

## Deutsche Akkreditierungsstelle GmbH

### Annex to the Accreditation Certificate D-PL-19102-01-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 13.06.2018 to 12.06.2023

Date of issue: 17.07.2018

Holder of certificate:

**AUCOTEAM GmbH**  
**Storkower Straße 115 a, 10407 Berlin**

for its

**testing laboratory for climatic, mechanical und corrosive environmental stress**

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

Tests in the fields:

**environmental simulation tests in the fields of temperature, humidity, corrosion, vibration and mechanical shock, solar simulation as well as tests in their combinations of technical products; protection tests; glow-wire test**

Abbreviations used: see last page

**The laboratory is permitted within the specified testing fields \*, without being required to inform and obtain prior approval from DAkkS the free choice of standard or equivalent test methods. The listed test methods are exemplary. The laboratory maintains a current list of all test methods in a flexible scope of accreditation.**

## 1 Tests at field of climatic, corrosive and mechanic-dynamical environmental testing

### 1.1 Climatic tests \*

Type of test	Test parameters	Test range	Measurement uncertainty	Typically test methods
Cold Dry heat Temperature change, fast Temperature change, slow damp heat, constant damp heat, cyclic Compound test Temperature/Humidity Water condensation test	Temperature	- 75 °C to + 25 °C	1,0 K	DIN EN 60068-2-1 DIN EN 60068-2-2 DIN EN 60068-2-14 DIN EN 60068-2-30 DIN EN 60068-2-38 DIN EN 60068-2-78 DIN EN 50155 DIN EN ISO 6270-1 DIN EN ISO 6270-2
		+25 °C to + 300 °C	0,5 K	
		+301 °C to + 900 °C	5,0 K	
	Relative humidity	≤ 100 % r.H.	1,5 % r.H.	
	Temperature change with determined speed	≤ 10 K / min	5 %	
Low air pressure with and without temperature	Pressure	≥ 1 mbar	4 %	DIN EN 60068-2-13 DIN EN 60068-2-40 DIN EN 60068-2-41
Artificial weathering	Exposure rate	0,83 W / (m <sup>2</sup> nm) by 340 nm		DIN EN ISO 4892-3

## 1.2 Mechanical-dynamic tests \*

Type of test	Test parameters	Test range	Measurement uncertainty	Typically test methods
Vibrations, sinusoidal vibrations, Broadband noise Shock Bump  (even with temperature- and humidity superposition)	Frequenz	3 ... 3.000 Hz	2,1 %	DIN EN 60068-2-6 DIN EN 60068-2-27
	Acceleration Sinusoidal Vibrations Broadband noise	0,1 to 800 m/s <sup>2</sup> (10 Hz to 3 KHz)	4,3 %	DIN EN 60068-2-53 DIN EN 60068-2-55
		0,1 to 800 m/s <sup>2</sup> (5 Hz to 10 Hz)	4,6 %	DIN EN 60068-2-64 DIN EN 60068-2-80
	Acceleration Shock	1 to 1.000 m/s <sup>2</sup>	4,4 %	DIN EN 60255-21-1 DIN EN 60255-21-2
		1.000 to 8.000 m/s <sup>2</sup>	6,1 %	DIN EN 60255-21-3 DIN EN 61373
Shock test	Impact energy	0,5 ... 4,99 J	3,0 %	DIN EN 60068-2-75 DIN EN 60068-2-77
		0,2 ... 0,49 J	10,0 %	
		5,0 ... 20,0 J	5 %	
Free fall Topple and Toppling over	Height of fall	5 ... 3.000 mm	2 mm	DIN EN 60068-2-31

## 1.3 Corrosive tests\*

Type of test	Test parameters	Test range	Measurement uncertainty	Typically test methods
Salt spray tests constant and cyclical	Salt concentration	0,5 to 5,0 % NaCl	0,2 %	DIN EN 60068-2-11
	Temperature	33°C to 37°C	0,5 K	DIN EN 60068-2-52 DIN EN ISO 9227
	Precipitation per h	1 ml to 2 ml / 80 cm <sup>2</sup>	0,3 ml	DIN EN 50155

## 1.4 Standardized test methods

DIN EN ISO 2360  
2017-12                      Non-conductive coatings on non-magnetic electrically conductive base metals - Measurement of coating thickness - Amplitude-sensitive eddy-current method

DIN EN ISO 2409  
2013-06                      Paints and varnishes - Cross-cut test

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DIN EN ISO 2808 2007-05	Paints and varnishes - Determination of film thickness (Modification: <i>only determination of the dry film thickness: Method 7C, Method 7D</i> )
DIN EN ISO 4624 2016-08	Paints and varnishes - Pull-off test for adhesion
DIN EN ISO 4628-2 2016-07	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering
DIN EN ISO 4628-3 2004-01	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting
DIN EN ISO 4628-4 2016-07	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 4: Assessment of degree of cracking
DIN EN ISO 4628-5 2016-07	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 5: Assessment of degree of flaking
DIN EN ISO 4628-6 2011-12	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 6: Assessment of degree of chalking by tape method
DIN EN ISO 4628-8 2013-03	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect
DIN EN ISO 4892-3 2016-10	Plastics - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (Modification: <i>only cycle number 3 and 5</i> )
DIN EN ISO 6270-2 2018-04	Paints and varnishes - Determination of resistance to humidity - Part 2: Condensation (in-cabinet exposure with heated water reservoir)

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DIN EN ISO 9227 2017-07	Corrosion tests in artificial atmospheres - Salt spray tests (Modification: <i>only neutral salt spray test (NSS-Test)</i> )
DIN EN ISO 16474-3 2014-03	Paints and varnishes - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (Modification: <i>only a cycle number 2 and 3</i> )
ISO 16750-3 2012-12	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads (Modification: <i>without point 4.5 Gravel Bombardement</i> )
ISO 16750-4 2010-04	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads (Modification: <i>without point 5.9 Solar Radiation</i> )
ISO 16750-5 2010-04	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 5: Chemical loads
DIN EN 50102 1997-09	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code) (Modification: <i>only IK06 to IK10</i> )
DIN EN 50155 2008-03	Railway applications - Electronic equipment used on rolling stock (Modification: <i>not a EMC-Test</i> )
DIN EN 50470-1 2007-05	Electricity metering equipment (a.c.) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)
DIN EN 60068-2-1 2008-01	Environmental testing - Part 2-1: Tests - Test A: Cold
DIN EN 60068-2-2 2008-05	Environmental testing - Part 2-2: Tests - Test B: Dry heat
DIN EN 60068-2-6 2008-10	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)
DIN EN 60068-2-11 2000-02	Environmental testing - Part 2: Tests; test Ka: Salt mist

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DIN EN 60068-2-13 2000-02	Environmental testing - Part 2: Tests; test M: Low air pressure
DIN EN 60068-2-14 2010-04	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
DIN EN 60068-2-27 2010-02	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
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 60068-2-31 2009-04	Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens
DIN EN 60068-2-38 2010-06	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test
DIN EN 60068-2-40 2000-08	Environmental testing - Part 2: Tests; test Z/AM: Combined cold/low air pressure tests
DIN EN 60068-2-41 2000-08	Environmental testing - Part 2: Tests; test Z/BM: Combined dry heat/low air pressure tests
DIN EN 60068-2-52 1996-10	Environmental testing - Part 2: Tests, Test Kb: Salt mist, cyclic (sodium chloride solution)
DIN EN 60068-2-53 2011-02	Environmental testing - Part 2-53: Tests and guidance: Combined climatic (temperature/humidity) and dynamic (vibration/shock) tests
DIN EN 60068-2-55 2014-10	Environmental testing - Part 2-55: Tests - Test Ee and guidance - Loose cargo testing including bounce
DIN EN 60068-2-61 1993-12	Environmental testing; part 2: test methods; test Z/ABDM: climatic sequence
DIN EN 60068-2-64 2009-04	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance
DIN EN 60068-2-66 1995-06	Environmental testing - Part 2: 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

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DIN EN 60068-2-68 1997-02	Environmental testing - Part 2: Tests; test L: Dust and sand
DIN EN 60068-2-75 2015-08	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests
DIN EN 60068-2-77 1999-10	Environmental testing - Part 2-77: Tests; test 77: Body strength and impact shock
DIN EN 60068-2-78 2014-02	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state
DIN EN 60068-2-80 2006-05	Environmental testing - Part 2-80: Tests - Test Fi: Vibration - Mixed mode
DIN EN 60255-21-1 1996-05	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment; section 1: Vibration tests (sinusoidal)
DIN EN 60255-21-2 1996-05	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment; section 2: Shock and bump tests
DIN EN 60255-21-3 1995-11	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment; section 3: Seismic tests
DIN EN 60255-27 VDE 0435-327 2014-11	Measuring relays and protection equipment - Part 27: Product safety requirements (Modification: <i>only the following test methods:</i> - 9 <i>Inscriptions, documentation and packaging</i> - 10.5.1 <i>Climatic environmental tests</i> - 10.5.2 <i>Mechanical tests</i> )
DIN EN 60601-1-11 VDE 0750-1-11 2016-04	Medical electrical equipment - Part 1-11: General requirements for basic safety and essential performance - Collateral Standard: Requirements for medical electrical equipment and medical electrical systems used in the home healthcare environment (Modification: <i>only the following test methods:</i> - 4.2 <i>Environmental conditions</i> - 5 <i>General requirements for the testing of ME devices</i> - 10.1 <i>Additional requirements for mechanical strength</i> )

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<p>DIN EN 60695-2-11 VDE 0471-2-11 2014-11</p>	<p>Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products (GWEPT)</p>
<p>DIN EN 60695-2-12 VDE 0471-2-12 2015-01</p>	<p>Fire hazard testing - Part 2-12: Glowing/hot-wire based test methods - Glow-wire flammability index (GWFI) test method for materials</p>
<p>DIN EN 60695-2-13 VDE 0471-2-13 2015-01</p>	<p>Fire hazard testing - Part 2-13: Glowing/hot-wire based test methods - Glow-wire ignition temperature (GWIT) test method for materials</p>
<p>DIN EN 60945 2003-07</p>	<p>Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results (Modification: <i>only the following test methods:</i></p> <ul style="list-style-type: none"> <li>- 8.2 <i>Dry heat</i></li> <li>- 8.3 <i>Damp heat</i></li> <li>- 8.4 <i>Cold</i></li> <li>- 8.5 <i>Heat shock (portable devices)</i></li> <li>- 8.6.1 <i>Case on a solid surface</i></li> <li>- 8.7 <i>Vibration (all device classes)</i></li> <li>- 8.8 <i>Rain and spray (suspended devices)</i></li> <li>- 8.11 <i>Resistance to oil (portable devices)</i></li> <li>- 8.12 <i>Corrosion (Salt spray) (all device classes)</i></li> <li>- 12.1 <i>Protection against accidental contact with hazardous voltages)</i></li> </ul>
<p>DIN EN 61010-1 2011-07</p>	<p>Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements (Modification: <i>only the following test methods:</i></p> <ul style="list-style-type: none"> <li>- 5 <i>Marking and documentation</i></li> <li>- 8 <i>Resistance to mechanical stresses</i></li> <li>- 10 <i>Equipment temperature limits and resistance to heat, <b>except:</b></i> <ul style="list-style-type: none"> <li>10.5.1 <i>Maintenance to air and creepage distances</i></li> <li>10.5.3 <i>Insulation materials)</i></li> </ul> </li> </ul>
<p>DIN EN 61373 2011-04</p>	<p>Railway applications - Rolling stock equipment - Shock and vibration tests</p>



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<p>DIN EN 62052-11 VDE 0418-2-11 2017-09</p>	<p>Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment (Modification: <i>all test methods, <b>except:</b></i> - 7.4 <i>Test for ground fault</i> - 7.5 <i>Electromagnetic compatibility</i>)</p>
<p>DIN EN 62271-203 VDE 0671-203 2012-11</p>	<p>High-voltage switchgear and controlgear - Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV (<i>point: 6.106.1</i>)</p>
<p>ASTM B 117 2016</p>	<p>Standard Practice for Operating Salt Spray (Fog) Apparatus</p>
<p>ASTM D 999 2008</p>	<p>Standard Test Methods for Vibration Testing of Shipping Containers (Modification: <i>only test method A1 (Vertical Motion)</i>)</p>
<p>ASTM D 4728 2017</p>	<p>Standard Test Methods for Random Vibration Testing of Shipping Containers</p>
<p>ASTM D 4169 2016</p>	<p>Standard Practice for Performance Testing of Shipping Containers and Systems</p>
<p>RTCA / DO-160G 2010-12</p>	<p>Environmental conditions and test procedures for airborne equipment (Modification: <i>only the following test methods:</i> - Sec 4 <i>Cold, dry heat, temperature changes, low-pressure</i> - Sec 5 <i>Temperature changes</i> - Sec 6 <i>Damp heat</i> - Sec 7 <i>Shock, constant acceleration</i> - Sec 8 <i>Swing</i> - Sec 10 <i>Condensation, splash</i> - Sec 12.4 <i>dust</i> - Sec 14 <i>Salt spray</i>)</p>
<p>DNVGL-CG-0339 2015-11</p>	<p>Environmental test specification for electrical, electronic and programmable equipment and systems</p>
<p>Lloyds Register of Shipping 2015-07</p>	<p>Guidelines on the implementation of Type Tests, LR Type Approval System - Test Specification Number - Point: 1-14</p>

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<p>MIL STD 810G w/Change 1 2014-04</p>	<p>Environmental engineering considerations and laboratory tests (Modification: <i>only following test methods:</i></p> <ul style="list-style-type: none"> <li>- 500.6 Vacuum</li> <li>- 501.6 High temperature</li> <li>- 502.6 Low temperature</li> <li>- 503.6 Temperature changes, fast</li> <li>- 504.2 Contamination by fluids</li> <li>- 506.6 Rain</li> <li>- 507.6 Air moisture</li> <li>- 509.6 Salt spray</li> <li>- 510.6 Dust</li> <li>- 512.6 Dipping</li> <li>- 514.7 Swing</li> <li>- 516.7 Shock</li> <li>- 520.4 Temperature, air moisture, swing and altitude</li> <li>- 523.4 Vibro-acoustics / temperature</li> <li>- 528.1 Mechanical vibration of ship equipment)</li> </ul>
<p>MIL-STD 883K w/Change 2 2017-02</p>	<p>Test method standard microcircuits (Modification: <i>only the following test methods:</i></p> <ul style="list-style-type: none"> <li>- 1001 Barometric pressure reduced (altitude operation)</li> <li>- 1003 High voltage, insulation resistance</li> <li>- 1004.7 Moisture resistance</li> <li>- 1009.8 Salt atmosphere</li> <li>- 1010.8 Temperature changes, slowly</li> <li>- 1011.9 Temperature changes, fast</li> <li>- 2001.3 Constant acceleration</li> <li>- 2005.2 Swing</li> <li>- 2006.1 Swing</li> <li>- 2007.3 Swing</li> <li>- 2026 Swing)</li> </ul>
<p>ISTA 2A 2011-01</p>	<p>Partial-Simulation Performance Test Procedure - Packaged- Products 150 lb (68 kg) or less</p>
<p>MBN 10 305-1 2008-06</p>	<p>E/E Environmental Testing - Part 1: Test Specifications (Modification: <i>only following test methods:</i></p> <ul style="list-style-type: none"> <li>- Pkt. 5 Environmental Testing</li> <li>- Pkt. 6 Environmental Test Specification (außer:             <ul style="list-style-type: none"> <li>6.1.9 Solar Radiation Soak</li> <li>6.4.1 Mixed Flowing Gas)</li> </ul> </li> </ul>
<p>MBN 10 305-2 2008-06</p>	<p>E/E Environmental Testing - Part 2: Test Selection Process</p>

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<p>MBN LV 124-1 2013-03</p>	<p>Electrical and electronic components in assenger vehicles up to 3,5 tonnes - General requirements, test conditions and test methods - Part 1: Electrical requirements</p>
<p>MBN LV 124-2 2013-08</p>	<p>Electrical and electronic components in assenger vehicles up to 3,5 tonnes - General requirements, test conditions and test methods - Part 2: Environmental requirements (Modification: <i>all test methods, <b>except:</b></i>  - Point 4      <i>Electrical requirements and tests</i>  - Point 9.17    <i>Sunning</i>  - Point 9.18    <i>Sulfur dioxide test</i>)</p>
<p>VW 80000 (LV 124) 2013-06</p>	<p>Electrical and electronic components in motor vehicles up to 3,5 tonnes - General requirements, test conditions and test</p>
<p>JDQ 53.3 2014-04</p>	<p>Environmental Design &amp; Testing of Electronc/Electrical Components an Assemblies (Modification: <i>only the following test methods:</i>  - Point 3      <i>Dust (<b>except</b> 3.3 Particle Impact)</i>  - Point 4      <i>Fluids</i>  - Point 6      <i>Mechanical (<b>except</b> 6.3.2 Transit Shock)</i>  - Point 7      <i>Temperature / Humidity)</i></p>
<p>JDQ 201 2015-03</p>	<p>Testing of Electronic and Electrical Devices - Environmental and Mechanical Loads (Modification: <i>all test methods, <b>except:</b></i>  - Point 7      <i>JDQ 201A3 - Particle Impact</i>  - Point 13     <i>JDQ 201C1 - Corrosive Atmosphere</i>  - Point 18     <i>JDQ 201D5 - Vibration Calibrated Accelerated Life Test (CALT)</i>  - Point 21     <i>JDQ 201E3 - Transit Shock)</i></p>

MAN M3499-1 2011-08	<p>General requirements for electrical, electronic, mechatronic and mechanical systems</p> <p>(Modification: <i>only the following test methods:</i></p> <ul style="list-style-type: none"> <li>- 3.3.7.1.3 <i>Test plan for mechanical systems</i></li> <li>- 3.3.7.2 <i>Functional test</i></li> <li>- 3.3.7.3 <i>Qualification test (<b>except:</b></i> <ul style="list-style-type: none"> <li><i>3.3.7.3.8 Noxious gas,</i></li> <li><i>3.3.7.3.12 EMV</i></li> <li><i>3.3.7.3.14 Dirt spraying chamber test</i></li> <li><i>3.3.7.3.15 Leak test</i></li> <li><i>3.3.7.3.17 Component-specific test</i></li> <li><i>3.3.7.3.19 Xenon light fastness test</i></li> <li><i>3.3.7.3.20 Solar simulation system)</i></li> </ul> </li> </ul>
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## 2 Protection tests and safety inspections

DIN EN 60529 VDE 0470-1 2014-09	Degrees of protection provided by enclosures (IP code)
ISO 20653 2013-02	Road vehicles - Degrees of protection (IP code) - Protection of electrical equipment against foreign objects, water and access

### Abbreviations used:

ASTM	American Society for Testing and Materials
DIN	German Institute for Standardization
DNVGL	Instruction of Det Norske Veritas / German Lloyd
EN	European standard
ISO	International Organization for Standardization
ISTA	International Safe Transit Association
JDQ	John Deere Quality test
MAN	Engineering works Augsburg – Nuremberg (Standard)
MBN	Mercedes Benz standard
MIL STD	Military standard of the US Army
RTCA	Radio technical commission for aeronautics
VDE	Association for Electrical, Electronic and Information Technologies
VW	Factory standard of Volkswagen AG