



Product Testing Report

Wheeled mobility devices for use as seats in motor vehicles to ISO 7176:19

Customer: Karma Mobility

TRL Project Reference: PTJ227 (J227I02)

Report details

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Sam Rattley (Test Engineer)		Technical referee (Technical Reviewer)	

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1 Introduction

This report details the test preparation and results for dynamic impact test completed in accordance with ISO 7176:19 on behalf of Karma Mobility. The tests were completed at the TRL ISF test facility on 24 October 2016.

The results section of this report assesses the performance of the Karma Mobility, Flexx wheelchair product against criteria stipulated in the above standard.

2 Test Specifications

2.1 Test sample

The test sample detailed below was provided by Karma Mobility and the Test House (TRL) has had no influence on the selection procedure. TRL prepared the product for test using the manufacturer's guidelines with assistance from the customer where required.

Test Object	Manufacturer	Reference Number	Description	Mass
Wheelchair	Karma Mobility	Flexx	Manual Wheelchair	18 kg
Wheelchair tiedowns	Unwin	OF03 OR02	Pair adjustable front straps Pair red rear webbing	N/A
Occupant restraints	Unwin	PSR-08909-A, PSR-07394-B, PSR-07393-B	Fixed 3 point harness	N/A
Anchorage	Unwin	3 PTR	Shoulder harness ATF.	N/A
Test dummy	HIII 50th percentile male			77.7 kg
Set up concessions	None			

2.2 Pre-Test Conditions

The following conditions were observed and measured prior to test.

Adjustment	Angle to horizontal (from front towards backrest)
	Pre-Test Measurement
Backrest angle	77°
Seat base angle	9°
Hip ↑ left (HL)	540 mm
Hip ↑ right (HR)	540 mm
Mean hip height [(HL + HR) / 2]	540 mm
B-post height (above shoulder) (effective)	185 mm

3 Photography

Video: a high speed camera (500fps) was positioned on the right side perpendicular to the direction of travel of the impact sled. The high speed video was used for analysis of the dynamic behaviour of the test dummy and wheelchair during the test.

Stills: Pre and post impact test photographs were taken using a digital stills camera to provide records of pre and post-test conditions.

4 Instrumentation

A HIII 50th percentile male test manikin was used with a nominal mass of 77.7 kg. The ATD was not instrumented.

The test sled was instrumented with two longitudinal accelerometers conforms to the sign convention in SAE J1733.

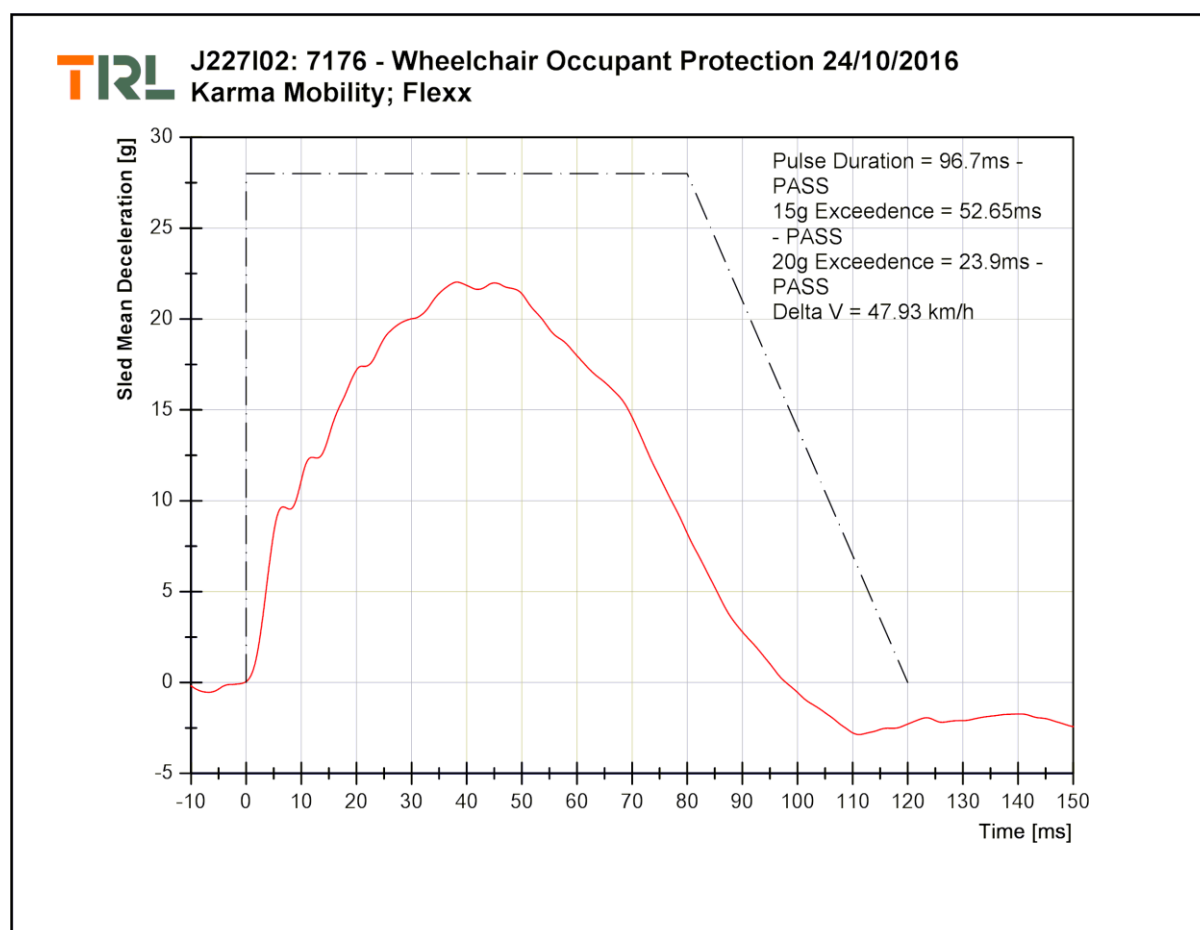
The instrumentation, used in this test, is calibrated annually at least.

5 Results

The test results are detailed below, including test pulse characteristics

5.1 Sled Deceleration Pulse

Annex A	Test Pulse Criteria	Results	Acceptance
A.3.1	The processed sled deceleration time pulse shall:		
(c)	Represent a change in velocity of 48^{+2}_{-0} km/h	47.93 km/h	Acceptable
(k) 1)	Fall within the marked area of Figure A.1	Yes	Acceptable
(k) 2)	Exceed 20 g for a cumulative time period of at least 15 ms	23.9 ms	Acceptable
(k) 3)	exceeds 15 g for a cumulative time period of at least 40ms	52.65 ms	Acceptable
(k) 4)	Have a duration of at least 75 ms from t_0 (start time) to t_f (finish time)	96.7 ms	Acceptable



5.2 Post-Test Conditions

The following conditions were observed and measured following the test.

Adjustment	Angle to horizontal (from front towards backrest)
	Post-Test Measurement
Backrest angle	83°
Seat base angle	5.9°
Hip ↑ left (HL)	580 mm
Hip ↑ right (HR)	550 mm
Mean hip height [(HL + HR) / 2]	565 mm

5.3 Observations

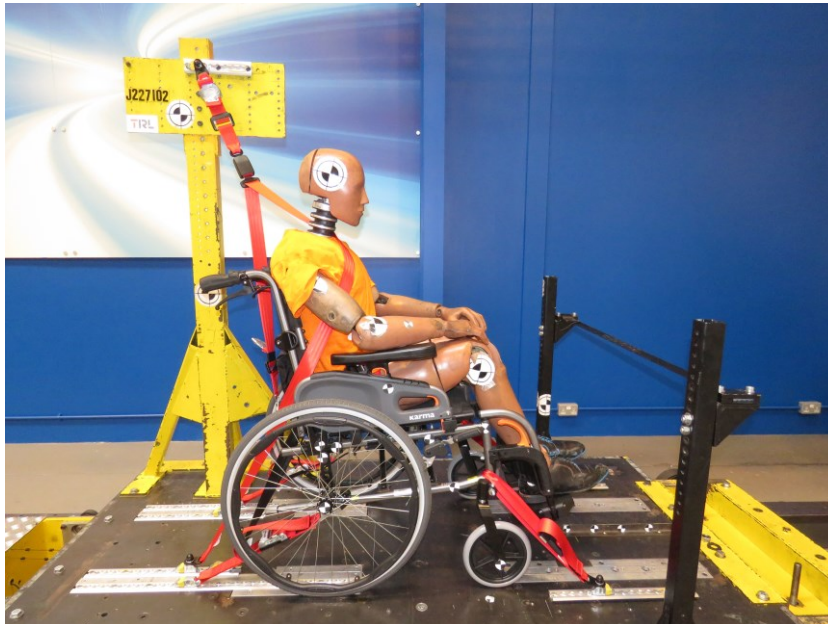
The performance criteria below are derived from Section 5.2 of ISO 7176-19:2008.

Section	Performance Criteria	Result	Pass/Fail
5.2.1	During the test		
(a)	The horizontal excursions of the ATD and the wheelchair shall not exceed the following limits:		
	Wheelchair point P [X_{WC}] : 200 mm	76.4 mm	Pass
	ATD knee [X_{knee}] : 375 mm	274.4 mm	Pass
	ATD front of head [X_{headF}] : 650 mm	388.9 mm	Pass
	ATD rear of head [X_{headR}] : -450 mm	-420.3 mm	Pass
(b)	Ratio of [X_{knee}] : [X_{WC}] ≥ 1.1	3.6	Pass
(c)	Batteries of the wheelchair shall not move completely outside the wheelchair footprint or into the wheelchair user's space.	Not applicable	N/A

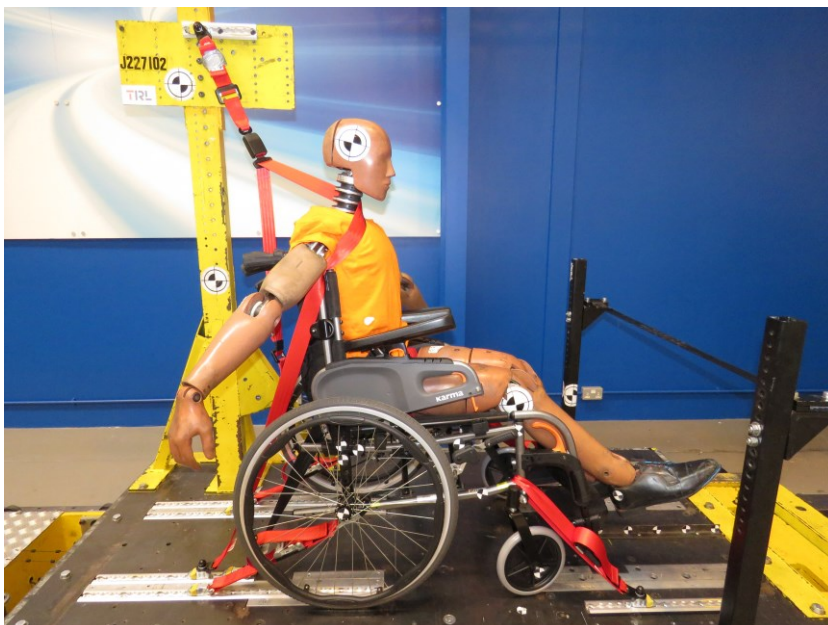
Section 5.2.2	Performance Criteria and Observation	Pass/Fail
a)	The wheelchair shall remain in an upright position on the test platform and the ATD shall be retained in the wheelchair in a seated posture, as determined by the ATD torso being oriented at not more than 45° to the vertical when viewed from any direction.	
	ATD remained in upright seated posture	Pass
	5°	
b)	The wheelchair securement points shall not show visible signs of material failure.	
	No visible signs of failure	Pass
c)	Components, fragments or accessories of the wheelchair with a mass in excess of 100 g shall not have completely separated from the wheelchair.	
	No parts separated	Pass
d)	Wheelchair components that may contact the occupant shall not fragment or separate in a manner that produces sharp edges, as defined by having a radius of less than 2 mm.	
	No parts separated	Pass
e)	Primary load-carrying components of the wheelchair shall not show visible signs of failure.	
	No visible signs of failure	Pass
f)	Locking mechanisms of tilt-in-space seat adjusters shall not show signs of failure.	
	N/A	N/A
g)	Removal of the ATD from the wheelchair shall not require the use of tools.	
	No tools required	Pass
h)	Release of wheelchair from the tiedown system shall not require the use of tools.	
	No tools required	Pass
i)	The post-test height of the average of left and right ATD H-points relative to the wheelchair ground plane shall not decrease by more than 20 % from the pre-test height.	
	Increase of +5%	Pass
j)	The wheelchair and its components shall not cause partial or complete failure of the webbing of any of the WTORS assemblies during the test	
	No failure of webbing caused by wheel chair	Pass

6 Still Photography

6.1 Pre-Test



6.2 Post-Test



END OF REPORT



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