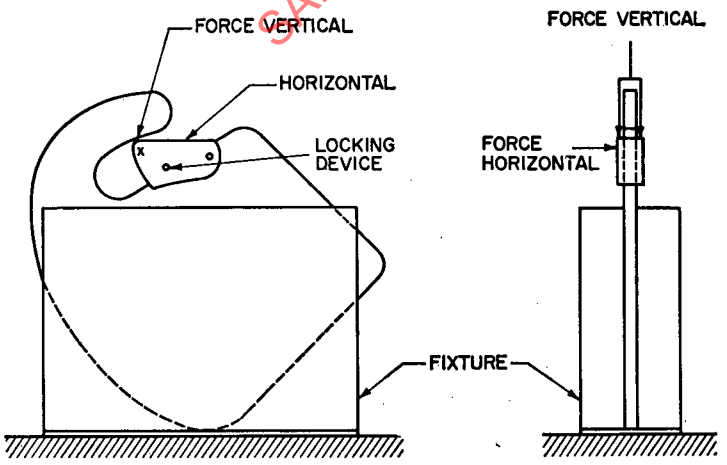

Fig. 2

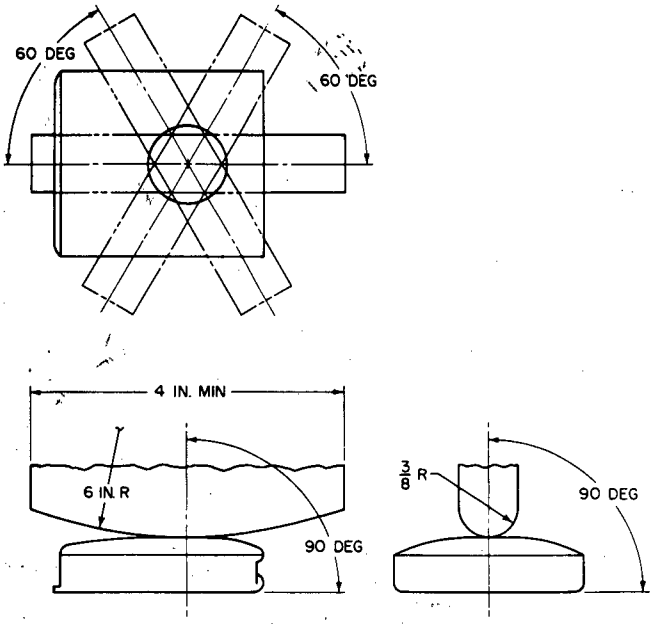

Fig. 3