Seat Belts for Construction Machines—SAE J386a

SAE Recommended Practice
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PREPRINT

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SEAT BELTS FOR CONSTRUCTION MACHINES — SAE J386a

SAE Recommended Practice

Report of Construction and Industrial Machinery Technical Committee approved March 1969 and last revised November 1973. Editorial change June 1977.

1. Purpose—This recommended practice provides minimum requirements for a pelvic restraint belt suitable for use primarily on crawler and wheel tractors, tractor-scrapers, loaders, and graders as defined in SAE J1057a (June, 1975). It may also be applicable to other machines as referenced in SAE J1116 (July, 1975).

2. Scope—This recommended practice covers the general requirements for webbing, buckle hardware, adjustment hardware, attachment hardware, and anchorages of the restraint system.

3. Definitions

3.1 Type 1 System—Lap belt only for pelvic restraint.

3.2 Type 2 System—Combination of pelvic and upper torso restraint.

3.3 Hardware—Any metal or rigid plastic part of the seat belt assembly.

3.4 Polyester Fiber—Any long-chain synthetic polymer composed of at least 85% by weight of an ester of a dihydric acid and terephthalic acid.

3.5 Roping—The tendency of a piece of webbing to twist upon itself and remain in the form of a rope instead of returning to its original strap form.

3.6 Model or Style Number—Identification of a seat belt assembly consisting of a single combination of webbing having a specific type of fiber, weave, and construction, and hardware having a specific design.

3.7 Seat Belt Assembly—Any strap, webbing, or similar device designed to secure a person in a vehicle, including all buckles or other fasteners and all hardware designed for installing the assembly in a vehicle.

3.8 Adjustment Hardware—Hardware designed for adjusting the seat belt assembly to fit the user, including such hardware that may be integral with a buckle, attachment hardware, or retractor.

3.9 Buckle—A quick-release connector which fastens a user in a seat belt assembly.

3.10 Attachment Hardware—Hardware for securing a seat belt assembly to an anchorage in a seat assembly or a vehicle.

3.11 Anchorage—A provision in a seat assembly or other suitable vehicle structure to receive the seat belt assembly attachment hardware (Type 1 or Type 2) and to transfer seat belt assembly loads to the seat and/or to the vehicle structure.

3.12 H-Point—The reference point used in this recommended practice is the H-point (pivot center of the torso and thigh of the two- and three-dimensional devices) as defined in SAE J826 (November, 1962). The H-point is referenced to the seat reference point (SRP) in SAE J898 (June, 1974).

4. General Requirements

4.1 Single Occupancy—A seat belt shall be designed for use by one, and only one, person at any one time.

4.2 Pelvic Restraint—A seat belt shall provide pelvic restraint whether or not upper torso restraint is provided. The seat belt shall also be designed to secure the pelvis and remain in the pelvic area under operating, collision, or rollover conditions.

4.3 Hardware—All hardware parts which contact, under normal usage, a person, clothing, or webbing shall be free from burrs and sharp edges.

4.4 Release—The seat belt shall be provided with a buckle or buckles readily accessible to the occupant to permit his easy and rapid removal from the assembly. The buckle release mechanism shall be designed to minimize the possibility of accidental release.

4.5 Adjustment—The seat belt shall be capable of snug adjustment by the occupant by a means easily within his reach, or shall be provided with an automatic locking or emergency locking retractor. The adjustment range shall accommodate the 5th through the 95th percentile American male (SAE J833 (June, 1974)).

4.6 Marking—Each seat belt shall be permanently and legibly marked or labeled with year of manufacture, model or style number, and name or trademark of manufacturer or distributor, or of the importer if manufactured outside of the United States.

4.7 Usage and Maintenance Instructions—Seat belts shall be accompanied by written instructions to the installer for the proper use of wearing the belt snugly and properly locating on the body and for the maintenance of the belt, including periodic inspection of all components. The instructions shall show the proper manner of threading the webbing in the hardware of seat belts in which the webbing is not permanently fastened.

4.8 Assembly Performance—The seat belt shall meet all the requirements for assembly performance listed in SAE J4c (July, 1965).[1]

4.9 Usage Encouragement—Soiled and messy seat belts can discourage usage. The belts should be protected from contact with the floor and other soiled areas when not in use.

5. Webbing Requirements

5.1 General—The webbing shall meet the applicable requirements of SAE J4c (July, 1965).

5.2 Material—The webbing material shall have a resistance to mild acids, alkalies, mildew, aging, moisture, and sunlight equal to or better than that of untreated polyester fiber.

5.3 Stiffness—To minimize "roping," the webbing shall be woven and/or treated to produce a stiffness in the transverse direction equal to or greater than that obtained with a weave of double plain with one up, one down binder without stuffers. This stiffness shall be effective for the usable life of the webbing. The webbing shall be flexible in the longitudinal direction to permit adjustment down to −40°F (−40°C).

5.4 Color—The color black is preferred since it is least affected by exposure to ultraviolet light.

5.5 Width—The webbing shall be not less than 1.8 in. (46 mm) in width when measured as specified in SAE J4c (July, 1965).

5.6 Strength—The webbing shall have not less than 6000 lb (2720 kg) breaking strength when tested by the procedures specified in SAE J4c (July, 1965).

5.7 Elongation—The webbing shall not extend to more than 15% at 2500 lb (1130 kg) when subjected to the specified forces in accordance with the procedures specified in SAE J4c (July, 1965).

5.8 Resistance to Abrasion—The webbing shall have a breaking strength not less than 75% of the strength before abrasion when tested in accordance with SAE J4c (July, 1965).

5.9 Ends—The ends of the webbing shall be protected or treated to prevent unraveling, and shall not pull out of the adjustment hardware at the maximum size adjustment.

6. Buckle Hardware Requirements

6.1 General—The buckle hardware shall meet all of the applicable requirements of SAE J4c (July, 1965).

6.2 Release—The buckle shall be designed so that it can be easily released with a single motion. It shall also be capable of being released with either available mittened hand.

6.3 Closure—The buckle shall be designed so that it can be easily closed with mittened hands.

6.4 Size—The buckles should be as wide as the webbing width and shall not present any rougher surface between the belt and the buckle than a doubled back thickness of the webbing when the assembly is loaded in accordance with the standard loop test (see SAE J4c (July, 1965)).

6.5 Padding—If a buckle is used which is less than the width of the webbing, a pad must be provided. This pad must cover the entire buckle area and be the full width of the webbing. It must be made of a material having properties equal to or better than those stated in paragraph 5.2 and must be permanently fastened to the assembly so that it is not injurious or uncomfortable to the operator.

7. Adjustment Hardware Requirements

7.1 General—The adjustment hardware shall meet all the applicable requirements of SAE J4c (July, 1965).

7.2 Location—When a two-piece belt is used, the adjustment means shall be on each half of the belt to allow for the centering of the buckle on the operator.

7.3 Operation—Each adjustment shall be capable of being made with the use of one mittened hand.

8. Attachment Hardware Requirements—The attachment hardware shall meet all the applicable requirements of SAE J4c (July, 1965).

9. Seat Belt Anchorages

9.1 General—Anchorages shall be such as to permit seat belt assemblies to be readily installed or replaced, and shall comply with the strength requirements indicated in paragraph 9.5.

9.2 Location of Anchorages

9.2.1 Anchorages on Vehicle or Seat Structure for Pelvic Restraint Belts—Anchorages for pelvic restraint belts shall be located so that a line from the anchorage point to the H-point (seat in the rearmost and lowest position if adjustable) will form an angle from the horizontal of 45–75 deg as shown in Fig. 1. Where practical, the preferred angle between the anchorage point and the H-point is the more vertical angle.

9.2.2 Suspended Seats—The pelvic belt anchorage shall be fastened to the seat assembly with a 45–75 deg angle as shown in Fig. 2. The belt extension shall be fastened to the pelvic belt on the upper end, and the anchorages at the lower end shall be located so that a line from the pelvic belt attachment on the seat assembly (seat in the rearmost and lowest position if adjustable) to the vehicle structure will for an angle from the horizontal of 45–75 deg as shown in Fig. 2.

[1] See 1974 SAE Handbook.

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