

Test report

Test report relating to a wheelchair according to the international standard ISO 7176-19:2008, concerning the product with trade mark: Meyra, type: 2.322, manufactured by Meyra GmbH.

Report number	89217519-06
Date	10 November 2020
Author	Ir K.P. Kooistra
Client	Meyra GmbH Meyra-Ring 2 32689 Kalletal-Kalldorf Germany
Project number	89217519
Project name	Meyra crash test according ISO 7176-19
Number of pages	19

All rights reserved.

No part of this report may be reproduced, provided to and/or examined by third parties, and/or published by print, photoprint, microfilm, in electronic form or any other means without the explicit previous written consent of TÜV Rheinland Nederland B.V.

In case this report was drafted within the context of an assignment to TÜV Rheinland Nederland B.V., the rights and obligations of contracting parties are subject to the General Terms & Conditions for Advisory, Research and Certification assignments to TÜV Rheinland Nederland B.V. and/or the relevant agreement concluded between the contracting parties.

© 2010 TÜV Rheinland Nederland

Headoffice:
Westervoortsedijk 73
NL-6827 AV Arnhem
P.O. Box 2220
NL-6802 CE Arnhem

Location Leek:
Eiberkamp 10
NL-9351 VT Leek
P.O.Box 37
NL-9350 AA Leek

info@nl.tuv.com
www.tuv.com/nl
Tel. +31 (0) 88 888 7 888
Fax +31 (0) 88 888 7 879

TÜV Rheinland Nederland B.V. is a
registered company at the Dutch
Chamber of Commerce under
number 27288788

VAT number: NL815820380B01
IBAN: NL61DEUT0265155096

Contents

1	Introduction	3
1.1	Purpose.....	3
1.2	Description of the sample(s), identification.....	3
1.3	Sampling procedure.....	4
1.4	Application	4
1.5	Method of testing	4
1.6	Put out to contract.....	4
1.7	Privacy statement	4
2	Summary of test results	5
3	Detailed test results	6
4	Remarks on the test results	13
5	Conclusion	14
6	References	15
7	Signatures.....	16
Appendix A, Pictures of the tested product		17
Appendix B, Sled deceleration (or acceleration) and velocity		19

1 Introduction

1.1 Purpose

The tests have been performed in order to establish whether or not the product meets the requirements of the international Standard ISO 7176-19 [1].

1.2 Description of the sample(s), identification

Subject	Specification/value
Description of the product	electrically powered wheelchair
Manufacturer	Meyra GmbH
Trade mark and type of product	Meyra, 2.322
Version	Seat width 430 mm
Options on the wheelchair that were tested together with the wheelchair	Headrest
Maximum occupant mass	135 kg
Mass of the unloaded wheelchair	134,6 kg
Test set up	
Used dummy during crash test	H3-50th, midsize adult male
Mass of the used dummy	76 (H3, 50th) kg
Angle to the horizontal of the seat	3 °
Angle to the vertical of the back rest	2 °
Tie down system handed in by the manufacturer of the wheelchair	Not applicable
Attachment method	Dummy wheelchair tie down system according to ISO 7176-19 [1]
Crash Simulator	Inverse Crash Sled
Orientation	Forward facing
Test number	S20380306
Test date	17-9-2020

Remark

There was no wheelchair tie down system provided by the manufacturer of the wheelchair.

As suggested by TR-NL, a surrogate tie down system was used according to Annex E of ISO 7176-19 [1]. This system consisted of 2 metal bars at the rear of the wheelchair and safety belt webbing at the front.

For pictures is referred to Appendix A.

1.3 Sampling procedure

TÜV Rheinland B.V. has had no influence on the selection of the sample.

The sample was test-worthy and was received on 16 September 2020 from the manufacturer.

1.4 Application

The request for testing was submitted by the manufacturer on 09-09-2020.

1.5 Method of testing

All applicable tests have been performed according to the international Standard ISO 7176-19 [1].

1.6 Put out to contract

Tests were performed at TASS International, Helmond, The Netherlands. TASS is accredited for this test.

1.7 Privacy statement

Due to privacy reasons, the names of involved personnel that executed the tests, are not disclosed in the report. However, this information is available on internal work sheets, test forms etc. in the project file.

2 Summary of test results

Summary of test results after performing all applicable tests according to the international Standard ISO 7176-19 [1].

Par.	Description	Pass/Fail/n.a
4	Design requirements	
4.1	Wheelchair securement	pass
4.2	Occupant restraints	n.a.
5	Performance requirements	
5.1	Wheelchair-anchored belt restraints	n.a.
5.2	Frontal impact	pass
5.3	Accessibility of securing points intended for use with four-point strap-type tie downs	pass
5.4	Accommodation of vehicle-anchored belt restraints (Normative Annex D)	Overall rating: A = good
6	Identification, labelling, user instructions, warning and disclosure requirements	
6.1	Identification and labelling	pass
6.2	Presale literature	pass
6.3	User and maintenance instructions	pass

3 Detailed test results

Sample nr:	89217519-06		
Req. nr.	Description of the requirement	Value of the test	Pass / fail / n.a.
4	Design requirements		
4.1	Wheelchair securement		
4.1.1	<p>Wheelchair suitable for 4-point strap-type tie down system according to ISO 10542, that conforms to Annex B, using a minimum of four securement points, two at the front and two at the rear that conform to the geometric specifications set forth in Annex B:</p> <ul style="list-style-type: none"> - closed rectangle - $\geq 60 \times \geq 25$ mm (Fig. B.1) - structural members solid (not hollow) (Fig. B.1) - structural members ≥ 26 mm (Fig. B.1) - radius R15-R12 - located as specified in Annex B.3 (Fig. B.2) 	<p>2 front, 2 rear</p> <p>closed rectangle width: 60 mm height: 30 mm solid 28 mm R = 15 located as in Fig. B.2</p> <p>conforms</p>	pass
4.1.2	If a wheelchair is intended by the manufacturer to also be secured by a docking securement device in public transportation and/or different private vehicles, the securement points on the wheelchair and/or of the wheelchair tiedown adaptors shall conform to the specifications set forth in Annex F and the performance requirements in Clause 5.	n.a. FOR APPROVAL TO EN 12183 OR 12184 VERSIONS 2014: SEE NEXT ROW	n.a.
	TEXT OF 4.1.2 IS MODIFIED BY EN 12183:2014 AND EN 12184:2014, MODIFIED TEXT: If a wheelchair is intended by the manufacturer to also be secured by a docking securement device in public transportation and/or different private vehicles, the securement points on the wheelchair and/or of the wheelchair tiedown adaptors shall conform to the performance requirements in Clause 5.	n.a.	n.a.
4.2	Occupant restraint		
4.2.1	Wheelchair-anchored pelvic belt	n.a.	n.a.
4.2.1 a)	Wheelchair-anchored pelvic belt between 30 and 75°	n.a.	n.a.
4.2.1 b)	Adjustment of pelvic belt	n.a.	n.a.
4.2.2	Wheelchair-anchored shoulder belt		
4.2.2 a)	Fit over shoulder/chest as illustrated in Figure 4	n.a.	n.a.
4.2.2 b)	Upper anchor or guide point at or above shoulder of the ATD	n.a.	n.a.
4.2.2 c)	Locate the shoulder-belt at least as far from the ATD, as shown in Figure 3	n.a.	n.a.
4.2.2 d)	Provide adjustment in the shoulder-belt as specified in Table 4	n.a.	n.a.
4.2.3	Rating the accommodation of vehicle or tie down-anchored occupant belt restraints using Normative Annex D	The Design requirement 4.2.3 is the same as the Performance requirement 5.4, so see 5.4	

Sample nr:	89217519-06		
Req. nr.	Description of the requirement	Value of the test	Pass / fail / n.a.
5	Performance requirements		
5.1	Wheelchair-anchored belt restraints		
5.1 a)	All belt parts in conformity with applicable subsections of ECE 16 or FMVSS 209	n.a.	n.a.
5.1 b)	Burning rate webbing <100 mm/min, when tested according to ISO 3795	n.a.	n.a.
5.2	Frontal impact		
5.2.1	During the test		
5.2.1 a)	Horizontal excursions limits ATD size: FOR APPROVAL TO EN 12183 OR 12184 VERSIONS 2014: SEE NEXT ROW	n.a.	n.a.
	Wheelchair point P, variable $X_{WC} \leq$ Large 200 mm		
	ATD knee, variable $X_{knee} \leq$ Large 375 mm		
	ATD front of head, variable $X_{headF} \leq$ Large 650 mm		
	ATD rear of head variable $X_{headR} \leq$ -Large -450 mm		
	TEXT OF 5.2.1.a) IS MODIFIED BY EN 12183:2014 AND EN 12184:2014, MODIFIED TEXT: If the wheelchair has a head restraint, the horizontal excursions of the ATD and the wheelchair, with respect to the impact sled, shall not exceed the limits in Table 7 at any time during the test. If the wheelchair does not have a head restraint, the horizontal excursions of the ATD and the wheelchair, with respect to the impact sled, shall not exceed the limits in Table 7 at any time during the test <u>with the exception that the excursion of the back of the head of the ATD, X_{headR}, shall not be measured.</u> Horizontal excursions limits ATD size:	conforms n.a.	pass n.a.
	Wheelchair point P, variable $X_{WC} \leq$ Large 200 mm	40 mm	pass
	ATD knee, variable $X_{knee} \leq$ Large 375 mm	155 mm	pass
	ATD front of head, variable $X_{headF} \leq$ Large 650 mm	154 mm	pass
	ATD rear of head variable $X_{headR} \leq$ Large -450 mm	-195 mm	pass
5.2.1 b)	Knee excursion exceeding point P as follow $X_{knee} / X_{WC} \geq 1.1$ When usage of vehicle-anchored pelvic belt restraint.	3.9	pass
5.2.1 c)	Excursions of batteries (if applicable) • not outside footprint wheelchair • not against ATD back of legs	conforms conforms	pass pass
5.2.2	After the test		
5.2.2 a)	Wheelchair upright, on the sled platform	conforms	pass
5.2.2 a)	ATD torso angle $\leq 45^\circ$	8 °	pass
5.2.2 b)	No visible signs of material failure on securing points	conforms	pass

Sample nr:	89217519-06		
Req. nr.	Description of the requirement	Value of the test	Pass / fail / n.a.
5.2.2 c)	No completely separated parts > 100 g	conforms	pass
5.2.2 d)	No sharp edges with R= < 2 mm	conforms	pass
5.2.2 e)	Primary load carrying components no visible signs of failure	n.a., see next row	n.a.
	TEXT OF 5.2.2 e) IS MODIFIED BY EN 12183:2014 AND EN 12184:2014, MODIFIED TEXT: Primary occupant-load-carrying components of the wheelchair shall not show visible signs of failure, <u>unless there is a backup system to provide support.</u>	conforms	pass
5.2.2 f)	Locking mechanisms of tilting seating adjusters no signs of failure	n.a.	n.a.
5.2.2 g)	ATD removable without tools	conforms	pass
5.2.2 h)	Wheelchair releasable without tools	conforms	pass
5.2.2 i)	Decrease of average height of ATD H-points to platform < 20%	9.8 %	pass
5.2.2 j)	No partial or complete failure of the webbing of any WTORS assembly during test by wheelchair and its components	conforms	pass
5.3	Accessibility of securement points intended for use with four-point strap-type tie downs with hook-type end-fittings		
5.3 a)	Allowance of one-handed attachment and engagement within 10 s	3 s	pass
5.3 b)	Allowance of one-handed disengagement and removal of the same hook gauge within 10 s	3 s	pass
5.4	Accommodation of vehicle-anchored belt restraints The wheelchair shall be tested for accommodation of vehicle-anchored occupant-restraint systems in accordance with Annex D and the resulting rating shall be reported in the product presale literature. Overall rating: <ul style="list-style-type: none">score 12-16 = A = goodscore 8-11 = B = acceptablescore 7 or less OR 1 score of 0 = C = poor		
	D.1 Overall ease of belt positioning	good = 2	Overall rating: 14 points = A = good
	D.2 Pelvic-belt-restraint contact area	good = 2	
	D.3 Shoulder-belt-restraint contact area	good = 2	
	D.4 Pelvic-belt-restraint contact location	good = 2	
	D.5 Shoulder-belt-restraint contact location	good = 2	
	D.6 Pelvic-belt-restraint angle	acceptable = 1	
	D.7 Pelvic-belt-restraint clear paths to anchor points	good = 2	
	D.8 Belt-restraint proximity to sharp edges	acceptable = 1	
6	Identification, labelling, user instructions, warning and disclosure requirements		

Sample nr:	89217519-06		
Req. nr.	Description of the requirement	Value of the test	Pass / fail / n.a.
6.1	Identification and labelling (on the wheelchair)		
6.1 a)	Securing point symbol <ul style="list-style-type: none"> total height of symbol $\geq 12\text{mm}$ line widths $\geq 10\%$ - $\leq 20\%$ of height sufficient contrast to the background, distance from 1 m 	conforms	pass pass pass
6.1 b)	Markings and/or wording to indicate location and type of any additional tie down (besides the four-point strap-type)	n.a.	n.a.
6.1 c)	Indication of conformity with ISO 7176-19:2008 (on the wheelchair)	conforms	pass
6.1 d)	Indication of conformity with ISO 7176-19:2008 (on the occupant restraints)	n.a.	n.a.
6.1 e)	Indication that postural support belts which are not intended as restraint, should not be used (on the postural support belts)	n.a.	n.a.
6.2	Presale literature		
6.2 a)	a statement that the wheelchair is designed to be secured facing forward when used as a seat in a motorvehicle and that it complies with the requirements of ISO 7176-19:2008	conforms	pass
6.2 b)	a description of the types of tiedowns that are suitable for use with the wheelchair (i.e., four-point straptype, clamp systems, specific type of docking system, etc.)	conforms	pass
6.2 c)	a statement that ease of access to, and manoeuvrability in, motor vehicles can be significantly affected by wheelchair size and turning radius, and that smaller wheelchairs and/or wheelchairs with a shorter turning radius will generally provide greater ease of vehicle access and manoeuvrability to a forward-facing position	conforms	pass
6.2 d)	a statement of whether the wheelchair provides, has been tested with, and can be used with, any manufacturer-designated wheelchair-anchored belt restraints	not applicable	n.a.
6.2 e)	the rating of the wheelchair's accommodation of vehicle-anchored belt restraints based on the test methods of Annex D	conforms	pass
6.3	User and maintenance instructions		
6.3.1	The user instructions shall include statements that		
6.3.1 a)	the wheelchair is designed to be forward-facing when used as a seat in a motor vehicle	conforms	pass
6.3.1 b)	the wheelchair conforms to the requirements of ISO 7176-19:2008	conforms	pass
6.3.1 c)	wheelchair users should transfer to the vehicle seat and use the vehicle-manufacturer-installed restraint	conforms	pass

Sample nr:	89217519-06		
Req. nr.	Description of the requirement	Value of the test	Pass / fail / n.a.
	systems whenever it is feasible, and the unoccupied wheelchair should be stored in a cargo area or secured in the vehicle during travel		
6.3.2	The user instructions shall include descriptions of		
6.3.2 a)	the types of tiedown systems that are suitable for use with the wheelchair (i.e. four-point strap-type, clamp systems, specific type of docking system, etc.)	conforms	pass
6.3.2 b)	the locations of all wheelchair securement points used in the frontal impact tests of Annex A and the markings used to identify them	conforms	pass
6.3.2 c)	belt-restraint anchor-point locations, if any, and the specifications for anchorage hardware and fasteners that are compatible with the anchor points	conforms	pass
6.3.2 d)	how the wheelchair is to be secured in a vehicle	conforms	pass
6.3.2 e)	the types of tiedown end-fittings that are compatible with the wheelchair securement points	conforms	pass
6.3.2 f)	the correct positioning of occupant belt restraints on the user, including statements that <ol style="list-style-type: none"> 1) the pelvic-belt restraint should be worn low across the front of the pelvis, so that the angle of the pelvic-belt restraint is within the preferred zone of 30° to 75° to the horizontal, similar to that shown in Figure 3, 2) a steeper (greater) angle within the preferred zone is desirable (see 4.2.1), 3) belt restraints should not be held away from the body by wheelchair components or parts, such as the wheelchair armrests or wheels, together with an illustration similar to that of Figure 6, 4) shoulder-belt restraints should fit over the shoulders, similar to the illustration provided in Figure 7, 5) belt restraints should be adjusted as tightly as possible, consistent with user comfort, and 6) belt webbing should not be twisted when in use 	conforms conforms conforms conforms conforms	pass pass pass pass
6.3.2 g)	the recommended settings for any adjustable parts, including, where applicable, seat and back rest positions, when the wheelchair is in use in a motor vehicle,	conforms	pass
6.3.2 h)	the wheelchair mass, as measured in ISO 7176-5	conforms	pass
6.3.2 i)	the maximum recommended user mass.	conforms	pass
6.3.3	The user instructions shall include illustrations of		
6.3.3 a)	the incorrect placement of belt restraints, as shown in Figure 6 as an example	conforms	pass

Sample nr:	89217519-06		
Req. nr.	Description of the requirement	Value of the test	Pass / fail / n.a.
6.3.3 b)	the correct placement of belt restraints, using an illustration similar to Figure 7 as an example	conforms	pass
6.3.3 c)	the locations of securement points for each type of tiedown method for which the wheelchair has been designed and successfully tested	conforms	pass
6.3.4	The user instructions shall include warnings, in 12-point font or larger , that		
	in 12-point font or larger, that	conforms	pass
6.3.4 a)	the wheelchair complies with the requirements of ISO 7176-19:2008 and, as such, has been designed and tested for use only as a forward-facing seat in a motor vehicle	conforms	pass
6.3.4 b)	the wheelchair has been dynamically tested in a forward-facing orientation with the ATD restrained by both pelvic and shoulder belts (e.g. a shoulder belt as part of a three-point belt restraint)	conforms	pass
6.3.4 c)	both pelvic- and shoulder-belt restraints should be used to reduce the possibility of head and chest impacts with vehicle components	conforms	pass
6.3.4 d)	in order to reduce the potential of injury to vehicle occupants, wheelchair-mounted trays not specifically designed for crash safety should 1) be removed and secured separately in the vehicle, or 2) be secured to the wheelchair but positioned away from the occupant with energy-absorbing padding placed between the tray and the occupant	conforms	pass
6.3.4 e)	when possible, other auxiliary wheelchair equipment should be either secured to the wheelchair or removed from the wheelchair and secured in the vehicle during travel, so that it does not break free and cause injury to vehicle occupants in the event of a collision	conforms	pass
6.3.4 f)	postural supports should not be relied on for occupant restraint in a moving vehicle, unless they are labelled as being in accordance with the requirements specified in ISO 7176-19:2008	conforms	pass
6.3.4 g)	the wheelchair should be inspected by a manufacturer's representative before reuse following involvement in any type of vehicle collision	conforms	pass
6.3.4 h)	alterations or substitutions should not be made to the wheelchair securement points or to structural and frame parts or components without consulting the wheelchair manufacturer	conforms	pass

Sample nr:	89217519-06		
Req. nr.	Description of the requirement	Value of the test	Pass / fail / n.a.
6.3.4 i)	spill-proof sealed batteries, such as "gelled electrolyte," should be installed on powered wheelchairs when used in a motor vehicle, and	conforms	pass
6.3.4 j)	care should be taken when applying the occupant restraint to position the seatbelt buckle so that the release button will not be contacted by wheelchair components during a crash	conforms	pass

4 Remarks on the test results

Req.nr.	Description of the requirement	Remark
	No remarks	

5 Conclusion

The electrically powered wheelchair, trade mark: Meyra, type: 2.322, meets the applicable requirements as stated in the international Standard ISO 7176-19 [1], with modifications to ISO 7176-19 as stated in EN 12183:2014 and EN 12184:2014.

The test results exclusively relate to the tested object.

Remark 1

The tests according to the test standard ISO 7176-19 were performed with the aim to receive approval according to the product standard EN 12183:2014 for manual wheelchairs or EN 12184:2014 for electrically powered wheelchairs and scooters. Both product standards contain modifications to ISO 7176-19, regarding the following performance requirements:

- 4.1.2 is replaced by the following:

If a wheelchair is intended by the manufacturer to also be secured by a docking securement device in public transportation and/or different private vehicles, the securement points on the wheelchair and/or of the wheelchair tiedown adaptors shall conform to the performance requirements in Clause 5.

NOT APPLICABLE

- 5.2.1 a) is replaced by the following:

If the wheelchair has a head restraint, the horizontal excursions of the ATD and the wheelchair, with respect to the impact sled, shall not exceed the limits in Table 7 at any time during the test.

THE TEST WAS PERFORMED WITH A HEAD REST MOUNTED ON THE WHEELCHAIR

If the wheelchair does not have a head restraint, the horizontal excursions of the ATD and the wheelchair, with respect to the impact sled, shall not exceed the limits in Table 7 at any time during the test with the exception that the excursion of the back of the head of the ATD, Xhead, R, shall not be measured.

NOT APPLICABLE

- 5.2.2 e) is replaced by the following:

Primary occupant-load-carrying components of the wheelchair shall not show visible signs of failure, unless there is a backup system to provide support.



Remark 2

When and if changes are made in production method and/or equipment, assessment according to this standard shall be reconsidered and re-tests shall be performed when the changes can lead to different specifications of the product. The decision and responsibility lies at the manufacturer.

6 References

- [1] International Standard ISO 7176-19:2008/Amd.1:2015 (E),
Wheelchairs – Part 19: Wheeled mobility devices for use as seats in motor vehicles,
International Standardization Organisation, July 2008/November 2015.


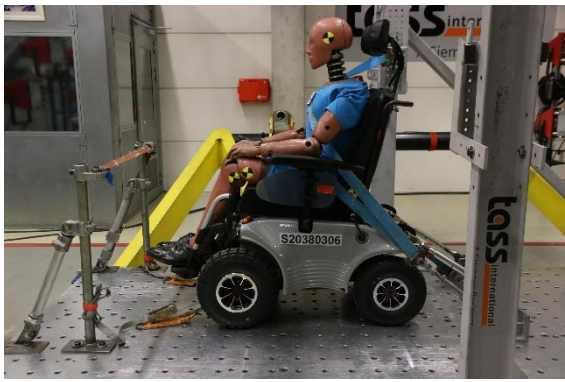

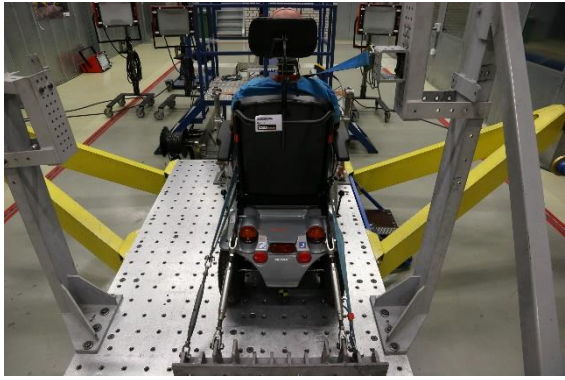
7 Signatures

Author	Signature
Ir K.P. Kooistra Expert medical products	
Approved by	Signature
T.W.J. Zandvliet, BSc. Expert medical products	


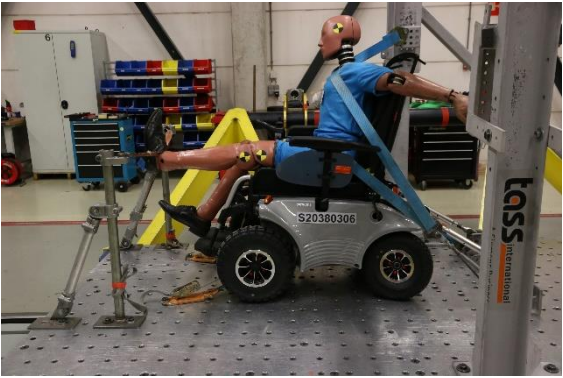
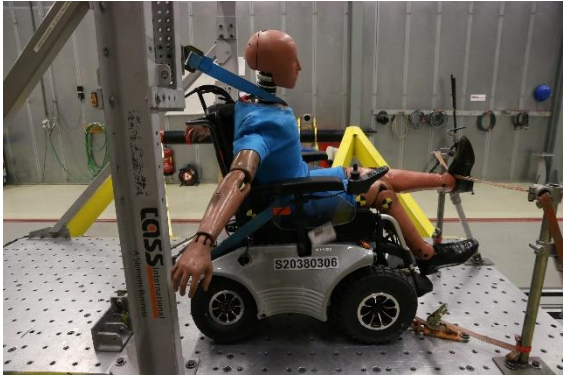

Appendix A, Pictures of the tested product

Pictures of the tested sample, trade mark: Meyra, type: 2.322.

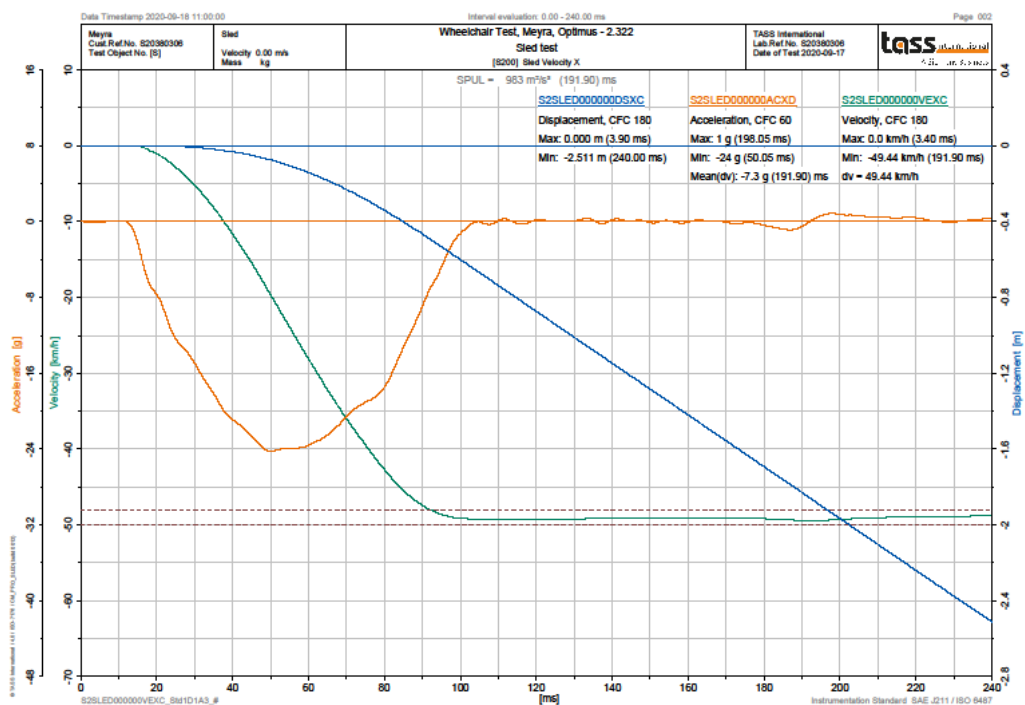
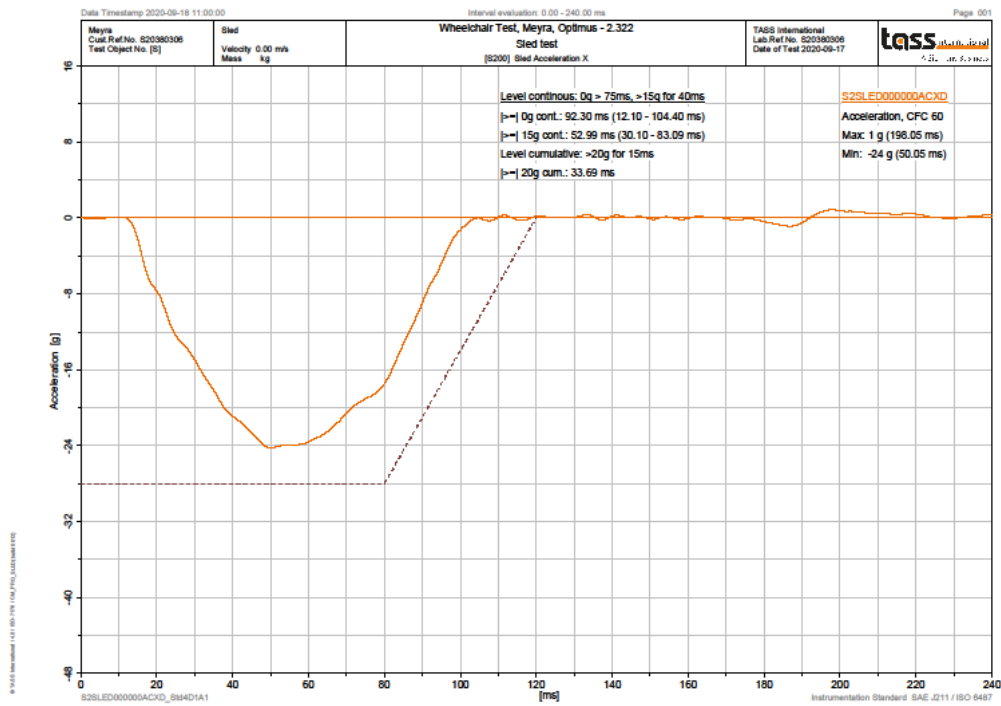
BEFORE the test

	
Front side	Left side
	
Right side	Back side

AFTER the test

	
Front side	Left side
	
Right side	Back side

Appendix B, Sled deceleration (or acceleration) and velocity



This is the end of this report.