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Wheelchair seating —

Part 3:
Postural support devices — Measurement of static, impact and repetitive load strengths

Sièges de fauteuils roulants —

Partie 3: Dispositifs de maintien de la posture — Mesure des tenues de route statiques, avec impact et répétitives

ICS 11.180.10

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Foreword

The ISO (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 3.

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 part of ISO 16840 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 16840-3 was prepared by Technical Committee ISO/TC 173, Technical system and aids for disabled or handicapped persons, Subcommittee SC 1, Wheelchairs.

Introduction

Postural Support Devices (PSD), constructed as additional components to wheelchair seating or as wheelchair seating in its own right, are widely available and used extensively for people with disabilities. The selection or prescription of the most appropriate PSD is partially dependent on knowledge of their ability to withstand static, impact and repeated loads. This standard is intended to specify test methods to provide this information.

The tests involve mounting the PSD on rigid test fixtures to simulate mounting on a wheelchair. Forces are then applied to simulate static, impact and repeated loads encountered during normal use. The rigid test fixture is utilized to provide a worst-case situation, which is repeatable and avoids destroying multiple wheelchairs during testing. There are no minimum performance requirements currently specified in this part of ISO 16840. Unless otherwise stated tests are performed at increasing loads until one of more failures occur. This standard does not test the strength of postural support devices to withstand crash conditions in a vehicle. Test methods for this purpose can be found in ISO 10542-1 and ISO16840-4.

Wheelchair seating —

Part 3:
Postural support devices — Measurement of static, impact and repetitive load strengths

1 Scope

This part of ISO 16840 specifies test methods and disclosure requirements for the static, impact, and repetitive load strength of postural support devices (PSD) with associated attachment hardware. Postural Support Devices include Seating Systems as defined in ISO 7176-26: Wheelchairs Part 26 - Nomenclature, Terms and Definitions.

It applies to postural support devices with associated attachment hardware intended for use with wheelchairs.

NOTE This standard does not test the strength of postural support devices to withstand crash conditions in a vehicle.

2 Normative references

The following standards, through reference in this text, constitute provisions of this part of ISO 16840. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements, based on this part of ISO 16840, are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

— ISO 7176-7: 1997, *Wheelchairs — Part 7: Method of measurement of seating and wheel dimensions.*

— ISO 7176-8:1997, *Wheelchairs — Part 8: Requirements and test methods for static, impact and fatigue strengths.*

— ISO 7176-15: *Wheelchairs — Part 15: Requirements for information disclosure, documentation and labeling.*

— ISO DIS 7176-26 : *Wheelchairs Part 26 - Nomenclature, Terms and Definitions*

— ISO 898-7:1992, *Mechanical proportions of fasteners – Part 7: Torsion test with minimum torques for bolts and screws with nominal diameters 1mm to 10mm.*

— ISO 10542-1:*Technical systems and aids for disabled or handicapped persons — Wheelchair tiedown and occupant-restraint systems — Part 1: Requirements and test methods for all systems.*

— ISO Guide 2, *Guide to Expression of Uncertainty in Measurement. ISBN 92-67-10188-9*

— ISO 554-1976(E), *Standard atmospheres for conditioning and / or testing - Specifications*

3 Terms and definitions

For the purposes of this part of ISO 16840 the definitions given in ISO DIS 7176-26, ISO 7176-7:1997 and the following definitions apply:

3.1
elastic attachment hardware
hardware that allows a PSD to move under force and return to its original position when the force is removed

EXAMPLE A PSD designed with a spring that allows movement.

3.2
deformable support surface
support surface which actively conforms to the shape of the body part being supported

NOTE The surface may or may not return to its original shape but remains conforming over time.

EXAMPLE Foam and fluid cushions are examples of deformable support surfaces.

3.3
passive movement support surface
support surface which moves with minimal resistance to follow the body part being supported

NOTE Passive support surfaces do not necessarily move back to a specific position.

EXAMPLE A mobile arm support is a passive movement support surface that allows movement with minimal resistance.

3.4
active movement support surface
support that is powered to change its configuration and its subsequent support forces

EXAMPLE An alternating pressure cushion or an electronically operated back support surface that reclines.

3.5
continuous lateral support

a support surface which has a depth that extends at least 75 mm forward/upward of its uncompressed adjacent support surface and has an angle between the adjacent support surface and the lateral support which is less than or equal to 120° as shown in Figure 1.

NOTE 1 Figure 2 shows a backrest with a contoured surface which is not considered to be a lateral support.

NOTE 2 If there are difficulties in establishing the location of the adjacent support surface, use the backrest, seat or legrest reference planes as defined in ISO 7176-7.

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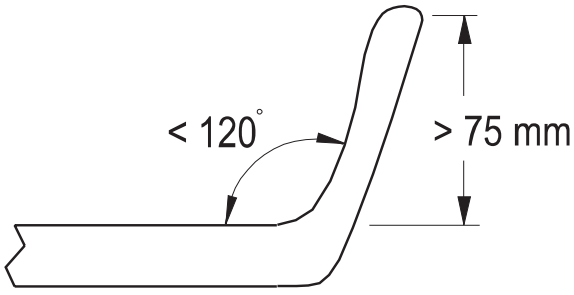


Figure 1 — Top view cross section of a back support with lateral supports

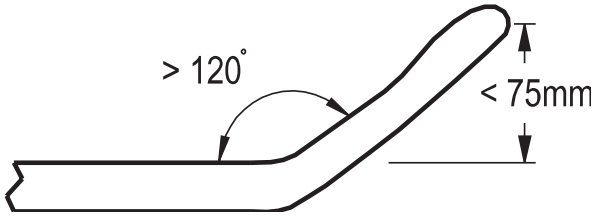


Figure 2 — Top view cross section of a back support with a contour not considered a lateral support

3.6
discontinuous lateral support
a support surface which is separate from the adjacent support surface. An example is shown in Figure 3.

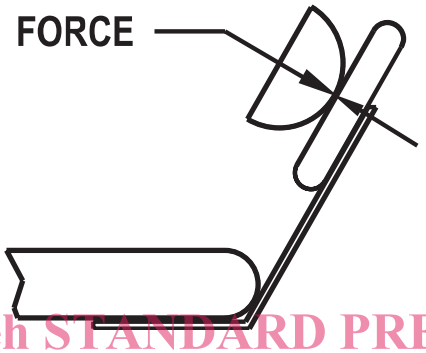


Figure 3 — Lateral support discontinuous with the adjacent support surface

4 Test apparatus

4.1 Rigid test fixtures, structures for securing or positioning postural support devices during testing as specified below. The tolerances for the length, width, depth and radius measurements are ± 5% of the dimension unless otherwise stated.

4.1.1 Rigid test frame, a means to simulate a wheelchair frame for securing a PSD which allows the full range of angle adjustment of PSD attachment hardware. An informative example of a rigid test frame is shown in Figure 4.

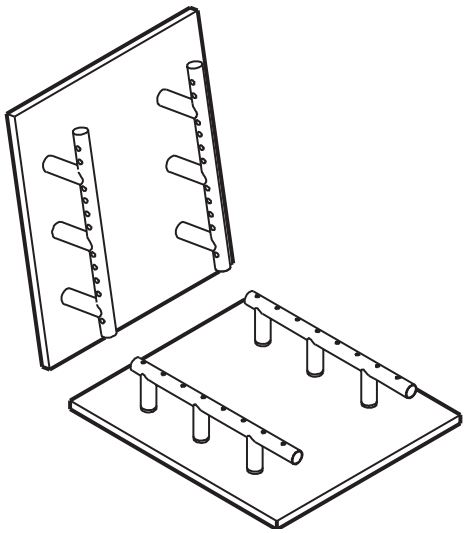
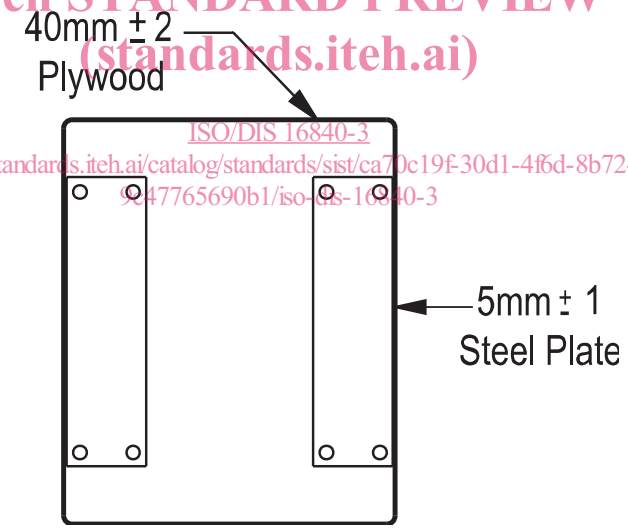


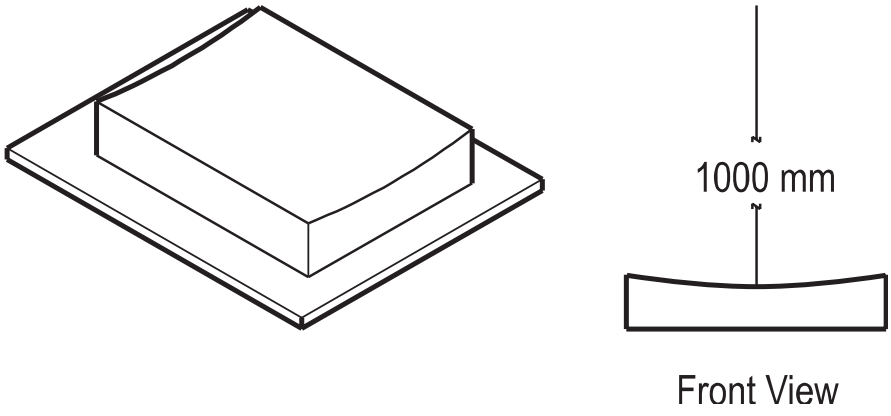
Figure 4 — Example of rigid test frame

4.1.2 Rigid surrogate support surface, a means of securing attachment hardware for PSDs intended to be used with rigid flat support surfaces but which are provided without rigid flat support surfaces. An informative example of a rigid surrogate support surface is shown in Figure 5. Holes may be drilled or other modifications made to accommodate the mounting of a variety of attachment hardware.



rFigure 5 — Example of Rigid surrogate support surface for testing attachment hardware

4.1.3 Curved rigid surface, A means to simulate in a rigid material, the curved surface of a sling upholstery seat or back support. The surface is used to secure seat cushions, and back supports or back support cushions, that are intended to be used with sling upholstery. An informative example of a Curved Rigid Surface with a radius of 1000 mm ± 100 mm is shown in Figure 6.



cFigure 6 — Example of Curved rigid surface with a radius of 1000 mm that simulates a surface with sling upholstery

4.1.4 Rigid Flat Surface, a means to simulate in a rigid material, the surface of a flat seat or back support. The surface is used to secure seat cushions, and back supports or back support cushions, that are intended to be used with a flat support surface.

4.2 Surrogate attachment hardware, structures to secure PSDs, intended to be used with attachment hardware, but provided without attachment hardware. Surrogate attachment hardware allows the attachment of PSDs to a rigid test fixture. An informative example of surrogate attachment hardware is shown in Figure 7.

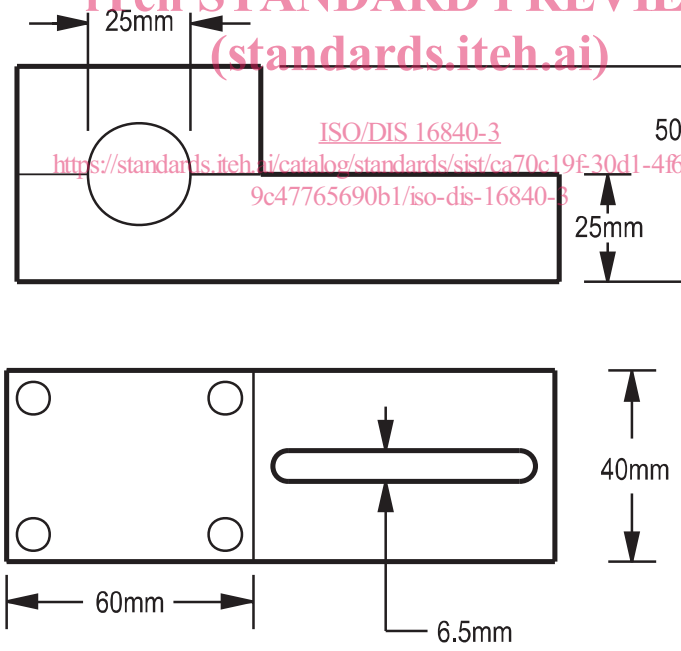


Figure 7 — Example of surrogate attachment hardware

4.3 Loading pads, structures that are specified below for the application of loads to Postural Support Devices.

4.3.1 Seat loading pad, a rigid indentor with a surface as specified for the Tapered Uniform Geometry Skeli (TUGS) indenter in ISO 16840-2.

4.3.2 200 mm x 200 mm convex loading pad, a loading pad made of a rigid material such as metal or hardwood as shown in Figure 8.

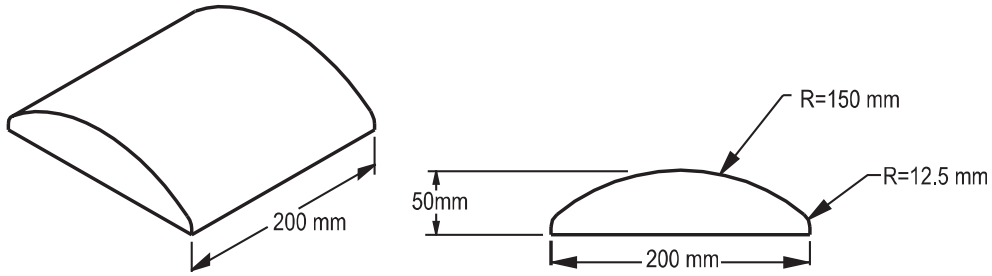


Figure 8 — Example of 200x200 convex loading pad

4.3.3 200 mm x 100 mm convex loading pad, a loading pad made of a rigid material such as metal or hardwood as shown in Figure 9.

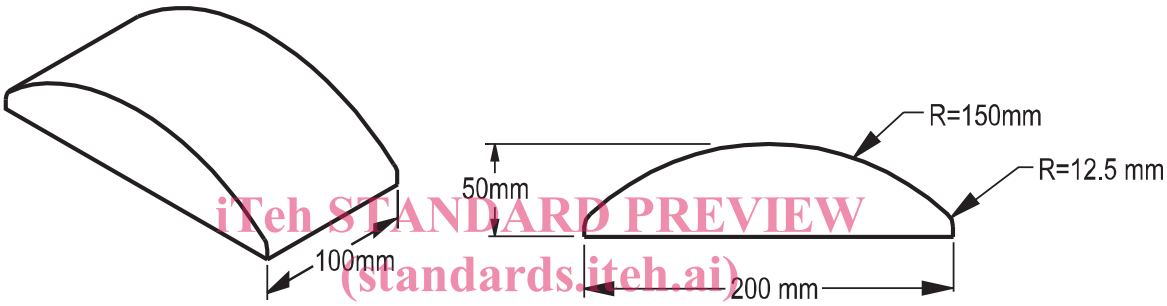


Figure 9 — Example of 200 mm x 100 mm convex loading pad

4.3.4 Adjustable convex loading pad, a loading pad with convex surface elements and adjustable width as shown in Figure 10.

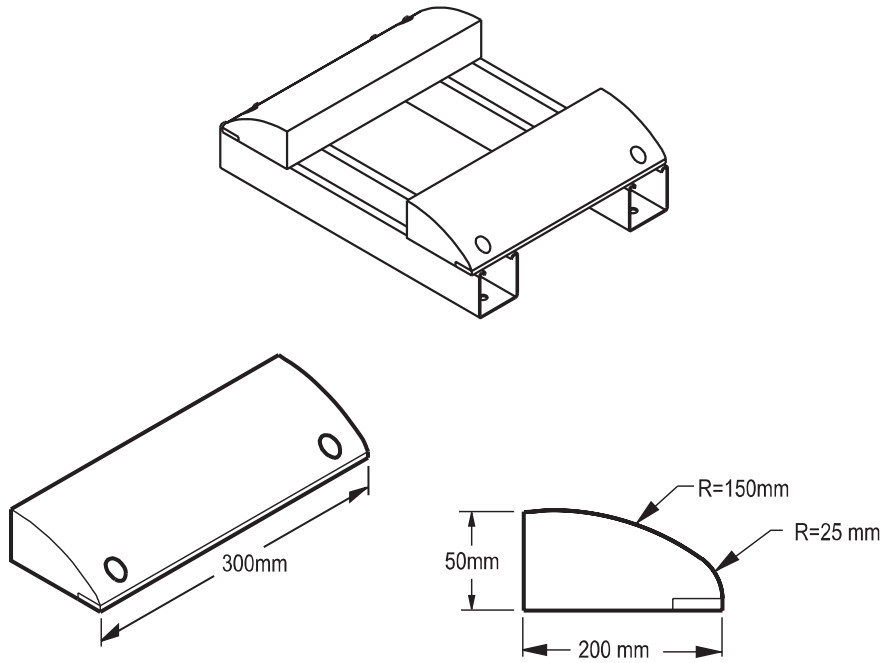


Figure 10 — Example of adjustable convex loading pad

4.3.5 Adjustable upper torso loading pad, a loading pad of adjustable size to simulate the upper torso as shown in Figure 11.

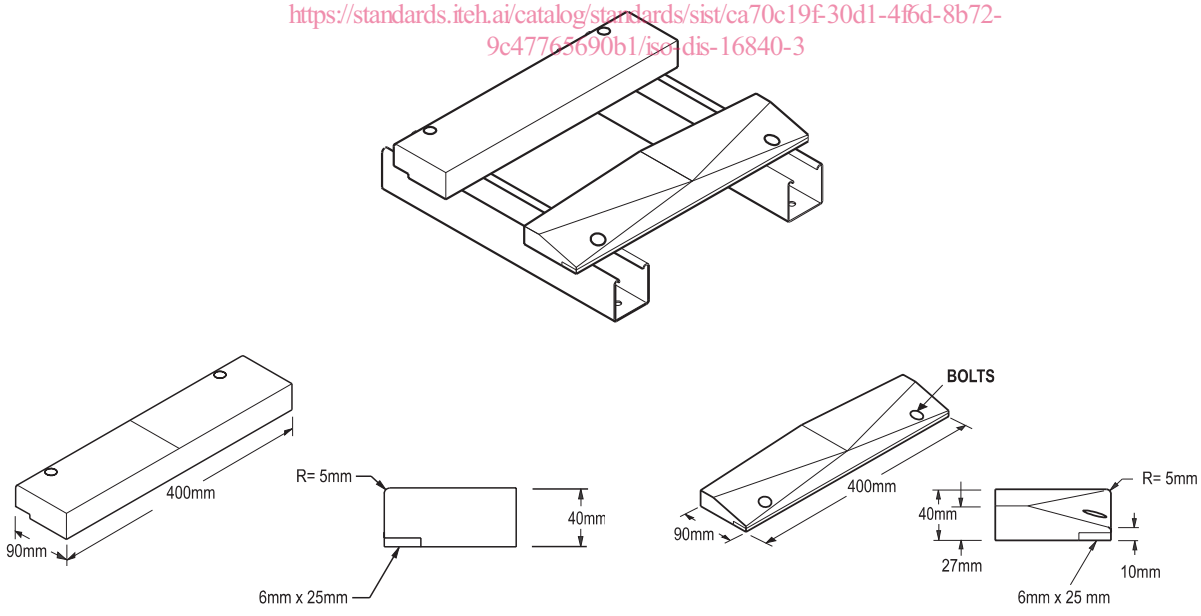


Figure 11 — Example of upper torso loading pad