

Australian Standard[®]

**EARTHMOVING MACHINERY —
SEAT BELTS AND SEAT BELT
ANCHORAGES**

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PREFACE

This standard was prepared by the Association's Committee on Earthmoving Equipment in conjunction with the preparation of AS 2294, Protective Structures for Operators of Earthmoving Machines.

AS 2294 specifies procedures for the evaluation of roll-over protective structures (ROPS) and falling object protective structures (FOPS). ROPS and FOPS are defined as structures whose primary purpose is to reduce the possibility of an operator who is wearing a seat belt of being crushed or otherwise injured should his machine roll over or be struck by a falling object.

This standard sets out requirements for seat belt assemblies primarily intended for earthmoving machines fitted with ROPS or FOPS, but adaptable to machines not so fitted.

In the preparation of this standard consideration was given to Australian standards for automotive seat belts. However, it was concluded that adaptation was difficult and not particularly relevant to earthmoving equipment. Most roll-over accidents involving earthmoving equipment occur at low speeds and hence the webbing is not generally required to provide energy absorption. The more important aspects for belt webbing and hardware is the provision of restraint and durability as a lot of equipment is expected to perform under harsh conditions. It was noted that other countries have adopted the International standard ISO 6683 as the basis of their national standard.

Therefore this standard closely follows ISO 6683. However, some of the requirements have been modified to take account of local conditions and standards. Where this standard deviates technically from the ISO document by way of additional or different requirements, the deviation is indicated by a rule in the margin against the clause or part thereof, affected.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

EARTHMOVING MACHINERY — SEAT BELTS AND SEAT BELT ANCHORAGES

1 SCOPE. This standard specifies the performance requirements for seat belts and the fastening elements of seat belts necessary to restrain an operator or rider within a roll-over protective structure (ROPS) in the event of a machine roll-over as defined in AS 2294.

NOTE: Dynamic seat belt systems are under study. Suitable requirements will be added when available.

2 APPLICATION. This standard applies to earthmoving machinery fitted with ROPS as specified in AS 2294.

NOTE: Seat belt systems that comply with any of the nominated standards listed in Clause 10 are deemed to comply with this standard.

3 REFERENCED DOCUMENTS. The following documents are referred to in this standard:

AS 1753	Webbing for Restraining Devices for Occupants of Motor Vehicles
AS 2294	Protective Structures for Operators of Earthmoving Machines
ISO 3411	Earth-moving Machinery — Human Physical Dimensions of Operators and Minimum Operator Space Envelope
ISO 5353	Earth-moving Machinery — Seat Index Point
ISO 6683	Earth-moving Machinery — Seat Belts and Seat Belt Anchorages
BS 6218	Specification for Performance Requirements for Seat Belts and Seat Belt Anchorages for Earthmoving Machinery Fitted with Roll-over Protection Structures
SAE J383	Motor Vehicle Seat Belt Anchorages — Design Recommendations
SAE J386	APR 80 Seat Belts for Construction Machines

4 DEFINITIONS. For the purpose of this standard, the following definitions apply:

4.1 Seat belt assembly — belt including any buckle, length adjuster, and means for securing to an anchorage, that fastens across the pelvic area to provide pelvic restraint during operating and roll-over conditions. It may also include webbing to provide upper torso restraint.

NOTE: This definition does not include retractors.

4.2 Anchorage — provision to transfer forces applied to the seat belt assembly to the machine structure.

4.3 Seat belt system — seat belt assembly with anchorages, and other components used to transfer seat belt assembly loads to the machine.

4.4 Polyester fibre — fibres of any long-chain synthetic polymer composed of at least 85 percent by mass of an ester of a dihydric alcohol and terephthalic acid.

5 SEAT BELT SYSTEM.**5.1 Belt webbing.**

5.1.1 General. All webbing shall comply with AS 1753 and shall have resistance to abrasion, temperature, mild acids, alkalis, mildew, ageing, moisture, sunlight and petroleum products, equal to or better than that of untreated polyester fibre.

The belt length shall be adjustable for the arctic-clothed operator in the 5th percentile to the 95th percentile as specified in ISO 3411.

5.1.2 Webbing for pelvic restraint. Webbing for pelvic restraint shall have a minimum width of 75 mm and be Class D22 in accordance with AS 1753.

5.1.3 Webbing for upper torso restraint. Webbing for upper torso restraint shall have a minimum width of 46 mm and shall be Class D16 or Class D22 in accordance with AS 1753.

5.1.4 Webbing connections. The width of connections likely to touch the wearer in normal use, measured at right angles to the length of each attached webbing, shall not exceed 100 mm.

NOTE: This usually is applicable to connections to securing buckles and adjusters.

5.2 Belt buckle. It shall be possible to release the buckle with one mittened hand in a single motion. The buckle shall remain closed until it is intentionally opened. The actuation force to open the buckle shall be 75 ± 65 N with a force on the belt loop of 670 ± 45 N.

5.3 Anchor fittings. Anchor fittings shall comply with the following requirements:

- Each fitting for seat belt assemblies intended for installation by other than the machine manufacturer shall include a device for attachment to the machine and such parts as are required to reinforce the structure at that point.
- Threaded fasteners shall include provision for locking, to prevent loosening under vibration.
- Fittings shall be designed so as to minimize the possibility of causing injury.
- Fittings shall be designed so that webbing is loaded through its approximate centreline when the seat belt is being worn.
- Webbing shall be permanently attached to, but need not be fixed in position on, each fitting.
- Fittings shall be designed so that inadvertent detachment from the strap is not possible.

6 ANCHORAGES.

6.1 General. Anchorages shall permit the seat belt assembly to be readily installed or replaced and shall comply with the strength requirements of Clause 8.

6.2 Pelvic restraint. If the seat does not swivel nor have a suspension system, the seat belt assembly shall be