

## Proposal for amendments to ECE/TRANS/WP.29/GRSP/2013/7

### Proposal for amendment of the draft gtr on pole side impact

The text reproduced below was prepared by the expert from Australia. Proposed modifications to the current text of the draft gtr on pole side impact (ECE/TRANS/WP.29/GRSP/2013/7) are marked in bold for new or strikethrough for deleted characters.

#### A. Proposal

*Statement of technical rationale and justification*

*Paragraph 75, amend to read:*

"75 The AIS 2005 definitions include very few AIS3 upper extremity injuries. In contrast to head and thorax injuries, which occur up to the AIS6 level, upper extremity injuries do not exceed the AIS2 level unless involving **an open fracture; a crush or traumatic amputation at, or below, the shoulder level; or injuries resulting in significant blood loss (>20% by volume).**"

*Text of the Regulation*

*Footnote 3., amend to read:*

"<sup>3</sup> ~~The technical specifications, requirements~~ **including detailed drawings and adjustment procedures for assembly/disassembly** of the WorldSID 50<sup>th</sup> percentile adult male dummy are available from **ISO, Geneva, Switzerland.** ~~specified in Addendum [2]~~X~~~~ of the Mutual Resolution **has been reserved for future prescription of WorldSID 50<sup>th</sup> percentile adult male technical specifications.**"

*Annex 1, paragraph 3.3.1., amend to read:*

"3.3.1. A WorldSID 50<sup>th</sup> percentile adult male dummy in accordance with Addendum ~~[2]~~X~~~~ of the Mutual Resolution and fitted with (as a minimum) all instrumentation required to obtain the data channels necessary to determine the dummy performance criteria listed in paragraph 4.2 of this regulation <sup>1</sup>."

*Annex 1, insert a new footnote 1., to read:*

"<sup>1</sup> **Addendum [2] of the Mutual Resolution is under development. Until Addendum [2] of the Mutual Resolution is adopted, ISO 15830 certification, assembly and disassembly procedures for the WorldSID 50th percentile adult male dummy may be obtained from ISO, Geneva, Switzerland. Engineering drawings are available from ISO at standards.iso.org/iso/15830. For progress on the development of**

**Addendum [2] to the Mutual Resolution refer to the UNECE Working Party on Passive Safety (GRSP) website, Palais des Nations, Geneva, Switzerland."**

*Annex 1, footnotes 1. (former) to 2., renumber as footnotes 2. to 3.*

*Annex 2, footnote 1., amend to read:*

"<sup>1</sup> Details of the H-point locator assembly (H-point tool) including drawings, **and dimensions and instructions for use are included in Addendum [2][X] of the Mutual Resolution available from ISO at standards.iso.org/iso/15830.**"

*Annex 2, delete paragraph 2.3.*

*Annex 2, paragraphs 2.4. (former) to 2.15., renumber as paragraphs 2.3. to 2.14.*

*Annex 2, paragraph 2.3. (new) and paragraph 2.6., amend to read:*

"2.3. "Design rib angle" means the nominal (theoretical) angle of the WorldSID 50th percentile adult male **middle thorax, lower thorax** and abdominal ribs relative to a level surface or horizontal reference plane, as defined by the manufacturer for the final adjustment position of the seat in which the dummy is to be installed. The design rib angle corresponds theoretically to the design torso angle minus 25°."

"2.6. "Dummy rib angle" means the angle of the test dummy **middle thorax, lower thorax** and abdominal ribs relative to a level surface or horizontal reference plane, as established by the thorax tilt sensor angle reading about the sensor y-axis. The dummy rib angle corresponds theoretically to the actual torso angle minus 25°."

*Annex 2, paragraph 2.12. (new), amend to read:*

"2.12. "Seat cushion reference line" means a planar line along the side surface of the seat cushion base and passing through the SCRP defined in paragraph 2.4.514 of this Annex. The seat cushion reference line may be marked on the side of a seat cushion support structure and/or its position defined using an additional reference point. The projection of the seat cushion reference line to a vertical longitudinal plane is linear (i.e. straight)."

*Annex 2, insert a new paragraph 2.15., to read:*

"2.15. "**Shoulder median plane**" means a plane dividing the left or right (as applicable) shoulder clevis into symmetrical anterior/posterior sections. The shoulder median plane is perpendicular to the centreline of the shoulder pivot shaft and parallel to the shoulder load cell y-axis (or an equivalently oriented axis of a shoulder load cell structural replacement)."

*Annex 2, paragraph 5.13. and paragraph 6.25., amend to read:*

"5.13. Record the longitudinal (X-axis) position of the SCRP in the vehicle reference coordinate system and measure the seat cushion reference line angle for future reference. Except as provided in paragraph 7.4.76 of this Annex; this adjustment position shall be used as the final seat cushion adjustment position for the installation of the dummy<sup>3</sup>."

"6.25. Except as provided in paragraph 7.4.76 of this Annex; the coordinates recorded in accordance with paragraph 6.24 above define the manikin H-point location of the seat, when the seat is adjusted to the final seat cushion and seat back detent test positions for the installation of the dummy."

---

Annex 2, paragraph 7.4.2., amend to read:

"7.4.2. Apply a for/aft and lateral rocking motion to settle the pelvis rearward in the seat. <sup>5</sup>"

Annex 2, insert a new footnote 5., to read:

"<sup>5</sup> **To ensure a repeatable and stable pelvis position will be achieved, it is recommended following the completion of this step, to verify the pelvis is in contact with the seat cushion over the whole pelvis length.**"

Annex 2, delete paragraph 7.4.3.

Annex 2, paragraphs 7.4.4 (former) to 7.4.16., renumber as paragraphs 7.4.3. to 7.4.15.

Annex 2, paragraph 7.4.3. (new), amend to read:

"7.4.3. Where there is interference between the lower abdominal rib coupler and/or the outer band of each (i.e. left/right) lower abdominal rib assembly contacts the pelvis flesh, ensure a repeatable placement of the contacting surfaces of the lower abdominal rib coupler and by making sure the lower edge of the outer band of each lower abdominal rib, is inside are positioned in-behind the inner abdominal wall of the pelvis flesh and, not on top of it-the pelvis flesh."

Annex 2, paragraph 7.4.5. (new), amend to read:

"7.4.5. Verify that the dummy H-point is reasonably close ( $\pm 10$  mm) to the WS50M H-point defined in paragraph 2.25 of this Annex. If not, repeat the procedures outlined in paragraphs 7.4.2 to 7.4.4.7.4.3. If it is still not possible to verify the dummy H-point is reasonably close ( $\pm 10$  mm) to the WS50M H-point, record the offset and proceed to the next step."

Annex 2, paragraph 7.4.10.1. (new), amend to read:

"7.4.10.1. Adjust the dummy until the thorax tilt sensor angle reading (about the sensor y axis) is within  $\pm 1^\circ$  of the design rib angle range specified by the manufacturer."

Annex 2, paragraph 7.4.12. (new) and paragraph 7.4.13., amend to read:

"7.4.12. Proceed to the final foot and leg positioning by repeating the steps outlined in paragraph 7.4.87 for a driver seating position or the steps outlined in paragraph 7.4.98 for a passenger seating position."

"7.4.13. {Verify that the test dummy H-point and dummy rib angle are still in accordance with paragraphs 7.4.109 and 7.4.110 respectively. If not, repeat the steps outlined from paragraph 7.4.109 onwards}."

Annex 2, paragraph 7.4.15. (new), amend to read:

"7.4.15. Place both arms at the 4548° detent position. In this position, the projection of the metallic each half arm bone centreline plane of symmetry to the mid-sagittal plane forms an angle of  $4548^\circ \pm \{5\}1^\circ$  with the adjacent (i.e. left/right as applicable) coronal shoulder median plane."

Annex 7, paragraph 4.1. and paragraph 5.1., amend to read:

"4.1. The maximum thorax rib deflection is the maximum deflection of any (upper, middle or lower) thorax rib, as determined in accordance with Addendum [X] of the Mutual Resolution from the voltage output measurements recorded by the deflection sensor mounted between the rib accelerometer mounting

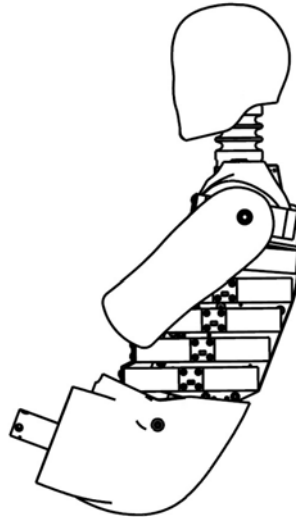
bracket and central spine box mounting bracket inside each struck side thorax rib, and filtered at a CFC of 600 Hz."

- "5.1. The maximum abdominal rib deflection is the maximum deflection of any (upper or lower) abdominal rib, as determined ~~in accordance with Addendum [X] of the Mutual Resolution~~ from the voltage output measurements recorded by the deflection sensor mounted between the rib accelerometer mounting bracket and central spine box mounting bracket inside each struck side abdominal rib, and filtered at a CFC of 600 Hz."

## B. Justification

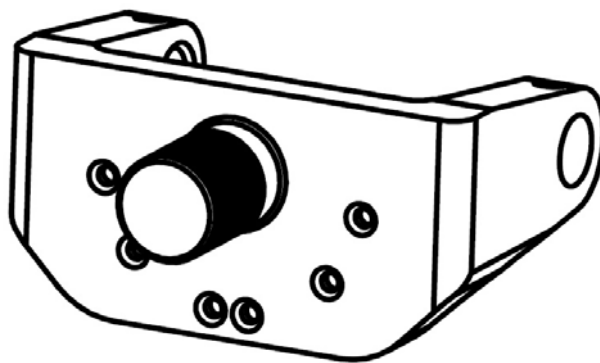
1. *Paragraph 75:* provides a more complete listing of the AIS 3+ upper extremity injuries that can occur according to AIS 2005 definitions.
2. *Footnote 3.:* amendment proposed to specify current source of WorldSID 50<sup>th</sup> male technical specifications, while also noting that Addendum [2] of the mutual resolution has been reserved for this purpose.
3. *Annex 1, paragraph 3.3.1.:* amendment proposed to specify Addendum [2] of the Mutual Resolution (currently reserved for WorldSID), instead of a generic Addendum [X].
4. *Annex 1, new footnote 1.:* proposed to specify current source of WorldSID 50<sup>th</sup> male technical specifications, while also noting that Addendum [2] of the Mutual Resolution has been reserved for this purpose.
5. *Annex 2, footnote 1.:* amendment proposed to specify current source of H-point tool drawings and dimensions.
6. *Annex 2, paragraph 2.3.:* deletion of "coronal plane" definition proposed. The proposed "shoulder median plane" definition (see paragraph 9 below) is more suitable for precisely locating the detent position the dummy arms are to be placed at for the test.

- 
7. *Annex 2, paragraph 2.6. (new) and paragraph 2.7.:* amendments proposed will provide more technically accurate definitions. The upper thorax rib of the WorldSID 50<sup>th</sup> dummy is oriented slightly differently to the middle thorax rib, lower thorax rib and abdominal ribs (see illustration below). The thorax tilt sensor angle reading about the sensor y-axis will indicate the angle of the middle thorax rib, lower thorax rib and abdominal ribs relative to a level surface or horizontal reference plane.



Source: WorldSID drawing number W50-00000 ([standards.iso.org/iso/15830](https://standards.iso.org/iso/15830))

8. *Annex 2, paragraph 2.12. (new):* re-numbering of paragraph cross reference due to proposed deletion of "coronal plane" definition.
9. *Annex 2, paragraph 2.15. (new):* provides a "shoulder median plane" definition which is used to locate the detent position the dummy arms are placed at for the test. The shoulder clevis referred to in the definition of the shoulder median plane is shown below.



Source: WorldSID drawing number W50-61113 sheet 1 ([standards.iso.org/iso/15830](https://standards.iso.org/iso/15830))

10. *Annex 2, paragraph 5.13. and paragraph 6.25.:* re-numbering of paragraph cross references proposed due to suggested deletion of paragraph 7.4.3. (former).

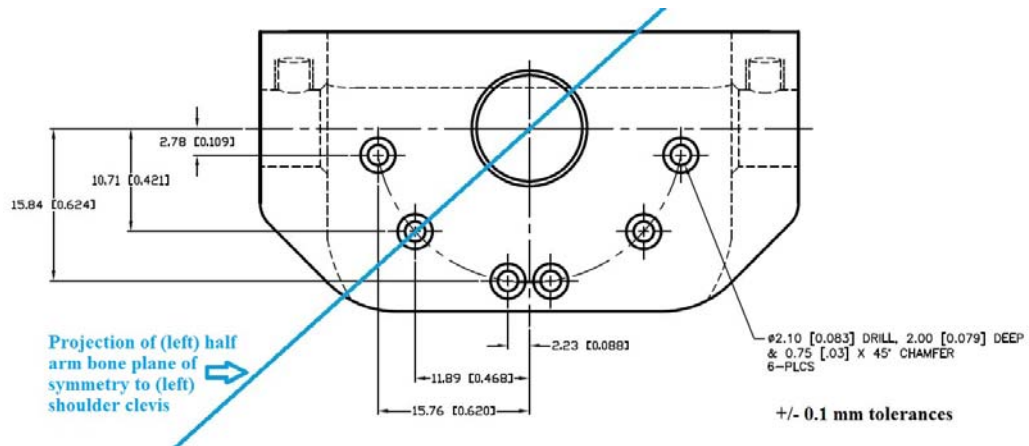
11. *Annex 2 new footnote 5.:* provides a recommendation to ensure dummy pelvis contact with the seat cushion over the whole pelvis length. This recommendation is intended as a means of achieving an end outcome, rather than a mandatory requirement. The important end outcome to be achieved is the matching of the test dummy H-point within  $\pm 5$  mm of the WS50M H-point. It is therefore suggested to include this ISO sourced advice for dummy pelvis contact with the seat cushion as an advisory footnote only (i.e. not a mandatory requirement).
12. *Annex 2, paragraph 7.4.3. (former):* deletion suggested as a recommendation regarding dummy pelvis contact with the seat cushion is now proposed as a footnote to paragraph 7.4.2.
13. *Annex 2, paragraph 7.4.3. (new):* provides a more technically precise wording. See example images showing lower abdominal rib position relative to pelvis flesh below. The outer band of each lower abdominal rib can be more accurately described as positioned “in-behind the inner abdominal wall of the pelvis flesh” rather than “inside the pelvis flesh”.



Source: WS-07-08 (left) and PSI-07-06 (right)

14. *Annex 2, paragraph 7.4.5. (new):* re-numbering of paragraph cross reference proposed due to suggested deletion of paragraph 7.4.3. (former).
15. *Annex 2, paragraph 7.4.10.1. (new):* specifies a defined tolerance for the dummy rib angle relative to the design rib angle specified by the manufacturer. The size of the tolerance proposed ( $\pm 1^\circ$ ) is the same as applies to vehicles for which a design rib angle is not specified by the manufacturer, and has been found to be workable in research tests conducted to support the development of the gr. The previously drafted ISO/DIS 17949:2012 derived wording allows manufacturers to specify the size of the tolerance range.
16. *Annex 2, paragraph 7.4.12. (new) and paragraph 7.4.13.:* re-numbering of paragraph cross references proposed due to suggested deletion of paragraph 7.4.3. (former).

17. *Annex 2, paragraph 7.4.15. (new)*: corrects description of the half arm detent position to be used for the test. The shoulder clevis detent positions which can be engaged by the half arm bone ball nose spring plunger are shown below. In the test position, each half arm bone plane of symmetry forms an angle of  $48^\circ$  (i.e.  $\arctan\{11.89/10.71\} \pm 1^\circ$  (note  $\pm 0.1$  mm dimensional tolerances apply) with the adjacent (i.e. left/right as applicable) "shoulder median plane".



Source: Adapted from WorldSID drawing no. W50-61113 sheet 2 (standards.iso.org/iso/15830)

18. *Annex 7, paragraph 4.1. and paragraph 5.1.*: removal of references to the yet to be finalised WorldSID addendum of the Mutual Resolution. Details will need to be obtained from ISO and/or the dummy manufacturer until the WorldSID addendum of the Mutual Resolution is adopted.