

**BUREAU OF INDIAN STANDARDS**

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*भारतीय मानक मसौदा*

**व्हीलचेयर**

**भाग 14 विद्युत संचालित व्हीलचेयर और स्कूटर के लिए बिजली और नियंत्रण प्रणाली - आवश्यकताएँ और परीक्षण विधियाँ**

*Draft Indian Standard*

**Wheelchairs**

**Part 14 Power and control systems for electrically powered wheelchairs and scooters - Requirements and test methods**

**[ICS 11.180.10]**

Artificial Limbs, Rehabilitation Appliances and Equipment for  
the Persons with Disability Sectional Committee, MHD 09

Last date for comments:  
5 June, 2024

**NATIONAL FOREWORD**

*(Adoption clause will be added later)*

The text of ISO Standard has been approved as suitable for publication as an Indian Standard Without deviations. Certain conventions are however not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'
- Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
IEC 60601-1, Medical electrical equipment — Part 1 General requirements for basic safety and essential performance	IS 13450 (Part 1): 2024 Medical Electrical Equipment Part 1 General Requirements for Basic Safety and Essential Performance (IEC 60601-1: 2020, MOD) ( <i>third revision</i> )	Modified

IEC 61032, Protection of persons and equipment by enclosures — Probes for verification	IS 1401: 2008 Protection of persons and equipment by enclosures - Probes for verification ( <i>second revision</i> )	Identical
IEC 62262, Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	IS 17050: 2023 Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts IK Code	Identical
IEC 62304, Medical device software – Software life cycle processes	IS/ISO 62304 : 2015 Medical device software - Software life cycle processes	Identical
ISO 10993-1, Biological evaluation of medical devices — Part 1: Evaluation and testing within a risk management process	IS 17932 (Part 1): 2023 Biological Evaluation of Medical Devices Part 1 Evaluation and Testing within a Risk Management Process (ISO 10993-1: 2018, MOD)	Identical
ISO 7176-2 Wheelchairs - Part 2: Determination of dynamic stability of electric wheelchairs.	IS 18651 (Part 2): 2024/ISO 7176-2: 2017 Wheelchairs Part 2 Determination of dynamic stability of electrically powered wheelchairs	Identical
ISO 7176-3 Wheelchairs - Part 3: Determination of efficiency of brakes.	IS 18651 (Part 3): 2024/ISO 7176-3: 2012 Wheelchairs Part 3 Determination of effectiveness of brakes	Identical
ISO 7176-4 Wheelchairs - Part 4: Determination of energy consumption of electric wheelchairs and scooters - Theoretical range.	IS 18651 (Part 4): 2024/ISO 7176-4: 2008 Wheelchairs Part 4 Energy consumption of electric wheelchairs and scooters for determination of theoretical distance range	Identical
ISO 7176-5 Wheelchairs - Part 5: Determination of overall dimensions, mass and turning space.	IS 18651 (Part 5): 2024/ISO 7176-5: 2008 Wheelchairs Part 5 Determination of dimensions mass and manoeuvring space	Identical
ISO 7176-6 Wheelchairs - Part 6: Determination of maximum speed, acceleration and retardation of electric wheelchairs.	IS 18651 (Part 6): 2024/ISO 7176-6 : 2018 Wheelchairs Part 6 Determination of maximum speed of electrically powered wheelchairs	Identical
ISO 7176-7 Wheelchairs - Part 7: Method of measurement of seating and wheel dimensions.	IS 18651 (Part 7): 2024/ISO 7176-7 : 1998 Wheelchairs Part 7 Measurement of seating and wheel dimensions	Identical

ISO 7176-9 Wheelchairs - Part 9: Climatic tests for electric wheelchairs.	IS 18651 (Part 9): 2024/ISO 7176-9 : 2009 Wheelchairs Part 9 Climatic tests for electric wheelchairs	Identical
ISO 7176-10 Wheelchairs - Part 10: Determination of obstacle-climbing ability of electric wheelchairs.	IS 18651 (Part 10) : 2024/ISO 7176-10 : 2008 Wheelchairs Part 10 Determination of obstacle-climbing ability of electrically powered wheelchairs	Identical
ISO 7176-13: 1989, Wheelchairs - Part 13: Determination of coefficient of friction of test surfaces.	IS 18651 (Part 13) : 2024/ISO 7176-13 : 1989 Wheelchairs Part 13 Determination of coefficient of friction of test surfaces	Identical
ISO 7176-15, Wheelchairs — Part 15: Requirements for information disclosure, documentation and labelling	IS 18651 (Part 15) : 2024/ISO 7176-15 : 1996 Wheelchairs Part 15 Requirements for information disclosure documentation and labelling	Identical
ISO 7176-21: 2009, Wheelchairs — Part 21: Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers	IS 18651 (Part 21): 2024/ISO 7176-21: 2009 Wheelchairs Part 21 Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters and battery chargers	Identical
ISO 7176-22, Wheelchairs — Part 22: Set-up procedures	IS 18651 (Part 22): 2024/ISO 7176-22: 2014 Wheelchairs Part 22 Set-up procedures	Identical
ISO 7176-26, Wheelchairs — Part 26: Vocabulary	IS/ISO 7176-26: 2007 Wheelchairs Part 26 vocabulary	Identical
ISO 14971, Medical devices — Application of risk management to medical devices	IS/ISO 14971: 2019 Medical devices - Application of risk management to medical devices ( <i>first revision</i> )	Identical

The technical committee has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

<i>International Standard</i>	<i>Title</i>
EN 12182	Assistive products for persons with disability — General requirements and test methods

IEC 60332-1-2	Tests on electrical and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame
IEC 60417	Graphical symbols for use on equipment
IEC 60529	Degrees of protection provided by enclosures (IP Code)
ISO 13732-1	Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces
UL 94	Tests for flammability of plastic materials for parts in devices and appliances

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with **IS 2: 2022** 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.

## **Introduction**

Electronic control systems in electric powered wheelchairs and scooters are critical for the safety, functionality and reliability of the vehicle.

This document specifies some wheelchair tests that are conducted on an inclined test plane. The intention of these tests is not to evaluate the performance of a wheelchair at the maximum gradient on which it is capable of operating. Instead, the objective is to reveal any changes in the wheelchair's behaviour that might occur under fault conditions, and these changes are more readily discovered when it is operated on a slope. For convenience, the inclined test plane has a fixed gradient, representative of those on which the wheelchair might be used.

The range of ambient temperatures under which testing is carried out is limited to allow comparison between the performance of a wheelchair in normal operation and performance when faults are introduced.

With inter-module wireless communication becoming more common with the possibility that the communication may cause changes in the behaviour of other devices, a subclause has been added to assist with an associated safety assessment.

## **Scope**

This document specifies requirements and associated test methods for the power, and control systems of electrically powered wheelchairs and scooters. It sets safety and performance requirements that apply during normal use and some conditions of abuse and failure. It also specifies methods of measurement of the forces necessary to operate controls and sets limits on the forces needed for some operations.

This document is applicable to electrically powered wheelchairs and scooters with a maximum speed no greater than 15 km/h intended to provide indoor and/or outdoor mobility for one disabled person whose mass lies in the range specified in ISO 7176-11.

**NATIONAL ANNEX A**  
*(National Foreword)*

**A-1 BIS CERTIFICATION MARKING**

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

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The technical content of the document has not been enclosed as it is identical with the corresponding ISO standard. For details, please refer to ISO 7176-14:2022 or kindly contact:

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