Transmitted by the representative of the United States of America

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Proposal for amendments to the draft Pole Side Impact GTR

The text reproduced below was prepared by the expert from the United States. This proposal is based on ECE/TRANS/WP.29/GRSP/2013/120.

I. Proposal

Paragraph 4.2.1, amend to read:

4.2.1. The performance criteria measured by a WorldSID 50th percentile adult male dummy in the front-row outboard seating position on the impact side of a vehicle tested in accordance with Annex 1, shall meet the requirements of 4.2.2 and, based on a determination by each Contracting Party or regional economic integration organization, either paragraph 4.2.1.1 or 4.2.1.2.

Insert new paragraphs 4.2.1.1. and 4.2.1.2., to read:

4.2.1.1. The performance criteria measured by a WorldSID 50th percentile adult male dummy in the front-row outboard seating position on the impact side of a vehicle tested in accordance with Annex 1, shall meet the requirements of paragraphs 4.2.3. to 4.2.6.

4.2.1.2. The performance criteria measured by a WorldSID 50th percentile adult male dummy in the front-row outboard seating position on the impact side of a vehicle tested in accordance with Annex 1, shall meet the requirements set by the Contracting Party or regional economic integration organization after conducting a cost/benefit analysis for their market based upon the injury risk curves in Annex 9.

Annex 1, amend to read:

Paragraph 2.3., amend to read:

2.3. "*Impact reference line*" is the line formed on the impact side of the test vehicle by the intersection of the exterior surface of the vehicle and a vertical plane passing through the centre of gravity of the head of the dummy positioned in accordance with Annex 2 or 8, as specified by the contracting party or regional economic integration organization, in the front-row outboard designated seating position on the impact side of the vehicle. The vertical plane forms an angle of 75° with the vehicle longitudinal centreline. The angle is measured as indicated in Annex 4, Figure 4-1 (or Figure 4-2) for left (or right) side impact.

Paragraph 2.5., amend to read:

2.5. "*Laden attitude*" means the pitch and roll angle of the test vehicle when positioned on a level surface with all tyres fitted and inflated as recommended by the vehicle manufacturer and loaded to the laden mass. The

test vehicle is loaded by centrally positioning 136 kg or the rated cargo and luggage mass (whichever is less) in the cargo/luggage carrying area over the longitudinal centreline of the vehicle. The mass of the necessary anthropomorphic test device is placed on the front-row outboard designated seating position on the impact side of the vehicle. The front-row seat on the impact side of the vehicle is positioned in accordance with Annex 2 or 8 as specified by the contracting party or regional economic integration organization,

Paragraph 4.2., amend to read:

4.2. Hydrogen fuel systems shall be prepared in accordance with the applicable post-crash fuel system integrity test procedures specified in the global technical regulation on hydrogen and fuel cell vehicles as implemented by the contracting party or regional economic integration organization (ECE/TRANS/180/Add.13).

Paragraph 5.1.1., amend to read:

5.1.1. Any seat adjustment, including any seat cushion, seatback, armrest, lumbar support, and head restraint; of a front-row outboard seating position on the impact side of the vehicle; shall be placed in the position of adjustment specified in Annex 2 or 8 as specified by the contracting party or regional economic integration organization.

Paragraph 5.2.1., amend to read:

5.2.1. Any adjustable safety-belt anchorage(s) provided for a front-row outboard seating position on the impact side of the vehicle, shall be placed in the position of adjustment specified in Annex 2 or 8 as specified by the contracting party or regional economic integration organization.

Paragraph 5.3.1., amend to read:

5.3.1. Any adjustable steering wheel shall be placed in the position of adjustment specified in Annex 2 or 8 as specified by the contracting party or regional economic integration organization.

Paragraph 5.8.1., amend to read:

5.8.1. Any adjustable pedals shall be placed as specified in Annex 2 or 8 as specified by the contracting party or regional economic integration organization.

Paragraph 6.1., amend to read:

6.1. Based on a determination by each Contracting Party or regional *economic* integration organization, a WorldSID 50th percentile adult male dummy in accordance with paragraph 3.3.1. of this annex shall be installed in accordance with either Annex 2 or Annex 8, as specified by the contracting party or regional economic integration organization, in the front-row outboard seat located on the impact side of the vehicle.

Paragraph 7.2., amend to read:

7.2. Based on a determination by each Contracting Party or regional economic integration organization, the maximum test speed may be reduced to 26 km/h for vehicles with a width of 1.50 m or less. [1]

Insert new Annexes 8 and 9, to read:

Annex 8

Seat adjustment and installation requirements for the WorldSID 50th percentile adult male dummy

1. Purpose

Repeatable and reproducible front-row seat installation of the WorldSID 50th percentile adult male dummy in a vehicle seat position and automotive seating posture representative of a typical mid-size adult male.

2. Definitions

For the purposes of this annex:

2.1. "*Actual torso angle*" means the angle measured between a vertical line through the manikin H-point and the torso line using the back angle quadrant on the 3-D H machine.

2.2. "*Centre plane of occupant (C/LO)*" means the median plane of the 3-D H machine positioned in each designated seating position. It is represented by the lateral (Y-axis) coordinate of the H-point in the vehicle reference coordinate system. For individual seats, the vertical median plane of the seat coincides with the centre plane of the occupant. For driver bench seating positions, the centre plane of the occupant coincides with the geometric centre of the steering wheel hub. For other seats, the centre plane of the occupant is specified by the manufacturer.

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°.

2.4. "*Design torso angle*" means the angle measured between a vertical line through the manikin H-point and the torso line in a position which corresponds to the nominal design position of the seat back for a 50th percentile adult male occupant established by the vehicle manufacturer.

[1] Contracting parties selecting this option shall notify the Secretary General in writing when submitting the notification required by Article 7.2. of the 1998 Agreement.

2.5. "*Dummy H-point*" means the coordinate point midway between the H-point locator assembly measurement points on each side of the test dummy pelvis. [2]

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°.

2.7. "*Fiducial marks*" are physical points (holes, surfaces, marks or indentations) on the vehicle body.

2.8. "*Leg (for dummy installation purposes)*" refers to the lower part of the entire leg assembly between, and including, the foot and the knee assembly.

2.9. "*Manikin H-point*" means the pivot centre of the torso and thigh of the 3-D H machine when installed in a vehicle seat in accordance with paragraph 6. of this annex. The manikin H-point is located at the centre of the centreline of the device, between the H-point sight buttons on either side of the 3-D H machine. Once determined in accordance with the procedure described in paragraph 6. of this annex, the manikin H-point is considered fixed in relation to the seat cushion support structure and is considered to move with it when the seat is adjusted.

2.10. "*Mid-sagittal plane*" means the vertical plane that separates the dummy into equal left and right halves.

2.11. "*Muslin cotton*" means a plain cotton fabric having 18.9 threads per cm^2 and weighing 0.228 kg/m^2 or knitted or non-woven fabric having comparable characteristics.

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 2.14. 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).

2.13. "*Seat cushion reference line angle*" means the angle of the seat cushion reference line projection in a vertical longitudinal plane, relative to a level surface or horizontal reference plane.

2.14. "*Seat cushion reference point*" (SCRP) means a point placed on the outboard side of the seat cushion at a horizontal distance between 150 mm (5.9 in) and 250 mm (9.8 in) from the front edge of the seat used as a guide in positioning the seat.

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).

[2] Details of the H-point locator assembly (H-point tool) including drawings and dimensions are available in Addendum [2] of Mutual Resolution No. 1.

2.16. "*Thigh (for dummy installation purposes)*" refers to the distal upper leg flesh section of the test dummy between, but not including, the knee assembly and the pelvis flesh.

2.17. "*Three-dimensional H-point machine*" (3-D H machine) means the device used for the determination of manikin H-points and actual torso angles. This device is defined in Annex 3.

2.18. "*Torso line*" means the centreline of the probe of the 3-D H machine with the probe in the fully rearward position.

2.19. "*Vehicle measuring attitude*" means the position of the vehicle body as defined by the coordinates of at least three fiducial marks; sufficiently separated in the longitudinal (X), transverse (Y) and vertical (Z) axes of the vehicle reference coordinate system, to enable accurate alignment with the measurement axes of a coordinate measurement machine. The vehicle measuring attitude is established by positioning the test vehicle, on a level surface; and adjusting the attitude of the test vehicle such that the vehicle longitudinal centre plane is parallel to the vertical longitudinal zero plane and the front left and right door sill pitch angles satisfy the vehicle test attitude requirements of paragraph 4.5. of Annex 1.

2.20. "*Vehicle reference coordinate system*" means an orthogonal coordinate system consisting of three axes; a longitudinal axis (X), a transverse axis (Y), and a vertical axis (Z). X and Y are in the same horizontal plane and Z passes through the intersection of X and Y. The X-axis is parallel to the longitudinal centre plane of the vehicle.

2.21. "*Vertical longitudinal plane*" means a vertical plane, parallel to the vehicle longitudinal centreline.

2.22. "*Vertical longitudinal zero plane*" means a vertical longitudinal plane passing through the origin of the vehicle reference coordinate system.

2.23. "*Vertical plane*" means a vertical plane, not necessarily perpendicular or parallel to the vehicle longitudinal centreline.

2.24. "*Vertical transverse plane*" means a vertical plane, perpendicular to the vehicle longitudinal centreline.

2.25. "*WS50M H-point*" means the coordinate point located 20 mm longitudinally forward in the vehicle reference coordinate system of the manikin H-point determined in accordance with paragraph 6. of this annex.

3. Seat comfort and head restraint adjustments

3.1. Where applicable, the test seat adjustments specified in paragraphs 3.1.1. to 3.1.3. shall be performed on the seat in which the dummy is to be installed.

3.1.1. Adjustable lumbar supports

3.1.1.1. Any adjustable lumbar support(s) shall be adjusted so that the lumbar support is in the lowest, retracted or most deflated adjustment position.3.1.2. Seat Backs

3.1.2.1. Place adjustable seat backs in the manufacturer’s nominal design riding position in the manner specified by the manufacturer. If the position is not specified, set the seat back at the first detent rearward of 25° from the vertical.

3.1.3. Head restraints

3.1.3.1. Position any adjustable head restraint in the highest and most forward position.

3.1.4. Other adjustable seat support systems

3.1.4.1. Position any adjustable parts of the seat that provide additional support so that they are in the lowest or non-deployed adjustment position.

4. Passenger compartment adjustments

4.1. Where applicable, the adjustment specified in paragraph 4.1.1. of this annex; and in the case where the dummy is to be installed on the driver's side, the adjustments specified in paragraphs 4.1.2. and 4.1.3. of this annex; shall be performed on the vehicle.

4.1.1. Adjustable safety-belt anchorages

4.1.1.1. Adjustable belt anchorages are placed at the manufacturer's nominal design position for a 50th percentile adult male occupant.

4.1.2. Adjustable steering wheels

4.1.2.1. Adjustable steering controls are adjusted so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If there is no setting detent in the mid-position, lower the steering wheel to the detent just below the mid-position.

4.1.3. Folding Armrests

4.1.3.1. Any folding armrest is retracted.

5. Procedure for establishing the test position of an adjustable seat cushion

5.1. The adjustment position of the seat cushion base on which the dummy is to be installed shall be determined by sequential completion (where applicable to the seat design) of the steps outlined in paragraphs 5.6. to 5.13. of this annex below; with the test vehicle at the vehicle measuring attitude defined in paragraph 2.19. of this annex above.

5.2. Using only the controls that primarily move the seat and seat cushion independent of the seat back in the fore and aft directions, move the SCRP to the rearmost position.

5.3. Using any part of any control, other than those just used, determine the full range of angles of the seat cushion reference line and set the seat cushion reference line to the middle of the range.

5.4. Using any part of any control other than those that primarily move the seat or seat cushion fore and aft, while maintaining the seat cushion reference line angle, place the SCRP to its lowest position.

5.5. Using only the controls that primarily move the seat fore and aft, move the seat cushion reference point to the mid travel position. If an adjustment position does not exist midway between the forwardmost and rearmost positions, the closest adjustment position to the rear of the midpoint is used. Using only the controls that primarily move the seat fore and aft, move the SCRP 20 mm rearward while maintaining the seat cushion reference line angle as closely as possible to the angle determined in 5.7.

5.6. If the seat or seat cushion height is adjustable, other than by the controls that primarily move the seat or seat cushion fore and aft, set the height of the seat cushion reference point to the minimum height, with the seat cushion reference line angle set as closely as possible to the angle determined in 5.7.

5.7. Except as provided in paragraph 7.4.6. of this annex; this adjustment position shall be used as the final seat cushion adjustment position for the installation of the dummy.

6. Procedure for manikin H-point and actual torso angle determination

6.1. The test vehicle shall be preconditioned at a temperature of 20 °C ± 10 °C to ensure that the seat material reaches stabilised room temperature for the installation of the 3-D H machine.

6.2. Adjustable lumbar supports and other adjustable seat supports shall be set to the adjustment positions specified in paragraph 3.1.1. and 3.1.2. of this annex.

6.3. The manikin H-point coordinates and final actual torso angle shall be determined for the seat in which the dummy is to be installed, by sequential completion of the steps outlined in paragraphs 6.4. to 6.24. of this annex below; with the test vehicle at the vehicle measuring attitude defined in paragraph 2.19. of this annex above.

6.4. Cover the area of the seating position to be contacted by the 3-D H machine with a muslin cotton sheet of sufficient size and place the seat and back assembly of the 3-D H machine in the seat.

6.5. Set the seat cushion position to the adjustment position recorded in accordance with paragraph 5.13. of this annex.

6.6. Using only the control(s) which primarily adjusts the angle of the seat back, independently of the seat cushion pitch; adjust the seat back position according to one of the following methods:

6.6.1. Place adjustable seat backs in the manufacturer's nominal design driving or riding position for a 50^{th} percentile adult male occupant, in the manner specified by the manufacturer.

6.6.2. Where a design seat back position is not specified by the manufacturer:

6.6.2.1. Set the seat back to the first detent position rearward of 25° from the vertical.

6.6.2.2. If there is no detent position rearward of 25° from the vertical, set the seat back angle to the most reclined adjustment position.

6.7. Adjust the seat and back assembly of the 3-D H machine so that the centre plane of the occupant (C/LO) coincides with the centre plane of the 3-D H machine.

6.8. Set the lower leg segments to the 50^{th} percentile length (417 mm) and the thigh bar segment to the 10^{th} percentile length (408 mm).

6.9. Attach the foot and lower leg assemblies to the seat pan assembly, either individually or by using the T-bar and lower leg assembly. The line through the H-point sight buttons should be parallel to the ground and perpendicular to the C/LO of the seat.

6.10. Adjust the feet and leg positions of the 3-D H machine as follows:

6.10.1. Both feet and leg assemblies are moved forward in such a way that the feet take up natural positions on the floor, between the operating pedals if necessary. Where possible, the left foot is located approximately the same distance to the left of the centre plane of the 3-D H machine as the right foot is to the right. The spirit level verifying the transverse orientation of the 3-D H machine is brought to the horizontal by readjustment of the seat pan if necessary, or by adjusting the leg and foot assemblies towards the rear. The line passing through the H-point sight buttons is maintained perpendicular to the C/LO of the seat.

6.10.2. If the left leg cannot be kept parallel to the right leg and the left foot cannot be supported by the structure, move the left foot until it is supported. The alignment of the sight buttons is maintained.

6.11. Apply the lower leg and thigh weights and level the 3-D H machine.

6.12. Tilt the back pan forward against the forward stop and draw the 3-D H machine away from the seat back using the T-bar. Reposition the 3-D H machine on the seat by one of the following methods:

6.12.1. If the 3-D H machine tends to slide rearward, use the following procedure. Allow the 3-D H machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required (i.e. until the seat pan contacts the seat back). If necessary, reposition the lower leg.

6.12.2. If the 3-D H machine does not tend to slide rearward, use the following procedure. Slide the 3-D H machine rearwards by applying a horizontal rearward load to the T-bar until the seat pan contacts the seat back (see Figure 3-2 of Annex 3).

6.13. Apply a 100 N ± 10 N load to the back and pan assembly of the 3-D H machine at the intersection of the hip angle quadrant and the T-bar housing. The direction of load application is maintained along a line passing by the above intersection to a point just above the thigh bar housing (see Figure 3-2 of Annex 3). Then carefully return the back pan to the seat back. Care must be exercised throughout the remainder of the procedure to prevent the 3-D H machine from sliding forward.

6.14. Install the right and left buttock weights and then, alternately, the eight torso weights. Maintain the 3-D H machine level.

6.15. Tilt the back pan forward to release the tension on the seat back. Rock the 3-D H machine from side to side through 10 degrees arc (5 degrees to each side of the vertical centre plane) for three complete cycles to release any accumulated friction between the 3-D H machine and the seat.

6.15.1. During the rocking action, the T-bar of the 3-D H machine may tend to diverge from the specified horizontal and vertical alignment. The T-bar must therefore be restrained by applying an appropriate lateral load during the rocking motions. Care is exercised in holding the T-bar and rocking the 3-D H machine to ensure that no inadvertent exterior loads are applied in a vertical or fore and aft directions.

6.15.2. The feet of the 3-D H machine are not to be restrained or held during this step. If the feet change position, they should be allowed to remain in that attitude for the moment.

6.16. Carefully return the back pan to the seat back and check the two spirit levels for zero position. If any movement of the feet has occurred during the rocking operation of the 3-D H machine, they must be repositioned as follows:

6.16.1. Alternately, lift each foot off the floor the minimum necessary amount until no additional foot movement is obtained. During this lifting, the feet are to be free to rotate; and no forward or lateral loads are to be applied. When each foot is placed back in the down position, the heel is to be in contact with the structure designed for this.

6.17. Check the lateral spirit level for zero position; if necessary, apply a lateral load to the top of the back pan sufficient to level the 3-D H machine's seat pan on the seat.

6.18. Holding the T-bar to prevent the 3-D H machine from sliding forward on the seat cushion, proceed as follows:

6.18.1. Return the back pan to the seat back; and

6.18.2. Alternately apply and release a horizontal rearward load, not to exceed 25 N, to the back angle bar at a height approximately at the centre of the torso weights until the hip angle quadrant indicates that a stable position has been reached after load release. Care is exercised to ensure that no exterior downward or lateral loads are applied to the 3-D H machine. If another level adjustment of the 3-D H machine is necessary, rotate the back pan forward, re-level, and repeat all procedures from paragraph 6.15. of this annex onwards.

6.19. Use the 3-D H machine back angle quadrant, with the head room probe in its fully rearward position, to measure the actual torso angle.

6.20. If necessary, use only the control(s) which primarily adjusts the angle of the seat back independently of the seat cushion pitch; to adjust the actual torso angle to the design torso angle ±1° specified by the manufacturer.

6.21. Where a design torso angle is not specified by the manufacturer:

6.21.1. use only the control(s) which primarily adjusts the angle of the seat back independently of the seat cushion pitch; to adjust the actual torso angle to 23° ± 1°.

6.22. Where a design torso angle is not specified by the manufacturer and no seat back angular adjustment position produces an actual torso angle within the 23° ± 1° range:

6.22.1. use only the control(s) which primarily adjusts the angle of the seat back independently of the seat cushion pitch; to adjust the actual torso angle as close to 23° as possible.

6.23. Record the final actual torso angle for future reference.

6.24. Measure and record the manikin H-point (X, Y, Z) coordinates in the vehicle reference coordinate system for future reference.

6.25. Except as provided in paragraph 7.4.6. 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.

6.26. If a rerun of the installation of the 3-D H machine is desired, the seat assembly should remain unloaded for a minimum period of 30 minutes prior to the rerun. The 3-D H machine should not be left loaded on the seat assembly longer than the time required to perform the test.

7. WorldSID 50th percentile adult male installation requirements

7.1. Adjustable lumbar supports, other adjustable seat supports and adjustable head restraints shall be set to the adjustment positions specified in paragraph 3. of this annex.

7.2. Passenger compartment adjustments shall be set to the adjustment positions specified in paragraph 4. of this annex.

7.3. With the seat in the position established in paragraph 5. of this annex the test dummy shall then be installed by completion of the steps outlined in paragraph 7.4. below; with the test vehicle at the vehicle measuring attitude defined in paragraph 2.19. of this annex above.

7.4. Dummy installation procedure

7.4.1. Place the test dummy in the applicable seat such that the mid-sagittal plane is coincident with the C/LO and the upper torso is resting against the seat back. [3]

7.4.2. Apply a for/aft and lateral rocking motion to settle the pelvis rearward in the seat. [4]

7.4.3. Where the abdominal rib coupler and/or the outer band of each (i.e. left/right) lower abdominal rib assembly contacts the pelvis flesh, ensure the contacting surfaces of the abdominal rib coupler and the outer band of each lower abdominal rib are positioned in-behind the inner abdominal wall of the pelvis flesh, not on top of the pelvis flesh.

7.4.4. Position the dummy H-point to match the WS50M H-point coordinates (defined by paragraph 2.25. of this annex) within ±5 mm. Priority should be given to the X-axis coordinate.

7.4.5. If it is not possible to position the dummy due to knee contact, shift the SCRP rearwards in stepwise increments to the closest position where the knee clearance is at least 5 mm. Modify the manikin H-point and WS50M H-point coordinates accordingly.

7.4.6. For a driver seating position:

7.4.6.1. Extend the right leg without displacing the thigh from the seat cushion and allow the sole of the foot to settle on the accelerator pedal. The heel of the shoe should be in contact with the floor-pan.

7.4.6.2. Extend the left leg without displacing the thigh from the seat cushion and allow the sole of the foot to settle on the footrest. The heel of the shoe should be in contact with the floor-pan. In case of tibia contact, slide the foot rearward (towards the seat) until a 5 mm clearance is obtained.

7.4.7. For a passenger seating position:

7.4.7.1. Extend each leg without displacing the thigh from the seat cushion.

[3] Seat centreline markings may be used to identify the C/LO and to facilitate placement of the dummy.

[4] To ensure that a repeatable and stable pelvis position will be achieved, it is recommended following the completion of this step, to verify that the pelvis is in contact with the seat cushion over the whole pelvis length.

7.4.7.2. Allow the sole of the right foot to settle on the floor-pan in-line (i.e. in the same vertical plane) with the thigh. The heel of the shoe should be in contact with the floor-pan. If the contour of the floor-pan does not permit the foot to rest on a planar surface, move the foot in 5 mm increments until the foot rests on a planar surface.

7.4.7.3. Allow the sole of the left foot to settle on the floor-pan in-line (i.e. in the same vertical plane) with the thigh and in the same for/aft location (alignment) as the right foot. The heel of the shoe should be in contact with the floor-pan. If the contour of the floor-pan does not permit the foot to rest on a planar surface, move the foot in 5 mm increments until the foot rests on a planar surface.

7.4.8. Position the dummy H-point to match the WS50M H-point coordinates (defined by paragraph 2.25. of this annex) within ±5 mm. Priority should be given to the X-axis coordinate.

If it is not possible to position the dummy due to knee contact, shift the SCRP rearwards in stepwise increments to the closest position where the knee clearance is at least 5 mm. Modify the manikin H-point and WS50M H-point coordinates accordingly.

7.4.9. Adjust the dummy by using head and thorax tilt sensor as follows:

7.4.9.1. Level the head and thorax to 0° ± 2.5°; at the same time monitor the pelvis tilt sensors.

7.4.9.2. May need to adjust neck brackets to level the head or minimize the angle.

7.4.10. Pelvis.

7.4.10.1. Monitor the pelvis tilt sensor; try to obtain 0° ± 2.5° and check to make sure dummy is still at the h-point position described in paragraph 7.4.5..

7.4.10.2. Measure and set the pelvic angle at 40° ± 2.5°or as close as possible to this value.

7.4.11. Check the legs and feet to see if they are in the desired locations as described in paragraph 7.4.7 and 7.4.8. Adjust knees to be in-line with the feet and legs in their final position.

7.4.12. Measure and record the final test dummy H-point position in the vehicle reference coordinate system and record the final dummy rib angle and head core tilt sensor angles.

7.4.13. Place both arms at the 45º detent position. In this position, each half arm bone plane of symmetry forms an angle of 45° ± 1° with the adjacent (i.e. left/right as applicable) shoulder median plane.

7.5. Dummy installation notes and recommendations

7.5.1. No distance is specified for the test dummy knee spacing. However, priority should be given to ensure:

7.5.1.1. at least 5 mm clearance between the knees/legs and the steering shroud and centre console;

7.5.1.2. a stable foot and ankle position; and

7.5.1.3. the legs are as parallel as possible to the mid-sagittal plane.

7.6. Safety-belt system

7.6.1. The dummy installed in accordance with paragraph 7.4. of this annex shall be restrained as follows using the safety-belt system provided for the seating position by the manufacturer:

7.6.1.1. Carefully place the safety-belt across the dummy and fasten as normal.

7.6.1.2. Remove slack from the lap section of the webbing until it is resting gently around the pelvis of the dummy. Only minimal force should be applied to the webbing when removing slack. The route of the lap-belt should be as natural as possible.

7.6.1.3. Place one finger behind the diagonal section of the webbing at the height of the dummy sternum. Pull the webbing horizontally forward and away from the chest, and utilizing the force provided by the retractor mechanism only, allow it to freely retract in the direction of the upper anchorage. Repeat this step three times.

Annex 9

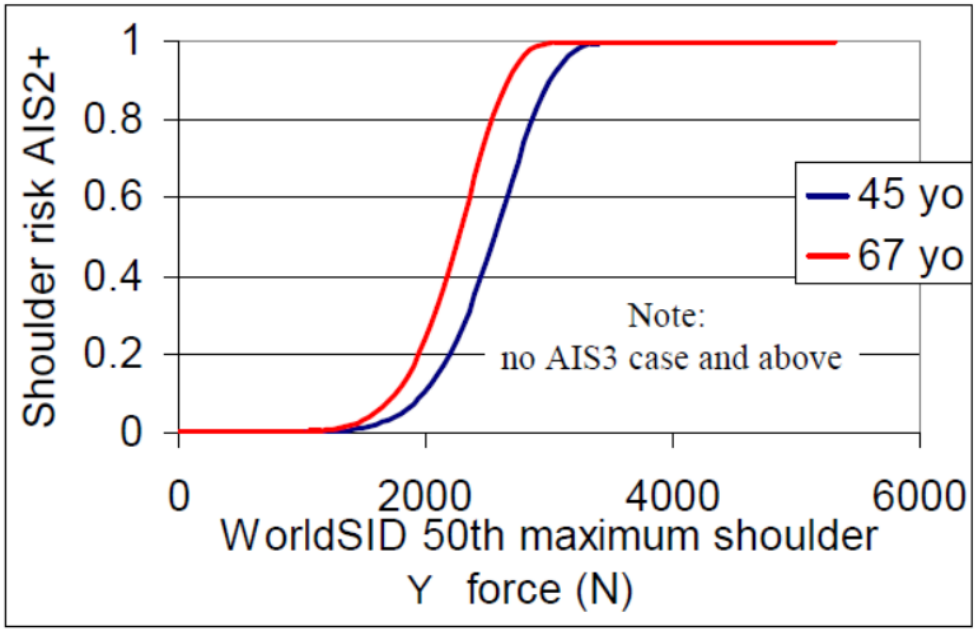
Injury Risk Curves for the WorldSID 50th percentile adult male

1. Shoulder performance criteria

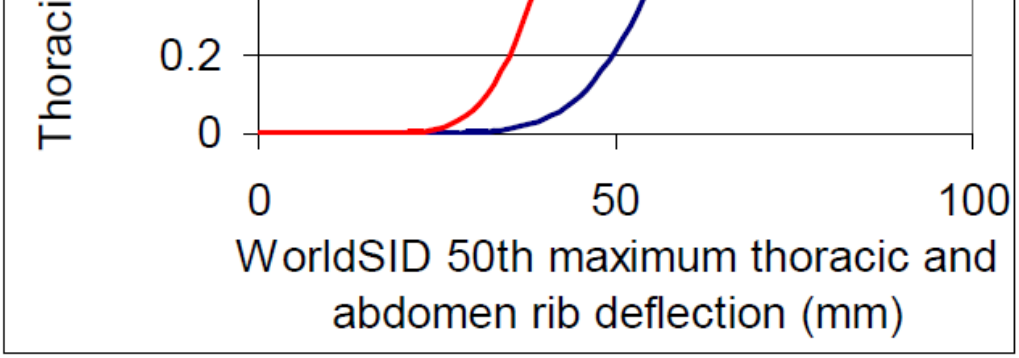
WorldSID 50th injury risk curves

- Shoulder injury risk AIS2+

Maximum shoulder Y force (N)	5% AIS2+	quality index at 5% AIS2+	25% AIS2+	quality index at 25% AIS2+	50% AIS2+	quality index at 50% AIS2+
45 year old	1799	fair	2270	fair	2556	fair
67 year old	1594	good	2011	good	2265	good



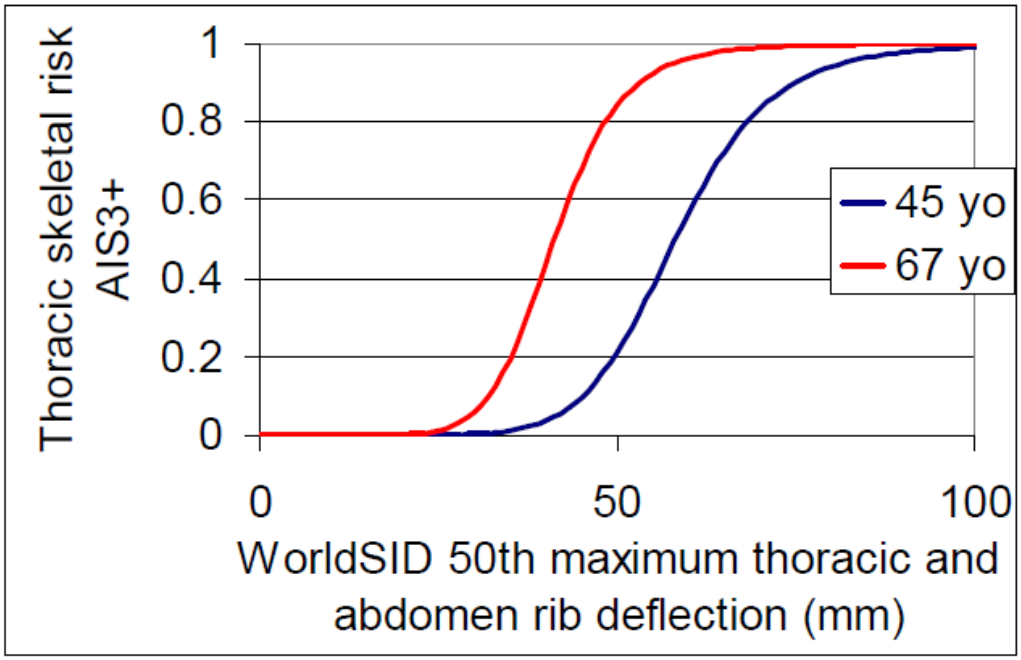
2. **Thora**



WorldSID 50th injury risk curves

- Thoracic skeletal injury risk AIS3+

Maximum thorax and abdomen rib deflection (mm)*	5% AIS3+	quality index at 5% AIS3+	25% AIS3+	quality index at 25% AIS3+	50% AIS3+	quality index at 50% AIS3+
45 year old	41.4	fair	51.2	fair	58.1	good
67 year old	29.3	fair	36.3	good	41.2	good



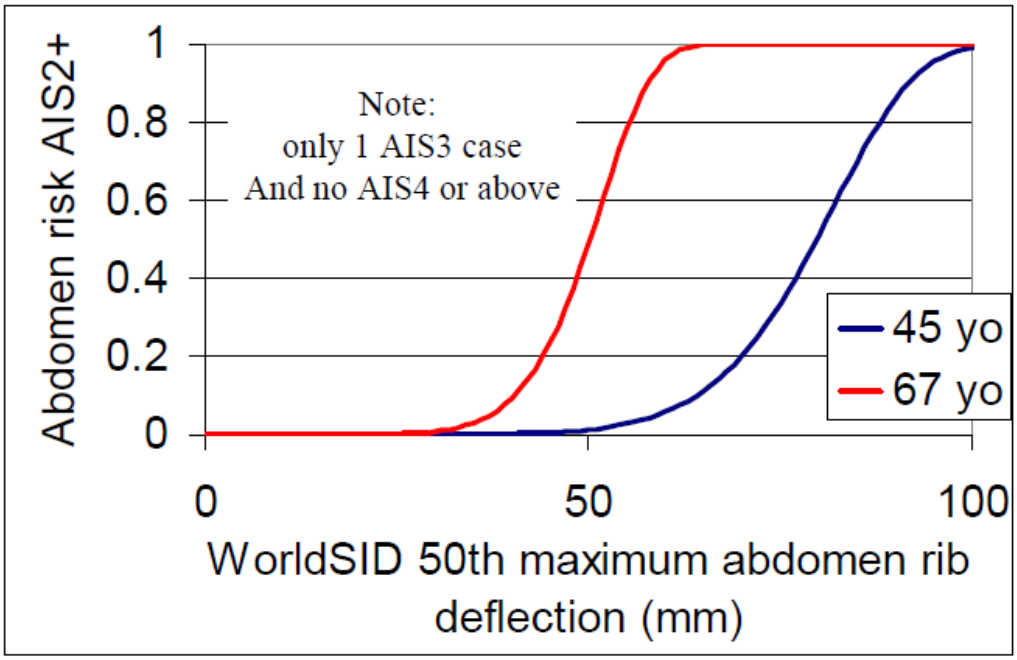
* Measured by 1D IR-TRACC

3. Abdominal performance criteria

WorldSID 50th injury risk curves

- Abdomen injury risk AIS2+

Maximum abdomen rib deflection (mm) *	5% AIS2+	quality index at 5% AIS2+	25% AIS2+	quality index at 25% AIS2+	50% AIS2+	quality index at 50% AIS2+
45 year old	58.9	fair	72.0	fair	79.8	fair
67 year old	37.1	fair	45.3	good	50.2	good



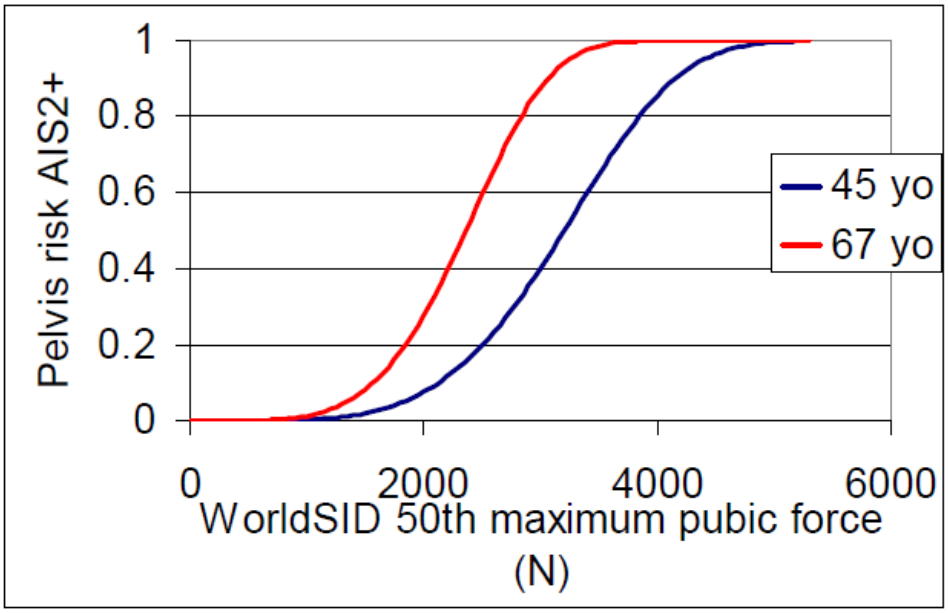
*** Measured by 1D IR-TRACC**

4. Pelvis performance criteria

WorldSID 50th injury risk curves

- Pelvis injury risk AIS2+

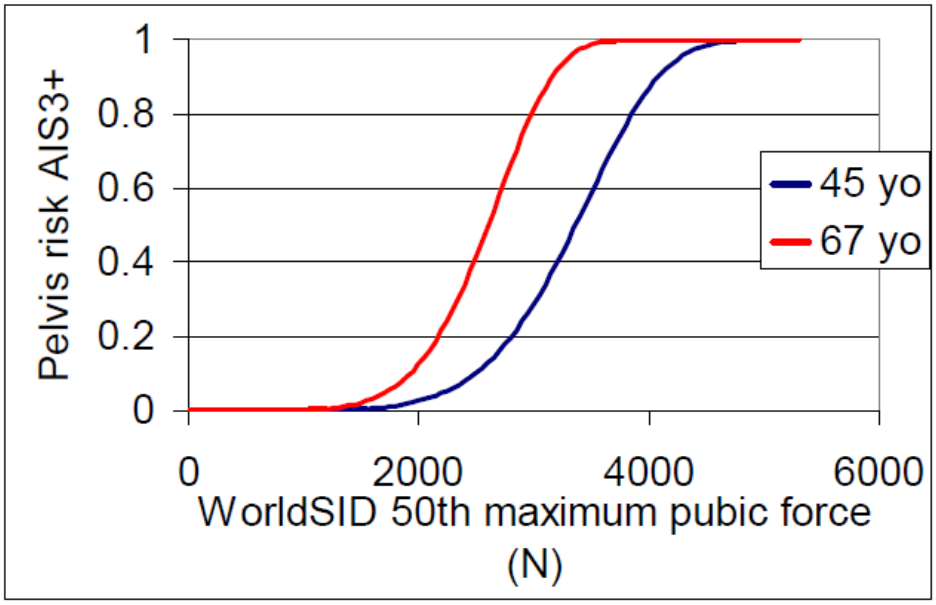
Maximum pubic force (N)	5% AIS2+	quality index at 5% AIS2+	25% AIS2+	quality index at 25% AIS2+	50% AIS2+	quality index at 50% AIS2+
45 year old	1818	fair	2645	marginal	3202	marginal
67 year old	1340	fair	1950	good	2361	good



WorldSID 50th injury risk curves

- Pelvis injury risk AIS3+

Maximum pubic force (N)	5% AIS3+	quality index at 5% AIS3+	25% AIS3+	quality index at 5% AIS3+	50% AIS3+	quality index at 5% AIS3+
45 year old	2214	marginal	2922	marginal	3365	marginal
67 year old	1714	good	2262	good	2605	good



II. Justification

This document proposes two amendments to the draft GTR to allow the United States to vote yes on the proposal at Phase 1. First, the document allows contracting parties the option of an alternate procedure for adjusting the seat and positioning the dummy based on that used by the United States during its WorldSID research. Second, the document allows contracting parties the option of modifying the injury criteria in the GTR based on cost/benefit analysis for their own country, but using the same injury risk curves used to develop the injury criteria in the GTR. The United States believes that the immediate effect of these amendments will be non-existent, as it is the only country which would take advantage of the options and had indicated that it will not begin the process of incorporating the GTR in its domestic regulation until Phase 2 is complete. In fact, the United States hopes that at the end of Phase 2 these provisions can be removed from the final GTR. The United States is proposing to place the alternate Annex to Annex 2 as Annex 8, rather than inserting it as a new Annex 3 as might make more sense, to minimize the edits that need to be made now and in the future if it is deleted. However, since the final outcome of Phase 2 cannot be predicted, the United States believes it cannot risk a potential obligation to propose the Phase 1 only GTR.

With regard to injury criteria, the United States added two paragraphs to Part A at the 53rd session of GRSP in May 2013. The United States is in a unique position as the only country with a current pole side impact requirement, and as such will have to show not only that it is cost beneficial, but that it provides increased benefits and/or reduced costs over the existing regulation. Because our national requirement includes a 50th percentile male dummy and a 5th percentile female dummy, our ability to make such an assessment is incomplete until both dummies are incorporated in the GTR. Because the outcome of Phase 2 is unknown, the United States no longer feels it can vote for the Phase 1 GTR unless it is in a position to initiate the process to propose it domestically regardless of what happens with Phase 2.

With regard to the seat adjustment and dummy installation procedures, the United States placed a study reservation on these procedures at the 53rd session of GRSP. The intent was that the United States would compare its procedure to the procedure accepted for the GTR and propose any changes electronically to GRSP. Since May NHTSA has been able to make a comparison of the two procedures with a very limited number of vehicles. Because of the limited number we do not know whether the comparisons are representative for the entire vehicle fleet. We have also not had the time to do further testing to determine the effect on performance of the differences we see in final seat and dummy location. Because all of the United States research was done using our procedure, the United States is currently only in a position to accept the Phase 1 GTR if it would be allowed to continue to use its procedure until these issues can be resolved.

The document also proposes some minor wording changes to clarify that some paragraphs are contracting party options, as the United States believes this is typically the way these types of provisions are drafted.