

| ISO 7176-19 Wheelchairs - Wheeled mobility devices for use as seats in motor vehicles | |
|---|---|
| Report Reference No. | TWR2406022 001 |
| Tested by | Christo Chi Engineer |
| Approved by | John Chang Reviewer |
| Date of issue | 2024-07-02 |
| Total number of pages | This report consists of 10 pages of test report |
| Testing Laboratory | TUV NORD Taiwan Co., Ltd. Taichung Laboratory |
| Address | 4F., No. 8, Huasin St., North District, Taichung 404, Taiwan |
| Applicant's name | KARMA MOBILITY CO., LTD |
| Address | 30 MOO 7 TAMBOL KHAMTALESO AMPHUR KHAMTALESO NAKHONRATCHASIMA 30280 THAILAND |
| Test specification: | |
| Standard | ISO 7176-19:2022, Refer to summary of testing |
| Test procedure | Test Result Report |
| Non-standard test method | None |
| Test Report Form No. | NORD_ ISO 7176_19 |
| Test Report Form Originator | TUV NORD |
| Master TRF | 2024-06 |
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| Test item description | Manual Wheelchair |
| Trade Mark | karma A Better Wheelchair, A Better Fit |
| Manufacturer | KARMA MOBILITY CO., LTD |
| Model/Type reference | KM-2512TL, KM-2501 |

List of Attachments (including a total number of pages in each attachment):

- Photo Documentation (1 pages);

Summary of testing**Tests performed (name of test and test clause):**

All applicable tests as described throughout this test report and in the Measurement Section were performed.

- Section 19: ISO 7176-19 Clause 5.2: Frontal impact
-

Testing location:

Automotive Research & Testing Center (ARTC)
No.6, Lugong S. 7th Rd.,
Lukang Township,
Changhua County 50544,
Taiwan (R.O.C.)

Details and test results are given in subsequent pages of this report.

This report refers only to the unit(s) submitted for test.

"(see Enclosure #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

**GENERAL INFORMATION****Test item particulars:**

| | |
|--|---|
| Dimensions | W 675 x H 950 x L 1030 (mm) |
| Weight | 10.9 kg |
| Maximum occupant mass specified by the manufacturer, | 115 kg |
| Intended use (Including type of patient, application location) ..: | Moving of adult disabled persons by self-driving. |
| Turning radius | 800 mm |
| Front wheel size | 7" |
| Rear wheel size | 14" |
| Brake type | Manual hand brake on rear wheels |

Testing

Date of receipt of test item(s): 21. May. 2024

Dates tests performed: 21. May. 2024

Possible test case verdicts:

| | |
|---|---------------------------------|
| - test case does not apply to the test object | N/A |
| - test object does meet the requirement | Pass (P) |
| - test object was not evaluated for the requirement | N/E (collateral standards only) |
| - test object does not meet the requirement | Fail (F) |

Abbreviations used in the report:

- normal condition..... : N.C. - single fault condition..... : S.F.C.
- means of Operator protection : MOOP - means of Patient protection : MOPP

General remarks:

"(See Attachment #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

The tests results presented in this report relate only to the object tested.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

List of test equipment must be kept on file and available for review.

Additional test data and/or information provided in the attachments to this report.

When determining the test conclusion, the Measurement Uncertainty was not considered according to IEC Guide 115 CL.4.4.3 Figure 2. This report does not provide Measurement Uncertainty.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60601-1:

The application includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided: ☐ Yes ☒ Not applicable

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies): KARMA MOBILITY CO., LTD

30 MOO 7 TAMBOL KHAMTALESO AMPHUR
KHAMTALESO NAKHONRATCHASIMA 30280
THAILAND

General product information:

The manual wheelchair is a self-propelled or transit wheelchair, it can either be propelled by the user (self-propelled) or by assistant.

The test perform at the model of KM-2512TL, to consider the worst case and represent the weakest construction.



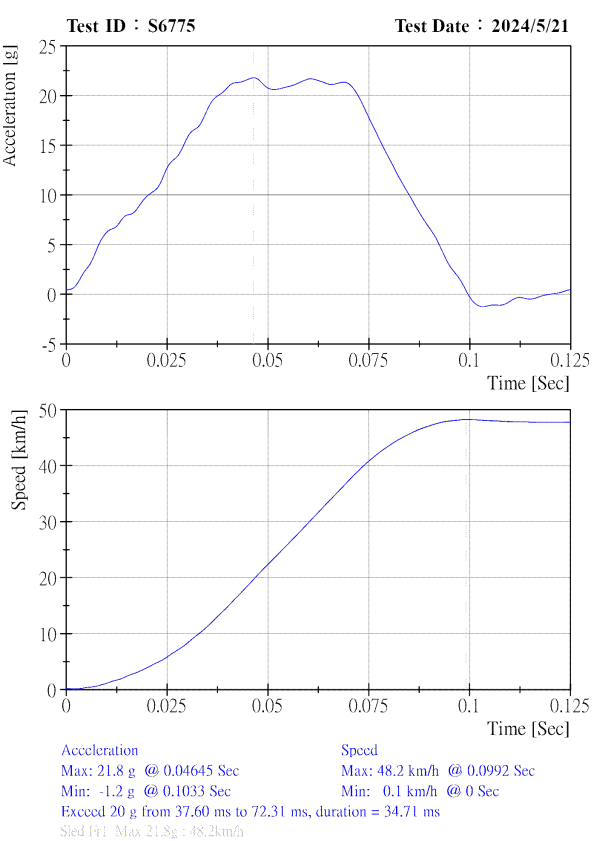
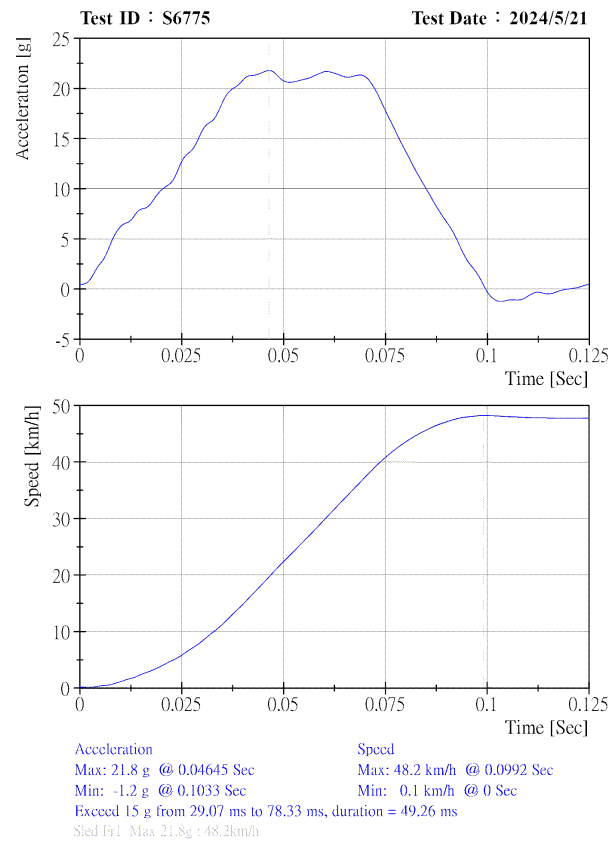
DESCRIPTION OF THE TEST SAMPLE:

| | |
|---|----------------------------|
| Seat location fore - aft | Non adjustable |
| Seat surface height at front edge | 510 mm |
| Seat plane angle | 6° |
| Backrest angle | 15° |
| Backrest height | 420 mm |
| Headrest height above seat..... | -- |
| Type and Mass of the ATD | Midsized adult male (77kg) |

Description of the used WTORS(wheelchair tiedown and occupant-restraint system)

| | |
|---------------------------|-------------------------------|
| Wheelchair tiedowns | four-point strap-type tiedown |
| Occupant restraints | three-point belt restraint |
| Anchorage | fixed |

Graph of the impact sled deceleration



Test pulse characteristics

Change of velocity (48 ± 2 km/h) : 48.2 km/h

Exceeds 20 g for a cumulative time period of at least 15 ms : 34.7 ms

Exceeds 15 g for a cumulative continuous time period of at least 40 ms : 49.3ms

Has a duration of at least 75 ms from start time to stop time . : 99.6 ms

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|--------------|---|-------------------------|-------------|
| Table | Requirement + Test | Result - Remark | Verdict |
| 5.2 | Frontal impact | | Pass |
| 5.2.1 | Frontal impact with strap-type tiedowns | | Pass |
| | a) When tested in accordance with Annex A using a four-point tiedown that conforms with ISO 10542-1, the wheelchair shall meet the requirements of 5.2.3 and 5.2.4 , or | Four-point tiedown used | Pass |
| | b) Where the wheelchair cannot meet the requirements in a) due to high mass features or facilities that accommodate the special needs of the intended occupant and requires additional securement points, the wheelchair shall meet the requirements of Annex K . | No such device | N/A |
| 5.2.2 | In addition to 5.2.1 , the wheelchair may also be tested using other methods of securement that conform with ISO 10542-1, such as a docking-type securement. To state conformance of the wheelchair with the frontal impact requirements for the additional securement method, the wheelchair shall meet the requirements of 5.2.3 and 5.2.4 when tested in accordance with Annex A using this other securement method. | No such device | N/A |
| 5.2.3 | During the test | | Pass |
| | a) The horizontal excursions of the ATD and the wheelchair with respect to the impact sled shall not exceed the limits in Table 1 until motion of the ATD and the wheelchair has ceased. | | Pass |
| | The horizontal movement of the test wheelchair P- Point, (X_{wc}) : | 17 mm | Pass |
| | The horizontal movement of the dummy Knee (X_{knee}) : | 312 mm | Pass |
| | Was the forward horizontal movement of the Dummy Head (X_{headF}) : | 463 mm | Pass |
| | Was the rearwards horizontal movement of the Dummy Head (X_{headR}) : | -333 mm | Pass |

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|--------------------|--|--|----------------------|-----------------------|------------------------|------------------------------|-----------------------|------------------------|------------------------------|--------------------|----------|-----|-----|-----|-----|-----|-----------------|------------|-----|-----|-----|-----|-----|-------------------|-------------|-----|-----|-----|-----|-----|------------------|-------------|------|------|------|------|------|------|
| Table | Requirement + Test | Result - Remark | Verdict | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <div>Table 1 — Horizontal excursion limits</div> <div>Dimensions in millimetres</div> <table><tr><th>Measurement point</th><th>Excursion variable</th><th>3-year old child ATD</th><th>6-year old child ATD</th><th>10-year old child ATD</th><th>Small adult female ATD</th><th>Midsized and large adult ATD</th></tr><tr><td>wheelchair point P</td><td>X_{wc}</td><td>150</td><td>150</td><td>175</td><td>200</td><td>200</td></tr><tr><td>ATD knee centre</td><td>X_{knee}</td><td>300</td><td>300</td><td>325</td><td>375</td><td>375</td></tr><tr><td>ATD front of head</td><td>X_{headF}</td><td>500</td><td>500</td><td>500</td><td>550</td><td>650</td></tr><tr><td>ATD back of head</td><td>X_{headR}</td><td>-350</td><td>-350</td><td>-400</td><td>-400</td><td>-450</td></tr></table> <div>X_{wc}: Horizontal distance relative to the sled platform between the point P target on the wheelchair at time t_0, to the point P target at the time of peak wheelchair excursion.</div> <div>X_{knee}: Horizontal distance relative to the sled platform between the ATD knee joint target at time t_0, to the knee-joint target at the time of peak knee excursion.</div> <div>X_{headF}: Horizontal distance relative to the sled platform between the most forward point on the ATD's head above the nose at time t_0, to the most forward point on the ATD's head at the time of peak head excursion.</div> <div>X_{headR}: Horizontal distance relative to the sled platform between the most rearward point on the ATD's head at time t_0, to the most rearward point on the ATD's head at the time of peak head excursion.</div> <div>NOTE See the last paragraph of A.4.12 for a description of how to estimate the point P excursion when it is not possible to place a contrast marker at point P.</div> | | Measurement point | Excursion variable | 3-year old child ATD | 6-year old child ATD | 10-year old child ATD | Small adult female ATD | Midsized and large adult ATD | wheelchair point P | X_{wc} | 150 | 150 | 175 | 200 | 200 | ATD knee centre | X_{knee} | 300 | 300 | 325 | 375 | 375 | ATD front of head | X_{headF} | 500 | 500 | 500 | 550 | 650 | ATD back of head | X_{headR} | -350 | -350 | -400 | -400 | -450 | Pass |
| Measurement point | Excursion variable | 3-year old child ATD | 6-year old child ATD | 10-year old child ATD | Small adult female ATD | Midsized and large adult ATD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| wheelchair point P | X_{wc} | 150 | 150 | 175 | 200 | 200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ATD knee centre | X_{knee} | 300 | 300 | 325 | 375 | 375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ATD front of head | X_{headF} | 500 | 500 | 500 | 550 | 650 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ATD back of head | X_{headR} | -350 | -350 | -400 | -400 | -450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b) If the wheelchair is tested with a vehicle-mounted pelvic-belt, the peak forward ATD knee excursion shall exceed the peak forward wheelchair point P excursion by 10 % or more, as indicated by: $X_{knee} / X_{wc} \geq 1,1$ | $X_{knee} / X_{wc} = 18.35$ | Pass | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c) Batteries of powered wheelchairs or their surrogate replacement parts shall | No battery used | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1) not move completely outside the wheelchair footprint, and | | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2) not move into the wheelchair occupant's space (e.g. shall not contact the back of the ATD's legs). | | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d) No components of the securement system (i.e. securement hooks of the strap-type tiedown or docking device latch mechanism) shall completely detach or disengage from a wheelchair securement point or adaptor at any time during the test. A stabilizer bracket or other component of a docking securement device whose purpose is not primarily to secure the wheelchair, but to aide in alignment or preventing rotation, may detach or disengage during the test. | There is no failure | Pass | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.2.4 | After the test | | Pass | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 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 | ATD torso not more than 45° to the vertical when viewed from any direction | Pass | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|-------------|---|--|---------|
| Table | Requirement + Test | Result - Remark | Verdict |
| | oriented at not more than 45° to the vertical when viewed from any direction. | | |
| | b) The structural components of the wheelchair securement points shall not completely fail. | There is no failure | Pass |
| | c) Rigid components, fragments or accessories of the wheelchair with a mass in excess of 150 g shall not be completely separated from the wheelchair. | The accessory is separated from the wheelchair, total 4.1g | Pass |
| | d) Wheelchair components that can contact the occupant shall not fragment or separate in a manner that produces sharp edges. | No sharp edge can contact the occupant | Pass |
| | e) Locking mechanisms of tilt seating adjusters shall not completely fail. | No such device | N/A |
| | f) Removal of the ATD from the wheelchair shall not require the use of tools, other than a hoist to lift the ATD. | No need tools to remove the ATD. | Pass |
| | g) Release of the wheelchair from the securement system shall not require the use of tools. | No need tools to remove the tiedown system from the wheelchair. | Pass |
| | h) 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. | ATD H-point doesn't decrease more than 20% from the pre-test height. | Pass |
| | i) The wheelchair and its components shall not cause complete failure of the webbing of any of the WTORS assemblies during the test. | There is no failure | Pass |
| | j) No components of the wheelchair securement (i.e. securement point end-fittings of the strap-type tiedown or the latch mechanism of a docking securement device) shall completely detach or disengage from a wheelchair securement point or wheelchair securement adaptor. A stabilizer bracket or other component of a docking securement system whose purpose is not primarily to secure the wheelchair, but to aid in alignment or preventing rotation, may be detached or disengaged. | There is no failure | Pass |

Photo Documentation



- End of Report -