

**ANSI/RESNA Subcommittee on Wheelchairs and Transportation
(SOWHAT)
UNCONFIRMED MINUTES**

October 22, 2000
Forbes A Meeting Room
Wyndham Garden Hotel
Pittsburgh, PA
9:00 AM-5:00 PM

1) Welcome and Introductions

Chairman Larry Schneider opened the meeting and welcomed everyone to the second meeting of the year, noting that the first meeting was held at the end of February in Vancouver. He then asked all in attendance to introduce themselves and to indicate their affiliation and the organization or interest group they are representing in their participation – e.g., researcher, manufacturer, consumer, clinician, or other.

2) Administrative matters

2.1 Announcement/implications of new subcommittee status

Larry explained that SOWHAT was previously a Working Group within the Wheelchair Standards Subcommittee. However, in June SOWHAT was changed to a separate Subcommittee under the RESNA Technical Guidelines Committee. This means that we now must define a set of voting members and we must seek to have representation from the various categories, including researchers, manufacturers, clinicians, consumers, and others. This also means that our acronym is now correct. Anyone can participate in the meetings, but only designated “members” can vote on official Subcommittee ballots. The mailing list and list serve will continue to include everyone who is interested. There are also no limitations on who can participate actively in meetings and provide input on standards under development.

2.2 Goals for Pittsburgh meeting

Larry indicated that, having completed the initial ANSI/RESNA WC/19 standard, we now must turn our efforts to additional issues that were not included in the first transit wheelchair standard. Since we do not yet have working drafts of additional parts to the transit wheelchair standard, the goal for this meeting is to discuss the different issues, define a clear course of action for each, and establish Working Groups to develop the new standards, or parts of standards.

2.3 Review and acceptance of meeting agenda

Larry reviewed the agenda for the meeting and asked if there were any additions or modifications. There were none and the agenda was accepted (see TW104 in 2.5 below).

2.4 Approval of Vancouver minutes from February 27, 2000– Document No. TW98

Larry indicated that Joe Zaworski had corresponded with him to indicate that the wording in Item 5.2.3 of the Vancouver minutes should be changed. Rather than saying that “... any standardized interface concept will be infringing upon the OSU patent,” the wording should indicate that “... the Subcommittee should be evaluating existing patents for docking systems/universal interface and considering them in their development of standards related to this area.” There were no other changes and the minutes were approved with this modification.

2.5 Distribution and numbering of documents

Larry reviewed recent and new Subcommittee documents that were available to attendees. The new documents include:

- TW97 – Scope Statement for Future Work Items developed at the Vancouver meeting.
- TW98 – Approved minutes from Vancouver meeting on February 27, 2000
- TW99 – Subcommittee report by Larry Schneider dated June 28th to the ANSI/RESNA Technical Guidelines Committee
- TW100 – RESNA press release for ANSI/RESNA WC/19
- TW101 & 102 – Transit Access Reports related to Wheelchair Transportation
- TW103 – L. Schneider letter to Andrew Lopez, FTA dated Sept 14, 2000 regarding the issues of optional wheelchair securement
- TW104 – Agenda for Pittsburgh Meeting dated 10/22/00
- TW105 – Preliminary List of SOWHAT Voting members
- TW106 – Strawman list of Frequently Asked Questions re WC/19
- TW 107 – ISO 16840-4: Seating for Use in Motor Vehicles - Draft standard
- TW108 – List of SOWHAT documents to date
- TW109 – SOWHAT mailing list as of 10/10/00
- TW110 – ANSI/RESNA Vol 1: WC19 April 2000 – approved standard as published by RESNA

2.6 Mail list and list serve updates

Larry Schneider passed around a copy of the SOWHAT mail list and list serve and asked those in attendance to make any corrections or additions, as appropriate.

2.7 Subcommittee membership

Larry indicated that, now that we are Subcommittee, we need to vote on approval of new members. To start the membership, Larry referred to document TW105 that contains a list of persons who have indicated a desire to participate as a voting member. Two names were added to this list, including Jim Swinehart of Metalcraft Industries, Inc. and Peter Grandolfo of Chicago public schools, and the group voted on and approved this list of people as the initial set of Subcommittee members. Because this group over represents manufacturers and researchers, an effort is needed to recruit representatives of consumers, clinicians, transportation service providers, transit operators, and government agencies. Larry noted that it is not required that all groups be represented equally, but the Subcommittee needs to make an effort to obtain a balanced representation, and it needs to document that effort. Various attendees indicated a willingness to help find additional persons who could participate on a regular basis. Bruce Constantin indicated that he was willing to organize financial support from industry to sponsor the travel of consumers to attend the meetings.

Other changes to the mailing list include:

- Add Rick Avcoin from EZ-lock to mailing list.
- Bruce Constantin will provide the name of an individual from NHTSA that he is working with.
- Peter Grandolfo was added as a member in the service provider/other category.
- Mike Wagner should be changed to the category of service provider/school bus transporter.
- Further define the “consumer” category to indicate wheelchair users.
- Suggestions for consumer participation are needed. The Spina Bifida Foundation was suggested as a possible source of consumer representation.
- Transit provider representation should be sought. It was suggested that we distribute an invitation letter to those individuals we would like to have participate.

Larry noted that there is still a pre-balloting process that seeks input from those on the mailing list which is a much larger group than members of the Subcommittee. UPitt Wheelchair Net is a wheelchair technology distribution site that can also be used as a mechanism to facilitate the Subcommittee's efforts, especially with regard to recruiting potential participants. www.wheelchairnet.org is the URL for this website.

2.8 Funding

Larry Schneider pointed out that the success in developing the initial version of WC/19 was largely due to the significant funding provided by various organizations. Doug Hobson indicated that, while the funding was substantial, it was below the amount of effort actually required and a significant effort of voluntary time was involved in the development of WC/19.

Larry indicated that we do not have nearly the same level of funding available for continued development of additional parts to the transit wheelchair standard. Doug Hobson reported that NIDRR intends to fund an RERC on Transportation this fiscal year and is expected to issue a statement on proposed priorities with an invitation for comments early in 2001. SOWHAT should provide input to NIDRR. Gina Bertocci indicated that both PVA and CDC have provided funding in the wheelchair transportation area and are potential sources of additional research funding.

3) Status of related work

3.1 SAE J2249 & J2252

Larry indicated that the process of updating SAE J2249 Wheelchair Tiedown and Occupant Restraint Systems (WTORS) has begun based, in part, on changes that have been implemented in ISO 10542: parts 1-5. The updated surrogate wheelchair drawings are also completed and SAE J2252 will be updated accordingly. The next SAE Restraint Systems Task Force meeting is scheduled in conjunction with SOWHAT in Montana in May 2001 (Note: Subsequent discussions raised the idea of moving the next upgrade of J2249 over to ANIS/RESNA Volume 4 and discontinuing efforts within SAE)

3.2 ISO 10542, 7176/19 & 16840-4

Doug Hobson reported on progress in comparable ISO standards. ISO 10542 currently has five parts. Parts 1 through 4 all involve testing of WTORS using the surrogate wheelchair. Part 1 applies to all WTORS; Part 2 provides additional requirements for four-point strap-type tiedowns; Part 3 applies to clamping type tiedowns; Part 4 applies to docking securement systems; Part 5 applies to systems testing of WTORS using production wheelchairs instead of the surrogate wheelchair and includes WTORS for children, which are not addressed in Parts 1 through 4. Parts 1 and 2 have been completed and are out for final voting; Parts 3 & 4 were discussed at ISO WG 6 meetings during the previous two days and will be modified for voting based on suggested changes; Part 5 is currently out for voting at the CD level.

Doug Hobson indicated that ISO 7176/19, the comparable ISO standard to WC/19, is going through final editorial changes based on discussions during the past two days. It will be sent to the ISO secretariat within the next six months for final voting. Differences from WC/19 are that ANSI/RESNA WC/19 requires testing wheelchairs using a surrogate four-point, strap-type tiedown and will require testing with a lap belt on the wheelchair after two years. ISO 7176/19 does not and will not require a lap belt on the wheelchair and allows dynamic testing with a commercial four-point tiedown that comply with ISO 10542-1 and 2. While 7176/19 requires

that the wheelchair provide for, and be tested using a four-point strap-type tiedown, it also provides for dynamic testing of wheelchairs using other types of securement systems. In addition, ANSI/RESNA WC/19 applies to pediatric wheelchairs for use by occupants aged six and older, but ISO 7176/19 applies only to wheelchairs used by adults.

Gina Bertocci stated that ISO 16840-4: *Seating for Use in Motor Vehicles* is under development and a working draft has been presented at ISO meetings during the past two days. The CD draft is being prepared for October 2001.

Doug Hobson indicated that Aleid Hekstra will take over as Chair of WG6.

3.3 CSA Z604 & Z605

Larry Schneider explained that, in Canada, CSA Z604 (transit wheelchair standard), Z605 (WTORS standard) and D409 (vehicle standard) are currently being updated based upon SAE, ISO, and SOWHAT developments. A new Technical Committee is being formed to vote on these documents, which are expected to be approved by June 2001. Larry has agreed to serve on the CSA Technical Committee.

4) WC/19 Implementation Issues

4.1 Update on WC/19 approval

Larry recognized the accomplishment of the Subcommittee in completing the first ANSI/RESNA transit wheelchair standard, which became officially adopted by ANSI/RESNA on May 19, 2000. This was the only ANSI wheelchair standard that was developed independently within the US. The development took approximately 3-1/2 years but an additional 1-1/2 years was required to complete final pre-balloting and balloting processes. Larry recognized Doug Hobson for his leadership in the development of this document.

Larry further indicated that WC/19 is currently Part 19 of Volume 1 of ANSI/RESNA Wheelchair Standards. However, a new Volume 4 will be established once the next portion of a transit wheelchair standard is available. Volume 4 will be reserved for all transportation-related wheelchair standards. Since we will be developing additional standards or parts of standards related to this area, these new documents will be assigned to different parts within Volume 4. A subgroup of the SOWHAT needs to develop a plan for developing and organizing current and future parts of Volume 4.

Larry also indicated that future revisions of the WTORS standard should probably be handled within SOWHAT and should probably become part of ANSI/RESNA Volume 4. In addition to having all of these standards in one location, many of the same people are involved in the development of both documents.

4.2 Reports on WC/19 from Industry & Others

4.2.1 Jeff Dolezal commented that wheelchair riders should not be denied access to public vehicles. PVA believes that ADA should be followed, - i.e. wheelchairs should be secured but restraint of the wheelchair occupant is their choice. Jeff also pointed out that his experience is that training of transit providers is needed. Jeff also expressed the need for independent securement for wheelchair-seated drivers.

4.2.2 Larry indicated that UMTRI has recently investigated two crashes involving wheelchair-seated occupants. He highlighted one success story of a 20-mph frontal impact of a WC/19 wheelchair. Had the nearly 300 lb wheelchair not been secured at the securement

points provided, this 20+ mph frontal impact could have resulted in serious or fatal injuries to the wheelchair-seated occupant. However, the wheelchair was effectively secured and the wheelchair user sustained only minor injuries.

- 4.2.3 Lee Sheffield of Invacare and Steve Lindquist of Sunrise Medical reported that minimal modifications have been required to bring pediatric wheelchairs into compliance with WC/19. Both indicated that they have focused on their pediatric product lines. Liability has been their greatest concern. Both also indicated that there has not been a high demand by consumers for wheelchairs with the transit option. Larry Schneider indicated that wheelchair manufacturers should not wait for consumers to demand the transit option on wheelchairs. They now have a defined target for designing and testing transit-option wheelchairs and they need to promote the transit option because they know that wheelchair travelers will be safer in these wheelchairs – i.e., they need to use safety as a selling point.

It was also indicated that reimbursement for the cost of the transit option by insurance companies and third-party payers is an important issue that needs to be addressed by the Subcommittee (see 4.4 below).

4.3 FTA and optional securement

Larry Schneider described the situation in Denver where a number of wheelchair users do not want their wheelchairs to be secured due to concerns of wheelchair damage. Consumers sent a letter to Arthur Lopez at the FTS (see TW101 & 102) requesting that wheelchair securement should be optional. Larry sent a letter to Mr. Lopez (TW103) indicating the existence of WC/19 and clarified that allowing wheelchair to be unsecured is not the same as allowing occupants to be unrestrained. Although able-bodied travelers may not wear belt restraints, their seats are anchored to the vehicle. Unsecured wheelchairs pose a hazard to other passengers in the vehicle, as well as to the wheelchair user. Larry indicated that the FTA has determined that decisions about wheelchair securement can be made on a local basis and that local districts can require that wheelchairs be secured if they so indicate in a written policy.

4.4 Promotion and Education on WC/19

Doug Hobson suggested that we have a responsibility for education and networking to inform consumers of the availability of transport-option products (especially in the pediatric products). Mike Wagner indicated that at an upcoming school-bus conference (TSD??) the availability of transport-option products and the importance of their use will be addressed. NAPT and State Directors are also continuing to advance the standard. Lee Sheffield pointed out the need for reimbursement of the transit-option. The VA is the largest purchaser of wheelchairs and they require that wheelchairs meet ANSI/RESNA standards; This should include WC/19 wheelchair requirements. It was suggested that Larry contact Fred Downs regarding the adoption of WC19 into the VA purchasing guidelines. Larry will prepare an informative letter that can be sent out to various organizations to promote the use of WC/19 wheelchairs. The VA's purchasing guidelines can have a significant impact on the industry. The cost of the transit option is approximately \$200, while that of the transit option for wheelchair seating is about \$100. Document TW100 is the RESNA press release that can be used to promote WC/19. Potential targets include the VA, the Shriners, Medicare, PTA's. Larry suggested that a Working Group be formed to address education and promotion. Doug Hobson indicated that UPitt would be willing to work with this group to host a web site dedicated to this effort.

5) New Work Items

5.1 Review of scope for new work items

Larry reviewed the list of new work items (TW 97) that resulted from the Vancouver meeting in February. Discussion followed and it was agreed that the most immediate priorities are:

- 1) completion of the companion guideline document to WC/19,
- 2) development of test procedures and labeling requirements for wheelchairs that can also be effectively secured by other (than four-point) types of tiedown systems,
- 3) development of procedures for WC-19 compliant testing of after-market seating inserts,
- 4) establishing geometry for a universal docking system, and
- 5) adding requirements for wheelchair-integrated restraint systems used by smaller children.

5.2 Status of Companion Document/FAQs

Larry referred the group to a strawman list of Frequently Asked Questions (FAQs) about WC/19 (TW 106), and indicated that these questions and their answers would be included in the companion document that is under development. A stand-alone document of FAQs and answers will also be prepared. Larry asked everyone to look over the list and to forward additional questions for inclusion.

5.3 Wheelchair Seating

5.3.1 After-Market Seating

5.3.1.1 Discussion of need for seating system test independent of specific wheelchair base

Larry indicated that the need for having the ability to test and approve wheelchair seating systems as compliant to WC/19 requirements, independent of a specific wheelchair/wheelchair base, was revisited at the last meeting in Vancouver. Near the completion of WC/19, it appeared that there may not be a need for such an independent assessment of seating inserts. This was because some wheelchair manufacturers were starting to team up with after-market seating manufacturers with regard to designing and sponsoring test matrices involving different combinations of seats and bases, and with regard to legal agreements concerning liability issues.

At the meeting in Vancouver, however, it became clear that there is still a strong need and interest on the part of the after-market seating companies for independent evaluation of their products. This need was discussed and reconfirmed at the Pittsburgh meeting. It was also agreed that a dynamic sled test using some kind of surrogate wheelchair base would be needed. Static testing can be useful to provide guidance to seating manufacturers in the design of their transport-safe seating components, but should not be relied on for compliance to WC/19 crash-testing requirements. A draft of the ISO 16840-4 (TW-107) document, which describes dynamic test methods for seating systems (normative) and static methods (informative) was distributed and reviewed by Gina Bertocci.

5.3.1.2 Test Results

Gina Bertocci reviewed results of static testing conducted at Pittsburgh under sponsorship from PVA and CDC. She and Miriam Manary presented the results of recent sled tests that have been conducted at UMTRI to provide quantitative information on dynamic loads imposed on wheelchair seats by the occupant for different securement-point-to-wheelchair center-of-gravity relationships. These results, will be used to validate computer models, help determine the most

appropriate static loads for pre-evaluation of wheelchair seating systems and to guide manufacturers in the design of transport-safe seating systems.

5.3.2 Secondary Supports

There was no discussion on this subject as it is not considered a high priority at this time.

5.4 Optional Methods for Wheelchair Securement

5.4.1 Test Method/Labeling for Docking Securement

Larry indicated that, for the foreseeable future, a WC/19-transit wheelchair will be required to provide for effective securement using the current most universal four-point, strap-type tiedown system. However, wheelchairs can also be designed and dynamically tested for securement by other methods, such as docking securement systems used by wheelchair-seated drivers. There is therefore a need to include in WC/19, or a related part, test procedures and criteria that will allow wheelchair manufacturers to indicate that a wheelchair model provides effective seating in a frontal crash for these alternative types of securement systems. Larry indicated that this should not be difficult to do, and that he will draft the needed wording for review at the next meeting. The primary question is how and whether to incorporate this addition into the existing WC/19 document, or whether to make it a separate part of Volume 4. Another question relates to how a wheelchair should be labeled when it has been demonstrated to be crashworthy for other types of securement systems.

5.4.2 Universal Docking Concept

Doug Hobson provided a brief overview of the Universal Interface (UI) concept and progress on this activity at the Univ. of Pittsburgh. The UI concept is intended to promote independent wheelchair securement, reduce the time for wheelchair securement, avoid the need for driver and/or attendant training, eliminate misuse of tiedowns, etc. To move forward beyond limitations of four-point tiedowns, automatic docking is needed. For a docking system to work universally in public vehicles, as is now achieved with the four-point tiedown, it is necessary to establish a universal interface geometry for the wheelchair that all docking devices in vehicles are capable of connecting with. The UI concept needs to be applicable to all wheelchairs, but especially to powered wheelchairs since these wheelchair users may be in the greatest need for assistance in securement/safe travel.

Bruce Constantin strongly supported the need for moving forward with a standard which will promote docking systems. He further indicated that he has a design for docking system that is universal in its adaptation of securement with all wheelchair types. He did not, however, provide any further information about his new docking system.

Joe Zaworski presented an alternative concept for interfacing wheelchairs and docking systems. His proposal is to specify a universal receptacle (UR) on the wheelchair that would accommodate the add-on wheelchair components needed for docking-type securement in a particular vehicle. The idea is that these add-on components would be quickly connected to, and disconnected from, the wheelchair as needed upon entering and exiting a vehicle. Joe's idea is similar to that of specifying the geometry of the square tubing into which the trailer-hitch shaft with 2" ball is placed, whereas Doug's idea is analogous to specifying the size and location of the 2" ball. By Joe's idea, the actual structural geometry required to interface with the docking device in each vehicle could be different and unique to that vehicle. The wheelchair interface hardware would be provided in the vehicle and would have the specified universal geometry required to be attached to the wheelchair's UR.

There was general concern among Subcommittee members that Joe's proposal requires that the driver or attendant add and remove the quick-disconnect hardware from the wheelchair in order to use the docking system. This concept defeats the primary advantage of the independent docking system approach to wheelchair securement. There was also general concern that providing a UR on the wide variety of wheelchairs, such that a single piece of Universal Interface hardware with receptacle-mating geometry could be quickly installed or removed and provide for effective wheelchair securement, would be extremely difficult and probably impossible.

Larry raised the issue of existing docking system patents that pose potential obstacles to specifying a particular Universal Interface geometry. Of particular concern is the patent by Oregon State University (OSU) which appears to claim that almost any type of protruding structure from a wheelchair that is designed for docking securement by means of resisting a moment (i.e., a torque) would infringe on the OSU patent. Larry indicated that these patent issues need to be explored and resolved but were not, at this time, a reason to give up on the concept of a Universal Interface in favor of a Universal Receptacle. Doug suggested that the UI needs to be free from patent royalties and the committee needs to proceed independently of patent infringement issues in order to move the industry forward. Peter Grandolfo expressed concern related to being a part of this group if patent infringement was not taken into account as we move forward with the development of such a standard. The group agreed that Larry would address this issue of patent infringement with ANSI, seeking legal guidance on how the Subcommittee should proceed.

A Docking System Working Group was established consisting of Doug Hobson, Steve Lindquist, Tom Adams, Winfried Kraft, Rick Avcoin, Bruce Constantin, Joe Takacs, Joe Zaworski, Jean Marc Girardin, Lee Sheffield, and Larry Schneider. Doug will serve as chair of the WG.

6) Review and Establishment of Working Groups

6.1 Working Group on Implementation, Education and Training

Larry indicated that there are many issues related to the implementation of WC/19 and the education of public, private, professional, and government groups about WC/19. A Working Group is needed to deal more effectively with these issues. The Working Group will consist of Doug Hobson, Mike Wagner, Peter Grandolfo, Jean-Marc Girardin, Jeff Dolezal, Larry Schneider, and Bette Cotzin. Larry will chair the Working Group.

Larry indicated that the WC/19 companion or guideline document is now under development. It will include detailed discussion of basic occupant protection principles, rationale for requirements in WC/19, interpretation of disclosure results from WC/19 testing, and answers to frequently asked questions (FAQs) about WC/19. The Subcommittee members should review the strawman list of FAQs which will also be posted on the UPitt website. It was also suggested that we could do a discussion group forum on FAQs initiated by SOWHAT. Initially it is planned to have one companion document but two documents may ultimately be desirable – a technical document for manufacturers and a second document targeted to consumers and clinicians. Jeff Dolezal suggested that the group consider converting the finished Companion Document into a publication similar to that of Peter Axelson's PVA-sponsored document on wheelchair selection/standards.

6.2 Working Group on Child Restraints

Larry noted that the current version of WC/19 does not address issues that are uniquely relevant to wheelchairs used by children under the age of six. While the contents of WC/19 are still relevant to younger children, there are additional requirements with regard to harness-type

restraints that may be integrated into wheelchair seats, that should be added to WC/19. A Working Group was established to address these issues and to draft the relevant sections to be added to WC/19 or placed in a new part of Volume 4. This Working Group will include Miriam Manary, Peter Grandolfo, and Bette Cotzin. Miriam will chair the Working Group.

6.3 Working Group on Universal Interface/Docking

As noted above, the Working Group for this activity consists of Doug Hobson, Steve Lindquist, Tom Adams, Winfried Kraft, Rick, Bruce Constantin, Joe Takacs, Joe Zaworski, Jean Marc Girardin, Lee Sheffield, and Larry Schneider. Doug will serve as chair of the WG.

6.4 Working Group on After-Market Seating

The Working Group will combine with the similar Working Group from ISO WG 6 and will consist of Gina Bertocci (chair), Miriam Manary, Larry Schneider, Lee Sheffield, Steve Lindquist, Bob Appleyard, Alan Lynch, Barend Ter Haar, Dongran Ha, Linda VanRoosmalen, Tricia Karg, Jim Swinehart, Tom Novotny, Foster Davis

7) Separate Working/Breakout Group Meetings (if time allows)

Time did not allow for separate meetings of Working and Breakout Groups.

8) New Business

There was no new business.

9) Review of assignments and action items.

Assignments and action items were not reviewed.

10) Next meeting dates/locations

The next meeting is scheduled for May 27th at Chico Hot Springs in Pray, Montana, following ISO WG 6 meetings. The meeting will also be held in conjunction with the SAE Restraints Task Force, although this activity may also be transferred to SOWHAT by then. Attendees of SOWHAT are encouraged to attend ISO WG6 meetings since discussions will be the same in many cases. Working Groups from both standards efforts can possibly meet jointly on Thursday or after hours. For those who want to stay in Yellowstone Park, the phone number for reservations is 307-344-7311.

11) Adjournment

The meeting was adjourned at about 5:00 PM.