

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-PL-11282-01-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 13.06.2018 to 02.11.2021 Date of issue: 15.11.2018

Holder of certificate:

**Institut für Galvano- und Oberflächentechnik Solingen GmbH & Co. KG (IGOS)
Grünwalder Straße 29-31, 42657 Solingen**

Tests in the fields:

mechanical-technological material testing and environmental simulation tests by hardness testing, climatic tests, layer thickness measurement, surface finish, gravimetric procedure, photometric and electrochemical procedure of polymeric and metallic coating materials

Abbreviations used: see last page

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

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 methods within the flexible scope of accreditation.

1 Material tests

1.1 Corrosion tests/Changing climate tests *

AS 2345 2006	Dezincification resistance of copper alloys
ASTM B 117 2016-14	Standard Practice for Operating Salt Spray (Fog) - Salzsprühnebelprüfung
ASTM B 368 2009-04	Standard Test Method for Copper-Accelerated Acetic Acid-Salt Spray (Fog) Testing (CASS Test)
ASTM G 85 2011-08	Standard Practice for Modified Salt Spray (Fog) (hier: <i>Annex 1: Acetic Acid-Salt Spray (Fog) Testing</i> <i>Annex 3: Acidified Synthetic Sea Water (Fog) Testing (SWAAT)</i>)
BMW AA-0129 2010-04	Cass-Test (Copper Accelerated Acetic Acid Salt Spray test)
BMW AA-0213 2015-04	Condensed water constant climate test
BMW AA-0224 2015-06	Cyclic corrosion test
BMW AA-0324 2010-05	Salt spray test
BMW PR 209 2008-09	TP Function validation sill finisher (here: <i>chapter 3.5.1: Humidity Storage</i> <i>chapter 3.5.2: Alternating climate test</i> <i>chapter 3.5.4: Salt spray test</i>)
BMW PR 303.4 1998-12	Climate change testing for equipment parts
BMW PR 308.1 2000-01	Climate test for bonded joints on trim parts - Chapter 3: For climate test
BMW QV 64005 2009-05	Corrosion resistance for refrigerant pipes (here: <i>chapter 4.9: Corrosion resistance, without chapter 4.9.1.3 Leak tests</i>)

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Bosch N42AP 102 1991-08	Climate tests - Salt spray fog test
Bosch N42AP 226 2010-09	Climate tests - Tightened lifetime - Corrosion test
Daimler Chrysler PA PP PWT 3001 2013-07	Alternating climate test
DIN 50014 1985-07	Climates and their technical application; standard atmospheres <i>(withdrawn standard)</i>
DIN 50018 2013-05	Testing in a saturated atmosphere in the presence of sulfur dioxide
DIN 50958 2012-12	Electroplated coatings - Modified corrodokote corrosion test (mod. CORR-Test)
DIN 8237 1982-10	Gold alloy coverings on watch cases - requirements, testing and marking
DIN EN 248 2003-01 Corrigenda 1 2017-05	Sanitary tapware - General specification for electrodeposited coatings of Ni-Cr
DIN EN 13523-27 2017-06	Coil coated metals - Test methods - Part 27: Resistance to humid poultice (Cataplasm test)
DIN EN 60068-2-11 2000-02	Environmental testing - Part 2: Tests - test Ka: Salt mist
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 temperature/humidity cyclic test <i>(here: without chapter 6.5)</i>
DIN EN 60068-2-52 1996-10	Environmental testing - Part 2: Tests, Test Kb: Salt mist, cyclic (sodium chloride solution)
DIN EN ISO 4541 1995-01	Metallic and other non-organic coatings - Corrodokote corrosion test (CORR test)

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DIN EN ISO 4628-1 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 1: General introduction and designation system
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 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 3: Assessment of degree of rusting
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 4628-10 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 10: Assessment of degree of filiform corrosion
DIN EN ISO 6270-2 2005-09 + Corrigenda 1 2007-10	Paints and varnishes - Determination of resistance to humidity - Part 2: Procedure for exposing test specimens in condensation-water atmospheres <i>(withdrawn standard)</i>
DIN EN ISO 6509-1 2014-09	Corrosion of metals and alloys - Determination of dezincification resistance of copper alloys with zinc - Part 1: Test method
DIN EN ISO 6988 1997-07	Metallic and other non-organic coatings - Sulfur dioxide test with general condensation of moisture
DIN EN ISO 9227 2017-07	Corrosion tests in artificial atmospheres - Salt spray tests
DIN EN ISO 10289 2001-04	Methods for corrosion testing of metallic and other inorganic coatings on metallic substrates - Rating of test specimens and manufactured articles subjected to corrosion tests

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DIN EN ISO 11997-1 Cycle- A-D 2006-04	Paints and varnishes - Determination of resistance to cyclic corrosion conditions - Part 1: Wet (salt fog)/dry/humidity <i>(withdrawn standard)</i>
DIN EN ISO 12944-6 1998-07	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 6: Laboratory performance test <i>(here: without tests ISO 4624: Paints and varnishes - Pull-off test for adhesion)</i>
DIN EN ISO 16701 2015-10	Corrosion of metals and alloys - Corrosion in artificial atmosphere - Accelerated corrosion test involving exposure under controlled conditions of humidity cycling and intermittent spraying of a salt solution
Fiat MS 50493-04 2011-01	Determination of the resistance organic coatings to the Propagation of Bubble under Skincorrosion (Scab In Door)
Ford CEPT 00.00-L-467 2009-03	Global Laboratory Accelerated Cyclic Corrosion Test
GMW 14872 2013-03	Cyclic Corrosion Laboratory Test
MBN 10494-6 2016-03	Testing of paints - Part 6: Climatic test <i>(here: without chapter 5.7 outdoor-exposure of coatings - testing of corrosion behavior without chapter 5.8 weather resistance without chapter 5.9 Simulated Weathering)</i>
Nissan NES M 0158 CCT-I/II CCT.IV 2009	Methods of Compound Corrosion Tests
Porsche PPV 4017 2011-08	Corrosion test - Modified Climate Change <i>(withdrawn document)</i>
Renault D17 2028-C 2007-10	Corrosion Test by Automatic Change of phases of salt spray, drying and humidity
SAE J 2334 2016-04	Laboratory Cyclic Corrosion Test

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SCANIA STD 4319 2012-09	Accelerated corrosion test - Atmospheric corrosion
SCANIA STD 4445 2014-12	Evaluation of corrosion on surface treated edges
VDA 233-102 2013-06	Cyclic corrosion testing of materials and components in automotive construction
VDA 621-415 1982-02	Paint tests - testing the corrosion protection of automobile paints with cyclically alternating stress <i>(withdrawn document)</i>
VOLVO STD 1027,14 2005-07	Accelerated corrosion test, Atmospheric Corrosion
VOLVO STD 1027,1375 2010-09	Corrosion resistance
VOLVO STD 423-0014 2015-01	Accelerated corrosion test - Atmospheric corrosion
Volvo VCS 1027,149 2002-06	Accelerated corrosion test
Volvo VCS 1027,1449 2014-02	Accelerated corrosion test Version II - ACT II
VOLVO VCS 1027,33719 2005-09	Climate ageing (Crack formation) Paints and enamels
VW PV 1073 2014-05	Chrome-plated plastic parts - corrosion resistance of chrome surfaces
VW PV 1200 2004-10	Vehicle Parts - Testing of Resistance to Environmental Cycle Test (+80/-40) °C
VW PV 1209 2016-02	Condensers, water and charge air coolers made of Aluminium alloys corrosion test (climate corrosion test)
VW PV 1210 2016-02	Automobile body and attachments - Corrosion test

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VW PV 2005 2000-09	Vehicle Parts - Testing of Resistance to Environmental Cycle Test
VW TL 182 2007-02	Inorganic protection layer on aluminium parts - surface protection requirement acid-heat-alkaline-resistance
VW 96380 2015-07	Corrosion test - Modified Climate Change (here: <i>without chapter 6.4</i>)

1.2 Media resistance *

BMW AA 0055 2010-06	Chemical resistance test of surfaces (here: <i>Test method 1: stability of fuel, Test method 7: Resistance of anodized surfaces</i>)
GM Appendix F10 2006-11	Materials Engineering Requirements - Anodized Version - chapter 1.2.2 - Alkaline resistance pH 12,5 and pH 13,5 (here: <i>without clause f and g</i>)
DBL 9201 2009-06	Aluminium parts with anodic oxidation coatings - Alkali resistance (here: <i>chapter 3.3.1.1 Salt spray testing chapter 3.3.1.2 alternating condensation atmosphere chapter 3.3.1.3 alkali resistance chapter 3.3.1.4 colorability chapter 3.3.1.5 temperature resistance</i>)
DIN EN ISO 2143 2010-12	Anodizing of aluminium and its alloys - Estimation of loss of absorptive power of anodic oxidation coatings after sealing - Dye- spot test with prior acid treatment (<i>withdrawn document</i>)
VDA 621-412 1985-03	Paint testing - chemical resistance of automobile paints (<i>withdrawn document</i>)
VW PV 1067 2007-05	Chrome-plated surfaces - resistance against de-icing salt containing calcium chloride
VW TL 182 2007-02	Inorganic protective coating on aluminium parts - surface protection requirement

VW TL 212 Anodized Coatings on Aluminium Parts - Alkali resistance -
2006-12 (here: *without chapter 3.8 weathering properties*)

1.3 Adhesive strength tests *

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

DIN EN ISO 2819 Metallic coatings on metallic substrates - Electrodeposited and
1995-01 chemically deposited coatings - Review of methods available for
testing adhesion
(here: *without chapter 2.1 press blazing testing,
without chapter 2.2 ball burnishing testing,
without chapter 2.3 scalp testing,
without chapter 2.13 cupping test*)

1.4 Surface roughness measurements **

DIN EN ISO 3274 Geometrical Product Specifications (GPS) - Surface texture: Profile
1998-04 method - Nominal characteristics of contact (stylus) instruments

DIN EN ISO 4287 Geometrical Product Specifications (GPS) - Surface texture: Profile
2010-07 method - Terms, definitions and surface texture parameters

DIN EN ISO 4288 Geometrical Product Specifications (GPS) - Surface texture: Profile
1998-04 method - Rules and procedures for the assessment of surface
texture

DIN EN ISO 16610-21 Geometrical product specifications (GPS) - Filtration - Part 21:
2013-06 Linear profile filters: Gaussian filters

DIN EN ISO 25178-2 Geometrical product specifications (GPS) - Surface texture: Areal -
2012-09 Part 2: Terms, definitions and surface texture parameters

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1.5 Mechanic-technological tests **

ASTM E384 2016	Microindentation Hardness of Materials
DIN 50125 2016-12	Testing of metallic materials - Tensile test pieces
DIN 50190-3 1979-03	Hardness depth of heat-treated parts - determination of the effective depth of hardening after nitriding
DIN 50969-2 2013-04	Prevention of hydrogen-induced brittle fracture of high-strength steel building elements - Part 2: Test methods
DIN EN 10328 2005-04	Iron and steel - Determination of the conventional depth of hardening after surface heating
DIN EN ISO 1519 2011-04	Paints and varnishes - Bend test (cylindrical mandrel)
DIN EN ISO 2639 2003-04	Steels - Determination and verification of the depth of carburized and hardened cases
DIN EN ISO 4516 2002-10	Metallic and other inorganic coatings - Vickers and Knoop microhardness tests (here: <i>Vickers microhardness tests</i>)
DIN EN ISO 6507-1 2006-03	Metallic materials - Vickers hardness test - Part 1: Test method
DIN EN ISO 6892-1 2017-02	Metallic materials - Tensile testing - Part 1: Method of test at room temperature

1.6 Measurements of coating thickness *

DIN EN ISO 1463 2004-08	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method
DIN EN ISO 2178 2016-11	Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method
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

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DIN EN ISO 3497
2001-12 Metallic coatings - Measurement of coating thickness - X-ray spectrometric methods

1.7 Abrasion tests, wear tests (Taber-Abraser) *

ASTM D 4060
2014 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

DIN 53754
1977-06 Testing of plastics - determination of abrasion, abrasive disk method

DIN EN ISO 7784-2
2016-12 Paints and varnishes - Determination of resistance to abrasion - Part 2: Method with abrasive rubber wheels and rotating test specimen

ISO 9352
2012-04 Plastics - Determination of resistance to wear by abrasive wheels

2 Physical-chemical tests

2.1 Determination of surface density by gravimetry **

DIN EN ISO 1460
1995-01 Metallic coatings - Hot dip galvanized coatings on ferrous materials - Gravimetric determination of the mass per unit area

DIN EN 12373-2
1999-02 Aluminium and aluminium alloys - Anodizing - Part 2: Determination of mass per unit area (surface density) of anodic oxidation coatings - Gravimetric method
(withdrawn standard)

DIN EN ISO 2106
2011-06 Anodizing of aluminium and its alloys - Determination of mass per unit area (surface density) of anodic oxidation coatings - Gravimetric method

DIN EN ISO 3210
2010-12 Anodizing of aluminium and its alloys - Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in phosphoric acid/chromic acid solution
(withdrawn document)

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DIN EN ISO 3892
2001-12 Conversion coatings on metallic materials - Determination of coating mass per unit area - Gravimetric methods
(here: *chapter 4.2 bonderizing on zinc and cadmium*)

DIN EN ISO 9717
2013-07 Metallic and other inorganic coatings - Phosphate conversion coating of metals
(*withdrawn document*)

2.2 Photometrical test **

DIN EN ISO 3613
2011-04 Metallic and other inorganic coatings - Chromate conversion coatings on zinc, cadmium, aluminium-zinc alloys and zinc-aluminium alloys - Test methods
(here: *chapter: 5.5.2 Testing for hexavalent chromium in transparent and colored chromate coatings*)

2.3 Electrochemical test methods **

ASTM B 456-11
2017 Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
(here: *6.2 Process and Coating Requirements*
6.7 Coating Thickness
6.8 Corrosion Testing
6.9 STEP Test Requirements
6.11 Density and Measurement of the Discontinuities in Chromium (Dubpernell Test))

ASTM B 504
2007 Standard Test Method for Measurement of Thickness of Metallic Coatings by the Coulometric Method

ASTM B 764
2014 Standard Test Method for Simultaneous Thickness and Electrode Potential Determination of Individual Layers in Multilayer Nickel Deposit (STEP Test)

DIN 50022
2007-11 Metallic and other inorganic coatings - Simultaneous thickness and electrode potential determination of individual layers in multilayer nickel deposits (STEP Test)
(*withdrawn document*)

DIN 53100
2007-06 Metallic coatings - Electroplated coatings of nickel plus chromium and of copper plus nickel plus chromium on plastics materials

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DIN EN ISO 1456 2009-12	Metallic and other inorganic coatings - Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium (here: <i>Annex A - Determination of cracks and pores in chrome coatings</i> <i>Annex B - Test methods for layer thickness determination</i> <i>Annex B.2 - Destructive testing</i> <i>Annex B.3.3 - X-ray spectrometry method</i> <i>Annex E - STEP-Test</i>)
DIN EN ISO 2177 2004-08	Metallic coatings - Measurement of coating thickness - Coulometric method by anodic dissolution
VW PV 1058 2010-03	Chrome-Plated Surfaces - Determination of the Microcracked Chrome Deposit
VW PV 1063 2013-04	Chrome-Plated Surfaces - Determination of the micropore thickness

Type of testing	Measurand/ Test parameters	Measurement and testing resources	Characteristic testing methods
Climate tests	Temperature	-70°C to +180°C	DIN EN 60068-2-38
Microscopic layer thickness measurement	Length measurement	5 µm to 1000 µm	DIN EN ISO 1463
Coating thickness measurement - X-ray-Procedure	Thicknesses	Depending on the material in accordance DIN EN ISO 3497	DIN EN ISO 3497

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abbreviations used:

AS	Australian Standard
ASTM	American Society for Testing and Materials
BMW	General Motors Worldwide
Bosch	Standard of Bosch
DIN	German Institute for Standard
EN	European Standard
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
BMW AA	Work instruction of Bayrische Motoren Werke
BMW PR	Test procedure of Bayrische Motoren Werke
DBL	Delivery condition of Daimler Benz
FIAT MS	FIAT Material Standard
GM	General Motors
MBN	Standard of Mercedes Benz
Nissan	Standard of Nissan
Porsche	Standard of Porsche
Renault	Standard of Renault
SAE	Society of Automotive Engineers
SCANIA	Standard of Scania
VDA	German Association of the Automotive Industry
VOLVO STD	Volvo Group Standard
VOLVO VCS	Volvo Group Volvo Car Standard
VM PV	Test procedure of Volkswagen
VW TL	Delivery condition of Volkswagen