



## Test Report: WAV Seats, Belts, Belt Anchorages and WTORS

### Legislation

EC Directive 2007/46/EC as amended by Regulation 2015/166, Annex XI, Appendix 3,  
Item 15A (Footnote W<sub>3</sub>)  
Item 19A (Footnote W<sub>5</sub>)  
Item 31A (Footnote W<sub>6</sub>)  
WTORS Dynamic Testing and WTORS Occupant Restraint Installation only.

### Test Details

Location of Test:	Unwin Martock TA12 6EY
Date of Test:	16/17/20/21 August 2018
VCA Representative(s):	James Diwell (16 <sup>th</sup> August 2018 Only) Rob Hookway
Manufacturer's Representative(s):	Paul Nieuwenhuis
Reason for Test Report:	<del>New approval / Extension of approval /</del> Test report only

### Manufacturer Details

Name and Address:	Tripod Mobility Collseweg 10 5674TR Nuenen The Netherlands
Type:	See Worst Case Notes
Commercial Description:	See Worst Case Notes
Category:	See Worst Case Notes

### Conclusion

The above mentioned vehicle/components were tested in accordance with the above mentioned legislation and were found to comply in all respects. This report relates only to the items tested.

Signature:

Name:	Rob Hookway
Position:	Type Approval Engineer
Date:	02 November 2018

### List of Annexes



# Vehicle Certification Agency

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Report Number: ESU437411-WAV

Issue: 1

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Annex	No of Pages	Subject
I	1	Comparison of vehicle and WTORS test geometry
II	4	T-12191
III	4	T-12198
IV	73	Info Docs
V	1	Welding Information



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## Worst Case Rationale

Test 1: T-12191, Test 2: T-12198 both as described below.  
In vehicle test of WTORS, to Non ISO10542 geometry.  
Rear tie downs use trip-lock fittings in body shell provided by Tripod

After both tests, some deformation of rear tie-down anchorages and buckle stalk mounting locations.

Issue 1: Correction to add missing environmental test reference (UTAC report).

*Note: Include information on variants and versions this report covers, as applicable. Supporting documents may be annexed to this report*

## Tests Required

	Yes, NA, See Report ... / Approval ... / Annex ...
Seats (Item 15a):	Not Applicable
Seatbelt Anchorages (Item 19a):	Not Applicable
Seatbelt Installation (Item 31a):	Not Applicable
WTORS Anchorages:	Yes
WTORS Components – Dynamic Test	Yes
WTORS Components– Material Tests	Not Applicable
WTORS Occupant Restraint Installation:	Yes

## Vehicle/Component Specification

Vehicle Type/Variant/Version:	L2 Peugeot Rifter bodyshell.
Wheelchair Front Tie-down Details:	1 – EF3H 2 – EF3H
Wheelchair Rear Tie-down Details:	1 - BQEMH 2 - BQPH
Occupant Restraint Details:	1 – SBT-11040-A – Short Stalks 2 – SBT – 11040-A – Long Stalks

## Manufacturer's Documentation

Manufacturer's documentation is complete and reflects the agreed specification for the components tested and covers all variants and versions agreed in the worst case rationale.

Yes

## Facility and Equipment Checks

Calibration certificates checked and valid, recorded in the following table:

Equipment	Serial / Certificate No.	Calibration due*
Data Acquisition	UIG 133	20-Nov-18
Accelerometer AX	UIG 108	13-Sep-18
Accelerometer AX	UIG 125	24-Nov-18

\*Specify calibrated date + (interval) or calibration due date.



Test Requirements		Complies Yes / NA
<b>Seats (Item 15A)</b>		
<b>Seatbelt Anchorages (Item 19A)</b>		
<b>Seatbelt Installation (Item 31A)</b> (Ordinary Seats)		
<b>WTORS Anchorages</b> (Anchorage strength may be tested using either the dynamic or static options below.)		
<b>General Requirements</b>		
Footnote W3	Longitudinal plane of the intended wheelchair-travelling position is parallel to the longitudinal plane of the vehicle.	Yes
Footnote W3	Appropriate information is made available to the vehicle owner that, in order to be capable of withstanding the forces transmitted by the tie-down mechanism during the various driving conditions, a wheelchair with a structure meeting the relevant part of ISO 7176-19:2008 is recommended.	Not Applicable
<b>Dynamic Testing</b>		
2007/46, Ann XI, App 3, 0.1.	Anchorage strength requirements are considered to be met if the dynamic WTORS component test is carried out in a representative body structure.	Yes
<b>Static Testing</b>		
2007/46, Ann XI, App 3, 0.1.	SWC load is applied by means of a surrogate wheelchair, as defined in ISO 10542:2012.	Not Applicable
2007/46, Ann XI, App 3, 2.1.1.	Occupant restraint load and the traction device used to apply it are as specified in ECE R14.	Not Applicable
2007/46, Ann XI, App 3, 2.2.	Loads are applied simultaneously at an angle of $10^\circ \pm 5^\circ$ above the horizontal plane. The SWC load is applied at a height of between 200 mm and 400 mm, measured vertically from the surface on which the SWC rests.	Not Applicable
2007/46, Ann XI, App 3, 2.2.	All forces are maintained for a period of not less than 0.2 seconds.	Not Applicable
<b>Forward Pull<sup>1</sup></b>		



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2007/46, Ann XI,  
App 3, 2.2.2

Belt position	Time to load (sec)	Time required load held (sec)	Required load (daN)	
Lap			1350 <sup>2</sup>	
Torso			1350 <sup>2</sup>	
Seat inertia <sup>#</sup>				
SWC			2450	

<sup>1</sup> Amend in accordance with paragraph 2.2.3, as appropriate for rear-facing wheelchairs.

<sup>2</sup> Where the occupant belt loads are transferred to the vehicle structure through a seat or structure similar to a seat, an inertia load should be added in accordance with R14 paragraph 6.4.4.

#### Rearward Pull<sup>1</sup>

2007/46, Ann XI,  
App 3, 2.2.2

Belt position	Time to load (sec)	Time required load held (sec)	Required load (daN)	
SWC			820 <sup>2</sup>	

<sup>1</sup> Amend in accordance with paragraph 2.2.3, as appropriate for rear-facing wheelchairs.

<sup>2</sup> Note 1225 daN rearward load is required for UK NSSTA approval

VCA

No part of the system failed, or became detached during the test.

Not  
Applicable

Remarks (give details of damage/deformation):

Not Applicable

#### Geometric Requirements

2007/46, Ann XI,  
App 3, 1.2.  
R14.07, 5.4.2.2.

Side-view projected angles of the lines between the SWC P-point and the lower occupant anchorages are between 30 and 80 degrees from the horizontal.

Yes

2007/46, Ann XI,  
App 3, 1.2.

Upper actual anchorage(s) are located at least 1,100 mm above the horizontal plane, passing through the points of contact between the rear tyres of the SWC and the vehicle floor. This condition is still satisfied after the static/dynamic strength test.

Yes

#### WTORS Components – Dynamic Test

##### Dynamic Test Set-up

ISO10542, Ann A,  
4.2.(a)

Wheelchair design meets characteristics specified in Annex E.

Yes

ISO10542, Ann A,  
4.2.(b)

Hybrid III dummy used with mass of 77.7 kg. Close-fitting cotton clothes worn and static resistance of all joints set to 1 g.

Yes



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2007/46, Ann XI, App 3, 2.3.1.	Test carried out in representative vehicle body structure* OR <del>All anchorages on sled set up are within an absolute linear distance of 50 mm from those on the vehicle*</del> <i>*Strikethrough, as appropriate.</i> <i>Note: There is no tolerance on the SWC P-point with respect to the declared travelling position of the wheelchair and so measurements of anchorage positions should be normalised to give the P-point as the origin in both sets of measurements.</i>	Yes
VCA	In the case of out-of-vehicle tests, comparison of anchorage positions is attached to the report as an Annex.	Not Applicable
ISO10542, Ann A, 5.7. VCA	Wheelchair reference plane parallel to vehicle longitudinal plane (+/- 3°). Where the wheelchair does not rest on a horizontal surface, this attitude is replicated on the sled, wherever possible.	Yes
ISO10542, Ann A, 5.8.	Tie-downs installed and tensioned, as per manufacturer's instructions.	Yes
ISO10542, Ann A, 5.12.	ATD is positioned upright in the SWC and symmetrical about its centreline with the pelvis as far back on the seat as possible and hands resting on thighs.	Yes
ISO10542, Ann A, 5.14.-5.18.	Occupant restraint installed, as per manufacturer's instructions.	Yes
ISO10542, Ann E, E.2.1	Tyre pressures set to 320 <sup>+30</sup> / <sub>-0</sub> kPa.	Yes
<b>Dynamic Test Results</b>		
ISO10542, Ann A, 4.1.(c)	Sled velocity change: <div>1) 48.05 2) 48.63</div> km/h <i>Requirement: 48 <sub>-0</sub><sup>+2</sup> km/h</i>	Yes
ISO10542, Ann A, 4.1.(d)	Acceleration pulse conforms to ISO 10542 requirements. <i>Requirement: &gt; 0g for 75 ms; &gt; 15 g for 40 ms; &gt; 20 g for 15 ms</i>	Yes
ISO10542, 5.2.3.(a)	ATD retained in seat of SWC.	Yes
ISO10542, 5.2.3.(b)	SWC is in an upright position on the impact sled.	Yes
ISO10542, 5.2.3.(c)	No WTORS component became detached or separated.	Yes
ISO10542, 5.2.3.(d)	Tools not required for release of SWC from tie-down system.	Yes
ISO10542, 5.2.3.(e)	Tools not required for release of ATD from restraint system.	Yes



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ISO10542, 5.2.3.(f)	No part of the WTORS exhibits signs of tearing, fragmentation, fracture, or complete failure (unless designed to do so, e.g. load limiting webbing).	Yes																		
ISO10542, 5.2.3.(g)	WTORS exhibits no dangerous roughness, sharp edges or protrusions likely to increase the risk of injury.	Yes																		
ISO10542, 5.2.2.(a)	<p>Movement of the SWC and ATD is within limits:</p> <table><tr><td>- Horizontal excursion of SWC:</td><td><table><tr><td>1) 189</td></tr><tr><td>2) 197</td></tr></table></td><td>mm</td><td>Limit: 200</td></tr><tr><td>- Horizontal excursion of ATD knee:</td><td><table><tr><td>1) 320</td></tr><tr><td>2) 241</td></tr></table></td><td>mm</td><td>Limit: 375</td></tr><tr><td>- Horizontal excursion of ATD head:</td><td><table><tr><td>1) 587</td></tr><tr><td>2) 547</td></tr></table></td><td>mm</td><td>Limit: 650</td></tr></table>	- Horizontal excursion of SWC:	<table><tr><td>1) 189</td></tr><tr><td>2) 197</td></tr></table>	1) 189	2) 197	mm	Limit: 200	- Horizontal excursion of ATD knee:	<table><tr><td>1) 320</td></tr><tr><td>2) 241</td></tr></table>	1) 320	2) 241	mm	Limit: 375	- Horizontal excursion of ATD head:	<table><tr><td>1) 587</td></tr><tr><td>2) 547</td></tr></table>	1) 587	2) 547	mm	Limit: 650	Yes
- Horizontal excursion of SWC:	<table><tr><td>1) 189</td></tr><tr><td>2) 197</td></tr></table>	1) 189	2) 197	mm	Limit: 200															
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1) 587																				
2) 547																				
ISO10542, 5.2.2.(b)	Horizontal excursion of ATD knee is at least 1.1 times excursion of SWC.	Yes																		
Remarks (condition of anchorages after test):																				
Deformation to rear anchorages.																				

## WTORS Components – Material Tests

### ECE Regulation 16/Environmental/Material Tests

ISO10542, 5.1.1.	ECE regulation tests as specified in the table below have been carried out and passed for all component parts of the WTORS, as applicable.	Yes
Test report details or other reference: UTAC report PV18-07711		
ISO10542, 5.1.2.	Burn rate of webbing and padding does not exceed 100 mm/min.	see report



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Subclause	Component	Subject	ECE R 16 tests referenced	Application <sup>a</sup>
6.2.1.1	rigid parts	sharp edges	—	OR + WTD
6.2.1.2	rigid parts	corrosion	7.2	OR + WTD
6.2.1.4	rigid parts	cold impact test	7.5.4	OR + WTD
6.2.2.1	buckles	correct use and size	—	OR
6.2.2.2	buckles	closing/releasing	7.8.2	OR
6.2.2.3	buckles	cold mating	7.5.3	OR
6.2.2.4	buckles	repeated testing	7.7	OR
6.2.3.2	adjustment devices	micro-slip	7.3	OR
6.2.3.4	belt-adjusting device	force	7.5.6	OR + WTD
6.2.5	various belt retractors	performance	7.2, 7.6.1 to 7.6.4	OR
6.2.6	preloading devices	performance	7.2, 7.9.2	OR
6.3.1	belts	general specs	7.4.3	OR
6.3.2	belts	strength	7.4.1.1, 7.4.2	OR + WTD
6.3.3	belts	strength	7.4.1, 7.4.2	OR + WTD
6.4.2	belts	strength	7.4.1.6, 7.4.2, 7.5	OR + WTD

<sup>a</sup> OR = occupant restraint, WTD = wheelchair tiedown.

### Webbing Slippage Tests

ISO10542, 5.3.

Strap type adjustment mechanisms show slippage of no greater than 25 mm when tested in accordance with Annex C or ECE R16.

see report

### Partial Engagement Test

ISO10542, 5.4. &  
Ann D

All parts of the WTORS with potential to be partially engaged separate from this condition, with a force of no greater than  $22^{+2}/_{-0}$  N, applied for a maximum of  $3^{+0.5}/_{-0}$  seconds.

see report

Description of components and subjected to the above test and manner of partial engagement (with photographs, if applicable):

See report

### WTORS Occupant Restraint Installation

2007/46, Ann XI,  
App 3, 1.3.  
R16.06, 8.2.2.

Belt(s) are installed so that, when properly worn, they will work satisfactorily and reduce the risk of bodily injury in the event of an accident. In particular, they are installed so that the:

Yes

R16.06, 8.2.2.1.

Straps are not liable to assume a dangerous configuration;

Yes





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R16.06, 8.2.2.2.	Danger of a correctly positioned belt slipping from the shoulder of a wearer as a result of his/her forward movement is reduced to a minimum;	Yes
R16.06, 8.2.2.3.	Risk of the strap deteriorating through contact with sharp rigid parts of the vehicle or seat structure is reduced to a minimum;	Yes
R16.06, 8.2.2.4.	Safety belt provided for each wheelchair position is such as to be readily available for use, including after a seat (or wheelchair) has been displaced/folded and then restored.	Yes
R16.06, 8.3.1.	Rigid parts do not increase the risk of injury in the event of an accident.	Yes
R16.06, 8.3.2.	Device for releasing the buckle is clearly visible to and within easy reach of the wearer, and designed so that it cannot be opened inadvertently or accidentally. It is located so that it is readily accessible to a rescuer in an emergency.	Yes
R16.06, 8.3.2.	Both when not under load and when sustaining the wearer's weight, the buckle is capable of being released by the wearer with a single simple movement of either hand in one direction.	Yes
R16.06, 8.3.2.	If the buckle is in contact with the wearer, the parts of the buckle likely to contact the body of the wearer presents a section of not less than 20 cm <sup>2</sup> and at least 46 mm in width, measured in a plane situated at a maximal distance of 2.5 mm from the contact surface.	Not Applicable
R16.06, 8.3.3.	Belt either adjusts automatically to fit or is designed so that the manual adjusting device is readily accessible to the wearer, is convenient and easy to use, and may be tightened with one hand.	Yes
R16.06, 8.3.4.	Belts incorporating retractors are installed so that they operate correctly and stow the strap efficiently.	Yes

## Remarks

Note: VCA apply measurement uncertainty to calibrated items but not test results.



## **Annex I – Comparison of Vehicle and WTORS Test Geometry**

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