
Wheelchairs —

Part 16:

**Resistance to ignition of postural
support devices**

Fauteuils roulants —

Partie 16: Résistance à l'inflammation des dispositifs de soutien postural



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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 7176-16 was prepared by Technical Committee ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 1, *Wheelchairs*.

This second edition cancels and replaces the first edition (ISO 7176-16:1997), which has been technically revised.

ISO 7176 consists of the following parts, under the general title *Wheelchairs*:

- *Part 1: Determination of static stability*
- *Part 2: Determination of dynamic stability of electric wheelchairs*
- *Part 3: Determination of effectiveness of brakes*
- *Part 4: Energy consumption of electric wheelchairs and scooters for determination of theoretical distance range*
- *Part 5: Determination of dimensions, mass and manoeuvring space*
- *Part 6: Determination of maximum speed, acceleration and deceleration of electric wheelchairs*
- *Part 7: Measurement of seating and wheel dimensions*
- *Part 8: Requirements and test methods for static, impact and fatigue strengths*
- *Part 9: Climatic tests for electric wheelchairs*
- *Part 10: Determination of obstacle-climbing ability of electrically powered wheelchairs*
- *Part 11: Test dummies*
- *Part 13: Determination of coefficient of friction of test surfaces*
- *Part 14: Power and control systems for electrically powered wheelchairs and scooters — Requirements and test methods*
- *Part 15: Requirements for information disclosure, documentation and labelling*
- *Part 16: Resistance to ignition of postural support devices*
- *Part 19: Wheeled mobility devices for use as seats in motor vehicles*

- *Part 21: Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers*
- *Part 22: Set-up procedures*
- *Part 23: Requirements and test methods for attendant-operated stair-climbing devices*
- *Part 24: Requirements and test methods for user-operated stair-climbing devices*
- *Part 25: Batteries and chargers for powered wheelchairs - Requirements and test methods*
- *Part 26: Vocabulary*
- *Part 28: Requirements and test methods for stair-climbing devices*

A technical report (ISO/TR 13570-1) is also available giving a simplified explanation of these parts of ISO 7176.

Introduction

The ignition and subsequent burning of wheelchairs is very rare, but can occur as a result of:

- being close to a burning object such as a fire beside the wheelchair;
- overheating of any electrical or electronic device on the wheelchair;
- fire sources (such as cigarettes or matches) falling onto the wheelchair.

Wheelchair occupants are at particular risk of injury or death from these fires and resulting fumes because they may not have the ability to move away from the wheelchair.

Wheelchairs can be considered to be comprised of the following components:

- a) structural components such as the frame, wheels, etc., which are essential to the mechanical integrity of the wheelchair;
- b) postural support devices, such as sling seats, sling backs, arm supports, foot supports, etc., which are attached to the wheelchair and/or its seating system and are primarily intended to give postural support to the wheelchair occupant;
- c) components to manage tissue integrity, such as seat or back support cushions, which are intended to have primarily a clinical function to minimize the risks of skin damage (these may also be intended to control posture);
- d) power-related components such as motors, energy sources, controllers, etc., which are required for the functioning of powered wheelchairs.

Each of the above components has a different severity of risk associated with their likelihood of igniting and of their resulting harm to the wheelchair occupant. ISO standards have been published or are in preparation to specify requirements and test methods for the above categories of components in order to help manufacturers and purchasers of wheelchairs to design and procure wheelchairs and their components which are appropriate for the risk of ignition balanced against the requirements of the wheelchair occupant. The aim of these ISO standards is to provide appropriate alternatives to using furniture-based standards, to reflect the uses and purposes of wheelchairs and their accessories.

The development of an ISO standard on the resistance to ignition of structural components [see list item a) above] has not yet commenced. The most likely sources of ignition are proximity to a heat source such as an electric radiator or domestic fire or a heat source such as a lighted match or cigarette falling onto the structure.

The tissue integrity components [see c)] are the subject of a draft ISO standard (ISO 16840-10), and permit a less stringent resistance to ignition based upon their priority for their clinical function which can override the need for a high resistance to ignitability.

The power related components [see d)] are the subject of ISO 7176-14 which specifies requirements to prevent overheating in electrical components that could lead to a fire.

This part of ISO 7176 is primarily concerned with the resistance to ignition of postural support devices [see b)] of a wheelchair. These typically include arm supports, sling seats, sling backs, lower leg supports, foot supports, lateral supports, head supports, etc. The most likely source of ignition is an open flame source falling onto the component's surface or into gaps between surfaces. Consequently, this part of ISO 7176 is written around resistance to an ignition source equivalent to a lighted match in contact with a test sample of an assembly of the upholstered part's composite materials in both a vertical and horizontal orientation. This part of ISO 7176 replaces ISO 7176-16:1997 since the latter only related to upholstered parts of a wheelchair and was originally based on furniture test methods and requirements, and therefore was not appropriate for clinically oriented components on a wheelchair.

The requirements of this part of ISO 7176 have been set at a basic minimum level and are less severe than mandatory requirements in some countries. Good practice is also to use materials which minimize

the risk of release of toxic substances as a result of ignition. Materials chosen shall also comply with biocompatibility requirements.

The day-to-day usage of a wheelchair can affect its materials' resistance to ignition through cyclic loading, movement of materials, washing, cleaning, etc. Manufacturers will often take these effects into account as part of their risk assessment when selecting materials for their products, to minimize the effects of this normal use. However, although this part of ISO 7176 can be used on parts that have been used, etc., the test samples specify new or unused parts.

Different environments commonly encountered by some wheelchair occupants can also affect the flammability of materials. For example, home oxygen systems, delivery systems for drugs carried in an inflammable medium, etc., can turn an inert material into a flammable one. Dust and other materials accumulated within the chair have also been found to be a source of readily ignitable material. Wheelchair manufacturers and occupants should be aware of these risks, and design and use wheelchairs accordingly, as covered by ISO 14971.

This part of ISO 7176 describes testing an assembly of the composite of materials as used in the wheelchair component, because the resistance to ignition of these materials individually may be quite different from those when assembled as a composite. Hence the results of testing to this part of ISO 7176 do not give any indication of the resistance to ignition of any of the separate individual materials of the postural support device.

Wheelchairs —

Part 16:

Resistance to ignition of postural support devices

1 Scope

This part of ISO 7176 specifies requirements and test methods to assess the resistance to ignition by match flame equivalent of all postural support devices that are supplied to be part of a wheelchair or its seating system.

This part of ISO 7176 only determines the resistance to ignition of the devices tested and not the ignitability of the complete wheelchair.

This part of ISO 7176 does not apply to the resistance to ignition of other parts of a wheelchair, e.g. wheels, framework.

This part of ISO 7176 does not take into consideration changes in resistance to ignition as a result of washing or use.

This part of ISO 7176 allows for the separate testing of inferior/superior supports (e.g. arm supports), which are usually used in the horizontal plane, and anterior/posterior/lateral/medial supports (e.g. thoracic harnesses, calf panels), which are usually used in the vertical plane.

Until such time as a flammability standard is available for the testing of other components or accessories of the wheelchair, it is advisable that any structural components considered to be at risk are tested at least to the ignitability levels of this part of ISO 7176.

NOTE 1 The requirements of this part of ISO 7176 have been set at a basic minimum level and are less severe than mandatory requirements in some countries.

Where practical, it is advisable that manufacturers use materials with superior resistance to ignition.

NOTE 2 Requirements for the control of risks from sources of fire created by electrical and electronic components are included in ISO 7176-14.

2 Normative references

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

ISO 8191-2:1988, *Furniture — Assessment of ignitability of upholstered furniture — Part 2: Ignition source: match flame equivalent*

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

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

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

3 Terms and definitions

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