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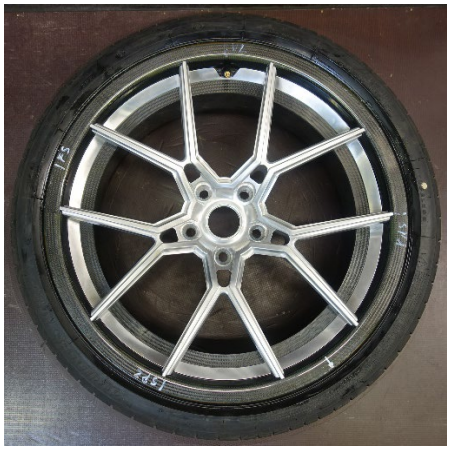
Laboratory Report

about Fatigue tests on
Hybrid-Wheel construction of the size 9J x 20 H2 offset 40

Report number: 713265924-00

Garching, 11.08.2022
Unit: PS-COM-T-RRW



Customer	:	
Type of construction	:	Fiber composite rim with light alloy star screwed in, by means of 10 connecting screws
Item number	:	NCV 20_1.51
Wheel site	:	9J x 20 offset 40
Permitted wheel load [kg]	:	650
Tire size	:	245/35 ZR20
Wheel weight [kg]	:	9,2

1. Test Laboratory

TÜV SÜD Product Service GmbH
TECC-Halle
Daimlerstr. 15
D-85748 Garching

Test sample ID	:	22-1531
Test duration	:	25.07.2022 bis 11.08.2022

2. Wheel testing

The test was carried out in accordance with the material-specific appendix, as of 27.10.2020, to the guideline for the testing of special wheels for motor vehicles and their trailers (BMV/StV 13/36.25.07-20.01 of 25.11.1998).

2.1. Wheel size

The dimensions and tolerances of the symmetrical drop centre rim correspond to the templates for the E.T.R.T.O. standard.

2.2. Material of the wheel

The materials used are fiber, matrix and light alloy materials; for more details, see wheel description.

3. General information about the tests performed under point 4

In deviation from the material-specific appendix, as of 27.10.2020, the following tests were not performed:

- Electrical conductivity (subitem 4.2)
- Stone chipping and scratch (subitem 4.3.4)
- Corrosion test (subitem 4.3.5)
- Environmental cycle test (subitem (4.3.6)
- Overpressure test (subitem 4.3.7)
- Steam jet test (subitem 4.3.9)
- Rotating bending test (subitem 4.4)
- Impact test 13° (subitem 4.7)
- Radial impact test with factor 4.3 (subitem 4.8)

The numbering from subitem 4 is based on the guideline listed under item 2.

4. Test program

4.1 Stiffness measurement

The results of the stiffness measurements in the as-delivered condition, after preconditioning, after the rotating bending test and after the biaxial test are listed in Annex 1.
Measurements were taken radially at the tire seat inside and axially at spokes offset by as much as 90° to each other as possible.
In total, up to 4 tests were carried out per position; the arithmetic mean values of the individual positions are given in the appendix.

4.2 Electrical conductivity

Not performed

4.3 Pre-damage

The preliminary damage always passed through the wheel number 22-1531.

4.3.1 Radial impact test

The test was performed between 2 spokes, opposite the valve hole, simulating the passage of a pothole or the passage of an obstacle.
The factor for the wheel load was 1.15, the tire inflation pressure was 2.0 bar.

4.3.3 10 times tire mounting

The tire used was of dimension 245/35 R20.

4.3.4 Stone chipping and scratch

Not performed

4.3.5 Corrosion test (NSS DIN EN ISO 9277)

Not performed

4.3.6 Environmental cycle test according VDA (without part A, corrosive influence)

Not performed

4.3.7 Over-pressure testing

Not performed

4.3.8 Thermal pre-damage

The radial test was carried out with a 245/35 R20 tire mounted, inflation pressure 2.0 bar.
For the course of the 10 runs, see Annex 2.
Axial testing is not technically possible at present, heating element defective.

4.3.9 Steam jet test

Not performed

4.4 Rotating bending test

Not performed

4.5. Biaxial wheel testing

An existing program is used as the basis. The basic program is a synthetic circuit derived from European operating conditions. It is made up of various load cases such as driving straight ahead on bad roads and motorways as well as different sharp right and left curves.

Test paramter:

Test bench:	ZF1 outer drum test rig
Tire manufacturer:	Bridgestone
Tire type:	Potenza
Tire size:	245/35 R20
Tire inflation pressure [bar]:	4,5
Static wheel load [kg]:	650
Tightening torque of the wheel bolts [Nm]:	120
Test speed [km/h]:	105

Test result:

Test sample ID:	22-1531
Target distance [km]:	7.500
Reached distance [km]:	7.500
Result visual inspection:	Without cracks
Condition of the wheel bolts:	Unobtrusive
Amount of used tires:	1

4.7. Impact Test 13°

Not performed

4.8. Radial impact test with factor 4,3

Not performed

5. Summary

The hybrid wheel construction of the size 9J x 20 H2 offset 40 of the client Advanced International Multitech Co. Ltd, partially meets the strength requirements of the material-specific appendix, status 27.10.2020, to the guideline for the testing of special wheels for motor vehicles and their trailers (BMV/StV 13/36.25.07-20.01 of 25.11.1998). The max. wheel load capacity of 650 kg was positively verified in the tests carried out. This report is not admissible for the application of a permit.

6. Annex

Annex 1: Test parameters and results of the stiffness measurement

Annex 2: Thermal pre-damage diagrams

This Laboratory Report with the Annexes compromises 16 pages.

Versuchsdurchführung:

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Garching, 11.08.2022

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Garching, 11.08.2022