

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-PL-18365-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 05.07.2021

Date of issue: 27.04.2022

Holder of certificate:

Bertrandt Ingenieurbüro GmbH
Hufelandstraße 26-28, 80939 München

Tests in the fields:

environmental simulation tests in the fields of temperature, humidity, solar radiation, vibration and mechanical shock as well as in combination of technical products; passive vehicle safety tests of airbag under thermal conditions (airbag deployment test); testing electrical and electronic assemblies and components; testing of connector systems / contacting

The laboratory is permitted within the specified testing areas indicated with *, without being required to inform and obtain prior approval from the DAkkS, the free choice of standard or equivalent test methods. (Flexible scope category I)

The listed test methods are exemplary.

Within the specific testing areas indicated with *, without being required to inform and obtain prior approval from the DAkkS, the laboratory is permitted to use standard test methods listed here with different issue dates or revision status updates . (Flexible scope category III)**

The laboratory maintains a current list of all test methods in a flexible scope of accreditation.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of testing laboratories. Laboratories that conform to the requirements of this standard, operate generally in accordance with the principles of DIN EN ISO 9001.

The certificate together with the annex reflects the status as indicated by the date of issue.

The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at <https://www.dakks.de/en/content/accredited-bodies-dakks>.

Abbreviations used: see last page

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This document is a translation. The definitive version is the original German annex to the accreditation certificate.

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1 Characteristic test methods

1.1 Tests of environmental influences on technical products using temperature (Flexible scope category I) *

DIN EN 60068-2-1 Environmental testing - Part 2-1: Tests - Test A: Cold
(VDE 0468-2-1)
2008-01

DIN EN 60068-2-2 Environmental testing - Part 2-2: Tests - Test B: Dry heat
(VDE 0468-2-2)
2008-05

DIN EN 60068-2-14 Environmental testing - Part 2-14: Tests - Test N: Change of
(VDE 0468-2-14) temperature
2010-04 (here: *without test Nc*)

1.2 Tests of environmental influences on technic products using solar radiation (Flexible scope category I) *

DIN EN 60068-2-5 Environmental testing - Part 2-5: Tests - Test Sa: Simulated solar
(VDE 0468-2-5) radiation at ground level and guidance for solar radiation testing
2011-10 (*withdrawn standard*)

DIN EN 60068-2-5 Environmental testing - Part 2-5: Tests - Test S: Simulated solar
(VDE 0468-2-5) radiation at ground level and guidance for solar radiation testing
2019-02 and weathering
(here: *only method Sa*)

DIN 75220 Ageing of automotive components in solar simulation units
1992-11

1.3 Tests of environmental influences on technic products using solar radiation (without flexible scope)

VDA 230-219 Ageing of automotive components in solar simulation units
2011-10

BMW PR 306.5 Solar simulation for furnishing parts
2011-10

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1.4 Combined environmental tests of technical products using temperature and humidity (Flexible scope category I) *

DIN EN 60068-2-30 2006-06	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
DIN EN 60068-2-38 (VDE 0468-2-38) 2010-06	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test
DIN EN 60068-2-61 1993-12	Environmental testing; part 2: test methods; test Z/ABDM: climatic sequence
DIN EN 60068-2-66 1995-06	Environmental testing - Test methods - Test Cx. Damp heat, steady state (unsaturated pressurized vapour)
DIN EN 60068-2-67 1996-07	Environmental testing - Part 2: Tests; test Cy: Damp heat, steady state, accelerated test primarily intended for components
DIN EN 60068-2-78 2002-09	Environmental testing - Part 2-78: Tests; Test Cab: Damp heat, steady state <i>(withdrawn standard)</i>
DIN EN 60068-2-78 2014-02	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state

1.5 Combined environmental tests of technical products using temperature and humidity (without flexible scope)

BMW PR 303.5 2010-01	Climate change test for furnishing parts
BMW PR 308.2 2006-04	Climatic test of adhesive bonds and material bonds of furnishing parts

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The test areas within the flexible scope (test field: material testing / climate or environmental testing) are defined by test parameters indicated in the following table and whose characteristic test methods are listed above.

Test type	Test parameter	Measurement / test range	Characteristic test methods
cold dry heat	Temperature	-40 °C to 140 °C	DIN EN 60068-2-1 DIN EN 60068-2-2
Temperature change	Temperature	-40 °C to 140 °C	DIN EN 60068-2-14 NA, Nb
Humidity heat constant, humidity heat cyclic, combined test, Temperature / humidity	Temperature	+10 °C to +90 °C	DIN EN 60068-2-30 DIN EN 60068-2-38 DIN EN 60068-2-78
	Relative air humidity	10 % to 95 %	
Solar simulation	Radiation strength	800 to 1.200 W/m ² at 280 nm to 3.000 nm	DIN 75220 DIN EN IEC 60068-2-5
	Temperature	-35 °C to +90 °C	
	Relative air humidity	10 % to 95 %	

1.6 Testing of environmental influence using vibration and mechanical blows on technical products (Flexible scope category I) *

DIN EN 60068-2-6
(VDE 0468-2-6)
2008-10

Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)

DIN EN 60068-2-27
(VDE 0468-2-27)
2010-02

Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock

DIN EN 60068-2-57
2015-10

Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time-history and sine-beat method

DIN EN 60068-2-64
(VDE 0468-2-64)
2009-04

Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance

DIN EN 60068-2-80
2006-05

Environmental testing - Part 2-80: Tests - Test Fi: Vibration - Mixed mode (here: *without chapter 6.1, 6.2, 6.3*)

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ISO 16750-3 Road vehicles - Environmental conditions and testing for electrical
2012-12 and electronic equipment - Part 3: Mechanical loads
(here: *without chapter 4.1, 4.2*)

1.7 Testing of environmental influence using vibration and mechanical blows on technical products (without flexible scope)

GS 97073-2 Environmental tests - Vibration test - testing of engine components
2015-10

The test areas within the flexible scope (test field: material testing / climate or environmental testing) are defined by test parameters indicated in the following table and whose characteristic test methods are listed above

Test type	Test parameter	Measurement / test range	Characteristic test methods
Vibrations sinusförmig, Schwingungen Broadband random, Shocks, Permanent shocks (also with temperature and humidity conditioning)	Frequency	5 Hz to 2.000 Hz	DIN EN 60068-2-57
	acceleration Sinus shocks	0,1 m/s ² to 400 m/s ²	DIN EN 60068-2-6
	acceleration broadband random	0,1 m/s ² to 170 m/s ²	DIN EN 60068-2-64
	acceleration Shocks	50 g / 6 ms: max. 150 kg 5 g / 30 ms: max. 700 kg	DIN EN 60068-2-27

1.8 Environmental simulation tests of electric and electronic components in power driven vehicles (without flexible scope)

VW 80000 Part II Electric and electronic components in power driven vehicles up to
2013-06 3,5t - general requirements, test conditions and tests - Part II -
environmental requirements and tests
(here: *only M-01; M-04; M-05; M-06; K-01; K-02; K-03; K-04; K-05; K-08; K-09; K-14; K-15 (without K-15a); K-16; L-02; L-03*)

VW 80000 Part II Electric and electronic components in power driven vehicles up to
2017-10 3,5t - general requirements, test conditions and tests - Part II -
environmental requirements and tests
(here: *only M-01; M-04; M-05; M-06; K-01; K-02; K-03; K-04; K-05; K-08; K-09; K-14; K-15 (without K-15a); K-16; L-02; L-03*)

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GS95024-3-1 2013-07	Electric and electronic components in power driven vehicles - environmental requirements and tests (here: <i>only M-01; M-04; M-05; M-06; K-01; K-02; K-03; K-04; K-05; K-08; K-09; K-14; K-15 (without K-15a); K-16; L-02; L-03</i>)
GS95024-3-1 2019-08	Electric and electronic components in power driven vehicles - environmental requirements and tests (here: <i>only M-01; M-04; M-05; M-06; K-01; K-02; K-03; K-04; K-05; K-08; K-09; K-14; K-15 (without K-15a); K-16; L-02; L-03</i>)
MBN LV 124-2 2013-08	Electric and electronic components in passenger vehicles up to 3,5t - general requirements, test conditions and tests Part II: environmental requirements (here: <i>only M-01; M-04; M-05; M-06; K-01; K-02; K-03; K-04; K-05; K-08; K-09; K-14; K-15 (without K-15a); K-16; L-02; L-03</i>)
MBN 10306 2018-03	Electric and electronic components in power driven vehicles - environmental requirements and tests (here: <i>only M-01; M-04; M-05; M-06; K-01; K-02; K-03; K-04; K-05; K-08; K-09; K-14; K-15 (without K-15a); K-16; L-02; L-03</i>)

1.9 Environmental simulation tests of electric and electronic components in power driven vehicles (Flexible scope category III) ***

ISO 16750-4 2010-04	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads (here: <i>only chapter 5.1; 5.2; 5.3; 5.6; 5.7</i>)
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2 Testing of passive vehicle safety of airbags under thermal conditions (airbag deployment test) (without flexible scope)

AK-LV 01 2009-06	Airbagsystem - Airbag-Moduls, requirements and tests - Clause 5: inflation test /Static behaviour
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3 Test of electric properties of electric and electronic construction groups and components

3.1 Tests of electric properties of connector systems / contact (Flexible scope category III) ***

ISO 16750-2 2012-11	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads (here: <i>without chapter 4.2; 4.3; 4.7; 4.8; 4.10.2; 4.11; 4.12</i>)
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3.2 Tests of connector systems / contact (without flexible scope)

GS 95024-2-1 2010-01	Electric requirements and tests - Electric and electronic components in power driven vehicles (here: <i>without E01; E04; E18; E20</i>)
GS 95024-2-2 2011-11	Electric requirements and tests - Electric and electronic components in power driven vehicles - additional requirements to GS 95024-2-1 (here: <i>without E01; E04; E18; E20</i>)
VW 80000 Part I 2013-06	Electric and electronic components in power driven vehicles up to 3,5t - general requirements, test conditions and tests - Part I - Electric requirements and tests (here: <i>only E18; E20</i>)
VW 80000 Part I 2017-10	Electric and electronic components in power driven vehicles up to 3,5t - general requirements, test conditions and tests - Part I - Electric requirements and tests (here: <i>only E18; E20</i>)
MBN LV 124-1 2013-03	Electric and electronic components in passenger cars up to 3,5t - general requirements, test conditions and tests - Part I: Electric requirements and tests 12 V electrical system (here: <i>only E18; E20</i>)

3.3 Tests of electric parameters of connectors / contact using current, voltage and resistance tests (Flexible scope categorie I) *

DIN EN 60512-1-1 2003-01	Connectors for electronic equipment - Tests and measurements - Part 1-1: General examination; Test 1a: Visual examination
DIN EN 60512-2-1 2003-01	Connectors for electronic equipment - Tests and measurements - Part 2-1: Electrical continuity and contact resistance tests; Test 2a: Contact resistance; Millivolt level method
DIN EN 60512-2-2 2004-01	Connectors for electronic equipment - Tests and measurements - Part 2-2: Electrical continuity and contact resistance tests - Test 2b: Contact resistance - Specified test current method

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DIN EN 60512-3-1 2003-01	Connectors for electronic equipment - Tests and measurements - Part 3-1: Insulation tests; Test 3a: Insulation resistance
DIN EN 60512-4-1 2004-01	Connectors for electronic equipment - Tests and measurements - Part 4-1: Voltage stress tests - Test 4a: Voltage proof
DIN EN 60512-5-1 2003-01	Connectors for electronic equipment - Tests and measurements - Part 5-1: Current-carrying capacity tests; Test 5a: Temperature rise
DIN EN 60512-5-2 2003-01	Connectors for electronic equipment - Tests and measurements - Part 5-2: Current-carrying capacity tests; Test 5b: Current-temperature derating

3.4 Tests of electrical properties of connectors / contact (without flexible scope)

GS 95006-7-1 2010-05	Line circuit in power driven vehicles - connector - tests (here: <i>only PG0; PG12; PG13; PG14 (without E14.2); PG15 (without E 5.1); PG19 (without B 19.4); PG20 (without B 6.1); PG21 (without B 6.1 & E 8.2)</i>)
MBN 10384 2010-11	Power driven vehicles – line circuit - test method (here: <i>only PG0; PG12; PG13; PG14 (without E14.2); PG15 (without E 5.1); PG19 (without B 19.4); PG20 (without B 6.1); PG21 (without B 6.1 & E 8.2)</i>)
VW 75174 2010-04	Connectors - line circuit in vehicles (here: <i>only PG0; PG12; PG13; PG14 (without E14.2); PG15 (without E 5.1); PG19 (without B 19.4); PG20 (without B 6.1); PG21 (without B 6.1 & E 8.2)</i>)
GS 95031 2017-03	Power driven vehicle high voltage contact - electric and electronic components in vehicles - test method (here: <i>only Kapitel 8; PG0 (without E 0.4); PG12; PG13; PG14 (without E14.2); PG15 (without E 5.1); PG19 (without B 19.4 & B 19.5); PG20 (without B 6.1); PG21 (without B 6.1 & E 8.2)</i>)
GS 95023 2016-11	Electrical properties and electrical safety of high voltage components in vehicles - electric/electronic components in vehicles - requirements and tests (here: <i>only chapter 7.3; 7.6; 7.7.5; 10.5.3</i>)
VW 80303 2014-06	Electrical properties and electrical safety of high voltage components in vehicles - requirements and tests (here: <i>only chapter 7.3; 7.6; 7.7.5; 10.5.3</i>)

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MBN LV 123 2014-03	Electrical properties and electrical safety of high voltage components in vehicles - requirements and tests (here: <i>only chapter 7.3; 7.6; 7.7.5; 10.5.3</i>)
VW 80300 2016-10	Electrical properties and electrical safety of high voltage components in vehicles - electrical requirements, test conditions and tests (here: <i>only HVPT-7 (with RT); HVPT-8 (with RT); EHV-01; EHV-02; EHV-03</i>)

3.5 Testing of electrical properties of pin socket connector systems / contact using current, voltage and resistance tests (Flexible Scope category I) *

ECE R 100 (EU 2015/ECE100; ECE 100; 2015/505) 2015-03	Regulation No 100 of the Economic Commission for Europe of the United Nations (UNECE) - Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train (here: <i>only annex 4A; 4B</i>)
DIN EN IEC 62196-1 (VDE 0623-5-1) 2015-06	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements (here: <i>only chapter 21.2; 26.8</i>)
ISO 6469-3 2018-10	Electrically propelled road vehicles - Safety specifications - Part 3: Electrical safety (hier: <i>only chapter 10.2; 10.3; 10.6</i>)
ISO 16750-2 2012-11	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads (hier: <i>only chapter 4.2</i>)
DIN EN 60664-1 (VDE 0110-1) 2008-01	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests (here: <i>only chapter 6.1.x and 6.1.y</i>)

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The test areas within the flexible scope (test field: electrotechnic/electrical parameters) are defined by test parameters indicated in the following table and whose characteristic test methods are listed above.

Test type	Test parameter	Measurement / test range	Characteristic test methods
current	Current - DC	±10 µA to ±1200 A DC	DIN EN 60512-5-1 DIN EN 60512-5-2
Voltage	Voltage DC	±10 mV to ±1000 V DC	ISO 16750-2 Kap. 4.2
Resistance	Resistance DC	1 nΩ to 30 MΩ	DIN EN 60512-2-1 DIN EN 60512-2-1
Isolation resistance	Isolation resistance for voltage DC	5 kΩ to 3,1 GΩ 100 V, 250 V, 500 V, 1000 V	DIN EN 60512-3-1
Voltage stress	Voltage stress	100 V to 6000 V DC 40 µA to 10 mA DC	DIN EN 60664-1 DIN EN 60512-4-1
		100 V to 5000 V AC 0,5 mA to 100 mA AC	DIN EN 60664-1 DIN EN 60512-4-1

Abbreviations used:

AK-LV	Working committee for suppliers requirements of the Automobile companies AUDI AG, Bayrische Motorenwerke AG, DaimlerChrysler AG, Porsche AG, Volkswagen AG
BMW	Bayrische Motorenwerke AG - Bavarian Motorworks AG
DIN	German Institute for Standardisation
ECE	Economics Commission for European Regulations
EN	European Standard
GS	Global Standard BMW - test method
IEC	International Electrotechnical Committee
ISO	International Organisation for Standardisation
LV	Supplier requirements
MBN	Mercedes Benz test method
VDA	Association of German Automobile Industry
VDE	Association of Electrotechnic, Electronic and Information technology
VW	Volkswagen AG test method

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