

HARNESS TYPE RESTRAINT ASSEMBLIES FOR USE IN MOTOR VEHICLES - SAE J854

SAE Recommended Practice

Report of Motor Vehicle Seat Belt Committee approved April 1963.

1. SCOPE AND BASIC REQUIREMENTS

1.1 This SAE Recommended Practice applies to single occupancy shoulder harness type restraint assemblies intended for installation in motor vehicles. Such a restraint assembly is composed of a shoulder belt portion and a lap belt portion. This recommended practice specifies performance requirements, test procedures and certain minimal design requirements for this type of restraining device.*

1.2 The design should be such that during deceleration the force applied to the pelvic area is in a downward and rearward direction. Loads on the shoulder portion of the belt must not tend to pull the lap portion of the belt into the abdominal area.

1.3 Upper torso restraint should never be used without complete pelvic restraint such as is provided by a conventional lap type seat belt assembly.

1.4 Shoulder strap(s) must be so attached as to minimize jackknifing of the occupant during deceleration. This will preclude attaching the upper end(s) of the shoulder strap(s) to the floor directly behind the seat unless the seat back is designed to carry the resulting load. Ideally, the upper end(s) of the shoulder strap(s) should be attached to body structure directly behind the seat at approximately shoulder height. Attachment point(s) should be located in such a manner as to keep the length of webbing at a minimum.

1.5 If the complete restraining device is designed so that the lap belt portion may be worn without the shoulder harness, the lap belt portion must then meet all the requirements of SAE Standard, Motor Vehicle Seat Belt Assemblies - SAE J4a, including all strength and elongation requirements.

1.6 The complete restraining device should be capable of adjustment to fit any occupant weighing at least 50 lb and with a seated height of 25 in. or greater (larger than approximately a six year old child).

2. WEBBING

2.1 Requirements

2.1.1 Elongation - Elongation of the webbing should not exceed 40% under 2500 lb, tensile test load. It is desirable that as much of this elongation as possible be due to permanent yielding (energy absorption) of the webbing rather

* Compliance with the requirements of this SAE Recommended Practice does not provide assurance that when the harness type restraint assembly is installed, the floor pan washers or other car structure reinforcing plates supplied with this harness type restraint assembly will be adequately strong to sustain the test load specified in Paragraph 4.1.1 for the assembly. Generally, a test of an installation in a car is necessary to determine the adequacy of the reinforcing plates. For recent models, data on tested anchorage installations can be obtained from the vehicle manufacturer.

than to elastic stretching. (Note limitation in Paragraph 1.5.)

2.1.2 Width - Portions of the belt webbing which may come in contact with the occupant should not be less than 1-7/8 in. wide under no load and not less than 1-3/4 in. wide when subjected to a test load of 2500 lb.

2.1.3 Minimum Strength - The rated minimum tensile strength of the webbing should not be less than 3000 lb when tested in accordance with Item 2.2.3. (Note limitation in Paragraph 1.5.)

2.1.4 Resistance to Abrasion - After the webbing is subjected to the abrasion test specified in Item 2.2.4, the webbing shall retain a minimum tensile strength of 2700 lb.

2.1.5 Color and Light Fastness - The following requirements are listed in order to give reasonable assurance that the dye in the webbing will not harm clothing or that the color of the webbing will not substantially change.

(a) Color Fastness - For crock, both wet and dry, equal to or better than class 3 in the AATCC Chart for Measuring Transference of Color. (This requires the use of Method 5650 of Federal Standard CCC-T-191B.)

(b) Light Fastness - Webbing should have a light fastness rating of Fair to 40 hr when tested in accordance with Method 5660 of Federal Standard CCC-T-191B.

2.2 Test Procedures

2.2.1 Elongation Test - When webbing samples are being prepared for the webbing tensile test (Item 2.2.3) they should be marked for elongation testing in the following manner: while subjected to a dead weight of 5 lb, the samples shall be inscribed with calibration marks 8 in. apart and equidistant from each end.

When 2500 lb are reached during the webbing tensile test, the distance between calibration marks shall be measured to the nearest 1/25 in. and recorded. (Each 1/25 in. in excess of 8 in. represents 1/2% elongation.)

NOTE: Separation of jaws should not be stopped while this measurement is being made.

2.2.2 Width - At the time sample is being prepared for the elongation test the width should be measured and recorded. The width shall be remeasured and recorded at the time elongation is recorded.

2.2.3 Tensile Test - Three samples of the webbing should be tested to determine compliance with the width, minimum strength, and elongation requirements given in the preceding items. The tensile tests should be more on samples which are at equilibrium with an atmosphere having a relative humidity of not more than 67% and a temperature of not more than 80 F. The samples should be tested in a suitable testing machine, using grips conforming to USAF Air Materiel Command Drawings MIL-330, 330-1,

330-3, and 330-4.* The samples should be mounted in the machine when the grips are 10 to 12 in. apart. The machine heads should separate at a maximum rate of 4 in./minute under no load. Each test sample of the webbing should withstand a load at least equal to its rated minimum tensile strength, for at least 3 sec without failure.

2.2.4 Abrasion Test - The webbing should be tested for abrasion resistance on the device shown schematically in SAE Standard, Motor Vehicle Seat Belt Assemblies -- SAE J4a. The webbing A shall have one end attached to weight B. The webbing shall pass over the hexagonal bar C (so positioned that two edges of the bar are used in the abrasion) and shall be attached to the oscillating drum D. The drum shall oscillate so that the webbing is given a 13 in. traverse over the bar at the rate of 60 ± 2 strokes per minute. Each stroke represents a 13 in. traverse in a single direction. Suitable guides shall be used to prevent lateral webbing movement parallel to the hexagonal bar axis. After 5000 strokes the webbing shall be removed the the minimum tensile strength shall be determined as specified in Item 2.

2.3. New abrading edges of hexagonal bar C shall be used for each specimen tested. Weight B shall be 5.2 lb $\pm$ 2 oz.

3. BUCKLE(S)

3.1 Requirements

3.1.1 Maximum Buckle Release Force - The belt buckle should release when a releasing force of not more than 30 lb is applied, when tested in accordance with Item 3.2.1.

3.1.2 Release and Latching Mechanism under No Load - When tested as specified in Item 3.2.2 the movement, by hand, of the buckle release and latching parts through their maximum travel shall not produce any galling or wearing of buckle parts or cause any failure.

3.1.3 General - Any metal to metal buckle should be checked to determine that there is no danger of latching in a manner resulting in reduced strength or holding ability; it shall not be possible to obtain partial engagement by means of any technique representative of actual use.

3.2 Test Procedures

3.2.1 Maximum Buckle Release Force Test - Three belt assemblies should be tested to determine compliance with the maximum buckle release force requirement. The belt assemblies used in the Rated Minimum Strength Test may be used for this test. The loads applied as recommended in Item 4.2.1 should now be reduced to a loop load of 150 lb, and while maintaining this reduced load, the buckle release force should be measured. The buckle release force should be applied in a manner and direction typical of that which would be employed by the seat belt occupant. For lever release buckles, the force may be applied on the centerline of the buckle lever or finger tab, 1/8 in. from its edge and in such direction as to produce maximum releasing effect. A 3/32 in. dia hole may be drilled through the buckle tab on lever at this application point, and a small

loop of soft wire may be used as the connection link between the buckle tab or lever and the force measuring scale. The release force, so measured, should be in conformity with the recommendations in Item 3.1.1.

3.2.2 Release and Latching Mechanism Under No Load - Prior to performing the following test procedure the buckle shall be run in by precycling at least 10 times through the complete travel of the latch.

The sections of the belt shall be connected together as in the normal use of the belt. The buckle is clamped or firmly held against a flat surface so as to permit normal movement of buckle parts. With the metal mating plate (metal-to-metal buckles) or webbing end (metal-to-webbing buckles) withdrawn from the buckle, the release mechanism shall be moved through the maximum possible travel against its stop with a force of 30 lb, 200 times, at a rate not to exceed 30 cycles per minute. This may be done by hand. The buckle shall be examined to determine compliance with the performance requirements of Item 3.1.2.

4. BELT ASSEMBLY

4.1 Requirements

4.1.1 Rated Minimum Strength - The shoulder harness type restraint assembly, including webbing, buckle, and adjustment and attachment fittings, should withstand the following loading of the pelvic area and upper torso restraining components:

(a) The upper torso and pelvic restraint components of the complete restraining device must withstand simultaneous static loop loads of 3000 lb each. The upper torso load may be divided equally between the halves of a double shoulder harness.

(b) The pelvic restraint component of the complete restraining device must meet the requirements of SAE J4a by withstanding a minimum static loop load of 5000 lb. However, if a slip connection is provided, between the upper torso and pelvic restraint components, which allows equalization of loading and insures that the pelvic restraint component cannot effectively be worn alone as a seat belt assembly, then only the loading in (a) need be applied.

4.1.2 Slippage - Slippage of the webbing in the adjusting means at, or near, the buckle, in the release mechanism, and at the attachment fittings, should not exceed a total of 1 in. under the test loads specified in Item 4.1.1.

4.2 Test Procedures

4.2.1 Rated Minimum Strength Test - Three restraint assemblies, selected at random, should be tested to determine compliance with the rated minimum strength requirement specified in Item 4.1.1. Each belt assembly should be tested in a suitable testing machine or in an appropriate vehicle using the attaching bolts, fittings, and other hardware provided by the seat belt supplier as part of the assembly. The test installation should be in accordance with the installation instructions furnished by the belt supplier. The load should be applied to the belt assembly by body blocks and/or shaped torso so as to produce the loads specified in Item 4.1.1. The belt shall be adjusted so that the buckle is at the side of the body block during the test. The load

*Copies of these drawings may be obtained from the Society of Automotive Engineers, Inc., 485 Lexington Avenue, New York 17, N. Y.