Test Report

Customer	**Alerta Medical**
Test Item:	**ALERTA Transit** **Manual, folding, transit wheelchair**
Test	**ISO 7176-19:2008 as amended by EN 12183:2014**
Millbrook Report No.	**17/1184**
Millbrook Test No.	**S14940**

Author:  B. Appleyard
Engineer

Approved:  N. Targett
Manager: Safety Test Engineering

Date: 26th July 2017

Distribution

Organisation	Recipient	Format	Qty
Alerta Medical Mill House New Mill Road Kilmarnock Ayrshire KA1 3JG	D. Lindberg	PDF	1
Millbrook Proving Ground Ltd Millbrook Bedford MK45 2JQ	Contract file	PDF	1

Report Revision History

Rev.	Revision Description	Date	Author	Approver	Pages
0	Initial release	26 July 2017	B. Appleyard	N. Targett	All

Test Report

Contents

Appendices

Appendix A	Graphical Results Transducer Calibration Report
Appendix B	Pre and Post Test Photography
Appendix C	Summary of Results
High Speed Digital Films	See “Films” directory on data media
Still Photography	See “Stills” directory on data media

Test Facility and Date

The test, number S14940, was performed on 14th July 2017 at the Servo Sled facility at Millbrook Proving Ground Ltd.

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Millbrook
Bedford
MK45 2JQ
England

Contact: Bob Appleyard
Telephone: 01525 842 709
Fax: 01525 408 203
Email: b.appleyard@millbrook.co.uk

Test Items

Test parts were delivered to Millbrook on 6th June 2017.

Item	Part No.	Test mass (kg)
Manual folding attendant propelled wheelchair. (Head Support not fitted)	Alerta Transit	15.5kg
Front Wheelchair Tie Downs	Unwin OF03	4.5kg
Rear Wheelchair Tie Downs	Unwin OR02	
Occupant Restraints	MPG SORv1	

The following table provides information regarding the ATD used in the test.

Description	Family	Test mass (kg)
50th percentile male	HII	75kg

Test Outcome

The Alerta manual, folding, attendant propelled wheelchair satisfied the dynamic test requirements of ISO 7176-19:2008 as amended by EN 12183:2014.

Note 1: Lap belt routing under arm support and skirt guard required to achieve effective location of lap belt.

Note 2: High definition pre and post-test still images of the test are provided in the 'Stills' directory.

Photographic

A single high speed camera was positioned to provide overall coverage of the dynamic response of test item and occupant during the test. The high speed camera (nominal 1000 frames per second) used for this test was as detailed below:

Camera Position	Camera	Lens
LH Total on-board view	MotionXtra NX-Air-5-S2	IDT 6mm

Disclaimers

1. The results contained within this report only relate to the Alerta manual, folding, attendant propelled wheelchair, as described in Test Items.

   Millbrook Proving Ground has no control over matters pertaining to conformity of production items with tested items.

Test Report

At Millbrook, we provide a comprehensive range of engineering, test and validation services to customers in the automotive, transport, petrochemical, defence and security industries. We are independent and impartial in everything we do.

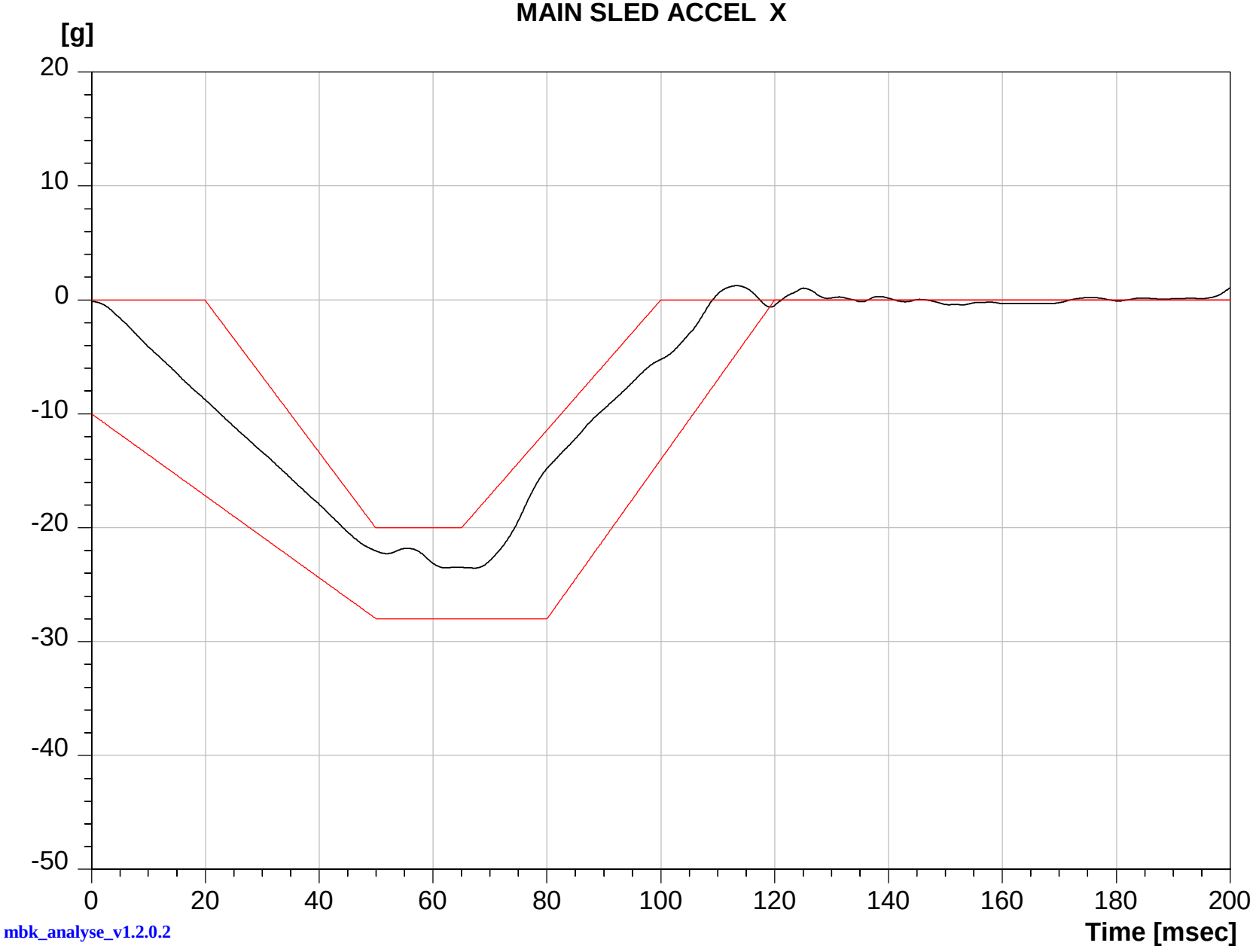
At our Proving Ground in the UK, we have 70km of varied test tracks, including hills routes, high speed areas and challenging off road courses. Our professional drivers and engineers perform repeatable tests, on all types of vehicles, in a secure and safe environment. We have a range of test facilities for components and full vehicles. These include engine dynamometers, environmental chambers, crash laboratory and advanced emissions testing.

We engineer and manufacture specialist vehicle conversions. These range from new versions of existing platforms, such as estate cars, to armoured solutions and complex electronics installations. We conduct impartial vehicle assessments and develop class-leading vehicle dynamics improvements. We help Vehicle Manufacturers manage complex bills of materials and launch new models.

We are passionate about customer service and technical excellence; we take pride in delivering exactly what our customers want, whether that is a vehicle test, engineered solution or smooth-running conference. We develop our people so that they remain at the leading edge of their specialist fields and contribute to the development of future regulations. The quality of our work is reflected in our ISO 9001 and ISO 17025 certification.

All of this combines to make Millbrook an integral part of the industries we serve and an ideal partner at any stage in the development and launch of the vehicles of tomorrow.

Millbrook, Bedford, MK45 2JQ, UK
www.millbrook.co.uk



Test No. : S14940

Test Date : 14 July 2017

Customer : Alerta Medical

Test Type : ISO 7176-19:2008
: as amended

Wheelchair : ALERTA
: Transit

WC+Seat Mass : 15.5kg

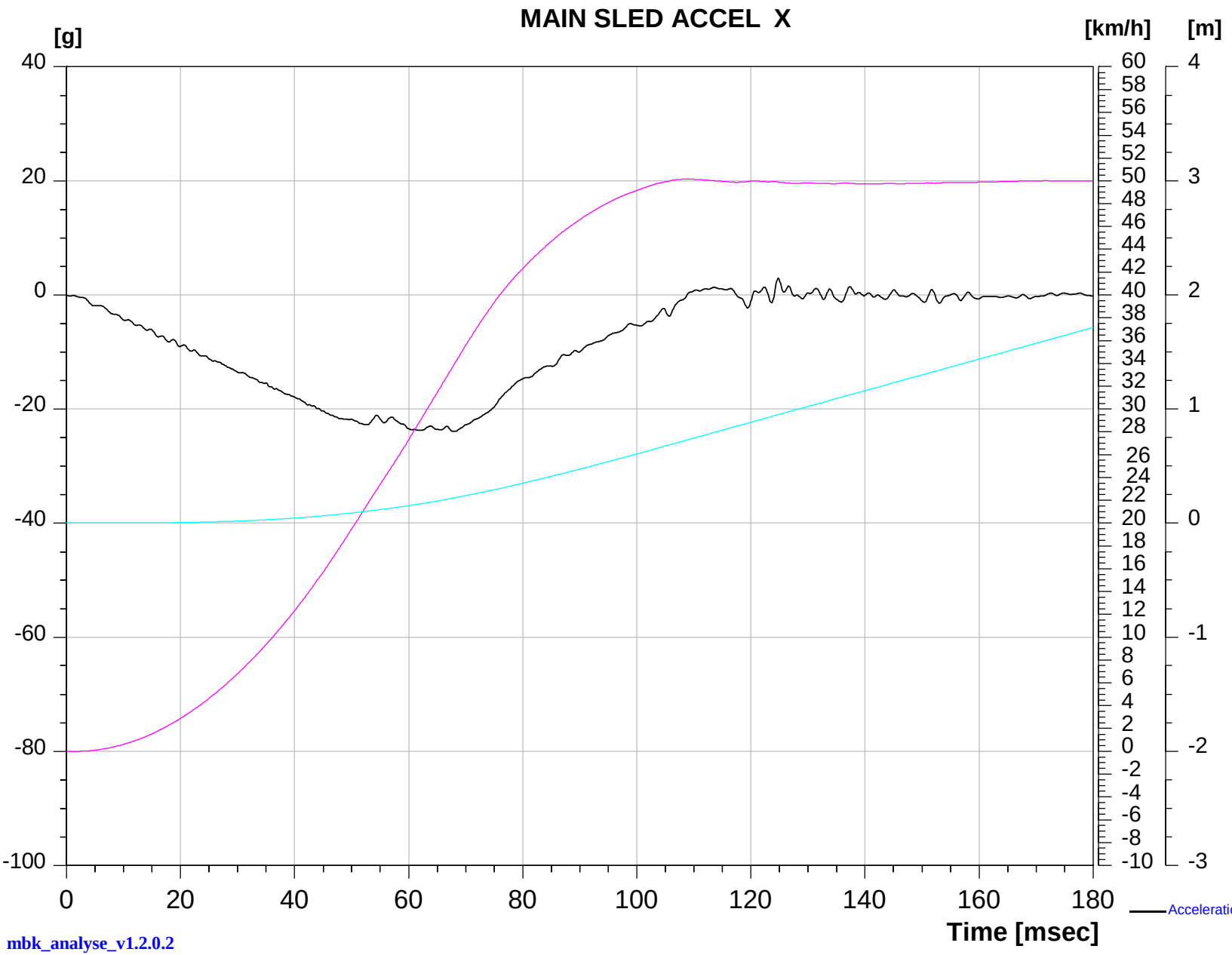
Occupant : Hyb II 50th

Tie-downs : Unwin
Occ. Res. : MBK Surrogate

Engineers
Spearhead : D. Lindberg
MBK : B. Appleyard

Max Test Velocity = 50.16 [km/h]

Filter : CFC 60 (SAE J211)
CAC : 500.00 [g]
Sensor ID : ZR23
Max Value : 2.23 g [216.0 msec]
Min Value : -23.54 g [67.3 msec]
Plot Date : 18/07/2017 at 16:53:12



MILLBROOK

Test No. : S14940

Test Date : 14 July 2017

Customer : Alerta Medical

Test Type : ISO 7176-19:2008
: as amended

Wheelchair : ALERTA
: Transit

WC+Seat Mass : 15.5kg

Occupant : Hyb II 50th

Tie-downs : Unwin
Occ. Res. : MBK Surrogate

Engineers
Spearhead : D. Lindberg
MBK : B. Appleyard

Filter : CFC 180 (SAE J211)
CAC : 500.00 [g]
Sensor ID : ZR23

Acceleration
Max Value : 3.35 g [216.2 msec]
Min Value : -23.92 g [67.8 msec]
Velocity
Max Value : 50.16 km/h [108.8 msec]
Min Value : 0.00 km/h [0.0 msec]
Displacement
Max Value : 10.11 m [1000.0 msec]
Min Value : 0.00 m [0.0 msec]
Plot Date : 18/07/2017 at 16:54:42

Sensor Calibration Report

Device No	ZR23	Calibration Date	07 Dec 2016
Description	Accel	Calibration Due	07 Dec 2017
Department	Crash Sled	Range (Min)	-200
Manufacturer	Endevco	Range (Max)	200
Model	2262C-200	Engineering Units	g
Serial No	ZR23	Output Units	mV
Comments	630Hz, 23k2	Calibration Notes	Screw On

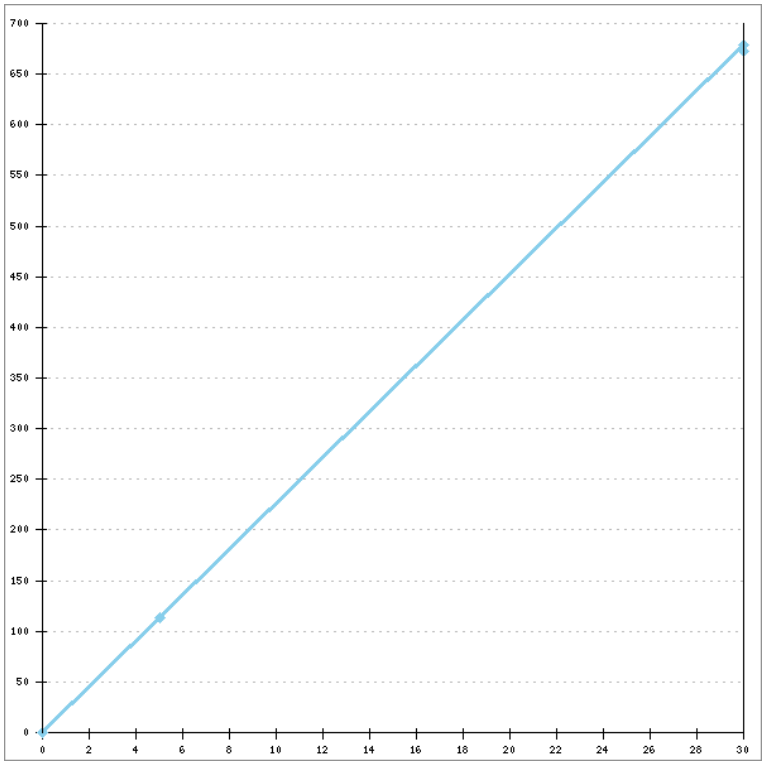
Procedure	INW003	Calibration Uncertainty	0.9036% min 0.0248 g
Supply Voltage	5 V	Calibrated By	VM
Temperature	20.3 °C	Calibration Equipment 1	50-CB37-36
Humidity	55.2 %	Calibration Equipment 2	50-9081-24
Barometric Pressure	mBar	Calibration Equipment 3	50-EE01-35
Amplifier Gain	100.668	Calibration Equipment 4	50-0414-47
Manufacturer Sensitivity	0.0634206 mV/V/g	Calibration Equipment 5	51-8135-55
Tolerence	±2.5 %	Calibration Equipment 6	

Low Cal	241.610 mV	Sensitivity	0.0632382 mV/V/g
High Cal	5.093344 mV	KT Gain	93.3699
Cal Resistor	3F kΩ	Correlation	0.999965
Shunt	152.425	Emulation Resistance	1003.986 Ω

Calibration Graph

Graph Data

Input	Output
0.000	0.000
5.000	113.593
30.000	679.317
30.000	671.992

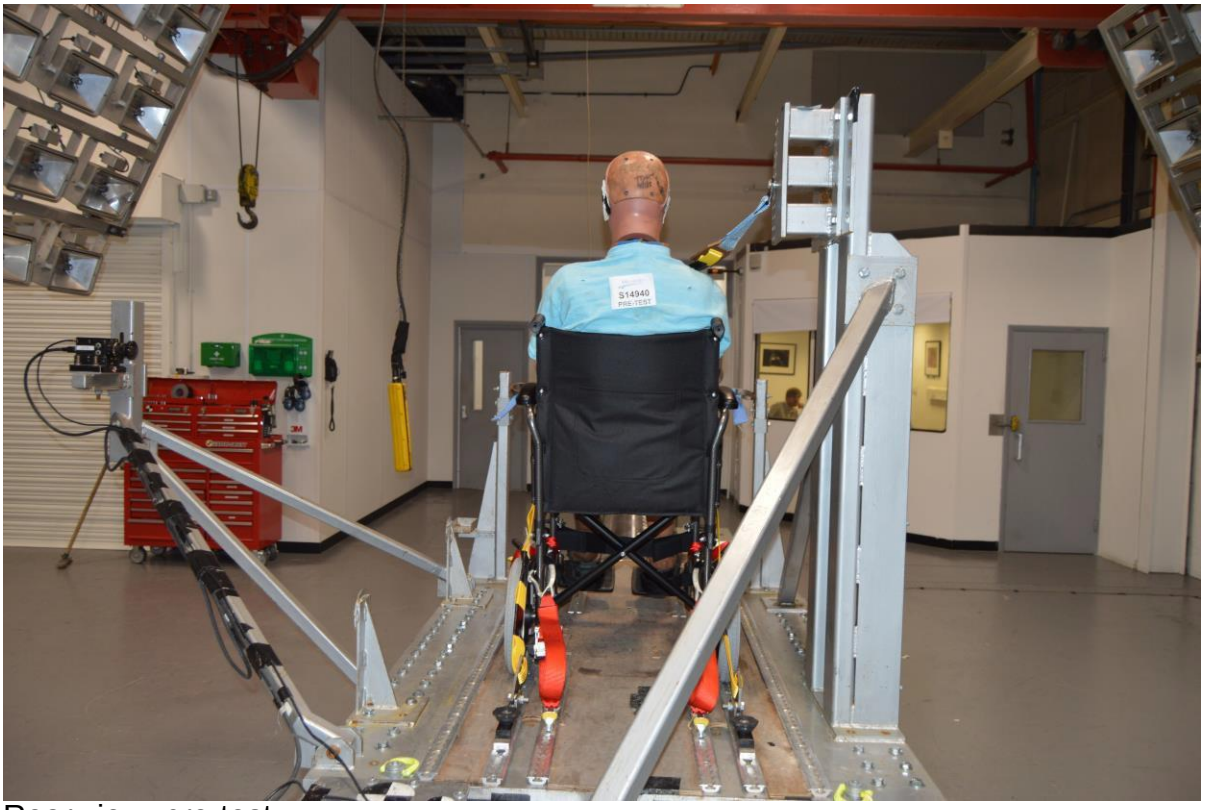


Print Date: 13 Mar 2017

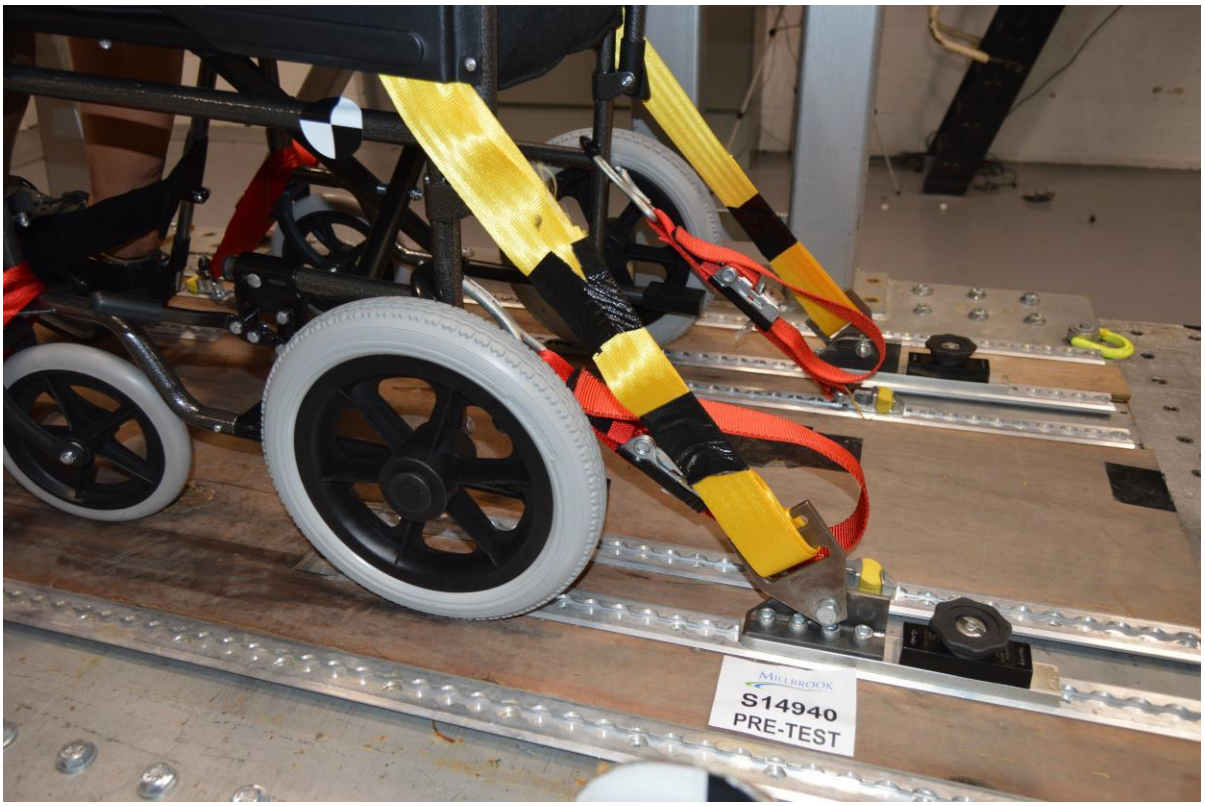
Front view of occupant, pre-test

LH view, pre-test

LH view, pre-test



Rear view, pre-test



Rear view of tie-downs, pre-test

LH front tie-down, pre-test

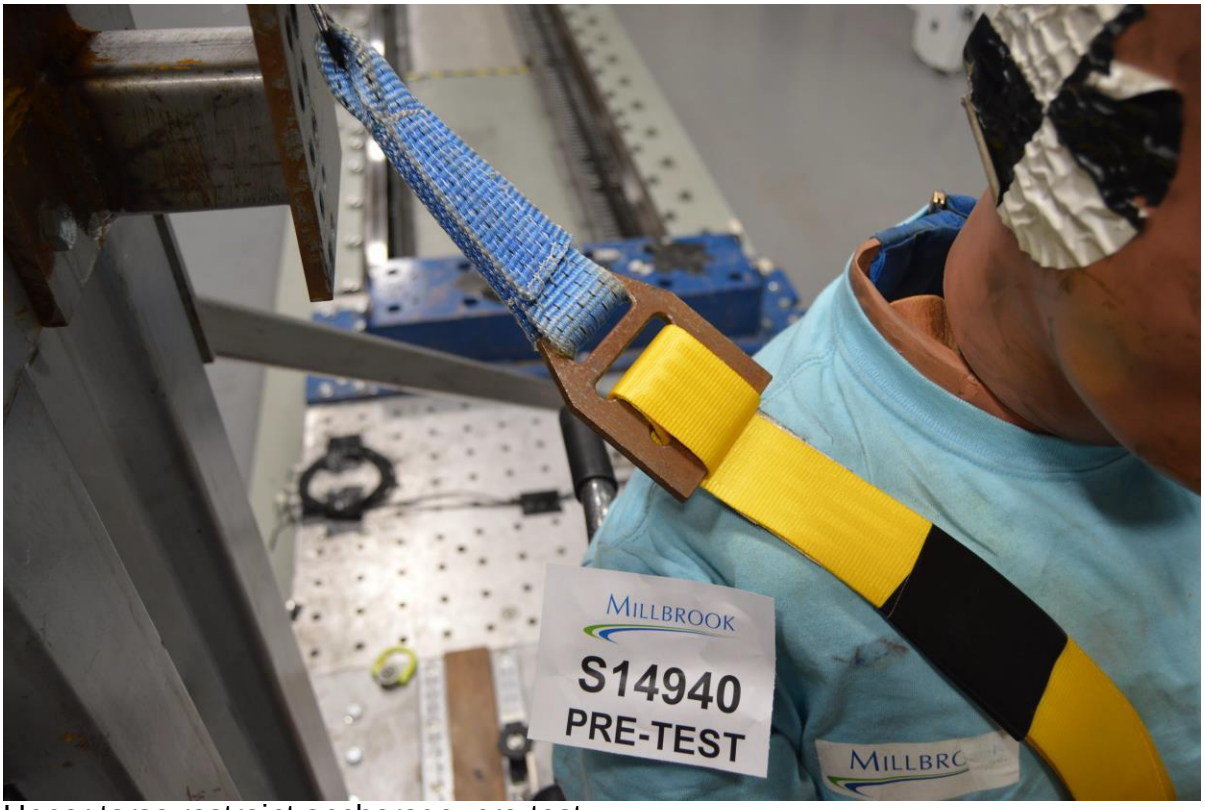
RH front tie-down, pre-test

Rear tie-downs, pre-test

LH rear tie-downs, pre-test

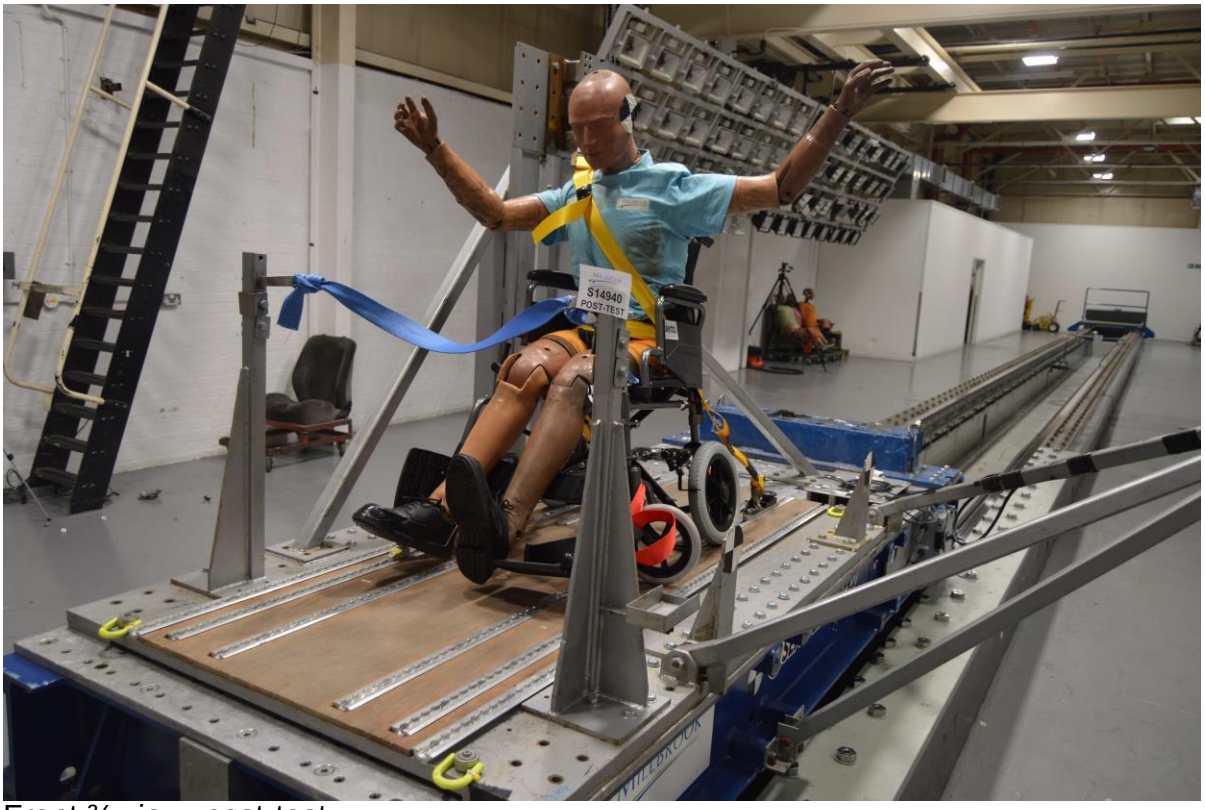
RH rear tie-downs, pre-test

Lap belt position, pre-test

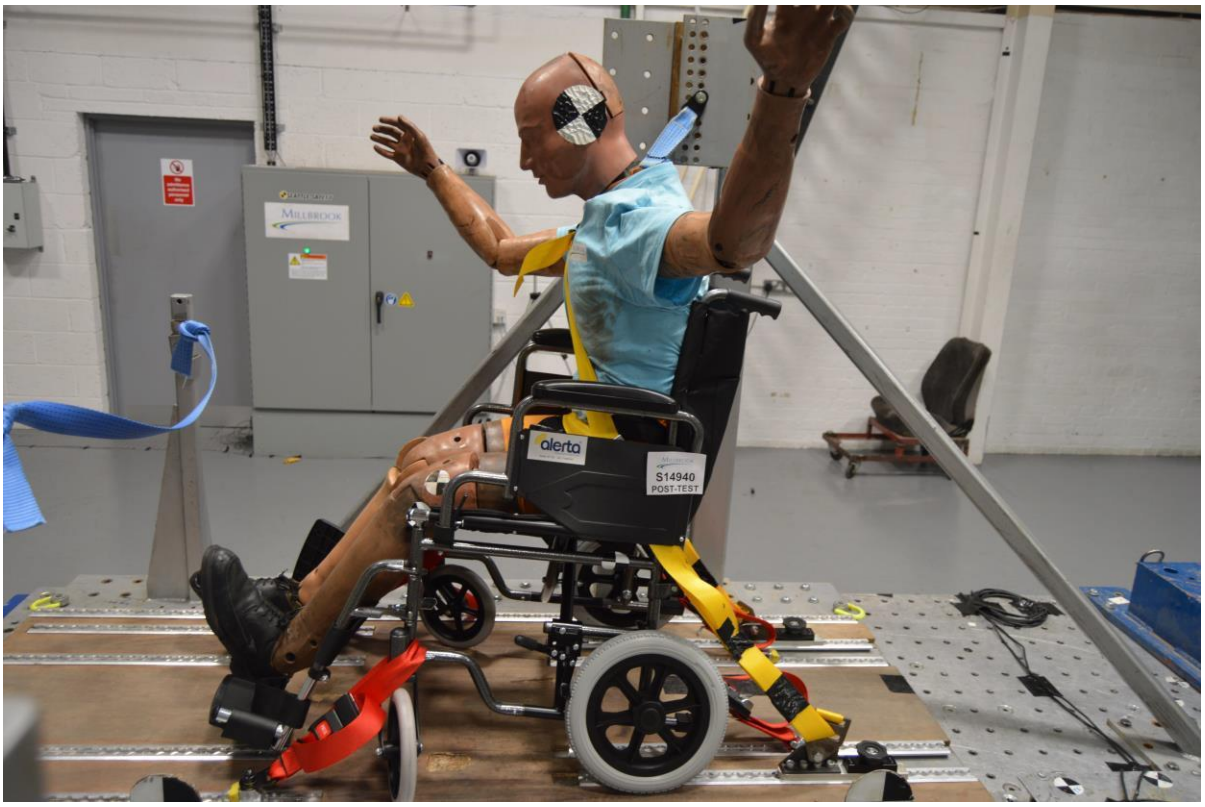


Upper torso restraint anchorage, pre-test

Front view, post-test

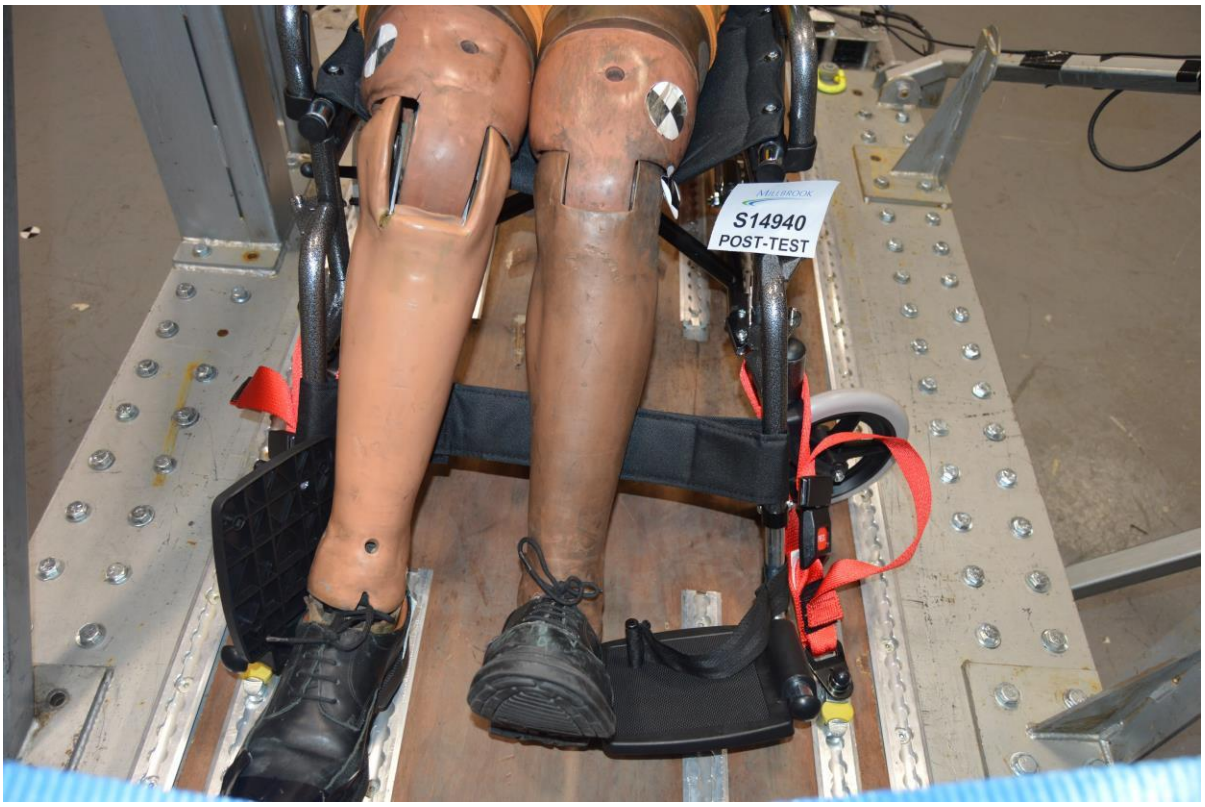


Front ¾ view, post-test



LH view, post-test

Rear view, post-test



Front tie-downs, post-test

Rear tie-downs, post-test

Occupant restraint upper anchorage point, post-test

Test Report
S14940 Appendix C

Test Results Summary

Test No:	**S14940**	**RESULTS**
Test Type	**ISO 7176-19:2008 as amended by EN12183:2014**	
Manufacturer	**Alerta Medical**	
Seat and WC Model:	**'Alerta', folding manual attendant propelled wheelchair**	
Mass:	**15.5kg**	
Seat Rail Angle:	**Fixed at 4.5°**	
Seat Back Angle:	**Fixed at 8°**	
Head Restraint:	**Not Fitted**	
Occupant:	**Hybrid II 50th Percentile (75kg)**	
Front Tie Downs:	**Front:Unwin OF03 RearTie Downs: Unwin OR02**	
Occupant Restraint:	**Millbrook Surrogate Occupant Restraint**	
5.1 During the Test		
a)	Horizontal ATD and wheelchair excursion limits as per limits shown in Table 7:-	
	Was the horizontal movement of the test wheelchair P- Point (X_{ss}) less than 200 mm. (±5 mm)	Pass 74mm
	Was the horizontal movement of the dummy Knee (X_{knee}) less than 375 mm. (±5 mm)	Pass 207mm
	Was the forward horizontal movement of the Dummy Head (X_{headF}) less than 650 mm. (±5 mm)	Pass 421mm
	Was the rearwards horizontal movement of the Dummy Head (X_{headR}) greater than -450 mm. (±5 mm)	Pass -195mm
b)	Was the ratio X_{knee}/X_{ss} >1.1:1	Pass 2.8:1
c)	Did the batteries of powered wheelchairs, or their surrogate parts:-	
	I. move outside of the wheelchair footprint	N/A
	II. move into the wheelchair user's space	N/A
5.2 Post Test		
a)	Did the wheelchair remain upright on the test platform and did the ATD remain in a seated posture in the test wheelchair with a torso angle > 45°	Pass
b)	Did the wheelchair securement points show visible signs of material failure	Pass
c)	Did any components of a mass greater that 100g become detached from the wheelchair	Pass
d)	Did any occupant contactable components fragment or separate with an edge of less than 2mm	Pass
e)	Did any primary load carrying components of the wheelchair show any visible signs of failure	Pass
f)	Did any 'tilt in space' locking mechanisms show signs of failure	Pass
g)	Was the ATD released from the wheelchair without the use of tools	Pass
h)	Was the wheelchair released from the restraint system without the use of tools	Pass
i)	Was the average decrease of H-Point height relative to the wheelchair platform less than 20% of the pre-test height	Pass <1%
j)	Did the wheelchair and its components cause partial or complete failure of the webbing or any of the WTORS assemblies	Pass
The wheelchair satisfied the dynamic test requirements of ISO 7176-19:2008 as amended by EN12183:2014		
Note: Lap belt routing under arm support and skirt guard required to achieve effective location of lap belt.		