

BS ISO 3776-2:2013



BSI Standards Publication

Tractors and machinery for agriculture — Seat belts

Part 2: Anchorage strength requirements

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National foreword

This British Standard is the UK implementation of ISO 3776-2:2013. It supersedes BS ISO 3776-2:2007 which is withdrawn.

The UK Committee encourages consideration of information included in OECD Standard Code for the official testing of protective structures on agricultural and forestry tractors (Static Test) Test Code 4, section 3.12.3, when acting on ISO clause 3.2.3 of ISO 3776-2. In summary, the UK committee recommends the user to consider the following:

- Differences between the information given regarding the seat slide adjustment prior to testing.
- The test procedures concerning the 'worst case' loading scenario for seat belt anchorage performance testing.

Additional related information that may assist the user:

- If the masses of alternative seats are comparable, those featuring seat belt anchorages, which transfer loading through the seat structure (e.g. via the suspension system and/or adjustment slides), will be required to withstand much higher test loading. They are therefore likely to represent the 'worst case'.
- If the applied loading will pass through the seat mountings to the vehicle chassis, the seat should be adjusted longitudinally to achieve the minimum amount of overlap of the mounting slides/rails. This will usually be when the seat is in the fully-rearward position but, if certain vehicle installations limit seat rearward travel, the fully-forward seat position may provide the worst case loading position. Observation of the amount of seat movement and mounting slide/rail overlap is pertinent.

The UK participation in its preparation was entrusted to Technical Committee AGE/6, Agricultural tractors and forestry machinery.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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**Tractors and machinery for
agriculture — Seat belts —**

**Part 2:
Anchorage strength requirements**

*Tracteurs et matériels agricoles — Ceintures de sécurité —
Partie 2: Exigences relatives à la résistance des ancrages*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

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The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 2, *Common tests*.

This second edition cancels and replaces the first edition (ISO 3776-2:2007), which has been technically revised for the technical harmonization with those sections of OECD Code 4: July 2012, OECD Code 6: July 2012, and OECD Code 7: July 2012 relating to seat belt anchorage strength testing.

ISO 3776 consists of the following parts, under the general title *Tractors and machinery for agriculture — Seat belts*:

- *Part 1: Anchorage location requirements*
- *Part 2: Anchorage strength requirements*
- *Part 3: Requirements for assemblies*

Introduction

Seat belts are used on agricultural machinery to restrain the operator in the seat during normal operation and use. When used on agricultural tractors, seat belts also serve to restrain the operator within the protective zone of the protective structure in the event of an upset. This part of ISO 3776 specifies the minimum seat belt anchorage strength requirements to meet these purposes.

This part of ISO 3776 specifies technical performance requirements, associated test procedures, and performance test report information. Technical harmonization with OECD is ensured by the Maintenance Agency operating as specified in [Annex B](#).

Tractors and machinery for agriculture — Seat belts —

Part 2: Anchorage strength requirements

1 Scope

This part of ISO 3776 specifies the strength requirements of the anchorages for pelvic restraint (seat) belts intended to be used by the operators of agricultural tractors and self-propelled machinery.

2 Terms and definitions

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

2.1

anchorage

provision to transfer forces applied to the seat belt assembly to the structure of the tractor or the machine

2.2

seat belt assembly

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

2.3

seat belt system

seat belt assembly with anchorages

2.4

seat mounting

all intermediary fittings (slides, etc.) used to secure the seat to the appropriate part of the tractor

2.5

applicable seat components

all components of the seat whose mass could contribute to loading of the seat mounting (to the vehicle structure) during a roll-over event

3 Anchorage testing

3.1 Test procedure type

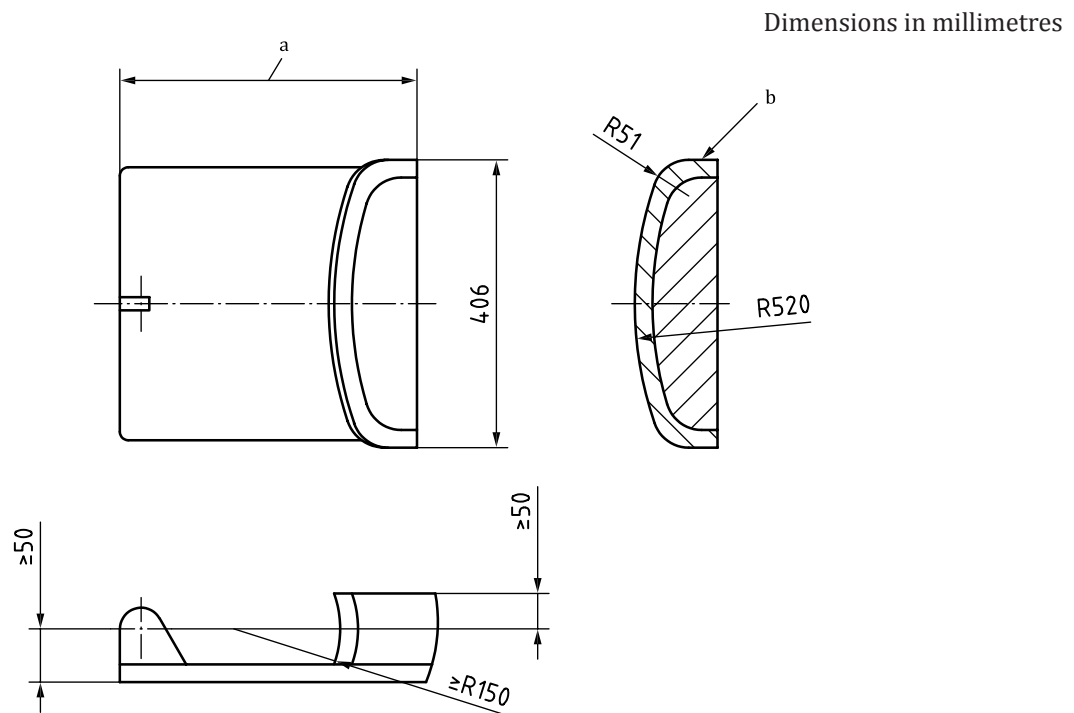
Only static tests for the anchorages are given in this procedure.

3.2 General

3.2.1 If, for a given protective structure, a manufacturer provides more than one seat with identical components which transfer the load from the seat belt anchorage to the seat mounting on the ROPS floor or tractor chassis, the testing station is authorised to test only one configuration, corresponding to the heaviest seat.

3.2.2 The seat shall be in position during the tests, fixed to the mounting points on the tractor using all intermediary fittings (such as suspension, slides, etc.) specified for the complete tractor. No additional non-standard fittings contributing to the strength of construction shall be used.

3.2.3 The anchorages shall be capable of withstanding the loads applied to the seat belt system using a device as shown in [Figure 1](#). The seat belt anchorages shall be capable of these test loads applied with the seat adjusted in the worst position of longitudinal adjustment to ensure that the test condition is met. If a worst position among the possible seat adjustments is not recognised by the testing station, the test loads shall be applied with the seat in the mid-position of longitudinal adjustment. For a suspended seat, the seat shall be set to the midpoint of the suspension travel, unless this is contradictory to a clearly stated instruction by the seat manufacturer. Where special instructions exist for the seat setting, these shall be observed and specified in the report.



Key

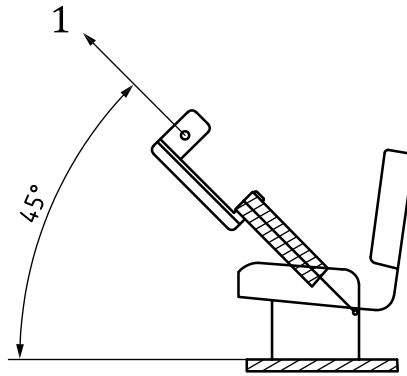
- a This dimension is optional.
- b Medium density foam rubber, 25 mm thick (canvas covered).

Figure 1 — Traction device

3.2.4 After the load is applied to the seat system, the load application device shall not be repositioned to compensate for any changes that could occur to the load application angle. The horizontal distance between the point at which the load generation apparatus is attached to the test rig and the nearest seat belt anchorage shall not be less than 1 000 mm.

3.3 Forward loading

A tensile force shall be applied in a forward and upward direction at an angle of $45^\circ \pm 2^\circ$ to the horizontal, as shown in [Figure 2](#). The seat belt anchorages shall be capable of withstanding a force of 4 450 N. In the event that the force applied to the seat belt assembly is transferred to the vehicle chassis by means of the seat, the seat mounting shall be capable of withstanding this force plus an additional force equal to four times the weight of all applicable seat components applied $45^\circ \pm 2^\circ$ to the horizontal in a forward and upward direction, as shown in [Figure 2](#).



Key

1 test load

Figure 2 — Load application in the upward and forward direction

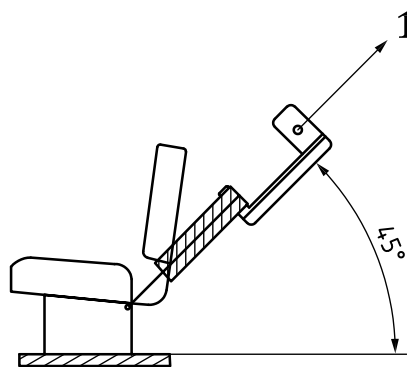
3.4 Rearward loading

A tensile force shall be applied in a rearward and upward direction at an angle of $45^\circ \pm 2^\circ$ to the horizontal, as shown in [Figure 3](#). The seat belt anchorages shall be capable of withstanding a force of 2 225 N. In the event that the force applied to the seat belt assembly is transferred to the vehicle chassis by means of the seat, the seat mounting shall be capable of withstanding this force plus an additional force equal to two times the weight of all applicable seat components applied $45^\circ \pm 2^\circ$ to the horizontal in a rearward and upward direction, as shown in [Figure 3](#).

Both tensile forces shall be equally divided between the anchorages.

3.5 Seat belt buckle release force

At the request of the manufacturer, measure the force required to open the seat belt buckle. The seat belt buckle shall open with a maximum force of 140 N following the load applications. This requirement is fulfilled for seat belt assemblies that satisfy the requirements of ECE-R16[1] or 77/541/EEC[2] as last amended.



Key

1 test load

Figure 3 — Load application in the upward and rearward direction

4 Acceptance conditions

Permanent deformation of any system component and anchorage area is acceptable under the action of the forces specified in [3.3](#) and [3.4](#). However, there shall be no failure allowing release of the seat belt system, seat belt assembly, or the seat adjustment locking mechanism.

NOTE The seat adjuster or locking device need not be operable after application of the test load.

5 Test report

5.1 A test report shall be prepared. [Annex A](#) provides an acceptable test report format. Should a different test report format be used, it shall, at a minimum, contain the information required in [Annex A](#).

5.2 The results of a test performed on an identical “operator restraint system” may be included in more than one test report provided that this system is fitted exactly in the same conditions.

Annex A (informative)

Test report for seat-belt anchorage strength

A.1 Anchorage performance

A.1.1 Loading in the forward and upward direction

Driver seat>	Make/Model/Type	
Gravity force $(F_g = \text{seat mass} \times 9.81)$ N	Required force $(4\,450 + 4 F_g)$ N	Applied force N

A.1.2 Loading in the rearward and upward direction

Driver seat	Make/Model/Type	
Gravity force $(F_g = \text{seat mass} \times 9.81)$ N	Required force $(2\,225 + 2 F_g)$ N	Applied force N

A.1.3 Curves, drawings, and photos

A copy of the force/deflection curves derived during the tests shall be included.

Drawings and/or photos of the seat mounting and anchorages have to be added.

A.1.4 Statement (if necessary)

The testing station certifies that the tested seat is the worst variant among the seats listed below that are identical regarding the make, range, and fixing on the protective structure.

Statement:

During the test, no structural failure or release of seat, seat adjuster mechanism, or other locking service occurred. The seat and safety belt anchorage tested fulfill the requirement of ISO 3776-2:2013.

Annex B **(informative)**

Designation of Maintenance Agency

A Maintenance Agency has been established by the ISO Technical Management Board (TMB) to ensure that technical harmonization can be maintained between ISO/TC 23/SC 2 Standards and OECD Tractor Test Codes. It operates through guidelines approved by the TMB, accessible at <http://standards.iso.org/iso/3776/-2/>, that entrust it to the following functions:

- a) to receive the requests for changes from recognized ISO/TC23/SC 2 P-members;
- b) to evaluate and resolve the requests for changes;
- c) to publish the approved changes.

Changes to this International Standard will be announced by the MA Secretariat to ISO/TC 23/SC 2 and will be made publicly available at <http://standards.iso.org/iso/3776/-2/>. They constitute authoritative amendments to [Clauses 1](#) to [5](#) and to the annexes of this part of ISO 3776.

Bibliography

- [1] ECE Regulation No. 16, *Uniform provisions concerning the approval of: I. Safety-belts, restraint systems, child restraint system and ISOFIX child restraint system for occupants of power driven vehicles II. Vehicles equipped with safety-belts, safety-belt reminder, restraint systems. Child restraint systems and ISOFIX child restraint systems*
- [2] 77/541/EEC, *Council Directive 77/541/EEC of 28 June 1977 on the approximation of the laws of the Member States relating to safety belts and restraint systems of motor vehicles*
- [3] OECD Code 4:July 2012, *OECD Standard Code for the official testing of protective structures on agricultural and forestry tractors (static test)*
- [4] OECD Code 6:July 2012, *OECD Standard Code for the official testing of front mounted roll-over protective structures on narrow-tracked wheeled agricultural and forestry tractors*
- [5] OECD Code 7:July 2012, *OECD Standard Code for the official testing of rear mounted roll-over protective structures on narrow-tracked wheeled agricultural and forestry tractors*

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