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Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests

*Engins de terrassement — Ceintures de sécurité et ancrages pour
ceintures de sécurité — Exigences de performance et essais*

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6683 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety requirements and human factors*.

This second edition cancels and replaces the first edition (ISO 6683:1981), which has been technically revised.

It also incorporates the Amendment ISO 6683:1981/Amd. 1:1990.

This corrected version of ISO 6683:2005 incorporates the following corrections.

- In Clause 4, reference to Clause 4 of SAE J386 has been deleted, such that the reference is made to the whole of SAE J386, and not only to that particular clause.

Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests

1 Scope

This International Standard establishes the minimum performance requirements and tests for restraint systems — seat belts and their fastening elements (anchorages) — on earth-moving machinery, necessary to restrain an operator or rider within a roll-over protective structure (ROPS) in the event of a machine roll-over (see ISO 3471), or within a tip-over protection structure (TOPS) in the event of a machine tip-over (see ISO 12117).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3411:1995, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope*

ISO 3471:1994, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements*

ISO 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 12117:1997, *Earth-moving machinery — Tip-over protection structure (TOPS) for compact excavators — Laboratory tests and performance requirements*

SAE J386:1997, *Operator Restraint System for Off-Road Work Machines*

UNECE R16:2000, *Uniform provisions concerning the approval of safety-belts and restraint systems for occupants of power-driven vehicles, vehicles equipped with safety-belts*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

seat belt assembly

belt, including any buckle, length adjuster, retractor and means for securing to an anchorage, that fastens across the pelvic area to provide pelvic restraint during operating and roll-over conditions

3.2

anchorage

provision to transfer forces applied to the seat belt assembly to the machine structure

3.3

restraint system

seat belt assembly with anchorages

3.4

polyester fibre

fibres of any long-chain synthetic polymer composed of at least 85 % by weight of an ester of a dihydric alcohol and terephthalic acid

4 Seat belt assembly

The seat belt assembly components shall be in accordance with either

- SAE J386, or
- UNECE R16:2000, Clause 6, but excluding 6.4.

5 Restraint system specifications

5.1 General

The restraint system may consist of an adjustable seat belt assembly or an adjustable seat belt assembly with retractor.

5.2 Belt webbing

The webbing shall have a minimum width of 46 mm. The belt length shall be adjustable for an arctic-clothed operator in the 5th to 95th percentile, in accordance with ISO 3411.

The webbing shall have resistance to abrasion, temperature, mild acids, alkalies, mildew, aging, moisture and sunlight equal to or better than that of untreated polyester fibre.

5.3 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. With a force on the belt loop of $670 \text{ N} \pm 45 \text{ N}$, the actuation force required to open the buckle shall be at least 10 N and shall not exceed 130 N.

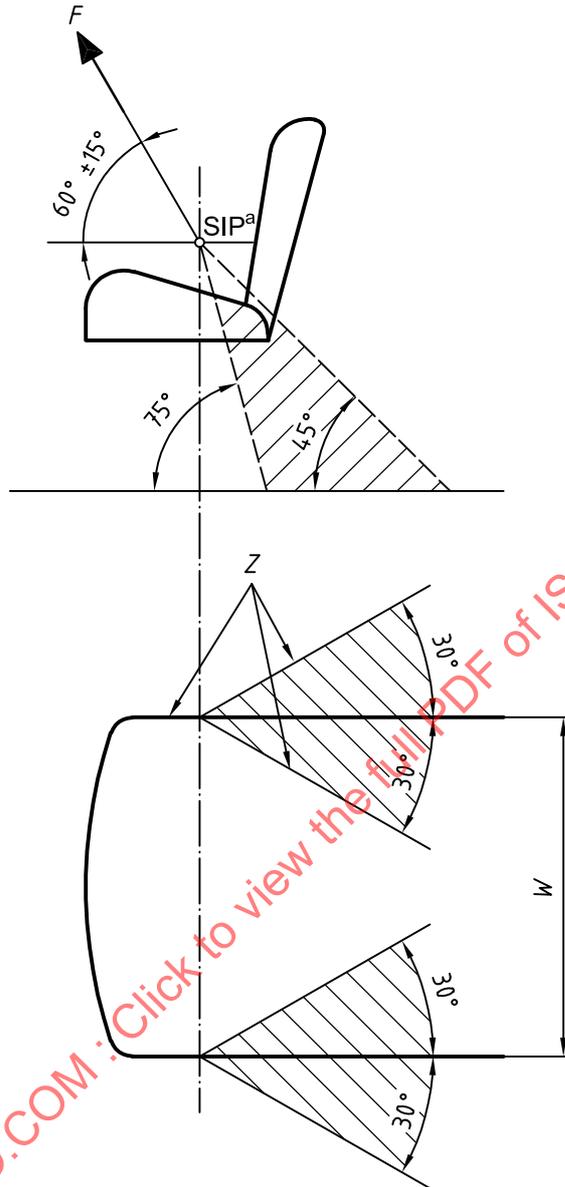
6 Performance requirements for anchorages

Anchorages shall permit the seat belt assembly to be readily installed or replaced and shall comply with the strength requirements of Clause 7.

If the seat does not swivel or have a suspension system, the seat belt assembly shall be anchored to the seat or to the machine at any point within the hatched zones shown in Figure 1.

If the seat does swivel or has a suspension system, the seat belt assembly shall be attached to anchorages on the seat near the rear corners of the seat cushion within the hatched zones shown in Figure 1, such that the seat belt assembly moves with the seat cushion at all times. Belts, cables or similar flexible devices may be used to transfer the seat belt assembly loads from the seat anchorages to the machine.

The seat index point (SIP) shall be determined in accordance with ISO 5353.



Key

F load force

W seat cushion width

Z belt zone

a Seat index point (see ISO 5353).

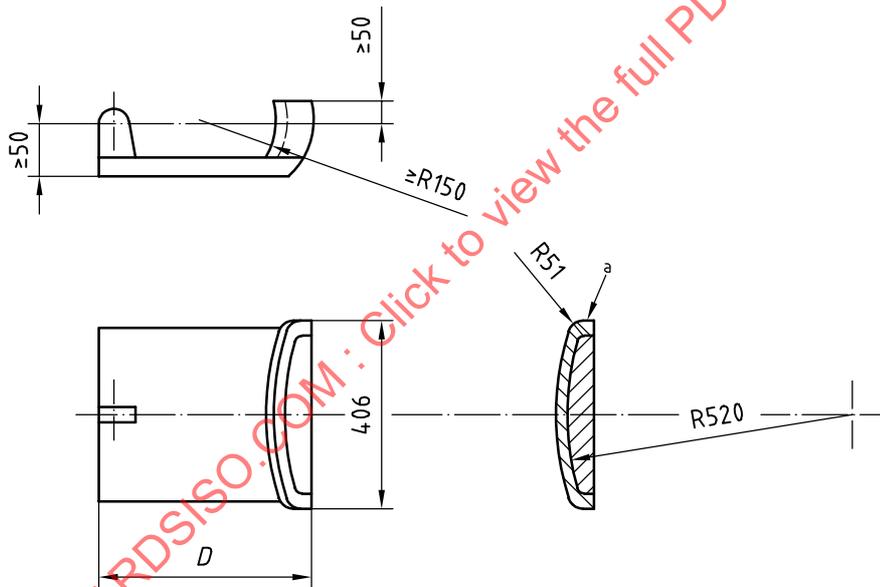
Figure 1 — Seat belt anchorage zones

7 Performance requirements and tests for restraint systems

The installed restraint system shall meet the following requirements when loaded in a forward and upward direction at an angle of $60^\circ \pm 15^\circ$ from the horizontal, with the line of force approximately passing through the SIP (see ISO 5353).

- a) The buckled restraint system shall withstand a gradually-increased force, F (see Figure 1), of a minimum of 15 000 N for at least 10 s. The force shall be attained within not more than 30 s. The body block shown in Figure 2 may be used for the application of F .
- b) The length of the seat belt assembly shall not increase by more than 20 % when subjected to F .
- c) Permanent deformation of any system component and anchorage area is acceptable under the action of F . However, there shall be no failure allowing release of the restraint system, seat assembly or seat adjustment locking mechanism.
- d) The belt buckle shall meet the opening force requirements of 5.2 after being subjected to F .

Dimensions in millimetres



Key

D optional

^a Foam rubber, medium density (canvas covered), 25 mm thick.

Figure 2 — Body block used for application of force F (see Figure 1)