

# Deutsche Akkreditierungsstelle

# Annex to the Partial Accreditation Certificate D-PL-19102-01-01 according to DIN EN ISO/IEC 17025:2018

15.09.2023

Date of issue: 15.09.2023

This annex is a part of the accreditation certificate D-PL-19102-01-00.

Holder of partial accreditation certificate:

## **AUCOTEAM GmbH**

with its testing laboratory

## Prüflabor für klimatische, mechanische und korrosive Umweltbeanspruchungen Storkower Straße 115 a, 10407 Berlin

The testing laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The testing laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of testing laboratories and confirm generally with the principles of DIN EN ISO 9001.

Tests in the fields:

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

This certificate annex is only valid together with the written accreditation certificate and 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.

Abbreviations used: see last page

Page 1 of 17 This document is a translation. The definitive version is the original German annex to the accreditation certificate.



Within the given testing field marked with \*, the testing laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, the free choice of standard or equivalent testing methods.

Within the scope of accreditation marked with \*\*\*, the testing laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use standards or equivalent testing methods listed here with different issue dates.

The testing laboratory maintains a current list of all testing procedures within the flexible scope of accreditation.



#### **1** Test area climatic tests \*

#### Type of test:

Testing of environmental resistance with regard to temperature, relative humidity, temperature changes, pressure changes with and without temperature and artificial weathering

#### Matrix / Sample / test item / Test object:

Electrotechnical, mechanical and mechatronic products and devices, housings, components, packaging, materials and coatings

#### **Measurements:**

Temperature, relative humidity, pressure, UV irradiance

Typical standard procedures:					
DIN 75220 1992-11	Ageing of automotive components in solar simulation units				
DIN EN 50155 2018-05	Railway applications - Rolling stock - Electronic equipment (Restriction: <i>no EMC tests</i> )				
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 60068-2-13 2000-02	Environmental testing - Part 2: Test - 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 60068-2-30 2006-06	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)				
DIN EN 60068-2-38 2010-06	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite tempe- rature/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 60068-2-61 1993-12	Environmental testing - Part 2: Test methods - Test Z/ABDM: Climatic sequence				
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 2020-08	Environmental testing - Part 2-67: Tests - Test Cy: Damp heat, steady state, accelerated test primarily intended for components				
DIN EN 60068-2-78 2014-02	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state				



#### Type of test:

Testing of environmental resistance with regard to temperature, relative humidity, temperature changes

#### Matrix / Sample / Test item / Test object:

Electrotechnical, mechanical and mechatronic products and devices

#### Measurements:

Temperature, relative humidity

#### **Typical standard procedures:**

ISO 16750-4Road vehicles - Environmental conditions and testing for electrical and<br/>electronic equipment - Part 4: Climatic loads

#### 2 Test area mechanic-dynamical tests \*

#### Type of test:

Testing of resistance to environmental influences such as vibrations, shock loads, impacts and free fall with and without climatic loads

#### Matrix / Sample / Test item / Test object:

Electrotechnical, mechanical and mechatronical products and devices, housings, components, packaging, materials and coatings

#### Measurements:

Frequency, acceleration, impact energy, drop height, temperature, relative humidity

#### **Typical standard procedures:**

<i>/</i> · ·	
ASTM D 999-08 2008 (2015 reapproved)	Standard Test Methods for Vibration Testing of Shipping Containers (Restriction: <i>only method A1 (Vertical Motion)</i> )
ASTM D 4169-16 2016	Standard Practice for Performance Testing of Shipping Containers and Systems
ASTM D 4728 2017	Standard Test Methods for Random Vibration Testing of Shipping Containers
DIN EN 50102 1997-09	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)



<b>Type of test:</b> Testing of resistance to environmental influences such as vibrations, shock loads, impacts and free fall with and without climatic loads			
Matrix / Sample / Test Electrotechnical, mech packaging, materials ar	anical and mechatronical products and devices, housings, components,		
Measurements: Frequency, acceleration	n, impact energy, drop height, temperature, relative humidity		
Typical standard proce	dures:		
DIN EN 60068-2-6 2008-10	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)		
DIN EN 60068-2-27 2010-02	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock		
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 60068-2-53 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 60068-2-64 2020-09	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008 +A1:2019)		
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 61373 2011-04	Railway applications - Rolling stock equipment - Shock and vibration tests		
ISO 16750-3 2012-12	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads (Restriction: <i>without point 4.5 Gravel Bombardement</i> )		



#### 3 Test area mechanical-static tests \*

#### Type of test:

Testing of resistance to environmental influences by static mechanical loads, impacts and free fall with and without climatic loads

#### Matrix / Sample / Test item / Test object:

Electrotechnical, mechanical and mechatronical products and devices, housings, components, packaging, materials and coatings

#### Measurements:

Impact energy, drop height, torsion, force, temperature, relative humidity

#### **Typical standard procedures:**

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DIN EN 50102 1997-09	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
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 60512-13-1 2006-11	Connectors for electronic equipment - Tests and measurements - Part 13-1: Mechanical operation tests - Test 13a: Engaging and separating forces
DIN EN 60512-13-2 2006-11	Connectors for electronic equipment - Tests and measurements - Part 13-2: Mechanical operation tests - Test 13b: Insertion and withdrawal forces
DIN EN 60512-13-5 2006-11	Connectors for electronic equipment - Tests and measurements - Part 13-5: Mechanical operation tests - Test 13e: Polarizing and keying method
DIN EN 60512-15-6 2009-03	Connectors for electronic equipment - Tests and measurements - Part 15-6: Connector tests (mechanical) - Test 15f: Effectiveness of connector coupling devices



#### 4 Test area corrosive tests \*

#### Type of test:

Testing of corrosion resistance by constant and cyclic salt spray tests

#### Matrix / Sample / Test item / Test object:

Electrotechnical, mechanical and mechatronical products and devices, housings, components, packaging, materials and coatings

#### Measurements:

Salt concentration, temperature, relative humidity, precipitation amount

# Typical standard procedures:

lypical standard proced	lures:
ASTM B 117 2019	Standard Practice for Operating Salt Spray (Fog) Apparatus
DIN EN 50155 2018-05	Railway applications - Rolling stock - Electronic equipment
DIN EN 60068-2-11 2000-02	Environmental testing - Part 2: Tests - Test Ka: Salt mist
DIN EN IEC 60068-2-52 2018-08	Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium chloride solution)
DIN EN ISO 9227 2017-07	Corrosion tests in artificial atmospheres - Salt spray tests (Restriction: <i>only neutral salt spray test (NSS test)</i> )

#### 5 Degree of protection tests and safety tests\*

#### Type of test:

Testing resistance against intrusion of foreign objects and water

#### Matrix / Sample / Test item / Test object:

Electrotechnical, mechanical and mechatronical products and devices, housings, components, packaging, materials and coatings

#### Measurements:

Force, flow, pressure, dust concentration, temperature, relative humidity

Typical standard procedures:		
DIN EN 60068-2-68 1997-02	Environmental testing - Part 2: Tests - Test L: Dust and sand	
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	



## 6 Tests according to standard procedures \*\*\*

Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	DIN EN 50470-1 2019-08	Electricity metering equipment (a.c.) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)	
	DIN EN 60255-27 VDE 0435-327 2014-11	Measuring relays and protection equipment - Part 27: Product safety requirements	Only: - 9 Labels, documentation and packaging - 10.5.1 Climatic environmental assessments - 10.5.2 Mechanical tests
	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	Only: - 4.2 Environmental conditions - 5 General requirements for testing ME devices - 10.1 Additional mechanical strength requierements
	DIN EN 60695-2-11 VDE 0471-2-11 2014-11	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products (GWEPT)	
	DIN EN 60695-2-12 VDE 0471-2-12 2015-01	Fire hazard testing - Part 2-12: Glowing/hot-wire based test methods - Glow-wire flammability index (GWFI) test method for materials	
	DIN EN 60695-2-13 VDE 0471-2-13 2015-01	Fire hazard testing - Part 2-13: Glowing/hot-wire based test methods - Glow-wire ignition temperature (GWIT) test method for materials	



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	DIN EN 60945 2003-07	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	Only: - 8.2 Dry warmth - 8.3 Damp heat - 8.4 Cold - 8.5 Thermal shock (portable devices) - 8.6.1 Fall onto a solid surface - 8.7 Vibration (all device classes) - 8.8 Rain and spray (Exposed Devices) - 8.11 Tesistance to oil (portable devices) - 8.12 Corrosion (salt spray) (all device classes) - 12.1 Protection against accidental contact with dangerous voltages
	DIN EN 61010-1 2011-07	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements	Only: - 5 Labels and documentation - 8 Resistance to mechanical stress - 10Device temperature limits and heat resistance, <u>except:</u> 10.5.1 Maintenance of clearances and creepage distances 10.5.3 Insulating materials
	DIN EN 62052-11 VDE 0418-2-11 2017-09	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment	Except: - 7.4 Ground fault resistance test - 7.5 Electromagnetic compatibility)
	DIN EN 62271-203 VDE 0671-203 2012-11	High-voltage switchgear and controlgear - Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV	here: point 6.106.1



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	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	
	ISO 16750-5 2010-04	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 5: Chemical loads	
	MIL STD 810G w/Change 1 2014-04	Environmental engineering considerations and laboratory tests	Only: - 500.6 Low Pressure (Altitude) - 501.6 High temperature - 502.6 Low temperature - 503.6 Temperature change, fast - 504.2 Liquid contamination - 505.5 Solar Irradiance (Sun) Procedure II - Stready state - 506.6 Rain - 507.6 Humidity - 509.6 Salt spray - 510.6 Dust - 512.6 Immersion - 514.7 Swing - 516.7 Shock - 520.4 Temperature, humidity, swing and altitude - 523.4 Vibro- Acoustic/Temperature - 528.1 Mechanical vibration of ship equipment
	MIL-STD 883K w/Change 3 2018-05	Test method standard microcircuits	Only: - 1001 Barometric pressure, reduced (altitude operation)



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	Continuation: MIL-STD 883K w/Change 3 2018-05	Test method standard microcircuits	<ul> <li>1003 High voltage</li> <li>resistance, insulation</li> <li>resistance</li> <li>1004.7 Damp heat,</li> <li>condensation</li> <li>1009.8 Salt spray</li> <li>1010.8 Temperature</li> <li>change, slow</li> <li>1011.9 Temperature</li> <li>change, schnell</li> <li>2001.3 Constant</li> <li>acceleration</li> <li>2005.2 Swing</li> <li>2006.1 Swing</li> <li>2007.3 Swing</li> <li>2026 Swing</li> </ul>

#### 7 Tests according to other test methods

Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	DNVGL-CG-0339 2019-12	Environmental test specification for electrical, electronic and programmable equipment and systems	
	GS 95006-7-1 2016-03	Automotive connectors - Tests	Except: - PG 2 Material and surface analysis, contacts - PG 3 Material and surface analysis, housing and single wire seal (ELA) - PG 5 Mechanical and thermal relaxation behavior - PG 6 Interaction between contact and housing - PG16 Fretting corrosion



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	Continuation: GS 95006-7-1 2016-03	Automotive connectors - Tests	<ul> <li>PG 19 B19.4 Industrial climate (multi-component climate)</li> <li>PG 28 Locking noise</li> <li>PG 29 Holding force of the blind plugs</li> </ul>
	ISTA 2A 2011-01	Partial-Simulation Performance Test Procedure - Packaged-Products 150 lb (68 kg) or less	
	JDQ 53.3 2014-04	Environmental Design & Testing of Electronic/Electrical Components and Assemblies	Only: - Point 3 Dust ( <u>except</u> : 3.3 Particle Impact) - Point 4 Fluids - Point 6 Mechanical ( <u>except</u> : 6.3.2 Transit Shock) - Point 7 Temperature / Humidity
	JDQ 201 2015-03	Testing of Electronic and Electrical Devices - Environmental and Mechanical Loads	Except: - Point 7 JDQ 201A3 - Particle Impact - Point 13 JDQ 201C1 - Corrosive Atmosphere - Point 18 JDQ 201D5 - Vibration Calibrated Accelerated Life Test (CALT) - Point 21 JDQ 201E3 - Transit Shock
	Lloyds Register of Shipping 2015-07	Guideline for conducting type examinations, LR Type Approval System - Test Specification Number 1	here: Point 1-14
	MAN M3499-1 2017-01	General requirements for electrical, electronic and mechatronic systems	Except: - Point 6.9 Noxious gas test - Point 6.13 Dirt spray chamber test - Point 6.15 Flammability - Point 6.16 Light fastness xenon test - Point 7.6 Rock chip test - Point 8.2 EMC



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	MBN 10 305-1 2008-06	E/E Environmental Testing - Part 1: Test Specifications	Only: - Point 5 Environmental Testing - Point 6 Environmental Test Specification <u>except:</u> 6.1.9 Solar Radiation Soak 6.4.1 Mixed Flowing Gas
	MBN 10 305-2	E/E Environmental Testing - Part 2: Test	
	2008-06	Selection Process	-
	MBN 10 384 2010-11	Automotive connectors - Tests	Except: - PG 2 Material and surface analysis, contacts - PG 3 Material and surface analysis, housing and single wire seal (ELA) - PG 5 Mechanical and thermal relaxation behaviour - PG 6 Interaction between contact and housing - PG 16 Fretting corrosion - PG 19 B19.4 Industrial climate (multi-component climate) - PG 28 Locking noise - PG 29 Holding force of the blind plugs
	MBN LV 124-1 2013-03	Electrical and electronic components in passenger cars up to 3,5 t - General requirements, test conditions and tests - Part 1: Electrical requirements	



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	MBN LV 124-2 2013-08	Electrical and electronic components in passenger cars up to 3,5 t - General requirements, test conditions and tests - Part 2: Environmental require-ments	Except: - Point 13.2 Rock Chip test - Point 14.18 Noxious gas test)
	LV 214 2010-03	Automotive Connectors - Tests	Except: - PG 2 Material and surface analysis, contacts - PG 3 Material and surface analysis, housing and single wire seal (ELA) - PG 5 Mechanical and thermal relaxation behaviour - PG 6 Interaction between contact and housing - PG 16 Fretting corrosion - PG 19 B19.4 Industrial climate (multi-component climate) - PG 28 Locking noise - PG 29 Holding force of the blind plugs
	LV 215-2 2013-03	Automotive high-voltage contact - Test standard	Except: - PG 2 Material and surface analysis, contacts - PG 3 Material and surface analysis, housing and single wire seal (ELA) - PG 5 Mechanical and thermal relaxation behaviour



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	Continuation: LV 215-2 2013-03	Automotive high-voltage contact - Test standard	<ul> <li>PG 6 Interaction</li> <li>between contact and</li> <li>housing</li> <li>PG 16 Fretting corrosion</li> <li>PG 19 B19.4 Industrial</li> <li>climate (multi-component</li> <li>climate)</li> <li>PG 28 Locking noise</li> <li>PG 29 Holding force of</li> <li>the blind plugs</li> <li>PG 50 EMC test</li> </ul>
	RTCA / DO-160G 2010-12	Environmental conditions and test procedures for airborne equipment	Only: - Sec. 4 Cold, dry heat, temperature changes, negative pressure - Sec. 5 Temperature change - Sec. 6 Damp heat - Sec. 7 Shock, constant acceleration - Sec. 8 Swing - Sec. 10 Condensed water, splash water - Sec. 12.4 Dust - Sec. 14 Salt spray
	VW 75174 2018-10	Automotive connectors - Tests	Except: - Point 6.1 PG 2 - Material and surface analysis, contacts - Point 6.2 PG 3 - Material and surface analysis, housing and single wire seal (ELA) - Point 6.6 PG 5 - Mechanical and thermal relaxation behaviour - Point 6.7 PG 6 - Interaction between contact and housing - Point 6.17 PG 16 - Fretting corrosion



Testing field	Standard / In- House Procedure / Version	Title of Standard or In- House Procedure	Test Range / Restrictions
Electrical engineering	Continuation: VW 75174 2018-10	Automotive connectors - Tests	<ul> <li>Point 6.20 PG 19 B19.4 - Industrial climate (multi- component climate)</li> <li>Point 6.29 PG 28 - Locking noise</li> <li>Point 6.30 PG 29 - Holding force of the blind plugs</li> </ul>
	VW 80000 2021-01	Electrical and electronic components in motor vehicles up to 3,5 t - General requirements, test conditions and tests	Except: - Point 10.2 Rock chip test - Point 11.18 Noxious gas test
	VW 80106 2014-01	Plug connection on and in electrical and electronic components in vehicles	
	VW 80302 2013-02	Automotive high-voltage contact - Test standard	Except: - PG 2 Material and surface analysis, contacts - PG 3 Material and surface analysis, housing and single wire seal (ELA) - PG 5 Mechanical and thermal relaxation behaviour - PG 6 Interaction between contact and housing - PG 16 Fretting corrosion - PG 19 B19.4 Industrial climate (multi-component climate) - PG 28 Locking noise - PG 29 Holding force of the blind plugs - PG 50 EMC test



#### Abbreviations used:

ASTM DIN	American Society for Testing and Materials German Institute for Standardization a. r.
DNVGL	Duideline Det Norske Veritas / Germanischer Lloyd
EN	European standard
GS	BMW Group Standard
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardization
ISTA	International Safe Transit Association
JDQ	John Deere Quality test
LV	Delivery specification of Audi AG
MAN	Machine factory Augsburg - Nürnberg (Standard)
MBN	Mercedes Benz Standard
MIL STD	Military standard of the US Army
RTCA	Radio technical commission for aeronautics
VDE	Association of Electrical Engineering, Electronics and Information Technology a. r.
VW	Regulation of Volkswagen AG