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Wheelchair ~~Seating~~ — seating —

Part 15:

Selection, placement, and fixation of flexible postural support devices in seating

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Foreword

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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 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 173, ~~Assistive Technology products~~ **Assistive Technology products**, Subcommittee SC-01-1, ~~Wheelchairs, Working Group WG11 Wheelchair Seating~~ **Wheelchairs, Working Group WG11 Wheelchair Seating**.

A list of all parts in the ISO 16840 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Postural support devices, such as positioning supports, are typically used to provide increased postural stability, and/or to maintain or correct the occupant's posture, in order to help maintain and increase day-to-day functionality for the individual. ~~These may~~ Postural support devices can also help to reduce the development of skeletal deformities, or to correct them. These devices, ~~with these~~ having postural support purposes, are not to be confused with belts and similar devices designed to act as vehicular occupant restraints. ~~They~~ Postural support devices may improve the occupant's safety in other ways, especially when used to prevent falls in or out of the seating system.

In the US, Axelson reported ~~[1]~~ that deaths from strangulation had occurred due to wheelchair occupants slipping down in their chairs as a result of inappropriate placement of pelvic positioning belts ~~[1]~~. In the UK, the records of the MHRA (Medicines and Healthcare Products Regulatory Agency) show that, over a 15-year period, there had been four reported deaths and 17 serious injuries ~~in the UK~~ involving, or attributed to, pelvic postural support devices or anterior trunk postural support devices. These deaths are thought to have occurred as a result of inappropriate placement, ~~or~~ adjustment, ~~or failure~~ of the supports, ~~or their failure~~.

There appears to be confusion as to best practice ~~in the selection and fixation of flexible postural support devices~~ (e.g. the updated MHRA recommendations in the UK ~~[2]~~ ~~[1]~~), and the reasons why postural supports need to be placed and adjusted according to the occupant's needs. ~~For this reason, this~~ This document has been produced to specify ~~the selection and placement of these criteria to be applied to~~ positioning supports when used in seating systems and chairs, including wheelchairs and bathroom equipment (such as shower chairs), and, where applicable, hoists. This ~~standard~~ document has been created ~~for use by~~ to support clinicians, engineers, carers, manufacturers, retailers, and repairers.

NOTE 1 —In this document, nomenclature has been based on ISO 7176-26 and ISO 16840-1. Thus, a support described as a positioning support ~~might~~ can have the name adapted to include a description of its function based on the part of the body to which it is applied: e.g. a pelvic positioning support helps to position the pelvis, but might not be applied directly to the pelvis (e.g. the thighs) to achieve this. On the other hand, an anterior pelvic support would be applied anterior to the pelvis.

NOTE 2 —Positioning support placement can differ based on clinical and risk assessment.

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Wheelchair ~~Seating~~ seating

Part 15: Selection, placement, and fixation of flexible postural support devices in seating

1 Scope

This document specifies requirements for the selection, placement, and fixation of flexible postural support devices within seating devices and systems; and to chairs, including wheelchairs and bathroom equipment. Seating devices can be involved in one or more situations, including hoists, static seating, wheelchair seating, shower chairs, etc. The devices enable the seated person (the occupant) to be positioned to maximize their functional activities, ~~and~~ in a safe environment. These requirements ~~have~~ are formulated to achieve a balance of posture maintenance ~~of posture~~ and ~~of~~ safety.

This document covers flexible positioning supports (padded or otherwise) used for postural positioning and/or safety. It does not cover belts and harnesses used in transportation for restraint, ~~nor~~ postural support devices made from rigid materials such as metal, wood, or hard plastics, ~~nor~~ postural support devices designed solely for use in sports-related seating.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 7000:2019, *Graphical symbols for use on equipment — Registered symbols*

ISO 7176-26:2007, *Wheelchairs* — ~~Part 26: Vocabulary~~

ISO 15223-1:2021, *Medical devices — Symbols to be used with information to be supplied by the manufacturer — Part 1: General requirements*

ISO 16840-1, *Wheelchair seating* — ~~Part 1: Vocabulary, reference axis convention and measures for body segments, posture and postural support surfaces~~

ISO 16840-3, *Wheelchair seating* — ~~Part 3: Determination of static, impact, and repetitive load strengths for postural support devices~~

ISO 16840-10, *Wheelchair seating* — ~~Part 10: Resistance to ignition of postural support devices — Requirements and test method~~

3 Terms, definitions, and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7176-26:2007, ISO 16840-1, and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

3.1.1

support

-

3.1.1.1

anterior support

postural support device (3.1.5.2) intended to contact the anterior surface of a body segment

[SOURCE: ISO 7176-26:2007, 4.7.23]

~~Note 1 to entry:—The anterior surface is based on the anterior surface when the person is seated in a typical upright sitting position~~

~~Note 2 to entry:—Examples of anterior support are anterior~~**EXAMPLE** ~~Anterior~~ head support, anterior lower leg support, anterior pelvic support, anterior shoulder support, anterior trunk support, and anterior upper arm support.

~~Note 3 to entry:—Note 1 to entry: The anterior surface is based on the anterior surface when the person is seated in a typical upright sitting position.~~

~~Note 2 to entry: The term can include the part of the anatomy receiving the support.~~

~~Note 3 to entry: The following are deprecated terms: anterior head strap, forehead strap, forehead support, headband, knee block, knee strap, lap belt, pelvic stabilizer, pelvic strap, safety belt, seat belt, sub-ASIS bar, backpack strap, shoulder bar, shoulder hook, shoulder retractor, shoulder strap, anterior thoracic support, butterfly strap, butterfly harness, chest harness, chest strap, H-strap, harness, spiderman strap, Y-strap, humeral strap.~~

[SOURCE: ISO 7176-26:2007, 4.7.23, modified — Examples and Notes to entry have been updated.]

3.1.1.2

circumferential support

postural support device (3.1.5.2) which supports a body segment on at least three sides from at least three directions

[SOURCE: ISO 7176-26:2007, 4.7.29]

~~Note 1 to entry:—Examples of circumferential support are circumferential~~**EXAMPLE**~~Circumferential~~ ankle support, circumferential chest support, circumferential neck support, and circumferential wrist support.

~~Note 2_1 to entry:—: The term can include the part of the anatomy receiving the support.~~

~~Note 2 to entry: The following are deprecated terms: ankle strap, cervical collar, circumferential cervical support, collar, Houdini strap.~~

3.1.3

flexible postural support device

flexible PSD

postural support device that is capable of conforming to the shape of the anatomy when applied to the occupant

~~Note 1 to entry:—This includes any component of a flexible postural support device which can in itself be non-flexible, such as a frame mount or adjustment buckle.~~

3.1.4

[SOURCE: ISO 7176-26:2007, 4.7.29, modified — Examples and Notes to entry have been updated.]

3.1.1.3

inferior support

postural support device (3.1.5.2) intended to contact the inferior surface of a body segment

[SOURCE: ISO 7176-26:2007, 4.7.28]

EXAMPLE — Inferior lower leg support, inferior pelvic support, and inferior thigh support.

Note 1 to entry:—: The inferior surface is based on the inferior surface when the person is seated in a typical upright sitting position

Note 2 to entry:—: The term can include the part of the anatomy receiving the support.

Note 3 to entry: The following are deprecated terms: stump support, obliquity pad, thigh wedge.

Note 4 to entry: An inferior support usually applies to the buttocks and thighs, and is used with, or as part of, a seat cushion.

Note 3 to entry:— The term has added to it the part of the anatomy which is receiving the support.

EXAMPLES — Inferior lower leg support, inferior pelvic support, and inferior thigh support.

Note 4 to entry:— The following are deprecated terms: stump support, obliquity pad, thigh wedge.

[SOURCE: ISO 7176-26:2007, 4.7.28, modified — Examples and Notes to entry have been updated.]

3.1.5.1.4

lateral support

postural support device (3.1.5.2) intended to contact the lateral surface of a body segment

[SOURCE: ISO 7176-26:2007, 4.7.26]

Note 1 to entry:— The term has added to it the part of the anatomy which is receiving the support.

EXAMPLES — lateral **EXAMPLE Lateral** head support, lateral knee support, lateral lower leg support, lateral pelvic support, lateral trunk support, lateral upper arm support, and lateral thigh support.

Note 2 to entry:—: The term can include the part of the anatomy receiving the support.

Note 2 to entry: The following are deprecated terms: head side support, lateral headrest, adductor pad, adductor strap, calf strap, calf support, leg block, leg guide, leg pad, leg strap, leg rest pad, hip block, hip guide, hip pad, lateral hip support, body side support, lateral, lateral support on its own, lateral pad, lateral thoracic pad, lateral thoracic support, scoliosis pad, side cushion, trunk pad, humeral block, protractor, adductor pad, adductor wedge, leg block, leg pad, leg strap, thigh block, thigh strap.

[SOURCE: ISO 7176-26:2007, 4.7.26, modified — Examples and Notes to entry have been updated.]

3.1.1.5

medial support

postural support device (3.1.5.2) intended to contact the medial surface of a body segment

EXAMPLE — Medial knee support, medial lower leg support, and medial thigh support.

Note 1 to entry: The term can include the part of the anatomy receiving the support.

Note 2 to entry: The following are deprecated terms: pommel, adduction strap, adductor pad, adductor wedge, leg adductor support, leg dividing support, wedge, wedge pad.

[SOURCE: ISO 7176-26:2007, 4.7.25, modified — Examples and Notes to entry have been updated.]

3.1.1.6

posterior support

postural support device (3.1.5.2) intended to contact the posterior surface of a body segment

EXAMPLE — Posterior foot support, posterior head support, posterior lower leg support, posterior lumbar support, posterior sacral support, and posterior upper arm support.

Note 1 to entry: The posterior surface is based on the posterior surface when the person is seated in a typical upright sitting position.

Note 2 to entry: The term can include the part of the anatomy receiving the support.

Note 3 to entry: The following are deprecated terms: heel cup, heel loop, heel strap, calf pad, calf panel, calf strap, calf support, leg strap, leg support, leg rest pad, lower leg support, posterior leg support, lower leg support, lumbar pad, lumbar roll, posterior pelvic support, elbow block, humeral block, protractor.

[SOURCE: ISO 7176-26:2007, 4.7.24, modified — Examples and Notes to entry have been updated.]

3.1.1.7

superior support

postural support device (3.1.5.2) intended to contact the superior surface of a body segment

EXAMPLE — Superior foot support, superior forearm support, and superior thigh support.

Note 1 to entry: The superior surface is based on the superior surface when the person is seated in a typical upright sitting position.

Note 2 to entry: The term can include the part of the anatomy receiving the support.

Note 3 to entry: The following are deprecated terms: toe cup, toe loop, forearm hook, forearm strap, leg strap, thigh strap.

[SOURCE: ISO 7176-26:2007, 4.7.27, modified — Examples and Notes to entry have been updated.]

3.1.2

linear support surface measures

Note 1 to entry: — Where the support's local axis is referred to, the axis system is that used in *A clinical application guide to standardized wheelchair seating measures of the body and seating support surfaces* [3].

Note 2 to entry: When describing the *width* (3.1.2.4) and *depth* (3.1.2.1) of an item used in the horizontal plane, the width dimension is expressed before the depth dimension.