



TECHNICAL REPORT

J4c

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MOTOR VEHICLE SEAT BELT ASSEMBLIES - SAE J4c

SAE Standard

Report of Motor Vehicle Seat Belt Committee approved November 1955 and last revised July 1965.

1. SCOPE

1.1 This SAE Standard provides for the following types of seat belt assemblies for use in motor vehicles, in order to minimize the risk of bodily harm in an accident:

Type 1 - Lap Belt for pelvic restraint.

Type 2 - Combination of pelvic and upper torso restraints.

(Type 2a - Shoulder belt - An upper torso restraint for use only in conjunction with a lap belt as a Type 2 seat belt assembly.)

Type 3 - Combination pelvic and upper torso restraint for persons weighing 50 lb (23 kg) or less and capable of sitting upright by themselves, that is children in the approximate age range of 8 months-6 years.

1.2 This standard specifies performance requirements, laboratory test procedures and minimal design requirements for seat belt assemblies when worn in the seated position.

2. DEFINITIONS

2.1 SEAT BELT ASSEMBLY - Consists of any strap, webbing, or similar device designed to secure a person in a motor vehicle with the intention of mitigating the results of a traffic accident, including all buckles or 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 HARDWARE - Any metal or rigid plastic part of the seat belt assembly.

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

2.4.2 Attachment Hardware - Any or all hardware designed for securing the webbing of a seat belt assembly to a motor vehicle.

2.4.3 Adjustment Hardware - Any or 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.

2.4.4 Retractor - A device for storing part or all of the webbing in a seat belt assembly.

2.4.4.1 Nonlocking Retractor - A retractor from which the webbing is extended to essentially its full length by a small external force, which provides no adjustment for as-

sembly length, and which may or may not be capable of sustaining restraint forces at maximum webbing extension.

2.4.4.2 Automatic Locking Retractor - A retractor incorporating adjustment hardware by means of a positive self locking mechanism which is capable when locked of withstanding restraint forces.

2.4.4.3 Emergency Locking Retractor - A retractor incorporating adjustment hardware by means of a locking mechanism that is activated by vehicle acceleration, webbing movement relative to the vehicle, or other automatic action during an emergency and is capable when locked of withstanding restraint forces.

2.5 SEAT BACK RETAINER - The portion of some seat belt assemblies designed to restrict forward movement of a seat back.

2.6 WEBBING - A narrow fabric woven with continuous filling yarns and finished selvages.

2.7 STRAP - A narrow nonwoven material used in a seat belt assembly in place of webbing.

3. GENERAL REQUIREMENTS

3.1 SINGLE OCCUPANCY - A seat belt assembly shall be designed for use by one, and only one, person at any one time.

3.2 PELVIC RESTRAINT - A seat belt assembly shall provide pelvic restraint whether or not upper torso restraint is provided, and the pelvic restraint shall be designed to remain on the pelvis under all conditions, including collision or rollover of the motor vehicle. Pelvic restraint of a Type 2 seat belt assembly, that can be used without upper torso restraint, shall comply with requirement for Type 1 seat belt assembly in Sections 3-6 inclusive.

3.3 UPPER TORSO RESTRAINT - A Type 2 or Type 3 seat belt assembly shall provide upper torso restraint without shifting the pelvic restraint into the abdominal region. The upper torso restraint shall be designed to minimize vertical forces on the shoulders and spine. Hardware for upper torso restraint shall be so designed and located in the seat belt assembly that the possibility of injury to the occupant is minimized. A Type 2a shoulder belt shall comply with applicable requirements for a Type 2 seat belt assembly in Sections 3-6 inclusive.

3.4 HARDWARE - All hardware parts which contact, under normal usage, a person, clothing, or webbing shall be free from burrs and sharp edges.

3.5 RELEASE - A Type 1 or Type 2 seat belt assembly shall be provided with a buckle or buckles readily accessible to the occupant to permit his easy and rapid removal from the assembly. A Type 3 seat belt assembly shall be provided with a quickly recognizable and easily operated release arrangement, readily accessible to an adult. Buckle release mechanism shall be designed to minimize the possibility of accidental release.

3.6 ATTACHMENT HARDWARE - A seat belt assembly shall include all hardware necessary for installation in a motor vehicle in accordance with SAE J800a, Motor Vehicle Seat Belt Installation*, except that seat belt assemblies designed for installation in vehicles equipped with seat belt anchorages shall not require underfloor hardware. The hardware shall be designed to prevent attaching bolts and other parts becoming disengaged from the motor vehicle in services. Reinforcing plates or washers furnished for universal floor installations shall be steel, free from burrs and sharp edges on the peripheral edges adjacent to the vehicle, not less than 0.06 in. (1.5 mm) in thickness nor less than 4 sq in. (25 sq cm) in area. The distance between any edge of the plate and the edge of the bolt hole shall be at least 0.6 in. (15 mm) and any corner shall be rounded to a radius of not less than 0.25 in. (6 mm) or cut at a 45 deg angle along an hypotenuse not less than 0.25 in. (6 mm) in length.

3.7 ADJUSTMENT - A Type 1 or Type 2 seat belt assembly shall be capable of snug adjustment by the occupant by a means easily within his reach and easily operable without appreciable interference with the driving process, or shall be provided with an automatic locking or an emergency locking retractor. A Type 3 seat belt assembly shall be capable of snug adjustment to fit any child capable of sitting upright and weighing not more than 50 lb (23 kg) unless specifically labelled for use with a child in a smaller weight range.

3.8 SEAT BACK RETAINER - A Type 3 seat belt assembly designed for attachment to a seat back, or for use in a seat with a hinged back, shall include a seat back retainer unless such assembly is designed and labelled for use in specific models of motor vehicles, in which the vehicle manufacturer has provided other adequate restraint for the seat back.

3.9 WEBBING - The ends of webbing in a seat belt assembly shall be protected or treated to prevent ravelling. The end of webbing in a seat belt assembly having a metal-to-metal buckle, that is used by the occupant to adjust the size of the assembly, shall not pull out of the adjustment hardware at maximum size adjustment. Provision shall be made for essentially unimpeded movement of webbing routed between a seat back and seat cushion and attached to a retractor located behind the seat.

3.10 STRAP - A strap used in a seat belt assembly to sustain restraint forces shall comply with the requirements for webbing in Section 4, and if the strap is made from a rigid

material it shall comply with applicable requirements in Sections 4-6.

3.11 MARKING - Each seat belt assembly shall be permanently and legibly marked or labelled with year of manufacture, model and name or trademark of manufacturer or distributor, or of importer if manufactured outside the United States. A model shall consist of a single combination of webbing having a specific type of fiber (nylon, polyester, or the like) weave and construction, and hardware having a specific design. Webbing of various colors may be included under the same model, but webbing of each color shall comply with the requirements for webbing in Section 4.

3.12 INSTALLATION INSTRUCTIONS - A seat belt assembly or retractor shall be accompanied by an instruction sheet providing sufficient information for installing the assembly in a motor vehicle except for a seat belt assembly or retractor installed in a motor vehicle by an automobile manufacturer. The installation instructions shall state whether the assembly is for universal installation or for installation only in specifically stated motor vehicles, and shall include at least those items in SAE J800a.

3.13 USAGE AND MAINTENANCE INSTRUCTIONS - A seat belt assembly or retractor shall be accompanied by written instructions for the proper use of the assembly, stressing particularly the importance of wearing the assembly snugly and properly located on the body, and for the maintenance of the assembly, including periodic inspection of all components. The instructions shall show the proper manner of threading webbing in the hardware of seat belt assemblies in which the webbing is not permanently fastened. Instructions for Type 2a shoulder belt shall include a warning that the shoulder belt is not to be used without a lap belt.

3.14 WORKMANSHIP - A seat belt assembly shall have good workmanship in accordance with good commercial practices.

4. REQUIREMENTS FOR WEBBING

4.1 WIDTH - The webbing in a seat belt assembly shall be not less than the following widths, when measured under conditions prescribed in paragraph 7.1:

Type 1 seat belt assembly - 1.8 in. (46 mm).

Type 2 seat belt assembly - 1.8 in. (46 mm).

Type 3 seat belt assembly - 0.9 in. (23 mm) for pelvic and upper torso restraint.

4.2 BREAKING STRENGTH - The webbing in a seat belt assembly shall have not less than the following breaking strengths when tested by the procedures specified in paragraph 7.2:

Type 1 seat belt assembly - 6000 lb (2720 kg)

Type 2 seat belt assembly - 5000 lb (2270 kg) for pelvic restraint; 4000 lb (1810 kg) for upper torso restraint.

Type 3 seat belt assembly - 1500 lb (680 kg) for pelvic and upper torso restraint; 4000 lb (1810 kg) for seat back retainer and for connection for pelvic and upper torso restraint to attachment hardware when assembly has single webbing connection; 3000 lb (1360 kg) for webbing connecting pelvic and upper torso restraint to attachment hardware when as

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sembly has two or more webbing connections.

4.3 ELONGATION - The webbing in a seat belt assembly shall not extend to more than the following elongations when subjected to the specified forces in accordance with the procedures specified in paragraph 7.3:

Type 1 seat belt assembly - 20% at 2500 lb (1130 kg).

Type 2 seat belt assembly - 30% at 2500 lb (1130 kg) for pelvic restraint; 40% at 2500 lb (1130 kg) for upper torso restraint.

Type 3 seat belt assembly - 20% at 700 lb (320 kg) for webbing in pelvic and upper torso restraints; 25% at 2500 lb (1130 kg) for webbing in seat back retainer and for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has single webbing connection; 25% at 1800 lb (820 kg) for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has two or more webbing connections.

4.4 RESISTANCE TO ABRASION - The webbing in a seat belt assembly after being subjected to abrasion as specified in paragraph 7.4 shall have a breaking strength not less than 75% of the strength before abrasion when measured by the procedure specified in paragraph 7.2.

4.5 RESISTANCE TO LIGHT - The webbing in a seat belt assembly, after exposure to the light of a carbon arc and after testing by the procedure specified in paragraph 7.5 shall have a breaking strength not less than 60% of the strength before exposure to the carbon arc and shall have a color retention not less than No. 2 on the Geometric Gray Scale*.

4.6 RESISTANCE TO MICRO-ORGANISMS - The webbing in a seat belt assembly after being subjected to micro-organisms and tested by the procedure specified in paragraph 7.6 shall have a breaking strength not less than 85% of the strength before subjection to micro-organisms.

4.7 COLORFASTNESS TO CROCKING - The webbing in a seat belt assembly shall not transfer color to a crock cloth either wet or dry to a greater degree than Class 3 on the AATCC Chart for Measuring Transference of Color,* when tested by the procedure specified in paragraph 7.7.

4.8 COLORFASTNESS TO STAINING - The webbing in a seat belt assembly shall not stain to a greater degree than Class 3 on the AATCC Chart for Measuring Transference of Color when tested by the procedure specified in paragraph 7.8.

5. REQUIREMENTS FOR HARDWARE

5.1 CORROSION RESISTANCE - Hardware parts of a seat belt assembly, except buckles, after being subjected to the condition specified in paragraph 8.1, shall be free of red rust, except for permissible red rust at peripheral edges or edges of holes on underfloor reinforcing plates or washers. Buckle surface or other metallic parts which may come into contact with webbing, the occupant, or his clothing, when the belt is worn, shall be free of ferrous and nonferrous cor-

rosion. Buckles and retractors shall conform to applicable requirements in paragraphs 5.7-5.11 inclusive.

5.2 TEMPERATURE RESISTANCE - Plastic, or other non-metallic, hardware parts of a seat belt assembly, and all retractors, when subjected to the conditions specified in paragraph 8.2, shall not warp, or otherwise deteriorate, to cause the assembly to operate improperly or fail to comply with applicable requirements in Sections 5 and 6.

5.3 ATTACHMENT HARDWARE - Eye bolts, shoulder bolts, or other bolts used to secure the pelvic restraint of a seat belt assembly to a motor vehicle shall withstand a force of 5000 lb (2270 kg) when tested by the procedure specified in paragraph 8.3. A seat belt assembly, having single attachment hooks of the quick-disconnect type for connecting webbing to an eye bolt, shall be provided with a retaining latch or keeper which shall not move more than 0.08 in. (2 mm) in either the vertical or horizontal direction when tested by the procedure specified in paragraph 8.3.2.

5.4 BUCKLE RELEASE FORCE - The buckle of a Type 1 or Type 2 seat belt assembly shall release when a force of not more than 30 lb (14 kg) is applied, and the buckle of a Type 3 seat belt assembly shall release when a force of not more than 20 lb (9 kg) is applied as prescribed in paragraph 8.4.

5.5 ADJUSTMENT FORCE - The force required to decrease the size of a seat belt assembly shall not exceed 11 lb (5 kg) when measured by the procedure specified in paragraph 8.5.

5.6 TILT-LOCK ADJUSTMENT - The buckle of a seat belt assembly having tilt-lock adjustment shall lock the webbing when tested by the procedure specified in paragraph 8.6 at an angle of not less than 30 deg between the base of the buckle and the anchor webbing.

5.7 BUCKLE LATCH - The buckle latch of a seat belt assembly when tested by the procedure specified in paragraph 8.7, shall not fail, nor gall or wear to an extent that normal latching and unlatching are impaired, and a metal-to-metal buckle shall separate when in any position of partial engagement by a force of not more than 5 lb (2.3 kg).

5.8 NONLOCKING RETRACTOR - The webbing of a seat belt assembly shall extend from a nonlocking retractor within 0.25 in. (6 mm) of a maximum length when a tension of 3 lb (1.4 kg) is applied as prescribed in paragraph 8.8.

5.9 AUTOMATIC LOCKING RETRACTOR - The webbing of a seat belt assembly equipped with an automatic locking retractor shall not move more than 1 in. (2.5 cm) between locking positions of the retractor, and shall be retracted with a force of not less than 0.6 lb (0.27 kg) when measured by the procedure specified in paragraph 8.9.

5.10 EMERGENCY LOCKING RETRACTOR - An emergency locking retractor used on a Type 1 or Type 2 seat belt assembly shall lock before the webbing extends 1 in. (2.5 cm) when the retractor is subjected to an acceleration of

0.5 g (5 m/sec²) and shall exert a retraction force of not less than 1.5 lb (0.7 kg) under zero acceleration when tested by the procedures specified in paragraph 8.10.

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