WHEELCHAIR TRANSPORTATION STANDARDS

W/c Tiedown and Occupant Restraint Systems-WTORS

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Why Standards and Regulations??

benchmark test for WTORS* performance

repeatable testing methods for WTORS

assure securement and wheelchair compatibility

installation and operational information for WTORS usage

comparable information in manuf's literature

provide WTORS manuf's with design guidance

ISO Wheelchair Transport Safety Standards

- ISO DIS-10542 WTORS Stds.
  - Part 1- General requirements and test methods
  - Part 2- Four-Point Strap Type Systems
  - Part 3- Docking Devices (future)
  - Part 4- Clamping Devices (future)
  - Part 5- Specific Combinations (future)
- ISO CD-7176/19 Wheelchairs:
  -Wheelchairs for use as seats in motor vehicles.

Wheelchair Tiedown and Occupant Restraint Systems (WTORS)

- Focus in North America
  - ISO 10542, Parts 1-5-(ISO)*
  - SAE J2249, WTORS-(US)
  - CSA Z605, MASORS-(Canada)

See note

Definitions

- WTORS - WC tiedown and occupant restraint system
- Four-point strap tiedown - WC tiedown system that attaches to the WC frame at four separate points and attaches to the vehicle at four separate anchor points

Definitions (cont.)

- Occupant restraint (OS)- system or device: - designed to minimize or prevent contact with a vehicle interior
- Upper torso restraint = shoulder belt, restraint: - portion of OS intended to restrain movement of the chest and shoulders
- Pelvic restraint = pelvic belt = lap belt=lap restraint: - belt assembly designed to limit movement of the pelvis
- WC securement - a device or system designed to secure a WC in place in a motor vehicle (also, WC Tiedown)

Definitions (cont.)

- Anchor point: - point (area) on vehicle, WC, WC tiedown, or vehicle seat base to which an anchorage is attached

- Securement point: - location on WC frame to which a WC tiedown connects

ISO-DIS10542, WTORS

- Voluntary standard.
- Target completion date: Fall, 1998 (1&2)
- Intended to reduce potential for injury to WC-seated occup's in a frontal crash
- Specifies design/ performance req'ments, test procedures, installation instructions and information disclosure requirements

ISO-DIS10542, WTORS

- Adult passengers or drivers
- Public or private vehicles
- Forward facing orientation only
- 4 point tiedowns, w/ provisions to test all types
- Requires pelvic & shoulder restraints
- Applicable to all W/Cs, including scooters
- Requires dynamic testing of WTORS
- Requires labeling and user instructions

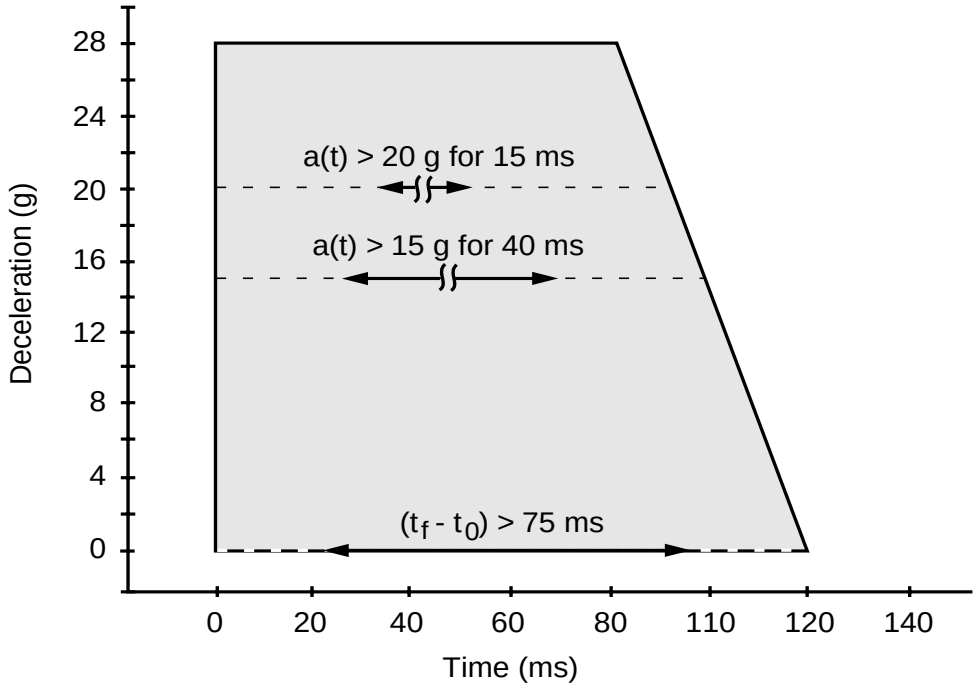
ISO-DIS 10542-WTORS (Cont.)

- Part1-Testing
  - Dynamic testing
    - Sled impact test
    - Utilizes surrogate (reusable) WC
    - 20 G, 30 mph deceleration pulse
    - 50th percentile male hybrid III ATD
  - Other testing
    - Partial engagement of components
    - Belt length and webbing slippage

See note

ISO-DIS 10542-WTORS (Cont.)

- Part 1-Dynamic test, Pulse Corridor



See note

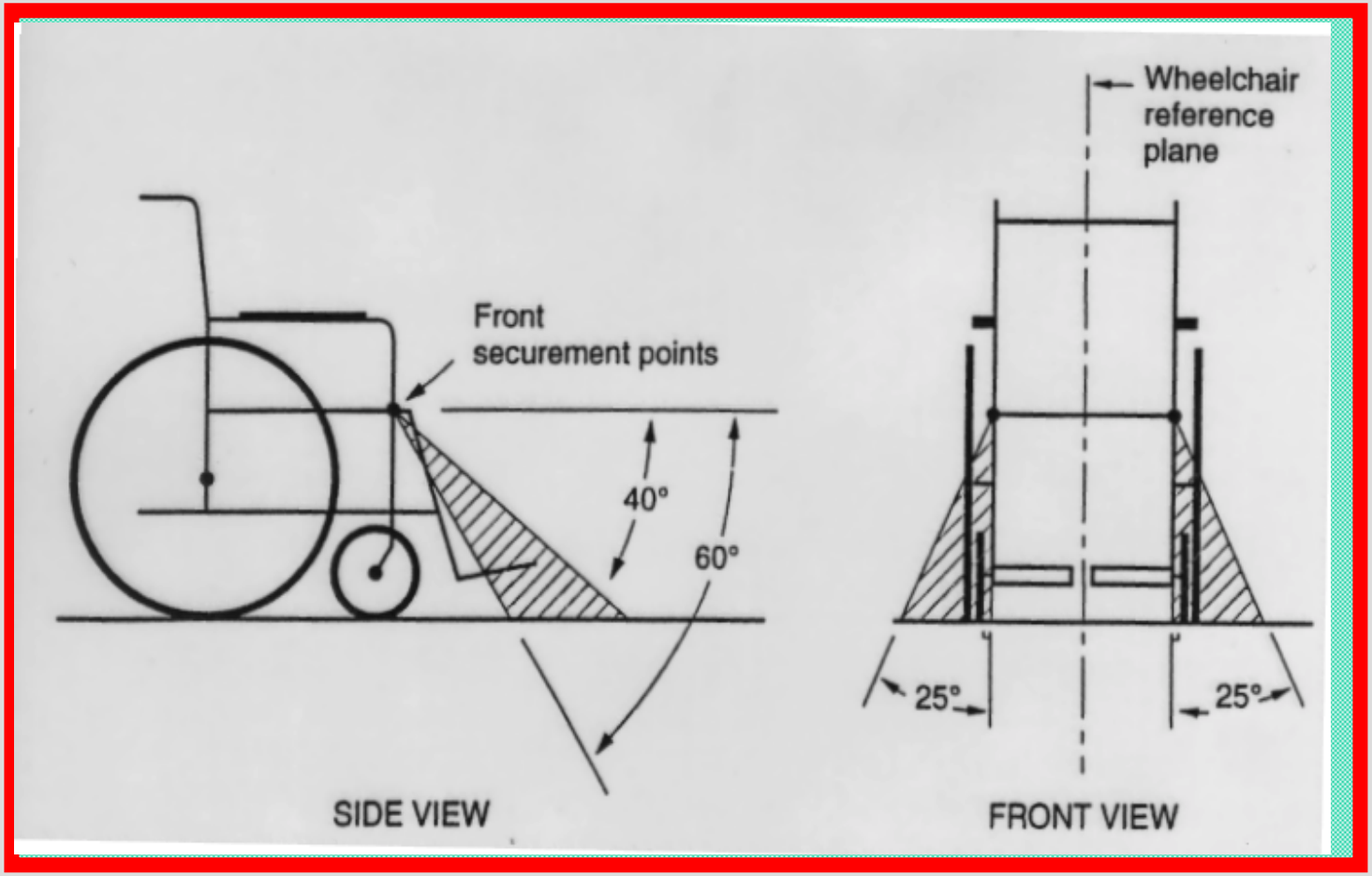
ISO-DIS 10542-WTORS (Cont.)

- Part1- Evaluation of Test Results
  - 1) Failure of components
  - 2) WC & dummy excursions
    - Surrogate WC --> 200mm
    - Dummy knee --> 375mm
    - Dummy head --> 650mm
  - 3) No WC loading of occupant
    - $EX_{knee}/EX_{wc} > 1.1$

See note

ISO-DIS 10542-WTORS (Cont.)

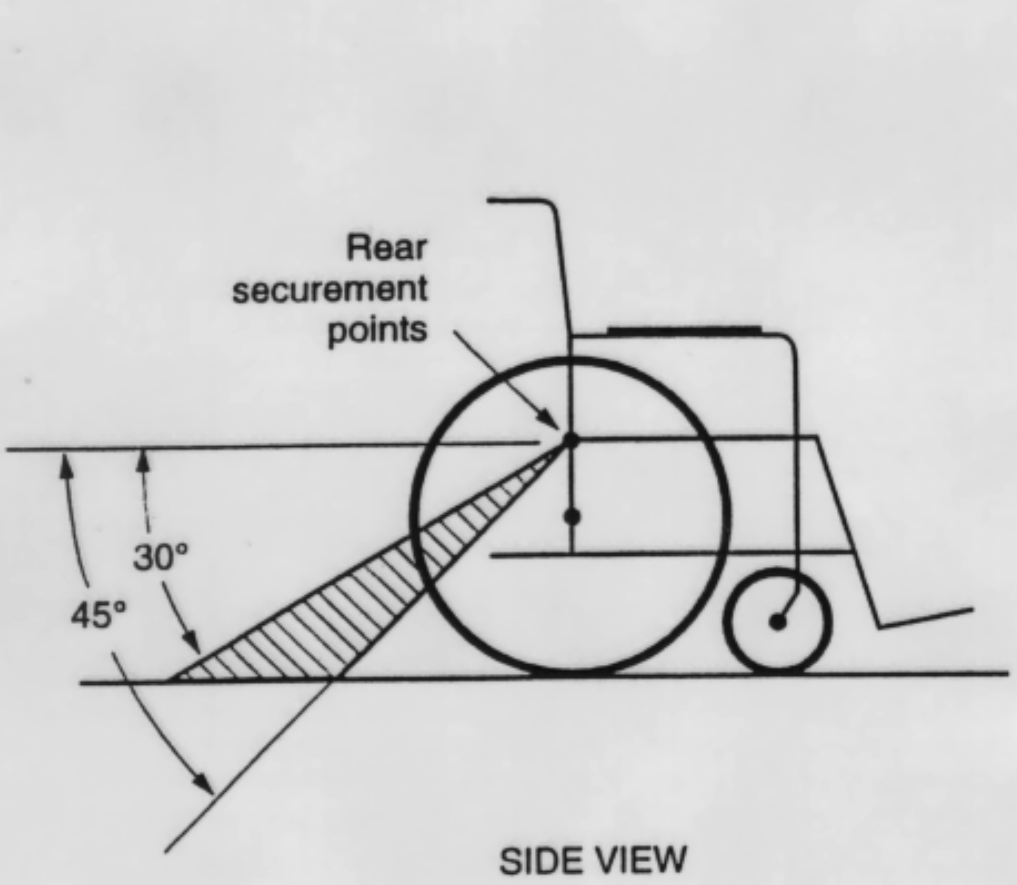
Installation-Front Tiedown Angles

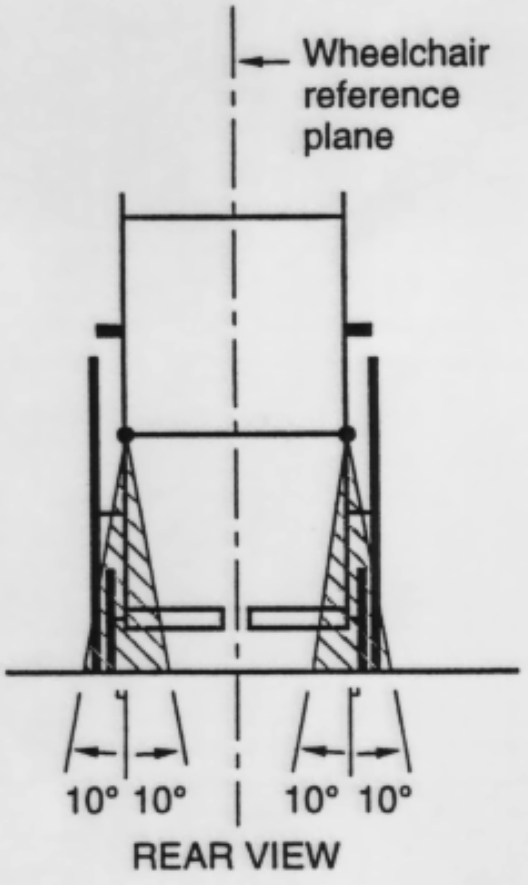


See note

ISO-DIS 10542-WTORS (Cont.)

Installation-Rear Tiedown Angles





See note

ISO-DIS 10542-WTORS (Cont.)

- Future Work:
  - Part 3 - Docking -type Systems-Requirements and test methods
  - Part 4 - Clamp -type Systems- Requirements and test methods
  - Part 5 - Systems for specific types of wheelchairs-Requirements and test methods
- Current Status -
  - Parts 1&2- final DIS voting stage
  - Parts 3-5-work just beginning

All WTORS-Current Status

- CSA 605--completed Nov. 1996
- SAE J2249--completed Feb. 1997
  - Application Guidelines-Fall, 1998
- ISO
  - Parts 1 & 2--Fall, 1999
  - Parts 3, 4 & 5--2000-2002

WTORS Procurement Guidance

- Purchase contingent upon WTORS compliance with ISO 10542/J2249
- Dynamic sled testing using surrogate WC
  - 20g/30 mph-results comply with std. limits
  - obtain pre-sale literature/lab reports
- Verify labeling on WTORS product (stds. compliance)
- Installation instructions included (and used)

Additional Information

Stds. development WWW site:

Information:

- copies of draft standards
- meeting minutes
- application guidelines
- http://www.rerc.upmc.edu/STDsDev/stdsindex.html

For final US Std. contact: Society for Automotive Engineers (SAE), Warrendale PA,

Request: J2249-Wheelchair Tiedown and Occupant Restraint Systems