TEST REPORT FOR:

# PRODUCT DESIGN GROUP INC. STELLAR HD Manual Wheelchair, 600 lbs / 272 kg user weight

LABORATORY REFERENCE

**492721**

**4th July 2017**

## REFERENCED DOCUMENTS IN THIS REPORT:

| AS/NZS 3695.1:2011<br>Part 1: Requirements and test methods for manual wheelchairs | |
|---|---|
| **Part 1** | **AS/NZS ISO 7176.1:2015 (Identical to ISO 7176-1:2014)<br>Part 1: Determination of static stability** |
| **Part 3** | **AS/NZS ISO 7176.3:2015 (Identical to ISO 7176-3:2012)<br>Part 3: Determination of effectiveness of brakes** |
| **Part 5** | **AS 3696.5-1989 (Identical to ISO 7176/5-1986)<br>Part 5: Determination of overall dimensions, mass and turning space** |
| **Part 7** | **ISO 7176-7-1998 (E)<br>Part 7: Measurement of seating and wheel dimensions** |
| **Part 8** | **AS/NZS ISO 7176.8:2015 (Identical to ISO 7176-8:2014)<br>Part 8: Requirements & test methods for static, impact and fatigue strengths** |
| **Part 11** | **AS/NZS ISO 7176.11:2013 (Identical to ISO 7176-11:2012)<br>Part 11: Test dummies** |
| **Part 13** | **AS 3696.13-1991 (Identical to ISO 7176-13:1989)<br>Part 13: Coefficient of friction of test surfaces** |
| **Part 16** | **AS/NZS ISO 7176.16:2013 (Identical to ISO 7176-16:2012)<br>Part 16: Resistance to ignition of postural supports** |
| **Part 19** | **AS/NZS 3696.19:2009 (Adopted from ISO 7176-19:2008 MOD)<br>Part 19: Wheeled mobility devices for use as seats in motor vehicles** |
| **Part 22** | **AS/NZS ISO 7176.22:2015 (Identical to ISO 7176-22:2014)<br>Part 22: Set-up procedures** |
| **Part 26** | **AS/NZS ISO 7176.26:2011 (Identical to ISO 7176-26:2007)<br>Part 26: Vocabulary** |

The above referenced standards were confirmed as current at date of testing

# TEST REPORT

This report may NOT be reproduced in part without written laboratory authorisation. The NovitaTech Test Laboratory has no control over the selection of test samples. Any extension of the findings of this report to cover production items must be based on the production being truly represented by the sample(s).

## PRODUCT

**Job no: 492721**

**Name and Model No:**
Product Design Group Stellar HD Manual Wheelchair
**Serial no(s) of test sample:**
Serial # 84166


**Maximum user mass:**
600 lb / 272 kg

**Documents used in testing**
As referenced on page 2 of this report.

## SUPPLIER

**Name:**
Product Design Group Inc

**Address:**
103 – 318 East Kent Avenue South
Vancouver BC Canada
**Telephone**: +1 604-323-9220 **Fax**:

**Contact person**: Torr Brown

**Order No:** n/a **Order Date**: n/a

## TESTING AUTHORITY

NOVITATECH TEST LABORATORY
171 Days Road, Regency Park, South Australia, 5010
**Telephone**: 1300 85 55 85 **Fax**: (08) 8243 8208

**Testing supervisor:** Wayne Wurfel
Senior Test Technician
(Authorised signatory)

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Reason: I attest to the accuracy and integrity of this document
Date: 2017.07.06 13:03:56 +09'30'

**Checked**: Andrew Rose
(Team Leader)

**Dates of testing period**:
May – July 2017

**Date of issue of this report**:
4th July 2017

## PRODUCT DETAILS

| | |
|---|---|
| **Manufacturer:** | |
| Name | Product Design Group Inc |
| Address | 103 – 318 East Kent Avenue South, Vancouver BC Canada |
| **Chair type:** | Rigid frame manual wheelchair (wide seat) |
| **Frame:** | |
| Size | Adult (Wide seat) |
| Frame type | Rigid frame with tilt function |
| Frame material | Tubular steel frame with sheet metal seat base and sling backrest |
| Tilt | Tilt function |
| Recline | No recline function |
| Anti-tips | Anti-tips fitted |
| Push handles | Individual cane type push handles |
| Footrests | Individual footrests, removable, swing up footplates |
| Armrests | Adjustable height, removable, padded arm support. |
| Headrest | No headrest |
| **Seating:** | |
| Backrest | |
| Width | 650 mm |
| Height | 465 mm |
| Description | Sling type fabric backrest |
| Seat | |
| Width | 660 mm |
| Depth | 550 mm |
| Description | Sheet metal seat base with Velcro fasteners for optional cushions |
| **Wheels:** | |
| Front castor wheels | |
| Width | 30 mm |
| Diameter | 130 mm |
| Description | Steel rims with solid tyres |
| Rear drive wheels | |
| Width | 28 mm |
| Diameter | 600 mm |
| Description | Spoked rims with solid tyres fitted |
| **Other features:** | |
| **Set-up details (to AS/NZS ISO 7176.22)** | **Ambient test temperature:** 22 ° C (Unless stated otherwise)<br>As per product user instructions and test standards requirements |

**Note**: Other descriptive dimensions etc. may be included in part 5 and 7 of the test report

| **Record of measurements from Set-up procedures to AS/NZS ISO 7176.22:2015 (ISO 7176-22:2014) Table B.2 (Informative requirements)** | | |
|---|---|---|
| **Adjustable part** | **Type of Equipment** | **Value / Position Measurement** |
| Seat plane angle | TLE 185 Inclinometer | 4.5° |
| Effective seat depth | TLE 141 measure | 550 mm |
| Effective seat width | TLE 141 measure | 660 mm |
| Seat surface height at front edge | TLE 141 measure | 455 mm (@ 4.5°) |
| Back support angle | TLE 185 Inclinometer | 12.8° |
| Back support height | TLE 141 measure | 465 mm |
| Handgrip height | TLE 141 measure | 975 mm |
| Back support width | TLE 141 measure | 650 mm |
| EITHER Footrest to seat | TLE 141 measure | 375 mm |
| Or Foot support clearance | TLE 141 measure | 55 mm |
| Foot support length | TLE 141 measure | 200 mm |
| Foot support to leg angle | TLE 185 Inclinometer | 115° |
| Leg to seat surface angle | TLE 185 Inclinometer | 110° |
| Arm support height | TLE 141 measure | 275 mm |
| Front of arm support to back support | TLE 141 measure | 545 mm |
| Air pressure, drive wheels | TLE 067 | NA (Solid tyres) |
| Air pressure, castor wheels | TLE 067 | NA (Solid tyres) |
| Fixed (rear) wheels diameter | TLE 141 measure | 600 mm |
| Fixed (rear) wheels, camber | TLE 185 Inclinometer | 0° |
| Fixed (rear) wheels, track | TLE 141 measure | 845 mm |
| Fixed (rear) wheels, air pressure | TLE 067 measure | NA (Solid tyres) |
| Movable (castor) wheels diameter | TLE 141 measure | 130 mm |
| Movable (castor) wheels, camber | TLE 185 measure | 0° |
| Movable (castor) wheels, track | TLE 141 measure | 735 mm |
| Movable (castor) wheels, air pressure | TLE 067 measure | NA (Solid tyres) |
| Other adjustable components | No other adjustable components | |
| **Note**: NA referenced for items that are not adjustable or applicable to this wheelchair. | | |

## AS/NZS 3695.1:2011 and AS/NZS ISO 7176.8:2015 – STATIC, IMPACT AND FATIGUE TESTS

| STATIC STRENGTH TESTS to AS/NZS ISO 7176.8:2015 | | | | |
|---|---|---|---|---|
| **Test method for static strength** | **Actual force applied, (N)** | **Specification according to a table of AS/NZS ISO 7176.8:2015**<br>**Force for 272 kg user mass (N)** | **Result of strength test** | **Reference in AS/NZS ISO 7176.8** |
| Armrest resistance to downward forces (No test dummy fitted) | 1905 (Both) | 952 N (Each) | PASS | 8.4 |
| Footrest resistance to downward forces (No test dummy fitted) | 1230 N | 1226 N | PASS | 8.5 |
| Tipping levers downwards load (Test dummy fitted)) | NA | 1000 N | PASS | 8.6 |
| Handgrips (Test dummy fitted) | 750 N | 750 N | PASS | 8.7 |
| Armrests resistance to upward forces (Test dummy fitted) | 1000 N | 1000 N | PASS | 8.8 |
| Footrest resistance to upward forces (Test dummy fitted) | 505 N | 500 (Each) | PASS | 8.9 |
| Push handle resistance to upward load (Test dummy fitted) | 880 N | 880 (Each) | PASS | 8.10 |

Remarks:

Static strength tests were performed before impact and fatigue tests. WW. End of remarks ----------

| IMPACT STRENGTH TESTS to AS/NZS ISO 7176.3:2015 | | | |
|---|---|---|---|
| **Test method for impact strength** | **Result of test and mode of failure (see list of failures above)** | **Impact angle used for test** | **Reference in AS/NZS ISO 7176.8** |
| Backrest resistance to impact (DUMMY THIGHS ONLY FITTED) | PASS | 30° | 9.3 |
| Hand-rim resistance to impact (DUMMY FITTED) | PASS | 45° | 9.4 |
| Castors (DUMMY FITTED) | PASS | 79.5° | 9.5 |
| Footrests resistance to lateral impact (DUMMY FITTED) | PASS | 79.5° | 9.6.3 |
| Footrests resistance to longitudinal impact (DUMMY FITTED) | PASS | 79.5° | 9.6.4 |
| Anti-tip devices – Upwards impacts (3 Times with test dummy fitted) | PASS | 15 mm | 9.7.1 |
| Anti-tip devices – Longitudinal impact (Test dummy fitted) | PASS | 79.5° | 9.7.2 |
| Anti-tip devices – Lateral impact (Test dummy fitted) | PASS | 79.5° | 9.7.3 |

Remarks:

Impact tests were performed before fatigue tests. WW. End of remarks ----------

| FATIGUE TESTS to AS/NZS ISO 7176.8:2015 | | | | |
|---|---|---|---|---|
| **Test method for fatigue strength** | **Actual number of cycles (Or cycles recorded at failure)** | **Specification according to AS/NZS ISO 7176.8, number of cycles** | **Mode of failure (see list of failures in table below)** | **Reference in AS/NZS ISO 7176.8** |
| Two drum test | 200,000 Cycles | 200,000 Cycles | PASS (See remarks) | 10.3 |
| Drop test | 6,667 Cycles | 6,666 Cycles | PASS | 10.4 |

Remarks:

Inspection of the wheelchair following the 2 drum fatigue testing revealed damage to the rear tyres. The sidewalls of the tyres had split at the point of contact to the rim. As these are solid tyres, they are unable to be repaired and must be replaced as a complete wheel unit.
It is the determination of this laboratory that this damage was attributed to abnormal heat build-up in the tyres due to continuous operation on the 2 drum machine.
This heat build-up and excessive tyre distortion along with the significant test load is not representative of normal operation of this product. A manual wheelchair would not be subject to 200 kms of continuous operation at 1 m/sec over rough terrain. Periodic inspection and replacement of tyres is recommended by the manufacturer and would not present a hazard to operators or attendants in normal operation.
The standard allows for replacement of wear items (tyres) identified in the operator's manual.
WW. End of remarks ----------

The sample submitted for this test satisfies the relevant requirements of AS/NZS 3695.1;2011 and AS/NZS ISO 7176.8:2015 (except the methods indicated in this report as "not tested" and/or tested with deviations) for user mass 272 kg / 600 lb

PASS

| **STRENGTH REQUIREMENTS AS/NZS ISO 7176.8:2015<br>Confirmation of strength test requirements – Post-test – Clause 4** | | |
|---|---|---|
| **Test requirement.** | **Result following all strength tests** | **Reference in AS/NZS ISO 7176.8 (Clause 4)** |
| No component to show evidence of visible cracks, be fractured or have become detached | See remarks<br>(Tyres replaced) | 4.1 a) |
| No externally visible cable shall be cut, abraded or crushed<br>No externally visible electrical connector shall be crushed or disconnected | PASS | 4.1 b) |
| All parts intended to move, rotate or be removable, folding or adjustable shall operate as req'd. | PASS | 4.1 c) |
| All power operated systems shall operate as described by the manufacturer | NA | 4.1 d) |
| Handgrips shall not be displaced | PASS | 4.1 e) |
| No component or assembly of parts shall exhibit visible plastic deformation, free play or loss of adjustment that adversely affects the function of the wheelchair | PASS | 4.1 f) |
| The brake mechanism shall not have moved from the pre-set condition | PASS | 4.1 g) |

Remarks:

Partial test only at request of supplier for confirmation of static strength and durability.
Wheelchair fatigue tested 200,000 cycles and 6,666 cycles drop test as per standards requirements.
WW. End of remarks ----------

| Traceable Equipment used for Measurements in this report | | | | | |
|---|---|---|---|---|---|
| **Gauge #** | **Gauge Type** | | **Gauge #** | **Gauge Type** | |
| TLE004 | Standard finger Probe | ☐ | TLE141 | Tape Measure, 5 Metre | ☒ |
| TLE009 | Cold Climate Chamber | ☐ | TLE144 | Stop Watch | ☒ |
| TLE010 | Test Rig ( Static Load Drop) | ☒ | TLE148 | Protractor, Vernier | ☐ |
| TLE011 | 2 Drum Durability Rig | ☒ | TLE151 | Accelerometer | ☐ |
| TLE012 | Stability Ramp - Static | ☐ | TLE167 | Test Masses, 25kg | ☐ |
| TLE016 | Square, Steel - Large | ☐ | TLE175 | 2 Drum Durability rig | ☐ |
| TLE018 | Rule, Steel – 1,000 mm | ☐ | TLE176 | Test Dummy | ☐ |
| TLE019 | Reference Load Gauge | ☐ | TLE179 | Test Rig Prosthetics, Foot | ☐ |
| TLE024 | Stability Ramp, Dynamic | ☐ | TLE182 | Multimeter | ☐ |
| TLE028 | Spring Balance 0-100g | ☐ | TLE183 | Impact Pendulum | ☐ |
| TLE029 | Spring Balance 0– 5kg | ☐ | TLE184 | Test Dummy | ☐ |
| TLE030 | Spring Balance 0-20kg | ☐ | TLE185 | Inclinometer | ☒ |
| TLE032 | Thermometer | ☐ | TLE186 | Inclinometer, small | ☐ |
| TLE049 | Torque Wrench | ☐ | TLE196 | Test Rig Prosthetics, Knee | ☐ |
| TLE067 | Tyre Pressure Gauge | ☐ | TLE201 | Load Cell | ☒ |
| TLE068 | Impact Mass, 25 kg Soccer | ☐ | TLE203 | Impactor | ☐ |
| TLE077 | Force Gauge, RLG | ☒ | TLE204 | Pendulum Impact Hammer | ☐ |
| TLE084 | Rule, Steel – 300mm | ☐ | TLE205 | Tape Measure, 8 Metre | ☐ |
| TLE087 | Test Obstacles | ☐ | TLE210 | Test Obstacle, Threshold | ☐ |
| TLE105 | Thermohygrograph | ☒ | TLE211 | Prosthetic Set up Gauge | ☐ |
| TLE106 | Scales, Digital | ☐ | TLE212 | Test Rig, Proof Test | ☐ |
| TLE112 | Vernier Caliper, 200mm | ☐ | TLE216 | Load Pad, Seat Base | ☐ |
| TLE114 | Spring Balance, 50kg | ☐ | TLE218 | Square, Steel - Small | ☐ |
| TLE131 | Test Dummy | ☐ | TLE220 | DC Wattmeter | ☐ |
| TLE132 | Test Dummy | ☒ | TLE221 | Temp/Humidity Meter | ☐ |
| TLE133 | Test Dummy | ☐ | TLE225 | Caliper, Digital 200mm | ☒ |

NOTES

$1U_{95}$ Uncertainty of measurements where not specified: linear ±1mm, angular +- 30', force, mass ±1%, temperature ±1°C, cycles ±1 count. This means the true measurement is within the stated tolerances at least ninety five times in one hundred
2 All testing was carried out in a controlled environment laboratory using methods set out in the Standards documents, all deviations and additions to the Standards' methods are noted in remarks.
3 All instruments either carried valid calibration certificates throughout the test period or were checked against traceable Standards before and after use.
4 The NovitaTech Test Laboratory has no control over the selection of test samples. Any extension of the findings of this report to cover production items must be based on production being truly represented by the sample(s).
5 Any non-conformances are indicated in red.
6 Items marked NA – Not applicable to sample tested

END OF REPORT