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**Road vehicles — Anchorages in vehicles
and attachments to anchorages for child
restraint systems —**

**Part 2:
Top tether anchorages and attachments**

*Véhicules routiers — Ancrages dans les véhicules et attaches aux
ancrages pour systèmes de retenue pour enfants —
Partie 2: Ancrages pour fixation supérieure et attaches*

ISO 13216-2:2004

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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.

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 13216-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 12, *Passive safety crash protection systems*.

ISO 13216 consists of the following parts, under the general title *Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems*:

— *Part 1: Seat bight anchorages and attachments*

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— *Part 2: Top tether anchorages and attachments*

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Part 3, *Classification of child restraint dimensions and vehicle space*, is under preparation.

This corrected and reprinted version of ISO 13216-2:2004 incorporates the following correction:

— The descriptive text for Figure 9 on page 14 has been replaced.

Introduction

This part of ISO 13216 specifies top tether anchorages and attachments: a means of limiting the pitch rotation of child restraint systems (CRS) when used in conjunction with the specifications of ISO 13216-1 and which can also be used in conjunction with seat belt systems for CRS installation.

The main body of this document presents a wide installation zone for top tether anchorages intended for CRS with *rigid* ISOFIX seat bight attachments — the “ISOFIX zone” — developed and evaluated in dynamic tests with CRS in combination with rigid ISOFIX seat bight attachments¹⁾.

Annex A specifies top tether anchorage installation zones, referred to as “conventional zones”, which are compatible with current US and Canadian regulations (those required under current Australian regulations are narrower). These conventional zones are applicable to all child restraint systems intended for use with top tether attachments and can be combined with any type of lower attachments: ISOFIX, LATCH or conventional seat belt attachments.

The ISOFIX zones were developed in order to allow more design possibilities for locating the top tether anchorage within the vehicle structure. They are based on the conventional zones, but test results have shown that CRS with rigid ISOFIX attachments can accept wider top tether angles than those in the conventional zones, in both the vertical and horizontal planes, without a reduction in performance.

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1) The application of ISOFIX zones to child restraint systems in combination with other types of attachments (LATCH or conventional seat belt attachments) had not been evaluated at time of publication.

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Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems —

Part 2: Top tether anchorages and attachments

IMPORTANT — Measures should be taken to assure that top tether anchorages positioned in the extended part of the ISOFIX zones (i.e. the portions outside the conventional zones) are used only in combination with ISOFIX child restraint systems having *rigid* seat bight attachments. Use of ISOFIX zones for positioning top tether anchorages could result in a positioning that is incompatible with regulations in some countries.

1 Scope

This part of ISO 13216 establishes the positioning zones, dimensions and general and static-strength requirements for top tether anchorages used together with seat bight anchorages according to ISO 13216-1 or with other systems for anchoring child restraint systems (CRS) in road vehicles. It is applicable to child restraint systems intended for children with a mass of up to 22 kg.

NOTE Further specifications for top tether anchorages, straps and connectors could exist in other standards and regulations.

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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 6549, *Road Vehicles — Procedure for H- and R-point determination*

ISO 13216-1, *Road vehicles — Anchorages in vehicles and attachments to anchorages for child restraint systems — Part 1: Seat bight anchorages and attachments*

SAE J1100:1993, *Motor vehicle dimensions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13216-1 and the following apply.

3.1

top tether anchorage

feature located on the vehicle in a defined zone, designed to accept a CRS tether strap connector and transfer its restraint forces to the vehicle structure

EXAMPLE Bar, bracket, ring, webbing loop (recessed or unrecessed).

3.2

top tether connector

device used to attach a top tether strap to a top tether anchorage

EXAMPLE Top tether hook (see Figure 8).

3.3

top tether strap

webbing strap which extends from the top of a CRS to the top tether anchorage and which is equipped with an adjustment device, a tension-relieving device and a top tether connector

4 Dimensions and installation requirements

4.1 Top tether anchorage dimensions

The top tether anchorage shall have dimensions permitting the attachment of a top tether connector (hook type).

Sufficient clearance shall be provided around each top tether anchorage to allow latching and unlatching to it (see Figure 9).

4.2 Positioning of top tether anchorage in ISOFIX zones

4.2.1 Anchorage zone determination — CRF

The top tether anchorage shall be located within the zone shown as shaded in Figure 1, using a child restraint fixture (CRF) in a seating position equipped with ISOFIX bars (for CRF dimensions, see ISO 13216-1).

The top tether anchorage shall be located more than 200 mm, but not more than 2 000 mm, from the origin of the top tether strap on the rear face of the CRF, measured along the strap when it is drawn over the seat back to the anchorage.

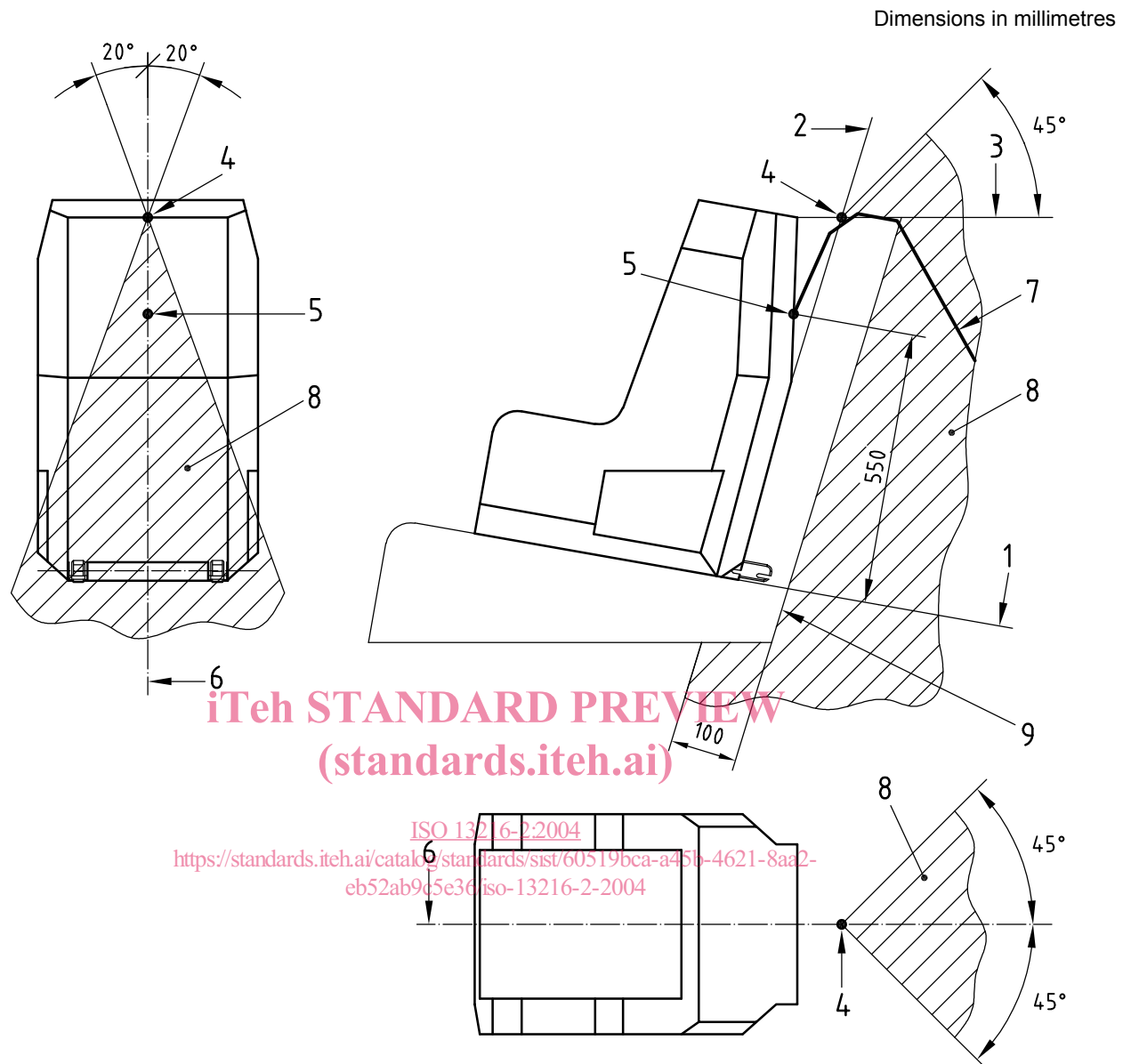
A top tether anchorage may be recessed in the seat back, provided that it is not in the strap wraparound area at the top of the seat back.

The seating position shall be the seat's rearmost, downmost position with the seat back in its nominal position, or else shall be the seating position recommended by the vehicle manufacturer.

4.2.2 Anchorage zone determination — Seating position

4.2.2.1 Subject to 4.2.2.2, that portion of the top tether anchorage designed to bind with a top tether connector shall be located within the zone shown as shaded in Figures 2 to 6 of the designated seating position for which it is installed, with reference to the H-point of a template according to ISO 6549, and such that

- a) the H-point of the template is located at the unique design H-point of the designated seating position, as defined in SAE J1100:1993, 2.2.11.1, at the full downward and rearward position of the seat, except that the template is located laterally midway between the two lower restraint system anchorages,
- b) the torso line of the template is at the same angle to the vertical plane as the vehicle seat in its most upright position, and
- c) the template is positioned in the vertical longitudinal plane that contains the H-point of the template.

**Key**

- 1 CRF horizontal face
- 2 CRF rear face
- 3 horizontal line tangent to top of seat back (last rigid point)
- 4 intersection between 2 and 3
- 5 tether reference point
- 6 CRF centreline
- 7 top tether strap
- 8 limits of anchorage zone ^a
- 9 backrest near face

The CRF rests on the seat cushion and the CRF rear face (2) is in contact with the seatback. In the side view, the top tether anchorage lies behind the CRF rear face. The intersection between the CRF rear face and the horizontal (3) line containing the top of the seat back (last rigid point) defines the reference point (4) on the centreline of the CRF. At point 4, a maximum angle of 45° above the horizontal line defines the upper limit of the top tether anchorage zone. In the top view, at point 4, a maximum angle of 90° defines the limits of the anchorage zone. In the rear view, at point 4, a maximum angle of 40° defines the limits of the anchorage zone. The origin of the top tether strap (5) is located 550 mm above the CRF horizontal face (1) on the CRF centreline (6).

^a The anchorage zone shall not extend by more than 100 mm under the seat, in order to allow the anchorage to be reached.

Figure 1 — Top tether anchorage location using CRF — ISOFIX zone

4.2.2.2 If location within the zone specified in 4.2.2.1 is not appropriate, that portion of the top tether anchorage designed to bind with the top tether connector may be located outside the zone, provided the vehicle is equipped with a routing device which

- a) ensures that the top tether strap functions as if the portion of the anchorage designed to bind with the top tether anchorage were located within the zone,
- b) is at least 65 mm behind the torso line in the case of a non-rigid webbing-type routing device or deployable routing device, and at least 100 mm behind the torso line in the case of a fixed rigid routing device, and
- c) is of sufficient strength, when tested after being installed as intended to be used, to withstand, together with the top tether anchorage, the load specified in 4.3

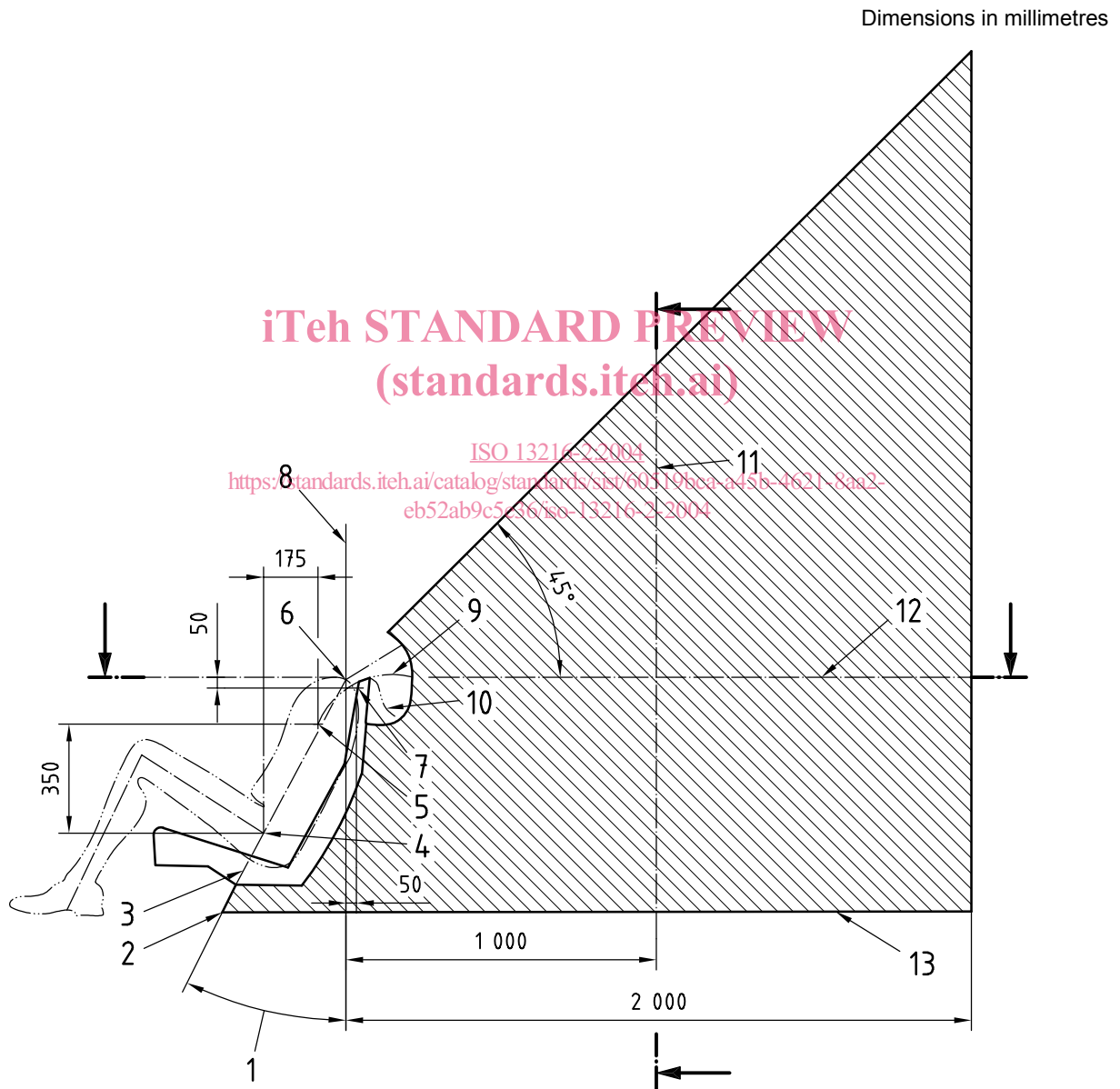


Figure 2 — Top tether anchorage location — ISOFIX zone — Side view

Key

- 1 back angle
- 2 intersection of torso line reference plane and floor pan
- 3 torso line reference plane
- 4 H-point
- 5 V-point ^a
- 6 R-point ^b
- 7 W-point ^c
- 8 vertical longitudinal plane
- 9 strap wraparound length from V-point: 250 mm
- 10 strap wraparound length from W-point: 200 mm
- 11 M-plane cross-section ^d
- 12 R-plane cross-section
- 13 line represents the vehicle specific floor pan surface within the prescribed zone

The portion of the top tether anchorage designed to bind with the top tether hook shall be located within the shaded zone.

NOTE The forwardmost surfaces of the zone are generated by sweeping the two wraparound lines throughout their extended range in the front part of the zone. The wraparound lines represent the minimum adjusted length of typical top tether straps extending from either the top of the CRS (W-point), or lower on the back of the CRS (V-point).

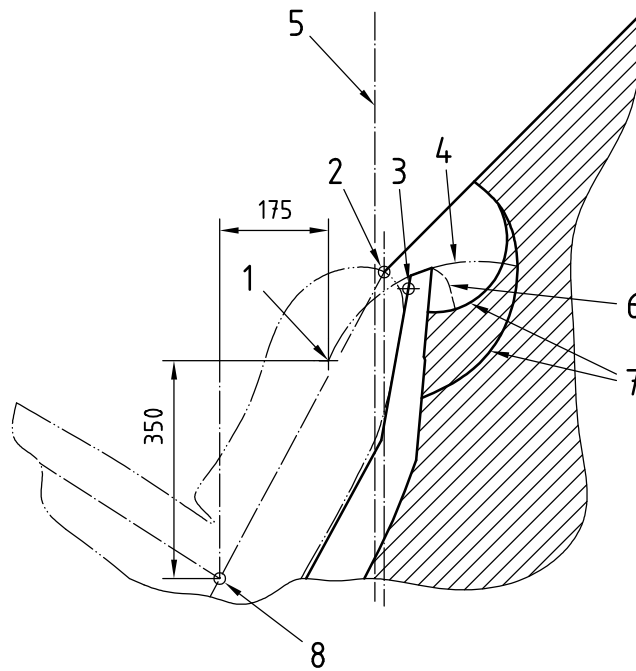
- a V-reference point: 350 mm vertically above and 175 mm horizontally back from the H-point.
- b Shoulder reference point.
- c W-reference point: 50 mm vertically below and 50 mm horizontally back from the R-point.
- d M-reference plane: 1 000 mm horizontally back from the R-point.

Figure 2 — Top tether anchorage location — ISOFIX zone — Side view (continued)

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Dimensions in millimetres



Key

- 1 V-point ^a
- 2 R-point ^b
- 3 W-point ^c
- 4 strap wraparound length from V-point: 250 mm
- 5 vertical longitudinal plane
- 6 strap wraparound length from W-point: 200 mm
- 7 arcs created by wraparound lengths
- 8 H-point

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- ^a V-reference point: 350 mm vertically above and 175 mm horizontally back from the H-point.
- ^b Shoulder reference point.
- ^c W-reference point: 50 mm vertically below and 50 mm horizontally back from the R-point.

Figure 3 — Top tether anchorage location — ISOFIX zone — Enlarged side view of wraparound area