

REPORT OF VOTING/ANNEX B

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Date 1999-09-13	ISO/DIS 10542-2
Secretariat SIS	ISO/TC 173 sc 1

Member body	<p align="center">COMMENTS</p> <p align="center">Comments shall be reproduced as received either by re-typing them, or directly by pasting them on this form</p>	<p align="center">OBSERVATIONS OF THE SECRETARIAT</p> <p align="center">on each comment submitted</p>
<p>DENMARK DS</p>	<p>DENMARK votes NO the the ISO/DIS 10542-2. This vote can be changed to YES if the following comment is accepted.</p> <p>Figure 2, page 4 The figure with the cross section A-A: The value 30 mm (+0; -1) shall be changed to: ".x mm ± 0,1 mm". Add a Footnote: " x is depending on the mass and the material of the wheelchair." Rationale: It is not possible to state a value. of 30 mm as this is depending on the mass of the wheelchair, This.is also reflected in Annex A. page 6.</p>	<p><u>Rejected.</u> These dimensions refer to the surrogatge wheelchair, not real wheelchairs with different masses. These dimension serve only as a gauge to see if the tiedown end fittings will fit on wheelchair frame tubing. It is correct at 30 mm +0, -1.</p>
<p>FRANCE AFNOR</p>	<p>Observations generales Le cas des autobus et autocars n'est pas prévu par cette norme qui ne considère qu'un type de choc frontal, correspondant aux decelerations subies par les vehicules legers et minibus. Ce fait pourrait etre penalisant pour l'innovation en direction de dispositifs specifiques aux autobus/autocars pour lesquels les concepteurs chercheraient des solutions plus pratiques et plus rapides à mettre en oeuvre, en rapport avec les conditions de trafic et d'exploitation en service public. La reference d'un tel type de choc existe dans le Reglement CEE et la Directive Europeenne 96/37 sur les sieges et ceintures de securite. ref : 01 3-93</p>	<p><u>WG discussion</u> : Requires translation</p>

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GERMANY DIN	<p>Reasons for; disapproval</p> <ul style="list-style-type: none"> - Crashtests with wheelchair-tiedown and occupant -restraint system, for which the occupant restraint system consist of a pelvic belt only, shows that the strain of the head increase due to the jackknifing effect. Therefore an occupant-restraint system shall have in every case pelvic. belt and an upper torso belt (three- or four point belt). A pelvic belt only as an occupant restraint system is not sufficient. <p>The angle to the horizontal for the pelvic belt shall be as great as possible, so that the submarining effect will be avoided. The allowed angle from 30° (45°) and more for a fragil wheelchair is too small. The allowed angle of the upper torso belt should be between 60° and 80°.</p> <p>The geometry of the occupant-restraint system shall be explained in a better way. The description of-the geometry for the occupant-restraint system should be orientated to the ECE-regulation I6.In this case the particular requirements of the wheelchair shall be considered. The geometry of the pelvic belt and of the upper torso belt shall be defined.</p> <p>-¹ For many wheelchairs it is not possible to lead the pelvic belt in a correct way even if there existed an appropriate description of the belt geometry for the occupant-restraint system. The reasons are the different constructions of the wheelchair (e.g. arm- and backrest or wheels), so that the pelvic belt will be lead not low enough or completely wrong over the pelvis. The lead of the pelvic belt which is not low enough brings by frontal collision serious abdominal injury. Therefore the lead of the pelvic belt shall pull through the wheelchair. The pelvic belt shall be fixed direct with the adapter system of the wheelchair which guarantee the optimal leading of the belt.</p> <ul style="list-style-type: none"> - The front and back. tiedown system of the wheelchair shall be fixed at clear visible and stable points; which reduce the misues by securing the wheelchair to a minimum. These fixation points can: be equipped additionally at different wheelchairs. - The fixation points at the back for the wheelchair tiedown system shall be connected by an adapter system with the fixation of the pelvic belt. Hereby among other things the resulted restraint force will be: reduced by a fragil wheelchair. 	<p><u>Accepted</u> pending WG discussion: see comments under Part 1</p> <p><u>Rejected:</u> reference to the pelvic and torso belt angles is not made in Part 2.</p> <p><u>Rejected:</u> descriptions of occupant restraint systems is covered under Part 1.</p> <p><u>Rejected :</u> This is a wheelchair issue being dealt with in 7176/19, not a WTORS issue.</p> <p><u>Rejected :</u> This is a wheelchair issue being dealt with in 7176/19, not a WTORS issue.</p> <p><u>Rejected :</u> This is a wheelchair issue being dealt with in 7176/19, not a WTORS issue.</p>

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JAPAN JISC	Disagree with comment Comment: The numerical value (20) of the gravity acceleration of the collision examination prescribed in this standard is too much. Japanese Standard value is 4, therefore it isn't suitable for the actual circumstances.	<u>Rejected</u> : see comments in Part 1 observations																																								
KOREA KATS	1). In the article 3.8 in p 2, "100" should be written as "10°". 2). In the article 3.13 in page 2, "connect" should be replaced by "are connected to". 3). In the article 4.3 a) "attach to" should be replaced by " be attached to". .	<u>Accepted</u> <u>Accepted</u> <u>Accepted</u>																																								
NETHERLANDS NNI	1) Note 1 of 4.2 refers to A.5 of 10542-1. This should be <u>Annex B</u> of ISO 10542-1. 2) Clause 4.1.b "two adjustable assemblies ... for adjustment at ... both front and rear anchor points" is in contradiction with clause 4.3.a "both fixed length assemblies should attach to either the front or the rear". Leave out both front and rear" in clause 4.1.b. 3) In the TEST project we measured the adjustability of several currently commercially available 4-point strap-type tiedowns. The results are given in the table underneath. As shown in the table will most systems have difficulty with complying to the adjustment ranges. <i>Adjustability of 4-point strap type WTORS measures in (cm), dimensions measured between (track) anchor and (wheelchair) attachment point.</i> <table border="1" data-bbox="281 987 1365 1120"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>front strap - min.length</td> <td>27</td> <td>33</td> <td>36</td> <td>37</td> <td>43</td> <td>44</td> <td>46</td> </tr> <tr> <td>front strap - max.length</td> <td>75</td> <td>84</td> <td>--</td> <td>118</td> <td>--</td> <td>88</td> <td>100</td> </tr> <tr> <td>rear strap - min.length</td> <td>41</td> <td>33</td> <td>49</td> <td>40</td> <td>46</td> <td>35</td> <td>46</td> </tr> <tr> <td>rear strap - max length</td> <td>73</td> <td>84</td> <td>79</td> <td>92</td> <td>87</td> <td>89</td> <td>87</td> </tr> </tbody> </table>		A	B	C	D	E	F	G	front strap - min.length	27	33	36	37	43	44	46	front strap - max.length	75	84	--	118	--	88	100	rear strap - min.length	41	33	49	40	46	35	46	rear strap - max length	73	84	79	92	87	89	87	<u>Accepted</u> Probably should refer to Annex A of Part 2. <u>Rejected</u> : statement as intended <u>WG discussion</u> <u>WG discussion</u> : Not clear what all this means. Further explanation required at meeting.
	A	B	C	D	E	F	G																																			
front strap - min.length	27	33	36	37	43	44	46																																			
front strap - max.length	75	84	--	118	--	88	100																																			
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	<p>4) In the TEST project an inventory was made on the location of the anchor points stipulated by the WTORS manufacturers. Several manufacturers did not give any indication at all. Several different dimension are summarised underneath. The for/aft distance in the standard between 1220 to 1375 and the mid-point location stipulated in A.1.b (1300 mm) is larger than currently specified by several WTORS manufacturers. The anchor point dimensions should be reconsidered.</p> <table border="0" data-bbox="281 548 1367 649"> <tr> <td>attach distance for/aft</td> <td><1200,</td> <td>1200 (± 100),</td> <td>1120-1370,</td> <td>~1370</td> </tr> <tr> <td>attach distance left/right front</td> <td>330,</td> <td>370 (± 50),</td> <td>~550,</td> <td>560-660, ~700</td> </tr> <tr> <td>rear</td> <td>330,</td> <td>330-380,</td> <td>~550,</td> <td>550 (± 50), ~700</td> </tr> </table> <p>5) How can this standard require minimum and maximum length of straps in clause 4.2 or a "tension zone" in clause 4.3.b when the position of the anchor points to the vehicle are not required to be within a standardized distance range? Standardization of installation recommendations has to be required in clause 5.1</p> <p>6) There is no need to refer in clause 4.4 to the surrogate wheelchair (see our comment on 10542-1). Rewrite this clause such that it refers to a "surrogate" securement point: We suggest: "....shall engage with the securement point shown and specified in Figure 2".</p> <p>7) From investigation into daily practise in the TEST project it became clear that users are not aware of the proper geometry of the WTD. Although we are aware that the written instructions supplied with the product are not the ultimate way to communicate these aspects, we would like to be sure that they are incorporated in the user instructions. Therefor we suggest to add a clause stating that the information equal to that of clause 5.1 shall also be given in the user instruction. This instruction shall also include a description of (not) appropriate wheelchair</p>	attach distance for/aft	<1200,	1200 (± 100),	1120-1370,	~1370	attach distance left/right front	330,	370 (± 50),	~550,	560-660, ~700	rear	330,	330-380,	~550,	550 (± 50), ~700	<p><u>WG discussion</u> : Not clear what all this means. Further explanation required at meeting.</p> <p><u>WG discussion</u> : needed and clarification required. Figure C.1 in Annex C provides rationale for adjustment lengths in Table 1 and includes expected anchorage distances. This standard cannot place requirements on vehicle anchorages.</p> <p><u>Rejected</u> pending WG discussion. The surrogate wheelchair is referenced because it provides a physical guage to assess whether end fittings comply.</p> <p><u>WG discussion</u></p>
attach distance for/aft	<1200,	1200 (± 100),	1120-1370,	~1370													
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	<p>8) The for/aft anchor point position specified in A.1.b is outside or at the border of installation specifications given by WTORS manufacturers (see point 4). Please reconsider.</p> <p>9) Why specifying the for/aft distance and leaving the lateral rear distance complete free and giving a nearly open range specification for the lateral front distance? Standardization of installation recommendations would be very useful for the end-user.</p> <p>10) Why specifying the strap length in clause A.2 whereas specifying angles in clause 5.1? We suggest to stick for clause A.2 to the specifications given in figures 3 and 4.</p> <p>11) Within the TEST project we encountered problems in tightening the WTD. We would encourage to put a force requirement on the effort to pull the straps or close the over-centre buckle or similar devices.</p>	<p><u>WG discussion</u></p> <p><u>WG discussion</u></p> <p><u>WG discussion.</u> A.2 specifies test set-up conditions and uses a minimum strap length which, based on the height of the rear securement points on the surrogate wheelchair, gives a rear-strap side-view angle that is within the preferred zone (i.e., about 31 to 33 degrees). One could have specified the angles but it is easier to measure the length when setting up a test. The angles indicated in the figures referenced in 5.1 are the recommended tiedown angles and are a function of securement point locations on actual wheelchairs. This is simply information to be conveyed to installers and angles are more useful and meaningful than lengths.</p> <p><u>Rejected</u> : It would difficult to determine first what should be an appropriate force (with tolerances) and secondly how to measure them with acceptable cross-lab repeatability. It is too late in the process to introduce a requirement of this complexity. UVa conducted tests that indicated that the test results are not significantly affected by the initial tension in the tiedowns, as long as they are tensioned to a reasonable level.</p>

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	<p>Annex <u>Intermezzo:</u> To get some feeling for the results given in this paragraph, this intermezzo gives examples of very rough estimations of the forces occurring during a dynamic impact.</p> <p>The force occurring during the crash will <u>at least</u> be: deceleration * mass.</p> <p>Depending on the design of the WTORS the mass will consist of.:</p> <ul style="list-style-type: none"> *. the mass of the wheelchair (in case of wheelchair tiedown only) *. the mass of the occupant (in case of separately attached occupant restraint) *. both wheelchair and occupant mass (in case of combined attachment and/or anchor points for the wheelchair tiedown and the occupant restraint system). <p>Since most tested systems included integrated tiedown and occupant restraint systems, in the examples in the tabel underneath all calculations take the mass of both the wheelchair and the occupant into account.</p> <p>In a frontal crash we may assume that all forces go through the rear attachment (connection WTORS/USMV) and/or rear anchor (connection WTORS/vehicle) point(s). Depending on the design of the WTORS the calculated force can be divided over one or more attachment or anchor points:</p> <ul style="list-style-type: none"> * 4-point strap type: 2 rear attachments and/or anchor points * delta-systems: 2 rear attachment points but only 1 rear anchor point <p>The mass of the ISO-surrogate wheelchair is 85 (kg). The mass of an standard manual wheelchair is around 25 (kg). The mass of the Hybrid III dummy is 75 (kg).</p> <table border="0" data-bbox="281 987 1018 1198"> <thead> <tr> <th></th> <th></th> <th colspan="2">4-point strap type</th> <th colspan="2">delta-systems</th> </tr> </thead> <tbody> <tr> <td>wheelchair</td> <td>(kg)</td> <td>25</td> <td>85</td> <td>25</td> <td>85</td> </tr> <tr> <td>occupant</td> <td>(kg)</td> <td>75</td> <td>75</td> <td>75</td> <td>75</td> </tr> <tr> <td>deceleration</td> <td>(g)</td> <td>20</td> <td>20</td> <td>20</td> <td>20</td> </tr> <tr> <td>No.attachments</td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>No.anchorages</td> <td></td> <td>2</td> <td>2</td> <td>1</td> <td>1</td> </tr> <tr> <td>force</td> <td>(kN)</td> <td>10</td> <td>16</td> <td>20</td> <td>32</td> </tr> </tbody> </table>			4-point strap type		delta-systems		wheelchair	(kg)	25	85	25	85	occupant	(kg)	75	75	75	75	deceleration	(g)	20	20	20	20	No.attachments		2	2	2	2	No.anchorages		2	2	1	1	force	(kN)	10	16	20	32	<p><u>Observation noted.</u> It's not clear what is being recommended, if anything.</p>
		4-point strap type		delta-systems																																								
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NEW ZEALAND SNZ	Performance requirements are inferred rather than specified	<u>Rejected</u> : WG cannot respond without more specific information
SWEDEN SIS	<p>General Comments</p> <p>The text must be checked for spelling errors, missing words and special characters. For example, + should be ± on several places.</p> <p>Special Comments</p> <p>Amend 4.1 b) as follows:</p> <p>have two fixed-length assemblies and two adjustable length assemblies and provision for longitudinal adjustment at either the front, rear, or both front and rear anchor points.</p> <p>A WTORS commonly used in Sweden has two fixed length straps at the rear and two adjustable length straps at the front and four fixed anchor points in the floor at a longitudinal distance of approximately 1300 mm. The function of this WTORS is perfectly satisfactory and there is no need for adjustable anchor points in the floor. Adjustable anchor points will make the WTORS more expensive. The requirements in 4.3 b) will assure that the WTORS will fit common wheelchairs by means of the two adjustable straps without having adjustable anchor points.</p> <p>Delete 5.2. See the comments mentioned above. The requirements in 5.1 are applicable also to WTORS with two fixed length assemblies and two adjustable length assemblies.</p>	<p><u>Accepted</u></p> <p>Cannot see any change to 4.1b as stated ? ?</p> <p><u>WG discussion</u> ∴ The WG previously asked for input on these types of tiedowns - e.g., what are the lengths of the fixed-length straps? What is the range of wheelchair securement points and anchorages that can be accommodated? It is very unlikely that these systems have the versatility of systems with four adjustable straps or with two adjustable straps and adjustable anchor points, but the WG should be presented with the information on this system.</p>

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U K BSI	<p>We disapprove for the technical, and editorial, reasons stated below. Acceptance of specified technical modifications will change our vote to approval.</p> <p>UK 1 (Introduction - Editorial) Consistency with Part 1 title.</p> <p><i>Proposed change</i> Insert "general" between "gives" and "requirements".</p> <p>UK 2 (Clause 1 - Editorial) Requirements must not be in the Scope. See ISO/IEC Directives Part 3: 1997. This deletion is not detrimental to the standard because everywhere is applicable there is a relevant statement e.g. 'Clause 4 the requirement of ISO 10542-1 apply with the addition of and it is mentioned for information in the introduction.</p> <p><i>Proposed change</i> Delete: "The provisions....10542"</p> <p>UK 3 (Clause 2 - Editorial) Not the correct title</p> <p><i>Proposed change</i> Delete last line of section 2 and replace with correct title of 10542-1.</p> <p>UK 4 (Clause 3 - Editorial) As the definitions of ISO 10542 – 1 are normatively referenced, it is incorrect to repeat them in this standard</p> <p><i>Proposed change</i> Delete 3.1 to 3.20</p>	<p><u>Accepted</u></p> <p><u>Accepted</u></p> <p><u>Rejected.</u> Tilteof 10542-1 is correct as given.</p> <p><u>WG discussion</u></p>

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	<p>UK 5 (Clause 4.3.b - Technical) As described in Annex C, the zones in figure1 are based on commercially available adjustable-length systems, and assume fixed anchorage points between 1220 & 1370 mm apart. UK systems commonly use 2 non-adjustable front straps but adjust the position of the front anchorages along tracking to ensure sound angles of engagement. Based on UK experience the frontal securement-point zone in Figures 1 & C1 is unrepresentative and unnecessary. It is therefore wrong to require fixed-length front straps to meet the requirement in 4.3b. This is particularly important with the wide range of wheel sizes used on chairs; excessive fixed point belt length makes for a very untidy set-up. In this context figure 4 shows a higher front securement point that is necessary.</p> <p><i>Proposed change</i> Change to "it adjustable-length systems, and assume fixed shall... assemblies, when the rear adjustable strap assemblies are attached to any rear securement-point locations within the zones of figure 1, and the front strap assemblies are correctly attached to the wheelchair.</p> <p>This may require rewording of 4.3a, although I am unfamiliar with any systems using fixed length rear and adjustable front straps.</p> <p>UK 6 (Clause 4.3 Fig 1 - Editorial) Normative material must not be in a note.</p> <p><i>Proposed change</i> Retitle Fig 1 as 'Typical schematic side view etc...'</p> <p>UK 7 (Clause 4.4 - Editorial) This adds nothing to the requirements in Part1 (Fig 2 = Fig E.4 in Pt 1).</p> <p><i>Proposed change</i> Delete 4.4</p>	<p><u>WG discussion.</u></p> <p><u>WG discussion</u></p> <p><u>WG discussion.</u> Clause 4.4 requires that securement points engage with SWC securement points. This is specific to Part 2.</p>

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	<p>UK 8 (Table 1 - Editorial) A 5. is evaluation of results in part 1.</p> <p><i>Proposed change</i> Should read 'Annex B'.</p> <p>UK 9 (Clause 5.1 - Editorial) The text repeats the dimensions shown in Figures 3 and 4., but leaves the information incomplete as the angles quoted are not referenced to a datum.</p> <p><i>Proposed change</i> Delete: 'which shows that' from 5.1. Clauses a) to d)</p> <p>UK 10 (A.1.b - Technical) This dimension not appropriate when variable anchorage positions are provided.</p> <p><i>Proposed change</i> Add "or, in the case of WTORS with adjustable anchorage positions, ensure the strap angles are within the ranges specified in 4.1'. Alternatively 'or as otherwise specified by the WTORS manufacturer".</p> <p>UK 11 (A.2 Technical) This implies that fixed length rear straps must be between 495 and 533 mm in length, which is not required in 4.3. Also Fig 1 does not show similar dimensional restrictions for rear straps.</p> <p><i>Proposed change</i> Reconsider content of A.2.</p> <p>UK 12 (A.2 Technical) This conflicts with A 4.6 in Part 1, which uses mid-point of the range.</p> <p><i>Proposed change</i> Reconsider content of A.2.</p>	<p><u>Accepted</u> but should be Annex A of Part 2.</p> <p><u>Rejected</u> : Helps to clarify the intent of the information in Figures 3-4</p> <p><u>WG discussion</u></p> <p><u>WG discussion</u></p> <p><u>WG discussion</u></p>

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<p>U S A ANSI</p>	<p>UK 13 (Annex C - Editorial) Figure C1 duplicates fig. 1. The rationale is based on a potentially false premise (i.e. expected fore/at distances). Does not illustrate the rationale as stated in the title.</p> <p><i>Proposed change</i> Delete Annex C.</p> <p>UK 14 (General) This standard has been largely written to ensure consistency with USA standards, which are based on limited choice of WTORS, and has limited accommodation for product styles not prevalent in USA. The WG is requested to consider if this standard could be unsuitable for "non-USA" products.</p> <p>UK 15 (Annex A General) Throughout the text tolerances are shown incomplete end or incorrect.</p> <p><i>Proposed change</i> Complete and/or correct all tolerances</p> <p>General comment on tolerances - there should be ± signs but only the + signs appear in the text.</p> <p>The notes in figures 1 and C 1, which are the same, should be changed. Attached are corrected figures with noted changes.</p> <p>Minus signs have been inappropriately dropped from "+/-" in several places. Check original document and correct</p>	<p><u>Rejected</u> pending WG discussion. The figure is provided specifically to clarify the rationale for adjustment length requirements, along with wording in Annex C. The fore/aft anchor point distances are based on estimates of real-world practice and have been available for WG comment and discussion for several years.</p> <p><u>Rejected</u> : The standard (i.e. Part 2) has been agreed to for many years. This discussion of whether four-point strap-type tiedowns are appropriate outside the U.S. has been held several times within the WG and comments from all countries have been carefully considered. It has been confirmed in these discussions that four point strap-type tiedown systems, as described in Part 2, are used routinely in many countries of the world. It has also been accepted that Parts 3 and 4 will address tiedown systems that are rarely used in the United States.</p> <p><u>Accepted</u></p> <p><u>Accepted</u></p>

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	<p>Note 1: Zones are based on minimum and maximum length requirements for tiedown assemblies given in Table 1, and on typical front-to-back anchor point distances available in vehicles.</p> <p>Note 2: Front and rear securement points on the wheelchair must fall within the front and rear zones defined relative to each other and relative to the wheelchair ground plan</p>	<p><u>WG discussion</u></p>