Votes and Comments in Response to 1999 WC/19 Pre-ballot Mailing and Editorial Committee Responses

Offered by	Vote	Clause	Specific Comments	Accepted/Not Accepted & WC/19 Changes
Ray Lee New Haven Equipment	Approve with comments	A.6	A.6 Test Methods, Paragraph (e) indicates required Tension of Wheelchair Tie Down Assemblies as 100N to 200N (22-44 Lbs). These values, lowered to more closely duplicate real world actuality will make the standard vulnerable to future legal attack "when" (Not If), an open hook tiedown system detaches from a wheelchair during travel. That thinking, which also led to A.D.A. permission to two-inch motion tolerance of an anchored wheelchair prior to travel from a bus stop, is not shared by school-bus officials. The State Of California, Title 13 regulations for securement of wheelchairs prohibits MOTION (As tested by the installer), prior to movement of the schoolbus. A.6 paragraph (e) should read 400N to 550N to represent proper pretensioning of tiedown assemblies to anchor an occupied wheelchair.	Not accepted. This is a tiedown and real-world issue, not a wheelchair and wheelchair standard issue. The tension range specified for testing in the standard will not result in disengagement of a hook during a test because the surrogate tiedown uses capture hooks. The frontal impact test is not intended to evaluate real-world disengagement conditions but rather is a dynamic strength test of the wheelchair and securement points. The standard does not control, or attempt to control tensions established in the real world. WTORS manufacturers should indicate proper tensioning procedures in their literature. The standard deals with the concern about tiedowns detaching from securement points by specifying a maximum slot geometry for wheelchair securement points. If it becomes established that real-world tensioning levels are in the 400N to 550N range, the test procedures can be adjusted in future versions of the standard. For now, however, wheelchair strength should be evaluated under conditions that are representative of the real-world conditions today, which are believed to be in the 100N to 200N tension range.
Patricia Karg U. of Pittsburgh	Approve with comments	Figure 2 4.9.4 Normative References 5.3I 6.2a 6.4c and j	Figure 2 cut off. Not clear what measuring to meet requirements of section 4.9.4. Should wc/vol.1 – section 93 be listed in Normative Reference Section or elsewhere. Wording is confusing since "as indicated by" could be read as referring to the wc imposing forward loads on ATD. Reword. Equation is clear, however. Correction of wc/vol 15 – section 15 to wc/vol 1. are redundant as far as use of both pelvic and upper torso belts.	Error made in copies sent. This has been corrected. Comment noted. This section has been clarified. Accepted. Good point. Reference has been added to Normative Reference Section. Accepted. Wording has been changed to clarify meaning. Accepted and corrected. Accepted. 6.4j has been deleted.

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Jeffrey Dolezal PVA	Disapprove with comments	4.9.1	PVA's concerns on Pelvic Restraint Requirements (optional vs. mandatory) have not been resolved to our satisfaction. Several documents related to our concerns and attempts to address these issues are attached. We believe our concerns have essentially been ignored or disregarded. Please forward our concerns, as outlined in the attached documents to the SOWHAT committee members for specific consideration and resolution.	At the November 1997 SOWHAT meeting, there was strong consensus to keep the requirement that WC/19 wheelchairs provide for, and be sold with, a wheelchair-anchored pelvic belt that conforms with 4.9.2 through 4.9.5 and 5.2, and that has been used in the dynamic test of Annex A for compliance with 5.3. However, it was also agreed that this requirement would not become effective until two years after the effective date of the standard in order to give the wheelchair manufacturer's time to modify products for this requirement. This is a requirement for the wheelchair manufacturer and not for the user, who has the option of not using the pelvic belt and removing it from the wheelchair. It is thus not true that PVA's concerns have not been listened to. PVA's representative at this meeting (John Wright) was the only person who expressed a desire for this requirement to not be mandatory after two years. Nevertheless, a further compromise on this issue is proposed. This compromise is to remove the requirement that the wheelchair be sold with a crash-tested pelvic restraint. Thus, 4.9.1 has been modified to require only that, after two years, the wheelchair provide for, and be dynamically tested with, a wheelchair-anchored pelvic belt that conforms with 4.9.2 through 4.9.5 and 5.2. In conjunction with this change, and in view of the fact that a wheelchair may not provide for a wheelchair-anchored pelvic belt for two years from the effective date of the standard, additional requirements have been added to section 6.2 (Presale Literature), 6.3 (User Instructions), and 6.4 (User Warnings), as indicated on the attached pages from the standard. It should also be noted that wheelchair manufacturers may choose not to sell WC/19 wheelchairs without a pelvic belt, and that the standard does not, and cannot, control the steps a manufacturer may take to protect themselves from consumers installing an inappropriate pelvic belt for use in a motor vehicle.
John Wright PVA	Disapprove	4.9.1	PVA's comments on pelvic restraints have not been resolved to our satisfaction. Several documents related to our concerns and attempts to address these issues are attached to Mr. Dolezal's ballot. We believe our comments have been ignored or disregarded. Please forward the comments to committee members per Mr. Dolezal.	See comments for Jeff Dolezal.

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Joe Takacs Kinedyne Corporation	Approve with comments	Page 10	Move Table 1 title to next page over the table.	Accepted and done.
		Figure 6	Shouldn't the 9.398 $\pm$ .203 dim be 9.264 $\pm$ .127 and the 5.182 R $\pm$ .102 be 5.128 R $\pm$ .127	Accepted. Dimensions provided by Am-Safe are actually somewhat different than these but they are very close.
		6.3g	Rather than a description of the tiedown end fittings, why not a statement that the end fittings shall be compatible with paragraph 4.7 and annex B requirements.	Not accepted. It is important that the manufacturer give more specific information about the dimensions and/or geometries of end fittings that will effectively mate with the securement points, not just a statement that they shall be compatible.
		Page 58	List case B before case C.	Accepted. Paragraph has been moved.
Tom Adams Cleveland Clinic	Disapprove with comment	4.3	We cannot have a standard for a transportable wheelchair that is too large to be transported. Wheelchair lifts and public access vehicles are designed for wheelchairs less than 48 inches in length. If this oversight is corrected, I would approve the document as a significant contribution to wheelchair transportation.	Not Accepted. The Committee believes that it is most important to be compatible with ANSI/RESNA WC/Vol. 1 – Section 93 at this time. Also, the overall length of a wheelchair is not the dimension that determines whether the wheelchair will fit on an ADA lift; this is more a function of the front/back wheelbase. The Committee wanted to minimize the numbers of wheelchairs that could not comply with the standard (e.g., it wanted to minimize the number of wheelchairs that are not provided with securement points for reasons of size or weight). The standard requires the manufacturer to indicate the wheelchair length in presale literature and to mention that wheelchair size can be an important factor in accessing and maneuvering in a motor vehicle. Although the requested change was not accepted, the wording of 6.2b in the Presale Literature requirements has been changed as indicated on page 16 of the standard (attached).

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Winfried Kraft Orthosafe, Inc.	Disapprove with comments	4.8	Locations of Securement Point This layout needs to be reviewed because it does not work in the dim. As given.	Not accepted without further clarification of why "it does not work."
		4.9.5	Shoulder-belt interface design as shown is not to FMVSS 209; at present time mgf. do not allow interface of equipment (specially American Safety) February 22, 1999. This produce is used by Kinedyne.	Not accepted. This issue has been discussed at length by the entire SOWHAT. It is a design that has been used for years by the auto industry and is currently successfully used by several different WTORS that comply with SAE J2249. The reason the pin/bushing mechanism does not comply with FMVSS209 has not been made clear.
Stan Cooper Hoveround, Inc.		Annex A A.4.3	Testing of structural integrity of wheelchair – proposal tests frontal impact at 48Km/h, (30mph) yet minimum legal speed on interstate and other arterial roads is 40 mph (64Km/h). Suggest increasing frontal impact test velocity to at least 40 mph (64Km/h).	Not Accepted. A 30-mph impact test is a well-accepted bench mark in the auto industry for testing vehicles and restraint systems, and has been accepted by ISO, CSA, and SAE groups writing standards for WTORS and wheelchairs for general use in motor-vehicle transportation. Also, there is a big difference between vehicle travel speeds and crash DeltaVs – although vehicles travel at speeds of 60 to 70 mph, DeltaVs greater than 30 to 35 mph are extremely rare.
		Annex A A.2	An unused wheelchair is used for testing. Such a device will be perfectly adjusted and torqued by the manufacturer to assure a reasonable chance of meeting the requirements. That wheelchair is not representative of the wheelchair that will be transported (say) at two years of age. Suggest subjecting test wheelchair to WC-08 (fatigue, two-drum and curb-drop testing) to artificially age the wheelchair immediately prior to frontal impact test run.	Not Accepted. Federal standards for motor vehicle crash testing do not require testing of aged vehicles and restraints. This should not be required for wheelchair crashworthiness testing and would be unduly complicated and expensive to implement.

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Gil Haury Invacare, Inc.	Approve with comments	6.1.1	Simplify wording to "Conforms with ANSI/RESNA WC/19" in order to reduce label size.	Accepted in order to simplify labeling and keep size of labels reasonable.
		6.1.3	Change wording to "Not intended for occupant restraint in a moving motor vehicle"	Accepted. Wording change has been made.
		6.1.4.c)	Change to require line widths for symbol between .031 and .062 of the overall symbol height, rather than a proportion of overall symbol height	Accepted. Changes have been made.
			How do we know that within two years all transport vehicles will have vehicle anchor points for the new three-point occupant restraint system?	They generally do now. For wheelchairs with on-board pelvic belts, only the vehicle-anchored shoulder belt will be needed, but vehicles will need to have three-point anchored restraints to deal with wheelchairs that do not have on-board WC/19 pelvic belts.
			How do we know that when the new three-point lap and shoulder belt is used on a folding chair and the vehicle is involved in a rollover forward impact that the chair may tend to fold somewhat and let the user submarine out of the chair?	Very few chairs will have a fully integrated belt restraint system although the standard allows for this. If the wheelchair can handle the occupant restraint forces of the fully integrated restraint and meet all the performance requirements of the frontal impact test, then there should not be a serious problem. It is also believed that using on-board pelvic belts will reduce the tendency for submarining under the pelvic belt from that of vehicle-anchored pelvic belts, even if there is some chair folding.
			Will manufacturers, after the three-point lap and shoulder belt become mandatory, need to have a kit of the above for the chairs built in the first two years of the standard?	Only the on-board pelvic belt will be mandatory. Wheelchairs sold before the 2-year grace period is up without on-board pelvic belts would not be required to be retrofitted for an on-board pelvic belt. It would be great if wheelchair manufacturers offered such a retrofit kit, however, and tested their products to make sure that the kit and wheelchair were crashworthy with the retrofitted on-board pelvic belt.
			What data do you have on testing the new chair mounted lap and shoulder belt?	Some pediatric wheelchairs have been tested with fully integrated restraint systems using a three-year or six-year old ATD, and the results have been very good. Several adult wheelchairs have been tested with a wheelchair-anchored pelvic belt with good results. The standard does not require a wheelchair-anchored shoulder or upper-torso belt, as this would be extremely difficult to achieve with most wheelchairs intended for use by adults.

Manary, Miriam UMTRI	Approve with comments	A6cii B5b	Change maximum lateral distance between rear anchor points from 508 mm to 610 mm (We have tested WC's at more than 508 mm	Accepted and changed
		4.1b	Define seatback angle as the angle of the line between the ATD head c.g. and H-point produced when the ATD is seated rather than depending on arbitrary seatback contour	Not accepted. The issue for this measurement is whether the wheelchair provides for a seated posture, and it is felt that use of a rigid seatback frame member is simple and adequate for this purpose, even though it may have a variable relationship to occupant posture across different wheelchairs.
		4.94 Table 1	Clarify information on pelvic belt adjustment range in Table 1 of Section 4.9.4.	Accepted and done.
		5.3g	Remove vagueness by increasing list of possible parts	Not accepted. It is felt that the description is adequate and clear.
		C.4i	Change $\pm$ 2 mm to $\pm$ 5 mm	Accepted.
		Figure 7	Flip hook symbol upside down	Accepted, although it can probably be oriented either way, flipping the hook symbol makes some sense.
		5.3j	Change "percent" to % to be consistent with 5.3I	Accepted.
		5.4	Add requirement about effective engagement of the hook with securement point.	Accepted. The following has been added as 5.4.2: "When tested in accordance with B.5 of Annex B, each securement hook shall effectively engage with each securement point, so that there is solid contact between the hook and the securement point structural member in the line of each securement-point-to-anchor point path.
		5.5	Add a level of accuracy to measurement required.	Accepted. The words "to an accuracy of $\pm$ 5 mm" have been added.
		7.2g	Remove the word "numbered."	Accepted. It now reads "a unique test report number on each page."
		A6.d	Change castor to caster.	Accepted and done throughout document.
		Figure A.2	Remove undefined variables from figure.	Accepted. Figure has been simplified.
		B.7	Question the use of the term "tester."	Accepted. Tester has been changed to "test person."

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Larry Schneider UMTRI	Approve with comments	Foreword	Suggest adding some words to the Foreword that: a) gives the rationale for the 30-mph, 20-g level of frontal impact testing, and b) the rationale for the requirement that a wheelchair be securable by a four-point strap-type tiedown.	Accepted. Two paragraphs have been added to the Foreword (paragraphs 7 and 9) as indicated on enclosed page ii from WC/19.
		Scope	Add the following: a) that the standard applies to wheelchairs intended for <u>single occupancy</u> b) <u>electric</u> wheelchairs to list of wheelchair types to which it applies c) the qualifier that the standard applies to wheelchairs intended to be secured by four-point, strap-type tiedowns <u>that comply with SAE J2249</u>.	Accepted. Accepted. Accepted.
		A.3c, Table A.1	Add wording to clarifying that wheelchairs designed for use by adults can be tested using either the midsize-male ATD or the large-male ATD. Previous wording made it sound like the large ATD had to be used if a wheelchair was designed for occupancy by adults that might weigh over 220 lb, but this was not the intention.	A note has been added under Table A.1 indicating that either ATD may be used.
Douglas Hobson U. of Pittsburgh	Approve			
Barry Wolff The Braun Corporation	Approve			
Foster Davis Freedom Designs, Inc.	Approve		The standard should be adopted without further delay, so a beginning point will be established for implementation	
Bette Cotzin Washtenaw Intermediate Schools	Approve			
Judy Marks Washtenaw Intermediate Schools	Approve			

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Bruce Constantin E-Z Lock, Inc.	Approve		Lots of good work. Good job!	
Michael Wagner Alpha Bus Co.	Approve			
Joel Murdy Sunrise Medical, Inc.	Approve			
Tom Whelan Sunrise Medical, Inc.	Approve			
Greg Shaw UVa	Approve		The definitive non-fiction work of this millenium!	
Gina Bertocci Uof Pittsburgh	Approve		Suggest in future revisions to either eliminate or modify sled test criterion related to evaluation of wc loading occupant. Modification should reflect assessing wc & knee forward excursion at same point in time as opposed to using peak values which may not occur at the same time.	To be further considered for next veresion. Once a wheelchair is required to be tested with a pelvic belt anchored to the wheelchair, this ratio requirement should no longer be necessary or useful. The test was primarily developed for WTORS testing in J2249 with the rigid surrogate wheelchair, where the test is used to make sure that the vehicle-anchored occupant restraint did not assist the tiedown system by applying forces through the ATD to secure the wheelchair. At the time, it was realized that the most accurate assessment would result by comparing ATD knee and wheelchair excursions at each point in time. However, it was felt that using peak wheelchair and knee excursions was much simpler and would generally be representative of the overall situation since it is believed that peak wheelchair and peak knee excursions generally occur at similar times. If is demonstrated that this is not the case, it may be necessary to change the procedure in the future. The test was retained in WC/19 where failure to comply would primarily imply that the wheelchair securement points provided too much “give.”
Paul Ulrich General Motors	Approve			
John Phillips Otto Bock	Abstain			
Jean Marc Girardin Q’Straint, Inc.	Approve			
Peter Grandolfo Chicago Public Schools	Approve			
John Thacker UVa	Approve			
Karen Finkel NSTA	Approve			