

American National Standard

for Wheelchairs –

Volume 1:

**Requirements and Test Methods for
Wheelchairs (including Scooters)**



RESNA

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for Wheelchairs –

**Volume 1:
Requirements and Test Methods for Wheelchairs
(including Scooters)**

Secretariat

**Rehabilitation Engineering and Assistive
Technology Society of North America**

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Technology Society of North America**

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Foreword

This standard covers manual and powered wheelchairs, including scooters, and personal mobility devices that may be supplied as accessories to wheelchairs and scooters. A wheelchair is generally tested as a complete system in a standard reference configuration that facilitates comparison of test results among different models. Accessory manufacturers often test their product on one wheelchair for which the accessory is recommended and determine those performance specifications that are affected by the addition of the accessory to the wheelchair.

In all cases, the information that is disclosed with regard to the testing should be considered with respect to the following note:

The results obtained are based on testing one or more wheelchairs of a specific model and type. The performance a specific individual gets from his/her own wheelchair will depend upon his/her own personal wheelchair set-up, driving skills and techniques and may not represent the results obtained using the standardized RESNA test procedures.

RESNA WC Volumes 1 and 2 consist of the following sections under the general title Wheelchairs:

Volume 1: Requirements and Test Methods for Wheelchairs (including Scooters)

- Section 0: **Test reports**
- Section 1: **Determination of static stability**
- Section 3: **Determination of effectiveness of brakes**
- Section 5: **Determination of dimensions, mass and maneuvering space**
- Section 7: **Method of measurement of seating and wheel dimensions**
- Section 8: **Requirements and test methods for static, impact and fatigue strengths**
- Section 11: **Test mannequins**
- Section 13: **Determination of coefficient of friction of test planes**
- Section 15: **Requirements for information disclosure, documentation and labeling**
- Section 16: **Resistance to ignition of postural support devices**
- Section 20: **Determination of the performance of stand-up type wheelchairs**
- Section 22: **Set-up procedures**
- Section 26: **Vocabulary**

Volume 2: Additional Requirements for Wheelchairs (including Scooters) with Electrical Systems

- Section 2: **Determination of dynamic stability of electrically powered wheelchairs**
- Section 4: **Energy consumption of electrically powered wheelchairs and scooters for determination of theoretical distance range**
- Section 6: **Determination of maximum speed of electrically powered wheelchairs**
- Section 9: **Climatic tests for electrically powered wheelchairs**

Section 10: **Determination of obstacle-climbing ability of electrically powered wheelchairs**

Section 14: **Power and control systems for electrically powered wheelchairs, scooters and add-in devices – Requirements and test methods**

Section 21: **Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers**

Section 25: **Batteries and chargers for powered wheelchairs**

The following sections are also on the work program:

Section 28: **Requirements and test methods for stair-climbing devices**

The following RESNA WC Volumes have been approved for publication:

Volume 3: Wheelchair Seating

Volume 4: Wheelchairs and Transportation

These standards had their inception in March of 1982 when the RESNA Standards Committee on Wheelchairs began creating standards in the United States as a result of awareness of International Organization for Standardization (ISO) activities related to wheelchairs. Eighteen standards were originally developed by the 26 member committee which was composed of a variety of people including rehabilitation engineers, wheelchair manufacturers, governmental representatives (Department of Veterans Affairs and Food and Drug Administration), and wheelchair users and prescribers. The committee completed the development of these standards in 1990. The committee grouped the standards into two volumes in 1998.

The standards are test procedures designed to produce objective information about wheelchairs. Some of the test methods establish minimum performance criteria for durability and safety reasons.

The American National Standards Institute (ANSI) originally sanctioned the ANSI/RESNA Standards on Wheelchairs in 1982. RESNA is now accredited as a standards organization and the Assistive Technology Standards Board (formerly Technical Standards Board) oversees the work of the RESNA standards committees. RESNA is an interdisciplinary organization that promotes assistive technology for people with disabilities. The committee has also worked concurrently with other countries as an ANSI member body to the International Organization for Standardization (ISO) to create international standards pertaining to wheelchairs.

Suggestions for the improvement of this standard are welcome. They should be sent to the following address:

**RESNA Assistive Technology Standards Board
2025 M Street NW, Suite 800
Washington, D.C. 20036**

This standard was approved by the RESNA Standards Committee on Wheelchairs and the RESNA Assistive Technology Standards Board for submittal to ANSI. Committee approval of the standard does not necessarily imply that all the committee members voted for its approval or the approval of every test method or requirement in the standard. Throughout the time period this version of the

standards was developed, the following people participated as members of the RESNA Standards Committee on Wheelchairs:

Organization Represented	Name of Representative
Ammer Consulting.	Chair, William Ammer
Beneficial Designs, Inc.	Secretary, Peter Axelson
.....	Technical Standards Editor, Seanna Kringen (deceased)
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Burke, Inc.	DuWayne Kramer, Jerry Traylor
Convaid, Inc.	Don Griggs, Sue Johnson, Brandon Roberts
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Dalhousie University-Nova Scotia Rehab Centre	R. Lee Kirby
DEKA Research and Development Corp.	Phil Brown, Stewart Coulter, Kurt Heinzmann,
.....	Dave Mower
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.....	Daniel Seidel, Mark Sherwood
Florida Atlantic University	Oren Masory
Golden Technologies.	Fred Kiwak, Gene Kulon
Hoveround, Corp.	Tony DiGiovanni, Robert Munch
Human Engineering Research Laboratories	Samuel Connor, Ben Gebrosky, Rory Cooper,
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.....	Ramakant Rambhatla, Brian Rich, Lee Sheffield,
Laird Technologies.	Gary Fenical
Leisure-Lift, Inc.	DuWayne Kramer, Jr., Jerry Trayler
Lester Electrical	Jamie Jesse, Mark Bauer, Gary Bouc
McIlwain Mobility Services	Chris McIlwain
MET Laboratories, Inc.	Nehemya Cohen, Rick Cooper, Leonard Frier
Microsoft Research	Jay Beavers
Minkel Consulting.	Jean Minkel
MK Battery	Rick Spiegel, Dennis Sharpe
Mobility Designs, Children's Healthcare of Atlanta	Kay Koch
New York University – Occupational Therapy Dept.	Anita Perr
Otto Bock HealthCare GmbH.	Robert Clarke
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PDG Product Design Group Inc.	Matt Delorme
Permobil, Inc.	Marita Brundin, Tara Gentile, Mehdi Merhazi, Herbert Van de Wal
Precision Calibration, Inc.	Michael Heckrotte
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Radiometrics Midwest, Corp.	Dennis Rollinger
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University of Pittsburgh..... Douglas Hobson
Veterans Health Administration National Center for Patient Safety..... Kendra Betz
Individual Members:
Jerome Connelly Farmer
Chris Field
Alexander G. Reed
Norman Reese

Dedication

As this revised edition of the RESNA Standard on Wheelchairs is completed, the Committee remembers the work of Seanna Kringen, Technical Standards Editor. Seanna was an amazing person and a real driving force behind the development of these standards. Seanna herself had a mobility impairment that made working on these standards important to her. She was also aware of the sometimes serious or fatal consequences of failures in manual and powered wheelchairs. She recognized that every person has the right to have mobility to participate equally in all aspects of life. The Committee thanks her family for her leadership, dedication, professionalism, and attention to detail. We will truly miss her energy, passion, and expertise. She will also be missed as a dear friend to many.

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Scope of Volume 1 and 2

Volume 1: Requirements and Test Methods for Wheelchairs (including Scooters) of the RESNA wheelchair standard applies to (1) single passenger occupant and attendant propelled wheelchairs, (2) single passenger electrically powered wheelchairs including scooters, and (3) add-on power kits for single passenger occupant and attendant propelled wheelchairs, intended to provide indoor and outdoor mobility for people with disabilities.

Volume 2: Additional Requirements for Wheelchairs (including Scooters) with Electrical Systems of the RESNA Wheelchair Standard applies to (1) single passenger electrically powered wheelchairs including scooters and (2) add-on power kits for single passenger occupant and attendant propelled wheelchairs, intended to provide indoor and outdoor mobility for people with disabilities. Volume 2 also applies to electrically powered ancillary equipment of all wheelchairs and scooters that are included within the scope of Volume 1 and/or Volume 2.

Hereafter, the words "wheelchair" and "wheelchairs" shall refer to all wheelchairs including scooters and add-on power kits within the scope of this standard.

The RESNA wheelchair standard does not apply to: (1) wheelchairs intended for special purposes, such as sports, and one of a kind custom-made wheelchairs, (2) wheelchairs specially designed and fabricated for specific people with disabilities, or (3) powered office chairs.

NOTE 1 Changes such as different sizes or production upon receipt of an order do not qualify a wheelchair as "one of a kind".

NOTE 2 Appropriate sections of this standard may be applied to wheelchairs and wheelchair accessories outside this scope, to the extent that it is practical.

In summary, Volume 1 specifies tests and methods of measurement applicable to all wheelchairs (manual and electric), while Volume 2 specifies additional tests and methods of measurement applicable to electrically powered wheelchairs and to the electrical systems of all wheelchairs. Thus, both volumes are required for testing powered wheelchairs. However, only Volume 1 is required for testing manual wheelchairs.

This standard specifies requirements and test methods for determining wheelchair performance. It also specifies requirements for the disclosure of the test results.

These test methods may be used to verify manufacturers' claims that a product exceeds the minimum requirements of this standard.

Standardized means of preparing and adjusting wheelchairs are provided to enable the test results to be used for the comparison of performance.

WARNING: This RESNA Standard calls for the use of procedures that may be injurious to the testing technician if adequate precautions are not taken.

Section 0

Test reports

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Section 0 Introduction

It is important that the results of testing be reported adequately and accurately. A standardized approach is usually used to report data that may need to be compared with test results of other similar devices.

Section 0: Test Reports

1 Scope

This section of RESNA WC-1 specifies requirements for the contents of test reports that include the results of testing wheelchairs and scooters according to the RESNA wheelchair test standards, Volume 1 and Volume 2.

Other results or data may be included in the test report, but each test report should contain all of the pertinent items listed in the clause below.

2 Test report requirements

The test report shall contain the following items:

2.1 Testing institution

2.1.1 Name

2.1.2 Address

2.1.3 Accreditations or certifications (if any)

2.1.4 Unique test report reference such as a report or contract number

2.2 Dates

2.2.1 Dates of tests

2.2.2 Date of report issue

2.3 Manufacturer or entity requesting the testing

2.3.1 Name

2.3.2 Address

2.4 Product identification

2.4.1 Product name or model

2.4.2 Serial number and/or batch number (if any)

2.4.3 Maximum occupant mass