

Deutsche Akkreditierungsstelle GmbH

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV

Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition

Accreditation



The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory

PAConsult GmbH

Birkenau 3, 22087 Hamburg, Deutschland

with the locations

Birkenau 3, 22087 Hamburg, Deutschland

Ulmenau 6-10 und 18-20, 22087 Hamburg, Deutschland

Humboldtstraße 33, 22083 Hamburg, Deutschland

Kolpingstraße 14, 88416 Ochsenhausen, Deutschland

Quitzwowstraße 47, 10559 Berlin, Deutschland

Badische Bahnhofstraße 16, 8212 Neuhausen am Rheinfl, Schweiz

is competent under the terms of DIN EN ISO/IEC 17025:2018 to carry out tests in the following fields:

physical-technological tests, physical and physical-mechanical tests, climate-, shock-, impact- and vibrations-, IP-protection-, solar radiation and corrosion tests as well as in whose combination; environmental simulation tests at packages, construction units, enclosures, components and devices

The accreditation certificate shall only apply in connection with the notice of accreditation of 13.11.2020 with the accreditation number D-PL-11130-01. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 14 pages.

Registration number of the certificate: **D-PL-11130-01-02**

Berlin,
13.11.2020

Dipl.-Ing. (FH) Ralf Egner
Head of Division

Translation issued:
14.01.2021

Head of Division



The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.

<https://www.dakks.de/en/content/accredited-bodies-dakks>

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

See notes overleaf.

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-PL-11130-01-02 according to DIN EN ISO/IEC 17025:2018

Valid from: 13.11.2020

Date of issue: 14.01.2021

Holder of certificate:

PAConsult GmbH
Birkenau 3, 22087 Hamburg, Deutschland

with the locations

Birkenau 3, 22087 Hamburg, Deutschland
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Tests in the fields:

physical-technological tests, physical and physical-mechanical tests, climate-, shock-, impact- and vibrations-, IP-protection-, solar radiation and corrosion tests as well as in whose combination; environmental simulation tests at packages, construction units, enclosures, components and devices

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 listed testing methods are exemplary. The testing laboratory maintains a current list of all testing methods within the flexible scope of accreditation.

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

*The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.
<https://www.dakks.de/en/content/accredited-bodies-dakks>*

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The testing methods are marked with the following symbols for the sites at which they are performed:

BER = Berlin

CH = Schweiz

OCH = Ochsenhausen

HH1 = Hamburg - Birkenau

HH2 = Hamburg - Ulmenau

HH3 = Hamburg - Humboldtstr.

Packaging tests as well as type tests on construction units, enclosures, components and devices with flexible scope of accreditation by category I

Test	Measured variable / Test parameter	Exemplary test procedures	Facility
A Low frequency vibration tests with fixed amplitude	Frequency range	DIN EN ISO 2247 ASTM D 4169 ASTM D 999 ISTA 1A-1E	HH1 HH2 HH3 CH BER OCH
	Amplitude (peak to peak)		
B Vibration test Shock test	Force vector Displacement Amplitude Peak to Peak Frequency range Acceleration Frequency range	ASTM D 4169 ASTM D 7386 ASTM D 4728 DIN EN 60068-2-64 ISTA 2A-2C	HH1 HH2 HH3 CH BER OCH
		DIN EN 60068-2-1 DIN EN 60068-2-6 DIN EN 60068-2-27 DIN EN 60068-2-57 DIN EN 60068-2-64 DIN EN 61373 DNVGL-CG-0339 RTCA DO-160 MIL-STD-810	HH1 HH2 HH3 BER
		DIN EN 60068-2-1 DIN EN 60068-2-27 DIN EN 60068-2-64	CH

Test	Measured variable / Test parameter	Exemplary test procedures	Facility
C Constant acceleration test (centrifuge)	Acceleration	RTCA-DO 160 G ISO 2669	HH1
D Shock test Impact test Drop test	Free fall	ASTM D 4169 ASTM D 7386 ASTM D 5276 ASTM D 6055 ASTM D 7179 DIN EN 22876 DIN EN 22248 (ISO 2248) DIN EN 28768 DIN EN ISO 4180 ISTA 3 A,B,E F,H und K	HH1 HH2 HH3 CH OCH BER
		DIN EN 60068-2-32 MIL-STD-810 RTCA DO-160	HH1 HH2 HH3 CH BER
E Stacking test Compression test Constant Load test (Linear load increase)	Apply and hold test force Apply and release test force	ASTM D 4169 ASTM D 642 ASTM D 7386 ISTA 3 A,B,E F,H und K	HH2 HH3 CH OCH BER
		DIN EN ISO 12048 DIN 55440-1 DIN EN ISO 2234 DIN EN ISO 4180	HH2 HH3 CH BER OCH
F Climate test	Working area humidity (temperature range)	ISTA Series ASTM D 4332 ASTM F 1980 ASTM F 2825 DIN EN ISO 2233	HH1 HH2 HH3 CH BER OCH
	Working area humidity (humidity range)	DIN EN 60068-2-30 DIN EN 60068-2-78 DNVGL-CG-0339 RTCA-DO-160 MIL-STD-810	HH1 HH2 HH3 BER
		DIN EN 60068-2-30 DIN EN 60068-2-78	OCH

Test	Measured variable / Test parameter	Exemplary test procedures	Facility
G Temperature test	Temperature range	ASTM D 4332 ASTM F 1980 DIN EN ISO 2233 ISTA 7D	HH1 HH2 HH3 CH BER OCH
	Temperature changing rate	DIN EN 60068-2-30 DIN EN 60068-2-78 DNVGL-CG-0339 RTCA-DO-160 MIL STD 810	HH1 HH2 HH3 CH BER
H Corrosion test (Salt spray test)	Temperature range	DIN EN ISO 9227 DIN EN 60068-2-11 DIN EN 60068-2-52	HH1 HH2 HH3 CH BER
	Spray pressure		
	Salt Solution		
I Atmospheric pressure	Atmospheric pressure	ASTM D 4169 ASTM D 6653 ASTM D 7386 ISTA 4AB	HH1 HH2 HH3 BER CH OCH
		RTCA-DO 160	HH2
		ASTM F 1140	OCH HH3
		ASTM D 4991	HH3 OCH
		ASTM D 3078	OCH
J Fluids Susceptibility	Visual inspection	MIL-STD-810 RTCA DO-160	HH1 HH2 HH3
	Spray or Immersion test		
	Temperature range		
K Flammability test	Temperature range	GOST R IEC 60695-2-2 DIN EN 60695-11-5 GL Richtlinien 2012 Part VI-7-2	HH1 HH2
	Time		
	Inflammableness / Inflammability		
L Incline Impact Horizontal Impact	Velocity	ASTM D 4169 ASTM D 880 DIN EN ISO 2244 ISTA 3 A,B,E F,H und K	HH2 HH3 CH BER OCH

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Test	Measured variable / Test parameter	Exemplary test procedures	Facility
M Solar Radiation	Wave length	MIL-STD 810 G	HH2 HH3
	Radiation intensity		
	Air velocity		
	Temperature		
N Bubble Test (Leak Detection)	Air pressure	ASTM F 2096	CH OCH HH3
	Optical Leakage (bubble emission)		
O Tensile and Pressure test	Force / Distance	ASTM F 88 ASTM D 882 DIN EN 2746	HH3 BER OCH
		DIN EN 868-5 DIN EN ISO 527-3	OCH HH3
P Sand- and Dust Test	Temperature	RTCA DO-160G Section 12.0 MIL-STD-810H Method 510.7	BER
	Humidity		
	Air pressure		
	Mass flow		

The test methods listed are characteristics of the description of the test report packaging tests:

DIN 55440-1 2019-10	Packaging test - Determination of compression resistance - Part 1: Test with constant conveyance speed
DIN EN 22248 1993-02	Packaging - complete, filled transport packages; vertical impact test by dropping
DIN EN 868-5 2019-03	Packaging for terminally sterilized medical devices - Part 5: Sealable pouches and reels of porous materials and plastic film construction - Requirements and test methods
DIN EN 22876 1993-02	Packaging - complete, filled transport packages - rolling test
DIN EN ISO 2234 2002-12	Packaging - Complete, filled transport packages and unit loads - Stacking tests using a static load
DIN EN ISO 2247 2002-12	Packaging - Complete, filled transport packages and unit loads - Vibration tests at fixed low frequency

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DIN EN ISO 4180 2020-03	Packaging - Complete, filled transport packages - General rules for the compilation of performance test schedules
DIN EN 28768 1993-02	Packaging - complete, filled transport packages - toppling test
ASTM D 3078 2002 (Reapproved 2013)	Standard Test Method for Determination of Leaks in Flexible Packaging by Bubble Emission
ASTM D 4169 2016	Standard Practice for Performance Testing of shipping containers and systems
ASTM D 7386 2016	Standard Practice for Performance Testing of Packages for Single Parcel Delivery Systems
ASTM D 6055 1996 (Reapproved 2019)	Standard Test Methods for Mechanical Handling of Unitized Loads and Large Shipping Cases and Crates
ASTM D 6179 2007 (Reapproved 2014)	Standard Test Methods for Rough Handling of Unitized Loads and Large Shipping Cases and Crates
ASTM D 6653 / 6653 M 2013	Standard Test Methods for Determining the Effects of High Altitude on Packaging Systems by Vacuum Method
ASTM D 880 1992 (Reapproved 2015)	Standard Test Method for Impact Testing for Shipping Containers and Systems
ASTM D 4332 2014	Standard Practice for Conditioning Containers, Packages, or Packaging Components for Testing
ASTM D 4991 2007 (Reapproved 2015)	Standard Test Method for Leakage Testing of Empty Rigid Containers by Vacuum Method
ASTM D 5276 2019	Standard Test Method for Drop Test of Loaded Containers by Free Fall
ASTM D 642 2015	Standard Test Method for Determining Compressive Resistance of Shipping Containers, Components, and Unit Loads
ASTM D 4728 2017	Standard Test Method for Random Vibration Testing of Shipping Containers
ASTM D 999 2008 (Reapproved 2015)	Standard Test Methods for Vibration Testing of Shipping Containers

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ASTM F 1980 2016	Standard Guide for Accelerated Aging of Sterile Barrier Systems for Medical Devices
ASTM F 2096 2011 (Reapproved 2019)	Standard Test Method for Detecting Gross Leaks in Packaging by Internal Pressurization (Bubble Test)
ASTM F 2825 2018	Standard Practice for Climatic Stressing of Packaging Systems for Single parcel Delivery
DIN EN ISO 12048 2001-04	Packaging - Complete, filled transport packages - Compression and stacking tests using a compression tester
DIN EN ISO 2233 2001-11	Packaging - Complete, filled transport packages and unit loads - Conditioning for testing
DIN EN ISO 2244 2002-12	Packaging - Complete, filled transport packages and unit loads - Horizontal impact tests
DIN EN 60721-3-2 2018-12	Classification of environmental conditions - Part 3-2: Classification of groups of environmental parameters and their severities - Transportation and Handling
ISTA 1A 2014	Packaged-Products 150 lb (68 kg) or Less
ISTA 1B 2014	Packaged-Products Over 150 lb (68 kg)
ISTA 1C 2014	Extended Testing for Packaged-Products 150 kg (68 kg) or Less
ISTA 1D 2014	Extended Testing for Packaged-Products over 150 kg (68 kg)
ISTA 1E 2014	Unitized Loads of Same Product
ISTA 1G 2014	Packaged-Products 150 lb (68 kg) or Less (Random Vibration)
ISTA 1H 2014	Packaged-Products Over 150 lb (68 kg) (Random Vibration)
ISTA 2A 2011	Packaged-Products 150 lb (68 kg) or Less

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ISTA 2B 2011	Packaged-Products Over 150 lb (68 kg)
ISTA 2C 2011	Furniture Packages
ISTA 3A 2018	Packaged-Products for Parcel Delivery System Shipment 70 kg (150 lb) or Less
ISTA 3B 2017	Packaged-Products for Less Than Truckload (LTL) Shipment
ISTA 3E 2017	Similar Packaged-Products in Unitized Loads for Truckload Shipment
ISTA 3F 2017	Packaged-Products in Mixed Pallet Loads for Regional Shipment 100 lb (45 kg) or Less
ISTA 3H 2011	Products or Packaged-Products in Mechanically Handled Bulk Transport Containers
ISTA 3K 2011	Fast Moving Consumer Goods in the European Retail Supply Chain
ISTA 4AB 2009	Packaged Products for Shipment in Known Distribution Channels
ISTA 7D 2007	Temperature Test for Transport Packaging

The test methods listed are characteristic of the description of the test report model tests on components, housings, components and devices:

DIN EN ISO 527-3 2019-02	Plastics - Determination of tensile properties - Part 3: Test conditions for films and sheets
DIN EN 1789 2014-12	Medical vehicles and their equipment - Road ambulances (Para. 6.4.1 and 6.4.2)
DIN EN 2746 1998-10	Aerospace series - Glass fibre reinforced plastics - Flexural test, three point bend method

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DIN EN 50155 2008-03	Railway applications - Rolling stock - Electronic equipment Section 10.2.1 Visual test Section 10.2.3 Cold test Section 10.2.4 Test with dry heat Section 10.2.5 Test with humid heat, circular Section 10.2.9 Insulation test Section 10.2.11 Vibration-, Shock- and Impact test Section 10.2.14 Test of the storage at low temperature
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
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 60068-2-32 1995-03	Basic environmental testing procedures - Part 2: Tests; test Ed: Free fall
DIN EN 60068-2-38 2010-06	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test
DIN EN 60068-2-52 2018-08	Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium chloride solution)
DIN EN 60068-2-55 2014-10	Environmental testing - Part 2-55: Tests - Test Ee and guidance - Loose cargo testing including bounce

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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
DIN EN 60068-2-68 1997-02	Environmental testing - Part 2: Tests - Test L: Dust and sand
DIN EN 60068-2-78 2014-02	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state
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 60512-11-1 1999-08	Electromechanical components for electronic equipment - Basic testing procedures and measuring methods - Part 11: Climatic tests - Section 1: Test 11a: Climatic sequence
DIN EN 60945 2003-07 + Corrigendum 1 2010-01	Maritime navigation and radio communication equipment and systems - General requirements - Methods of testing and required test results (here: Para. 8.2 to 8.7)
DIN EN 61373 2011-04 + Corrigendum 1 2018-01	Railway applications - Rolling stock equipment - Shock and vibration tests
DIN ISO 9022-3 2015-08	Optics and photonics - Environmental test methods - Part 3: Mechanical stress

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DIN EN ISO 9227 2015-09	Corrosion tests in artificial atmospheres - Salt spray tests
DNVGL-CG-0339 2019-12	Environmental test specification forelectrical, electronic and programmableequipment and systems
MIL-STD 810 C 1981-04	Assessment of Foreign Aircraft to vibrations when shooting with onboard weapons - Test specification number 519.2 Vibration
MIL-STD 810 E 1989-07	Test methods for determining the effects of natural and induced environments on equipment used in military applications Section 501.4: High temperature Section 502.4: Low temperature Section 507.4: Humidity Section 514.4: Vibration I Section 514.5: Vibration II Section 516.5: Shock
MIL-STD 810 F 2008-10	Department of defence test method standard for environmental engineering consideration and laboratory tests Section 501.4: High temperature Section 502.4: Low temperature Section 507.4: Humidity Section 514.4: Vibration I Section 514.5: Vibration II Section 516.5: Shock
MIL-STD 810 G 2000-01	Environmental engineering considerations and laboratory tests Section 500.5: Low Pressure Section 501.5: High Temperature Section 502.5: Low Temperature Section 505.5: Solar Radiation Section 507.5: Humidity Section 514.5: Vibration II Section 514.6: Vibration Section 516.6: Shock

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MIL-STD 810 H 2019-01	Environmental engineering considerations and laboratory tests Section 500.6: Low Pressure Section 501.7: High Temperature Section 502.7: Low Temperature Section 505.7: Solar Radiation Section 507.6: Humidity Section 514.7: Sand and Dust Section 514.8: Vibration Section 516.8: Shock
RTCA / DO 160 D 2004-06 RTCA / DO 160 E 2004-09 RTCA / DO 160 F 2007-06	Environmental condition and test procedures for airborne equipment Section 5.0: Temperature Variation Section 6.0: Humidity Section 7.0: Operational shock and crash safety Section 8.0: Vibration
RTCA / DO 160 G 2010-12	Section 4.0: Temperature and Altitude Section 5.0: Temperature Variation Section 6.0: Humidity Section 7.0: Operational Shocks and Crash Safety Section 8.0: Vibration Section 10.0: Waterproofness Section 11.0: Fluids Susceptibility Section 12: Sand and Dust Section 14.0: Salt Spray
ISO 2669 1995-04	Environmental tests for aircraft equipment - Steady-state acceleration
DIN EN 60695-2-2 1996-07	Fire hazard testing - Part 2: Test methods - Section 2: Needle-flame test
DIN EN 60695-11-5 2005-11	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance
GL Guidelines 2012 Part VI-7-2	Classification and Construction - VI: Additional Rules and Guidelines - 7: Guidelines for the Performance of Type Tests - Item 11: Flammability

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Physical and physical-mechanical tests

ASTM D 882 2012	Standard Test Method for Tensile Properties of Thin Plastic Sheeting
ASTM F 88/F 88M 2015	Standard Test Method for Seal Strength of Flexible Barrier Materials
ASTM F 2096 2011 (Reapproved 2019)	Standard Test Method for Detecting Gross Leaks in Packaging by Internal Pressurization (Bubble Test)
ASTM F 1140/F 1140M 2013	Standard Test Methods for Internal Pressurization Failure Resistance of Unrestrained Packages
ASTM F 1886/F 1886M 2016	Standard Test Method for Determining Integrity of Seals for Flexible Packaging by Visual Inspection

Test methods with flexibility by Category III

ASTM F 3039 2015	Standard Test Method for Detecting Leaks in Nonporous Packaging or Flexible Barrier Materials by Dye Penetration
ISO 5636-5 2013-11	Paper and board - Determination of air permeance (medium range) - Part 5: Gurley Method

IP-Protection class test with flexible scope of accreditation by category I

Test	Measured variable / Test parameter	Exemplary test procedures	Facility
Waterproofness tests	Water flow rate Pressure	RTCA DO 160E DIN EN 60529 DIN 40050-9	HH1 CH
	Water flow rate (high pressure) max. pressure		HH1
	Submersion depth		HH1 CH
	Water temperature range		HH1

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IP-protection with flexibility by category III

DIN 40050-9 1993-05	Road vehicles - Degrees of protection (IP-code) - Protection against foreign objects - Water and contact - Electrical equipment
DIN EN 60068-2-68 1997-02	Environmental testing - Part 2: Tests - Test L: Dust and sand
DIN EN 60529 2014-09	Degrees of protection provided by enclosures (IP Code)

Abbreviations used:

ASTM	American Society for Testing and Materials
DNVGL	Det Norske Veritas Germanischer Lloyd
GL	Germanischer Lloyd SE
IEC	International Electrotechnical Commission
ISTA	International Safe Transit Association
MIL-STD	Department of defence test method standard for environmental engineering consideration and laboratory tests
RTCA	Environmental condition and test procedures for airborne equipment