

ANSI/RESNA
Subcommittee on Wheelchairs and Transportation
Unconfirmed Minutes

May 27, 2001
Board Room
Chico Hot Springs Resort - Pray, Montana

1) Welcome and Introductions

Subcommittee Chair, Larry Schneider, opened the meeting and noted that all in attendance had also attended the previous two days of ISO WG6 meetings in which many of the same issues and topics had been discussed and worked on. In particular, the ISO/SOWHAT Working Groups on Wheelchair Seating Systems and Docking Systems had met in WG6 Breakout groups. For these reasons, Larry indicated that that the SOWHAT meeting would probably be able to end between noon and 1:00 PM.

2) Administrative matters

2.1 Review and acceptance of meeting agenda

The group accepted the meeting agenda as presented (TW114)

2.2 Approval of Pittsburgh meeting minutes

The group accepted the minutes from the SOWHAT Pittsburgh meeting as distributed.

2.3 Distribution and numbering of documents

Larry reviewed the following new Subcommittee documents.

TW111 – Minutes of Oct 22 Meeting in Pittsburgh

TW112 – Distribution/Mailing List

TW113 – SOWHAT List serve email addresses

TW114 – Agenda May 27, 2001

TW115 – List of SOWHAT Voting Members as of May 26, 2001

TW116 – LIST of SOWHAT Working Groups and members as of May 21, 2001

TW117 – Letter to Fred Downs of the VA from L Schneider – dated April 16, 2001

TW118 – Answers to FAQ's - May 21, 2001 Draft

TW119 – Draft article on Transit Wheelchairs for next publication of Guidelines to Selecting a Wheelchair

TW120 – Initial List of Updates for SAE J2249 re transfer to ANSI/RESNA Vol. 4

TW121 – Seating Devices for Use in Motor Vehicles – ISO 16840-4 Draft – May 2001

TW122 – Extending WC19 to Smaller WC Occupants – May 21, 2001

TW123 – Draft Introduction to Vol4 Standards and Info for Reports for Transit WC & Related Equipment

TW124 – List of SOWHAT Documents as of 5/26/01

TW125 – SAE Wheelchair Restraint Task group Draft Minutes – Feb 1, 2000 - Reno

2.4 Mail list and list-serve updates

Larry indicated that copies of the SOWHAT mailing list and list serve are being circulated and requested that everyone check their information and add their name and information if they are not currently on the lists. Larry also indicated that the list serve is especially important since almost all of the communication for the group occurs via the list serve.

2.5 Update on Subcommittee membership

TW115 currently reflects the 25 official voting members of SOWHAT. Larry noted the high number of researchers and manufacturers. Doug Cross indicated that Hale Zukas, who was previously an active participant of SOWHAT, would like to be added as a voting member of the Subcommittee. Joe Takacs indicated that Bob Joseph will be replacing him on the Subcommittee, and that the name Kinedyne should be replaced by "Sure-Lok." Larry indicated that the consumer, clinician, and government groups are low in representation. He also indicated that Doug Cross's attendance at the meeting, as a representative of public transit (AC Transit of Oakland CA) as well as users of public transit, is particularly welcome on the Subcommittee. Larry indicated that representation of the public transit community has been sought for many years, but this is the first time that anyone has been willing and able to attend a SOWHAT meeting and participate actively. Larry called for a vote on adding Doug Cross, Bob Joseph (as a replacement for Joe Takacs), and Hale Zukas to the Subcommittee, which passed unanimously.

2.6 Expansion of SOWHAT Scope to include WTORS

Larry noted that the scope of SOWHAT has been expanded from that of only transit wheelchairs to include WTORS. That is, the previous effort to develop standards for WTORS in SAE is being moved into ANSI/RESNA SOWHAT. Larry is currently in discussions with SAE staff regarding this transition.

2.7 Organization of ANSI/RESNA Volume 4

Larry reminded the group that, while the initial version of WC/19 is in Volume 1 of ANSI/RESNA wheelchair standards, this document will soon be transferred over to Volume 4, which will be dedicated to all standards and related documents dealing with transit wheelchairs and WTORS.

2.8 Review of Work Items and Working Groups

TW116 provides a list of the four Working Groups established at the Pittsburgh SOWHAT meeting. Larry reviewed the goals of each of the Working Groups. Bob Joseph and Doug Cross requested to be added to WC/19 Implementation, Education and Training WG. Doug Hobson suggested that an educational slide presentation be prepared so that all members could present the work of SOWHAT. Larry indicated that this was especially important since some people who are not well informed about WC/19 are spreading misinformation about the standard.

Bob Joseph, Paul Edwards, and Doug Cross requested to be added to the Docking System WG.

3) Status of related work

3.1 ISO 10542 and SAE

The ISO WG6 activities were reviewed during the past two days so no further update was needed. ISO 10542-1 and - 2 (WTORS and WTORS supplement for four-point strap-type tiedowns) have been approved and are being published by the ISO Secretariat, although it is not known when they will be available. The SAE Restraint Task Group has not been active in recent years, but is not moved into SOWHAT. Doug Hobson will officially resign as Task Group chair and will

recommend to the Chairman of the SAE Adaptive Devices Subcommittee that future development and updates of WTORS standards be done in SOWHAT. Larry indicated that future upgrades of WTORS standards can probably continue to be published as future versions of SAE J2249, as well as in Volume 4 of ANSI/RESNA wheelchair standards.

3.2 ISO 7176/19

This document is currently out for FDIS (final) ISO voting. Comments and votes are due by the end of June.

3.3 CSA Z604 & Z605

Larry indicated that he had a recent communication with Andre Wisaksana of CSA to find out the status of these documents. Andre indicated that they are currently waiting on completion of D409 which deals with the vehicle, and which will include vehicle aspects of wheelchair securement. D435 (transit buses) addressing accessible transit buses is also being prepared and will include a proposed lower crash pulse for low floor buses. There has been discussion of rear facing transport as a part of these documents. Joe Takacs reported that the Canadian users report accepting rear-facing transport. A draft of D436 (wheelchair accessible over-the-road coaches) is also under development in Canada.

3.4 Other

There were no other reports on related activities.

4) Reports from Working Groups

4.1 Formation of WTORS Working Group

Larry indicated that since we have moved WTORS to SOWHAT, we need a new Working Group to deal with WTORS. Larry agreed to chair the new WG and reviewed TW120, which is a preliminary list of updates needed for SAE J2249 since it was adopted in 1996. The WG will be responsible for updating SAE J2249 and for converting it to an ANSI/RESNA standard in Volume 4. A draft of this converted document will be prepared for the next SOWHAT meeting. Also the new WG should work toward updating the companion document for J2249 which is currently on the UPitt website. Doug Hobson suggested that we also take this opportunity to review ISO 10542 and SAE J2249 for differences and discrepancies between the two documents. Other members of the WTORS group will include Bob Joseph, Jean Marc Girardin, Doug Cross, Doug Hobson, Tom Adams, Joe Takacs and Edward Stait.

4.1.1 *Need for upgrades to WTORS standard*

The group discussed the issue of wheelchairs with a mass greater than 275 lb using four rear tiedowns and the potential problems associated with this. Doug Cross indicated that most vehicles are not equipped to use four rear tiedowns so it doesn't really matter whether there are four rear tiedowns or not. Larry indicated that the purpose of allowing more than four securement points on heavier wheelchairs is to provide wheelchair users and transportation groups the opportunity to achieve effective wheelchair securement and crashworthiness under 30-mph crash conditions. Whether more than four tiedown straps are actually used is up to the transportation company and/or the wheelchair user, and should be decided based on the size of the vehicle, the travel mode, and the level of risk that one is willing to trade off for increased safety. The decision to use more than four tiedown straps can also be made for heavier transit wheelchairs whether or not there are more than four securement points on the wheelchair, since more than one tiedown strap can be attached to each securement point.

4.1.2 Status of SWC Drawing package

Larry reported that the drawing package for the surrogate wheelchair has been updated and completed. The SWC drawing package includes modifications to the ballast weights and additions that allow the surrogate wheelchair to accommodate the addition of different shaped longitudinal frame members for attaching wheelchair components of docking-type tiedown systems. A new version of SAE J2252 is being prepared and will be included in the new ANSI/RESNA Volume 4.

4.2 WC/19 Education and Implementation WG

Larry reported on a number of activities of the Education and Implementation Working Group since the last meeting as indicated in 4.2.1 through 4.2.3.

4.2.1 Status of WC/19 Guideline Document

Larry reported that there a draft of the Guidelines Document is closer to completion and circulated a copy for the group to examine. A section of answers to frequently asked questions is also under development and will be included in the Guideline Document. The document is now targeted for completion in latter par of 2001.

4.2.2 Correspondence to VA and others

Larry referred the group to document number TW117 which is a letter he wrote to Fred Downs of the VA, with the assistance of Doug Hobson and Jeff Dolezal. The purpose of the letter was to notify the VA about the WC 19 standard and to request that the VA adapt the new standard as it had other wheelchair standards, by reference. Larry indicated that he has not yet received a response from Fred.

4.2.3 Presentations, News Releases

Larry indicated that he recently made presentations on WC/19 and SAE J2249 at Conferences and Workshops in Pennsylvania, Ohio, and Michigan. He also indicated that the June or July issue of the School Transportation Newsletter will include an article on WC/19. The article will be a reduced version of TW118, answers to FAQs. Tilt in Space and recline issues have been a source of questions and are addressed in the FAQ's. The group indicated that NAARTS (rehab tech suppliers) is another group that should be targeted for education since they are often the ones to educate the consumers. Doug H. asked if it would be possible for SOWHAT to present to the annual meeting of the American Public Transportation Association (APTA) on wheelchair transportation standards. This year's APTA meeting is scheduled for September 30 through October 4th, in Philadelphia. Also, the annual Bus and Paratransit Conference is scheduled for May, 2002 in Minneapolis.

4.2.4 Update on Answers to FAQs

See 4.2.3

4.2.5 Discussion – obstacles to WC/19 implementation

There was no discussion on this topic.

4.2.6 Views from public transit

Doug Cross spoke to the group as a representative of public transit as well as a representative of disability-oriented groups who use public transit systems. He indicated that there is interest from a number of organizations in participating more in the standards development process. In particular,

APTA and ESPA would like to coordinate more involvement from national transit industry and advocacy groups. ESPA has offered to help convene a meeting of interested parties. He offered to provide information to other organizations, such as the Community Transportation Association of America (CTAA).

Doug C. further indicated that there is continued concern from consumer advocates, including members of AC Transit's Accessibility Advisory Committee, regarding the potential requirement for consumers to have particular wheelchair designs or ancillary equipment. Some advocates feel all necessary securement accommodations should be incorporated into public transit vehicles. Some consumers are also very concerned that they be able to perform as much of the securement as possible themselves, and do not want to feel "trapped".

Regarding any proposed docking technology, which is seen as a potential benefit by some consumers, there is concern that the docking interface or vehicle clamping mechanism could interfere with the rear area of wheelchairs. This could create conflict with the need to carry backpacks and other gear, as well as possibly impede the use of traditional 4-point securement systems by non-docking users. The consensus appears to be that the ISO and SOWHAT groups should seek increased involvement from transit consumers.

Representing AC Transit as one of the US bus systems with heavy patronage by wheelchair users (800 boardings per average weekday), Doug C. likened AC Transit's experience to those of other Bay Area and western US systems that have been fully lift-equipped for many years. This is in contrast to bus systems elsewhere in the US, which either have not yet become, or just recently became, fully accessible. Many issues with wheelchair securement reach a crisis stage when bus operations are affected on a more regular basis, such as when multiple boardings per bus trip are experienced.

Transit experience with securement problems and injuries/claims stem mostly from "tip-overs" and "sliding" by unsecured, or improperly secured, wheelchairs. This happens in normal operations, due to sudden stops or excessive speed around corners, especially on hills. Lack of standardization for equipment within fleets, as well as inadequate operator training, are also contributing factors. "Crashworthiness" has not been a major concern.

The reasons for improper securement are many, but mainly revolve around the complexity and physical difficulty in attaching and tensioning strap-type systems. Many transit operators think "docking" systems could solve many of these problems, if a uniform standard could be implemented, to the point of enough consumers being able to use it to make it worthwhile.

Doug C. indicated that the Center for Urban Transportation Research at the University of South Florida has recently distributed a wheelchair securement survey. The survey was directed at transit operators. The contact info is www.nctr.usf.edu/securement - Jennifer Harden at 813-974-1092.

Doug C. shared some of the operating issues related to wheelchair securement in his transit system. They are also investigating the use of rear facing within their system. Interested in docking system as a future securement method. Bus maintenance is a concern however with docking systems. There are plans to use minivans as backup for some paratransit vans. Minivans offer smoother ride and are able to access tighter spaces. The consumer perspective is split with regards to docking, especially given the need to have hardware attached to the wheelchair. Others are interested in safer securement offered by docking. Doug C. will report back to APTA and Project Action on the ISO and SOWHAT meetings.

From the transit operations perspective, Doug indicated several potential concerns regarding the proposed approach to universal docking, including:

- The 20-G crash standard may be excessive for large urban transit buses, which rarely, if ever, encounter such forces in service mishaps. This can

result in “over-engineering” the systems, making them bulkier, more complicated, and more costly than necessary. A parallel approach by the Canadian Standards Institute is considering significantly lower G forces for crash testing.

- There has been no differentiation between the needs of fixed route (large bus) and paratransit (van/small bus) service. This could be a problem if docking devices are specified which cannot be accommodated into the “open” floor plan required by many paratransit services.
- The rear-only orientation of the universal interface that is currently being proposed may preclude using a truly universal system, which could be used both by disabled van drivers and users of public transit vehicles. Minivans used in paratransit services may also be affected, in that the front passenger seat area may be used as a wheelchair tie-down location.

There is also interest among some transit systems in trying other innovative approaches. AC Transit, Akron Metro, and the Transit Authority of River City (TARC), Louisville, Kentucky, will test a motorized strap system being developed by the Cleveland Clinic. Some U.S. systems are looking at the European rear-facing padded barrier approach, which is also being tried in Canada. AC Transit and some other systems are beginning to provide wheelchair marking and “tether” straps to riders, for aiding proper securement.

4.3 Wheelchair Seating

Gina indicated that ISO 16840-4 Seating Devices for Use in Motor Vehicles was reviewed during the ISO WG6 meetings these past two days, and will be updated to reflect suggested changes. An updated version of the document will be completed and prepared for CD voting by the end of June. The test method contained within the standard is based upon a surrogate wheelchair base that is used in dynamic sled impact testing. Seating systems mounted to the surrogate base for testing can be evaluated independent of a specific wheelchair frame. A prototype surrogate wheelchair base has been developed by UMTRI and Pittsburgh, and has undergone two tests at UMTRI. Additional testing is needed for validation. The ISO document will be converted to an ANSI document for the next meeting as a draft. The ANSI/RESNA version of this document will be different because the ISO version does not yet include seating systems for children, whereas the ANSI/RESNA version of WC/19 does include children.

4.3.1 Surrogate Wheelchair Base Update/Test Results

Larry described progress on the design and development of a surrogate wheelchair base that can be used for sled impact testing of after-market seating systems. Larry showed pictures of the surrogate base, which provides 1-in diameter rails for attaching seats and 1-in diameter removable seatback posts for attaching backrests. In the current version, these rails are spaced a fixed distance of 18 in, from outside edge to outside edge, to accommodate typical adult-size seating systems. The seatback posts of the surrogate base include replaceable deformable rods that allow for seatback deformation on dummy rebound. Also the front wheels are connected to the frame by replaceable deformable aluminum bars. The mass and C.G. of the surrogate base are the same as the surrogate wheelchair specified in SAE J2249 for testing WTORS, and can be adjusted to account for different seat and seatback masses. This first prototype of a surrogate base has been designed for use with four-point securement systems and provide for two heights of rear securement points that will produce different wheelchair kinematics and different seat loading during a frontal impact. Larry showed videos of two sled tests that had been conducted to date. The first test was run without a crash dummy and with the rear tiedown straps attached to the upper rear securement points. This resulted in unrealistic rearward rotation of the wheelchair. The second test was conducted with a midsize male crash dummy and with the rear securement points attached to the lower rear securement points. This test produced wheelchair kinematics that are very comparable to a recent test of a powerbase wheelchair conducted at UMTRI. Much more work is needed to improve the design of the surrogate base and to validate results of seat and backrest performance using this base to results obtained using actual wheelchair bases. It was also indicated that the surrogate base needs to be able to accommodate child-size seating systems.

4.3.2 *Other issues*

There was no further discussion.

4.4 Child Restraints

Larry described the draft document developed by Miriam relative to expanding WC/19 to include requirements for totally integrated restraints, such as a five-point harness, similar to that provided with child safety seats. These new requirements will be implemented in WC/19 format in by the next meeting.

4.5 Docking Securement

Larry indicated that the primary question is how to qualify wheelchairs that are crashworthy for docking and other securement. Doug asked whether we could use the LATCH concept for child restraints as a precedence for Universal docking.

4.5.1 *Addition of test for docking securement and wheelchair labeling requirement*

Larry indicated that it is a simple matter to modify WC/19 so that one can dynamically test a wheelchair that is designed for securement using a docking system or some other type of wheelchair tiedown device other than a four-point, strap-type tiedown. However, the big question is, what should this wheelchair be called and how should it be labeled. We currently say that a wheelchair is not a WC/19 wheelchair unless it passes certain performance requirements when tested using a four-point tiedown. So, what do we call a wheelchair that has only passed the test for docking securement, and now do we label it? Also, how do you label a wheelchair that is design for securement using a four-point tiedown as well as a docking-type tiedown? – e.g., WC/19 plus EZ Lock?

4.5.2 *Universal Docking Update and Discussion*

Doug provided a brief overview of work on developing the universal docking concept that was discussed during the previous two days of WG6 meetings. The term Universal Docking Interface Geometry (UDIG) has been adopted as opposed to Universal Docking Device, since the goal is to specify the universal geometry that is on the wheelchair to which docking systems in vehicles will engage, and not the hardware itself.

5) **Other Business**

5.1 Strategic Planning Working Group re Volume 4

Larry indicated that, along with the need to move everything to Volume 4, there is a need and opportunity to rethink the strategy for additional parts of transit wheelchair documents and rethink the terminology for transit wheelchairs. Do we add an adjective like four-point transit, or E-Z-lock transit to qualify the type of tiedown that a wheelchair is considered a transit wheelchair? Do we continue to require that a transit wheelchair provide for securement using a four-point tiedown? Doug suggested that this activity be incorporated into the work of the Education and Implementation Working Group. Aleid asked to be a part of this Working Group.

5.2 Future Funding Opportunities

It was noted that the NIDRR has announced an RERC with priorities that are directly in line with the goals of SOWHAT. The funding of this five-year wheelchair transportation RERC should provide a significant boost to the work of SOWHAT.

5.3 Additions/Deletions to Voting Members

See 2.5.

6) Next meeting dates/locations

The group did not have any clear ideas on when and where the next meeting should be held. Larry will request suggestions from all participants when the minutes are emailed.

7) Adjournment

The meeting adjourned at 12:30.