

Decon Wheel AB
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Crash testing of a Netti III HD E-MOVE electrical power assist wheels according to ISO-7176-19, section 5.2.

(4 appendices)

Summary

A crash test of Netti III HD E-MOVE electrical power assist wheels wheelchair has been performed. The wheelchair was loaded with a midsize adult male 79,1 kg crash test dummy and crash tested at 48,5 km/h, with a 15 g pulse for >40 ms and 20 g for >15 ms duration.

| Section | Reference | Comment | Fulfilment of requirement |
|---------|--------------------------|---------|---------------------------|
| 5.2.1a | Horizontal excursion | | Yes |
| 5.2.1b | Knee vs. WC excursion | 2,83 | Yes |
| 5.2.1c | Battery movement | | Yes |
| 5.2.2a | ATD torso angle <45° | | Yes |
| 5.2.2b | Securement points | | Yes |
| 5.2.2c | Separation of <100 grams | | Yes |
| 5.2.2d | Sharp edges radius >2 mm | | Yes |
| 5.2.2e | Load carrying components | | Yes |
| 5.2.2f | Tilt-in space locking | | Yes |
| 5.2.2g | Removal of ATD, no tools | | Yes |
| 5.2.2h | WC removal, no tools | | Yes |
| 5.2.2i | Post height diff <20% | | Yes |
| 5.2.2j | No webbing failure | | Yes |

The test object fulfilled the requirements in ISO-7176-19:2008, section 5.2.

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1 Introduction

SP Technical Research Institute of Sweden has on assignment of Decon Wheel AB performed a crash test of a Netti III HD E-MOVE electrical power assist wheels wheelchair according to ISO 7176-19:2008. The purpose of the test was to evaluate if the wheelchair fulfilled the crash test requirements with a midsize adult male 79,1 kg crash test dummy.

2 Description of the test object

| | |
|----------------------------|--|
| Manufacture: | Decon Wheel AB |
| Wheelchair name: | Netti III HD E-MOVE electrical power assist wheels |
| Wheelchair serial no: | 103- |
| Seat width: | SW 450 mm |
| Seat depth: | 450 mm |
| Seat height: | 475 mm |
| Wheel base: | Netti III wheelchair wheel frame |
| WC weight: | 44,4 kg |
| Seat angle: | 16 degree backwards |
| Back rest angle: | 90 degree to seat plate |
| Back rest type: | Standard Velcro back with Uno cushion (3D fabric) |
| Back rest height: | 500 mm above seat |
| Arm rest: | Netti III HD armrest |
| Leg rest/Foot plate: | Netti fixed leg supports/ Universal 80010+80018 |
| Calf pads: | No |
| Heel straps: | Yes |
| Rear wheel: | 24" E-move |
| Wheel attachment: | E-move brackets |
| Castor wheel: | 7" front castor item no 86134 |
| Castor wheel fork: | Standard front fork for 7" - item no 86135 |
| Castor Stem: | 12 mm quick release stem |
| Neckrest: | Netti head rest C with fabric 3D - 40882 |
| Pelvic belt: | see: occupant restraint system |
| Antitip device: | Standard Netti anti-tip - item no 25419 |
| Test object specific: | E-MOVE electrical power assist wheels |
| Occupant restraint system: | Unwin restraint system supplied by Sp |
| 4-point tie down system: | Unwin restraint system supplied by SP |
| Occupant weight range: | 75kg - 135kg |
| Test object arrival at SP: | 2016-10-04 |
| Selection of test object: | The test object has been selected by the client without SP's assistance. |

3 Test method and performance

| | |
|----------------------|--------------------------------------|
| Test method: | ISO-7176-19:2008, section 5.2 |
| Test date: | 2016-10-04 |
| Test facility: | SP Safety crash laboratory in Borås. |
| Ambient temperature: | 20,1 °C SP inv. no: 403553 |

| | |
|--|--|
| Crash pulse: | 15 g for >40 ms, 20 g for >15 ms, 48-50 km/h. |
| Pulse measurement: | Two accelerometers mounted on the sled, the graph can be found in appendix 1. SP inv. nos. BX42667 and BX42669. |
| Velocity measurement: | Optical time sensors measuring the time for the sled to travel a distance of 0,5 meters just before impact. SP inv. no. 900081. |
| Excursion measurement: | The excursion values were measured from the high-speed film by the film analysis program, TEMA, with an accuracy of ±5 mm. |
| Film camera: | Photron Fastcam SA4, 1000 frames per second, with a Tamron SP-AF/28-75mm-F/28 XR Di lens. |
| Crash test dummy: | Midsized adult male 79,1 kg. SP inv. no. 401460. |
| Occupant restraint system and manufacture: | Unwin restraint system supplied by SP |
| 4-point tie down system and manufacture: | Unwin restraint system supplied by SP |
| Photographs: | Photos were taken before and after the test and can be found in appendix 2. |

The test object was mounted in a forward facing direction on the impact sled and attached with the 4-point tie-down restraint. A midsize adult male 79,1 kg crash test dummy, was positioned in the test object and fixed with the 3pt occupant restraint.



Photo 1 Test setup

4 Test results

The sled was accelerated to a speed of 48,5 km/h before impact.

Table 1 Test results

| Standard section | Reference | Requirement | Result/ Comment | Requirement fulfilment |
|------------------|--|-------------|-----------------|------------------------|
| 5.2.1a | Horizontal excursion: Head forward | <650 mm | 326 | Yes |
| 5.2.1a | Horizontal excursion: Head rearward | <-450 mm | -353 | Yes |
| 5.2.1a | Horizontal excursion: Knee forward | <375 mm | 150 | Yes |
| 5.2.1a | Horizontal excursion: Wheelchair point forward | <200 mm | 53 | Yes |
| 5.2.1b | Knee vs. WC excursion: X_{knee} / X_{wc} | >1.1 | 2,83 | Yes |
| 5.2.1c | Batteries of powered wheelchairs shall: - not move completely outside the wheelchair footprint - not move into the wheelchair user's legs space | | | Yes |
| 5.2.2a | The wheelchair shall remain in an upright position on the test platform. The ATD shall be retained in the wheelchair in a seated posture, as determined by the ATD torso being oriented at no more than 45° to the vertical. | | | Yes |
| 5.2.2b | The wheelchair securement points shall not show visible signs of material failure. | | | Yes |
| 5.2.2c | Components, fragments or accessories of the wheelchair with a mass in excess of 100g shall not have completely separated from the wheelchair. | | | Yes |
| 5.2.2d | 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 less than 2 mm. | | | Yes |
| 5.2.2e | Primary load carrying components of the wheelchair shall not show visible signs of failure. | | | Yes |
| 5.2.2f | Locking mechanisms of tilt-in-space seat adjusters shall not show signs of failure. | | | Yes |
| 5.2.2g | Removal of ATD from the wheelchair shall not require the use of tools. | | | Yes |

| | | | |
|--------|--|--|-----|
| 5.2.2h | Release of wheelchair from the tie-down system shall not require the use of tools. | | Yes |
| 5.2.2i | The post-test height of the average of left and right ATD H-points relative to the wheelchair ground plane shall not have decreased by more than 20% from the pre-test height. | | Yes |
| 5.2.2j | The wheelchair and its components shall not cause partial or complete failure of the webbing of any of the WTORS assemblies during the test. | | Yes |

The test object fulfilled the requirements according to ISO 7176-19:2008, section 5.2. The test results showed in this report refer only to the tested object.

5 Measurement uncertainty

The measurement uncertainty for the deceleration pulse is less than 1,5%.
 Reported uncertainty corresponds to an approximate 95 % confidence interval around the measured value. The interval has been calculated in accordance with GUM (The ISO guide to the expression of uncertainty in measurements), which is normally accomplished by quadratic addition of the actual standard uncertainties and multiplication of the resulting combined standard uncertainty by the coverage factor $k=2$.

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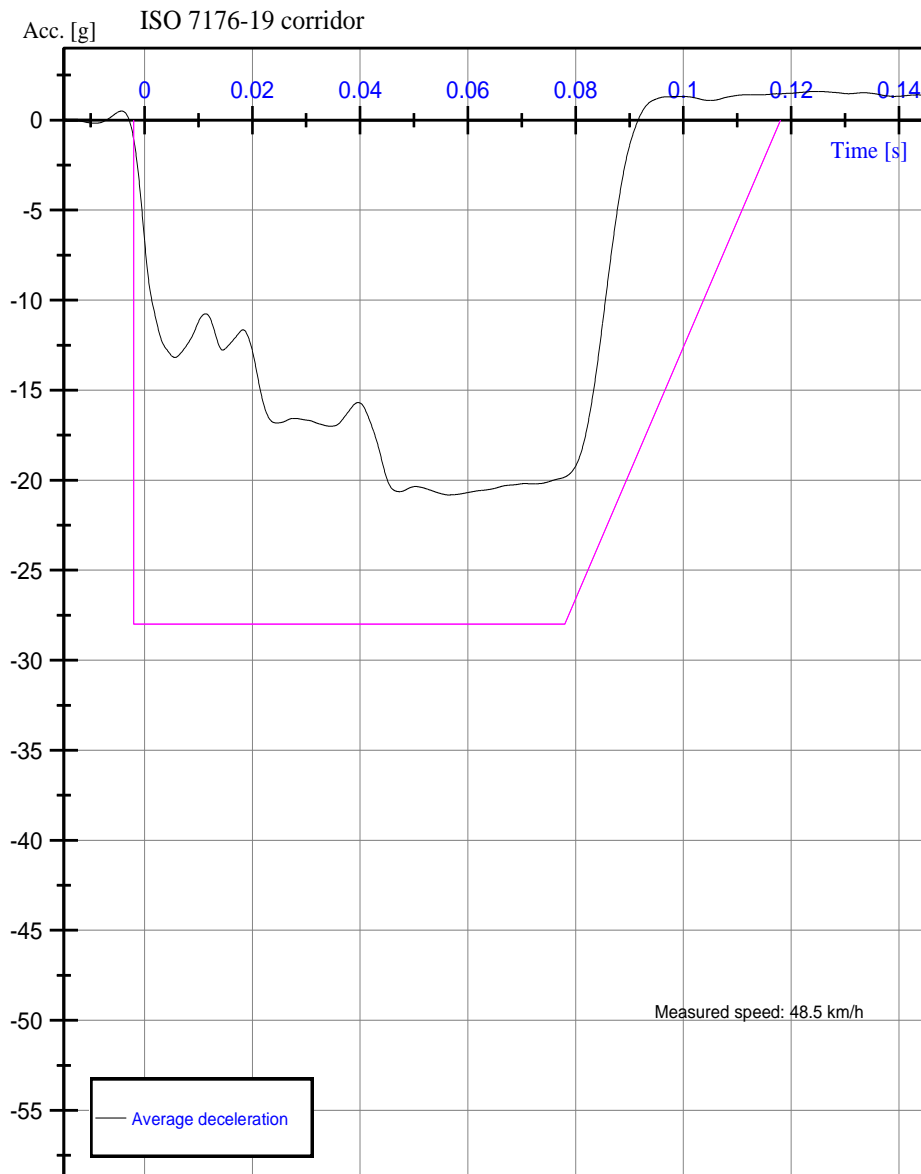
Appendices

Appendix 1: Deceleration graph (1 page)

Appendix 2: Photos (4 pages)

Appendix 1

Sled deceleration, Average pulse, CFC 60



| | |
|---------------------|-------------|
| Customer: | Decon AB |
| Test object: | E-move |
| Standard: | ISO 7176-19 |
| Test date: | 2016-10-04 |
| Test: | 1 |

Appendix2



Photo 1. Before test



Photo 2. Before test

Appendix2



Photo 3. Before test



Photo 4. Before test

Appendix2



Photo 5. After test



Photo 6. After test

Appendix2



Photo 7. After test

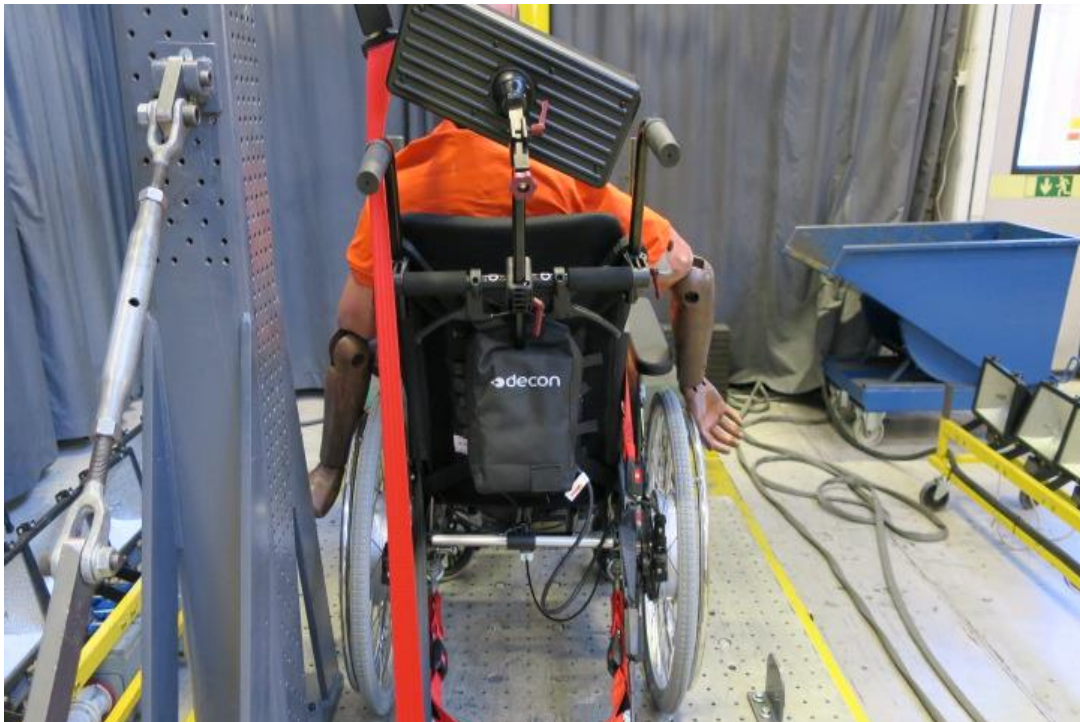


Photo 8. After test