



IFO SERVICES

Laboratory Services



IFO

Institut für
Oberflächentechnik
GmbH

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Take advantage of our cumulative knowledge

In our laboratories in Germany, the Netherlands, Middle East and China, all industries can access qualified staff, modern facilities, and equipment for surface engineering issues and testing.

Our in-depth understanding of production facilities and process engineering is an important pillar of our work.

This background knowledge fuels our practical expertise and customer interactions. Accredited testing methods guarantee objective results.



Deutsche
Akkreditierungsstelle
D-PL-11086-01-00



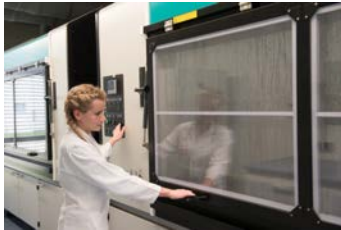
Deutsche
Akkreditierungsstelle
D-ZE-11086-01-00



PROD. NO:

SERVICE DESCRIPTION:

420046 (ISO 9227 NSS)
420044 (ISO 9227 AASS)
420047 (ISO 9227 CASS)



Corrosion Tests in artificial atmospheres - Salt spray test acc. to DIN EN ISO 9227 / ASTM B117

With salt spray testing, the corrosion behavior of metallic or non-metallic layers can be determined in an accelerated manner. Either neutral (NSS) or acidic (AASS, containing acetic acid) corrosion-promoting atmospheres are created in a chamber with sprayed 5% sodium chloride solution. The corrosiveness of the spray medium can be enhanced even further by adding copper chloride (CASS) to the salt spray.

420096 (ISO 6270-1)
420048 (ISO 6270-2)



Condensation water climate test according to DIN EN ISO 6270-1 / DIN EN ISO 6270-2

With condensation climate testing, a test specimen is continuously exposed to either one-sided (ISO 6270-1) or all-encompassing (ISO 6270-2 CH) water condensation load. In addition, depending on the requirements, cycles with alternating exposure (ISO 6270-2 AHT / AT) can be realized.

420042 (AHT 0,2 S)
420043 (AHT 1,0 S / 2,0 S)



Alternating condensation climate test containing sulphur dioxide (Kesternich) according to DIN EN ISO 22479 / DIN EN ISO 6988 / DIN 50018

By adding sulphur dioxide to the alternating condensation climate test, an industrial atmosphere or acid rain can be simulated. This produces sulphurous acid on the sample surface and triggers corrosion reactions.

420049



Filiform corrosion testing according to DIN EN ISO 4623-1 / DIN EN ISO 4623-2 / DIN EN 3665 / QUALICOAT

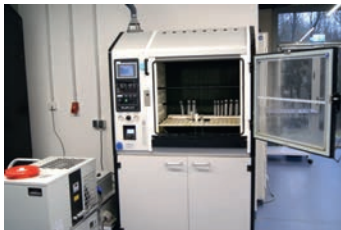
This test evaluates the protective effect of coatings on metal substrates against filiform corrosion. For this purpose, the coating of a test specimen is scribed to the substrate. Corrosion is initiated by applying chlorides. After storage in a climate chamber with constant conditions, the resulting filamentous corrosion is evaluated.

PROD. NO:

SERVICE DESCRIPTION:

420051 (CCT)

Cyclic Corrosion Test (CCT)

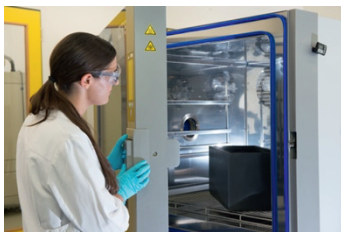


Cyclic corrosion testing (CCT) was developed to reconstruct corrosion damage close to occurrences in the field under accelerated laboratory conditions and is mainly used in the automotive industry. The test covers various temperature and humidity conditions in combination with corrosive atmospheres (salt spray).

Commonly, it is tested according to VDA 621-415 or DIN EN ISO 11997-1 - Cycle B, DIN EN ISO 60068-2-52, VW PV 1209 and VW PV 1210.

420109 (ACT)

Alternating Climate Test (ACT)



The test includes a repeating (cyclic) different temperature and humidity values in order to simulate environmental conditions close to reality. The sample is tested for visual changes (colour and gloss change), damage (formation of blisters and cracks) or deformation resistance.

Examples for test standards are VW PV 1200, VW PV 2005-A, PTL 8140, BMW PR 303.5 and DBL 5416.

420110

Accelerated weathering test (artificial weathering with xenon arc lamps) according to DIN EN ISO 16474-2 and DIN EN ISO 4892-2



The accelerated weathering tests are among the artificial forms of weathering. The destruction of the surface of plastics or coatings by filtered xenon arc irradiation together with cyclic deionized water spray is tested. This method, also known as "Sun Test", is used to determine weathering resistance of coating materials for exterior and (with the corresponding filters) interior usage.

It is tested according to e.g. VW PV 3929, VW PV 3930, SAE J2527, BMW AA-0235, ISO 2135, ISO 105-B02 and ISO 105-B06.

420098

Accelerated weathering test (artificial weathering with UV fluorescent lamps) according to DIN EN ISO 16474-3, DIN EN ISO 4892-3, GSB AL 631-7 and GSB ST 663-7



In contrast to accelerated weathering with xenon arc lamps, UV fluorescent lamps (UVA-340, UVB-313) are used as a light source. These lead to an even greater acceleration of decomposition processes of organic compounds. A heated water reservoir simulates formation of dew by condensation of water on the sample surface. After exposure to UV light and water condensate in cyclic alternation, the colour and gloss stability of organic and metallic surfaces as well as textiles are tested.

PROD. NO:

SERVICE DESCRIPTION:

430001

Mass loss test according to DIN EN ISO 3210 / ASTM B680 / ASTM B137



The mass loss test is used to determine the quality of anodisation layers, which is significantly influenced by the sealing of its pores. The test specimen is immersed in acid solution for a defined time and the resulting mass loss in relation to the sample surface is determined.

430110 – 430112

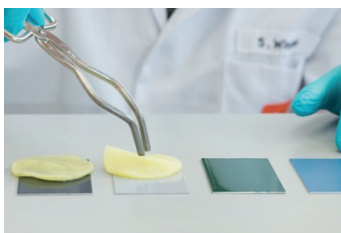
Technical cleanliness analysis according to VDA Volume 19 Part 1



The technical cleanliness analysis is usually carried out on components for the automotive industry and serves to check the cleaning performance within the production process. The test specimens are first cleaned with appropriate cleaning agents to extract and transfer particles and fibers from the component to the cleaning medium. This is followed by filtration of the rinsing solution and an analysis of the contaminants on the filter, which can be carried out both gravimetrically and by particle counting.

**430002 (Chemical)
430011 (SWA)
430020 (Alkali)**

Resistance tests according to DIN EN ISO 2812

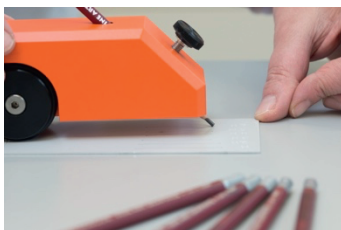


In these tests, coatings are tested for their resistance to chemicals, operating fluids and detergents – with or without additional temperature stress, depending on the requirements. Special tests are alkali and acid-heat-alkali (SWA) resistance tests.

Typical test media are defined e.g. by the VW 50002 factory standard.

430030

Pencil hardness according to DIN EN ISO 15184 / ASTM D3363



This test method covers a procedure for rapid determination of hardness of an organic coating on a substrate using pencil leads of known hardness. The hardness of the pencil leads is gradually increased until the coating surface shows visible damage.

PROD. NO:

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430031

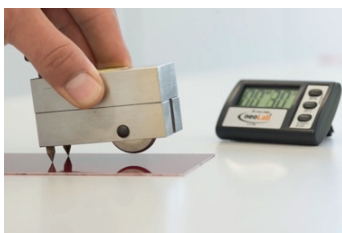
Mandrel bending test according to DIN EN ISO 1519 (cylindrical mandrel) and DIN EN ISO 6860 (conical mandrel)



The mandrel bending test is used to determine the ductility and adhesion strength of paints, varnishes, or similar products on metallic substrates. The sample is bent around a cylindrical (DIN EN ISO 1519) or conical (DIN EN ISO 6860) mandrel and then examined for cracking or detachment. The cylindrical mandrel bending test can be carried out according to specifications with different bending radii. In conical mandrel bending test, the bending radius decreases along the longitudinal axis of the sample.

430047

Indentation test (Buchholz hardness) according to DIN EN ISO 2815



The film hardness of a single-layer or multi-layer coating structure can be determined by the Buchholz indentation test. Here, an indenter is placed shock-free on the horizontally aligned surface of the organic coating to be tested and lifted off after a load period of 30 seconds. The length of the lenticular impression in the coating is measured and the indentation resistance according to Buchholz is calculated.

430032

Colour measurement according to DIN EN ISO/CIE 11664-4



In the CIELAB colour space, each perceptible colour is defined in a three-dimensional coordinate system. For the measurement, both the illumination (light type and angle) and the measurement geometry are decisive. With the 45°/0° geometry, a circular directional illumination at a 45° angle and a view perpendicular to the same plane (0°) is realised. This takes the influence of the surface structure into account. In the case of the d/8° geometry, the surface is measured at an 8° angle to the vertical under diffuse illumination. By standard, samples are illuminated with D65 daylight beneath 10° normal observers.

430003

Pressure water-jetting test according to DIN EN ISO 16925



The Pressure water-jetting test is a type of adhesion test for coatings. For this purpose, the sample are scribed and then exposed to a high-pressure water jet with defined parameters. Either the maximum detachment of the coating from the scribe (VW TL 52451) or a characteristic value of the damage, determined with comparative images (DIN EN ISO 16925) are presented.

Typical test parameters are defined in the standards VW PV 1503, MBN 10494-5, BMW AA-0136 and TSA 900046.

PROD. NO:

SERVICE DESCRIPTION:

430033

Gloss measurement according to DIN EN ISO 2813



With a reflectometer, the gloss of a coating can be measured with standardised measuring geometries. The gloss is determined by the reflected portion of a light beam through the surface of the sample at 20, 60 and 85° measuring angles and given in gloss units.

430035

Adhesive strength test according to DIN EN ISO 2409 (cross cut) and DIN EN ISO 16276-2 (X shaped incision)



In the cross cut test (layer thicknesses $\leq 250 \mu\text{m}$), a single- or multi-bladed knife is used to cut through the coating down to the substrate at specified spacings and the paint adhesion is evaluated over the proportion of the detached surface inside the incision grid.

For layer thicknesses above $250 \mu\text{m}$, an incision similar to a St. Andrew's cross with an opening angle between 30° and 45° is cut down to the substrate with a single-bladed knife and the damage from the intersection is evaluated on the basis of comparative images from the standard.

430039

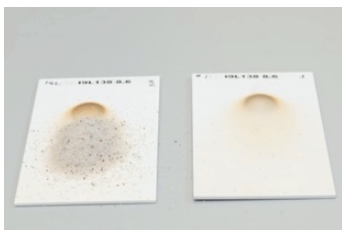
Impact test according to DIN EN ISO 6272-1 / DIN EN ISO 6272-2 / ASTM D2794



With the impact test, the physical resistance and ductility of a coating can be tested in the event of sudden deformation. A standardised body is dropped onto the sample from a variable height in order to examine the deformed area for cracking or layer detachment after the impact.

430042

Falling sand abrasion test according to ASTM D968



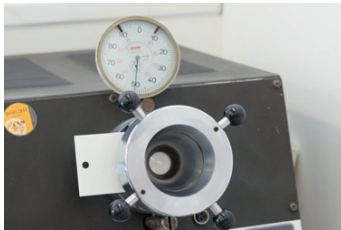
The falling sand abrasion test is used to determine the resistance of organic coatings to abrasion. Abrasives (standardised sand grains) fall from a defined height onto a coated sample plate at a specified angle and gradually erode the surface.

PROD. NO:

SERVICE DESCRIPTION:

430045

Cupping test according to DIN EN ISO 1520



The cupping test is used to test the resistance of a coating to cracking or detachment from a metallic substrate that is gradually deformed by deepening. A hemispherical die is pressed against the test plate until a crack forms, the coating detaches from the metallic substrate, or the required cupping depth has been achieved.

430043

Layer thickness measurement according to DIN EN ISO 2178 (magnetic method) / DIN EN ISO 2360 (eddy current method)



The magnetic-inductive method is one way of non-destructive layer thickness measurement, in which the thickness of non-magnetic layers on magnetic substrates (e.g. steel) can be determined.

For the measurement of thicknesses of non-conductive layers on non-magnetic metal substrates (e.g. aluminum), the so-called eddy current method is used.

430013

Stone chip testing according to DIN EN ISO 20567-1 (multi-impact test)



The resistance of coatings to stone chip damage is of particular interest to the automotive industry. In order to simulate stone chipping, a defined amount of angular iron grit is shot at the surface under defined conditions. The evaluation of the stone chipping resistance is carried out with the help of standardised comparative images.

430014

Pull-off testing according to DIN EN ISO 4624 Method B



With pull-off testing, the adhesive strength of a single- or multi-layer system can be determined quantitatively. In Method B, which is particularly suitable for rigid structures, a standardised die made of aluminum is glued to the surface and mechanically torn from the sample after the curing process of the adhesive. The force required for this is measured and normalised on the tested surface. The given results are the tensile stress, as well as a fracture pattern which provides insight whether it ruptured between two layers (adhesive fracture) or within a layer (cohesive fracture).

PROD. NO:

SERVICE DESCRIPTION:

430086

Roughness depth measurement according to DIN EN ISO 4287



In roughness depth measurement, the surface roughness of blasted, swept or otherwise mechanically pre-treated surfaces is measured by the profile method.

430004

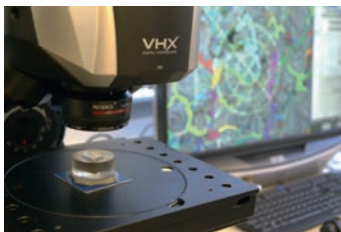
Dye spot test according to DIN EN ISO 2143



The dye spot test determines the quality of the sealing of anodisation layers. The anodised layer is first exposed to an acid treatment and then treated with a dye solution. The degree of (irreversible) staining is assessed by a characteristic value and serves to classify the sealing quality.

430006

Materialography

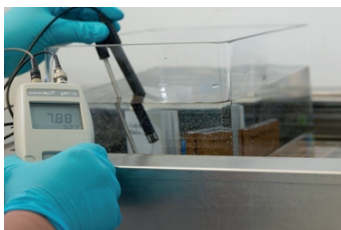


In this method, a part of the sample is separated and embedded in a synthetic resin. By defined grinding and polishing steps, a cross-section of the portion to be analyzed is prepared and viewed at appropriate magnification with an optical microscope. In addition to pure micrography, thickness measurement of individual layers and assessment of edge coverage of coatings is also possible. Suitable etching processes can also be used to enable a microstructure analysis of metals and alloys.

Direct assessment and three-dimensional topographic images of small sample parts with up to 6000x magnification are also feasible.

430005

Machu test according to QUALICOAT



The Machu test serves as a rapid corrosion test. Initially, the sample is scribed with an X shape down to the substrate. This sample is then exposed to a test solution containing sodium chloride and hydrogen peroxide for 48 hours. The corrosion protection can be assessed by the infiltration at the scribe.

PROD. NO:

SERVICE DESCRIPTION:

430008

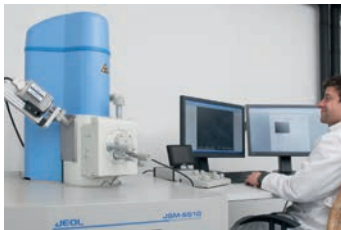
Mortar test according to DIN EN 12206-1



With the mortar test, the resistance of organic layers against mortar can be assessed. Since mortar is alkaline, it must be tested whether the paint layer is damaged by exposure. For this method, a standardised mortar is prepared and applied to the surface. After 24 hours of storage under specified conditions, the exposed area is cleaned and inspected. The test is mainly required by specifications focused on construction and façades, e.g. Qualicoat, GSB and AAMA specifications, and is evaluated accordingly.

430010

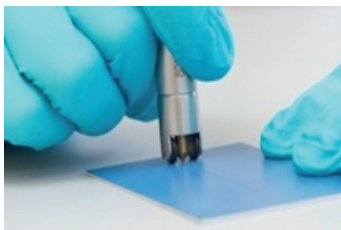
Scanning Electron Microscopy (SEM) / Energy Dispersive X-ray Microanalysis (EDX)



With scanning electron microscopy (SEM), the surface of a sample can be viewed with high magnification. A finely bundled electron beam scans the surface and interactions of the electrons with the object are used to create an image. Energy dispersive X-ray spectroscopy (EDX) is a form of elemental analysis by detecting characteristic X-ray radiation of the elements comprising the sample.

430037

Scratch resistance test according to DIN EN ISO 1518-1



In scratch resistance testing, a standardised cemented carbide tip is pulled over the coated surface with constant force. Depending on the requirements, the tip must not reach the base material or leave a permanent impression.

430041

Martindale test according to DIN CEN / TS 16611



The Martindale test is an abrasion resistance test of powder coatings within the scope of the Qualicoat specification. In this method, an abrasive pad is moved over the samples in a defined pattern. Finally, the gloss level is measured and compared with an unexposed area.

PROD. NO:

SERVICE DESCRIPTION:

430007

Pistol test according to DIN ISO 4532



In the pistol test (referred to as "(single) impact test" in some standards), a sphere made of hardened steel with a diameter of 5 mm is shot at the sample surface with a specified force (up to 90 N). The coating is then checked for cracks or chips.

430012

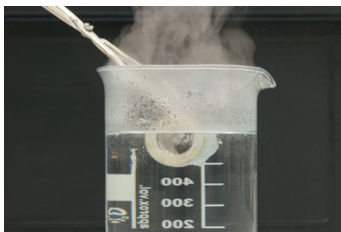
Admittance measurement according to DIN EN ISO 2931



The admittance measurement is used to facilitate a quick statement about the quality of sealed anodisation layers. The conductivity between an electrolyte measuring cell on the anodised layer and the base material (aluminum) is measured when alternating current is applied.

430016

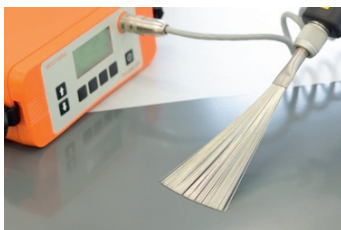
Thermal shock according to DIN EN ISO 2819 section 4.12



In thermal shock testing, especially electroplated coatings are tested for their adhesive strength by heating and subsequent quenching in cold water. Due to the different thermal expansion coefficients as well as the present temperature gradient, there is a short-term mechanical stress between coating and base material. No cracks or chipping must occur in the process.

430086

Porosity testing according to DIN EN ISO 29601 / DIN 55670 / DIN EN ISO 8289



The occurrence of corrosion on coated substrate is often due to coating defects. Porosity testing is used to detect microscopic and macroscopic defects in a coating by moving a probe (called holiday detector) over the sample under applied voltage. When a defect is detected, there is an electrical breakdown and an electronic signal.

PROD. NO:

SERVICE DESCRIPTION:

430010

Raman spectroscopy



The method of laser-based Raman microscopy combines the imaging of a light microscope with the analysis of organic and inorganic compounds. Certain bonds in organic molecules are excited with monochromatic light and the resulting energy difference is registered - the resulting Raman spectrum is considered a chemical fingerprint of the investigated sample.

430009

Fastness to rubbing according to ISO 105-X12



The rubbing fastness test is used to determine the colour fastness of a surface against rubbing with a cotton fabric. A cylindrical test die with rubbing cloth, either dry or wet, travels a certain number of double strokes over the sample surface with a defined applied weight force. Subsequently, both the exposed area and the used cotton fabric are evaluated for visual changes via grey scale comparison.

430038

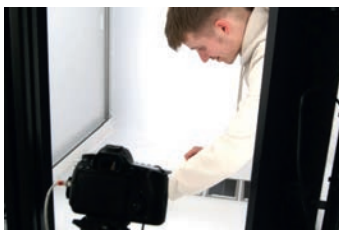
Manual scratch test according to MBN 10494-5 Ch. 5.2.1



With the manual scratch test, the coating is scraped off to the substrate by pulling a special cable stripper's blade over the surface. Subsequently, the edges of the scraped coating are assessed and assigned to a characteristic value on the basis of comparative images.

430081

Professional photo box



With the automatic photo studio ORBITVU ALPHASHOT XL, professional photos of test specimens can be taken. Using uniform all-round lighting and two cameras, the sample can be presented in a 360° view.



IFO Quality Mark

Our customers can use the quality mark to highlight the quality of their product and advertise with tested quality.



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Oberflächentechnik
GmbH**

Product

Test according to DIN EN ISO 12944-6:2018

Corrosivity category: C4-H

Valid in conjunction with Test report (number) of (date)



Independent accredited institute
for the testing and inspection
of coatings and coating systems

Laboratory services

- Mandrel bending test
- Pencil hardness
- Indentation test (Buchholz hardness)
- Falling sand abrasion test
- Impact test
- Cupping test
- Stone chip testing
- Pull-off testing
- Materialography
- Machu test
- Mortar test
- Technical cleanliness analysis
- Scanning Electron Microscopy (SEM)/Energy Dispersive X-ray Microanalysis (EDX)
- Layer thickness measurement
- Gloss measurement
- Colour measurement
- Adhesive strength test
- Roughness depth measurement
- Mass loss test
- Dye spot test
- Fastness to rubbing (Crockmeter and Martindale test)
- Metallography
- Microstructure analysis
- Scratch resistance test
- Colour Fastness
- Accelerated weathering test with xenon and UV fluorescent lamps
- Admittance measurement
- Resistance test
- Corrosion test
- Cyclic corrosion test VDA 621-415
- Test installation for coating and pretreating
- Powder coating application
- Liquid coating application
- Alkali resistance
- Pressure water-jetting test
- Raman spectroscopy

Claims and experts

- Corrosion protection and coating consultancy services
- Existing facades: assessing and evaluating the condition of facade surface finishes
- Investigation of damage claims
- Cleaning work or site measurements
- Expert opinions for courts
- Expert opinions on materials and components with and without coatings

Quality checks

- QUALANOD quality checks
- QUALISTEELCOAT quality checks
- GBS quality checks
- QUALICOAT quality checks
- QALIDECO quality checks
- QIB, Quality Association for Industrial Coatings
- QUALISTRIP – European quality association for industrial stripping of metals and plastics

Coating inspections

- Maintenance of steel and aluminium structures
- Corrosion protection for new construction projects
- Monitoring execution

Coating research

- Material investigations
- Coating research
- Expert reports

Certification Authority

- Monitoring of coating companies in accordance with DBS 918340
- Certification of powder coating companies in accordance with DIN 55633
- Certification of galvanisation companies in accordance with ISO 1461
- Certification of coating companies using liquid painting in accordance with DIN EN ISO 12944
- Monitoring of factory production control systems in accordance with DIN EN 1090
- General technical approvals
- Customised product certification
- Certification of hot-dip galvanisation companies in accordance with DAST Guideline
- Certification for metal construction companies in accordance with DIN EN 1090

REQUEST FOR QUOTATION LABORATORY SERVICES



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REQUEST FOR QUOTATION

Company:

Contact person:

☐ Mr. ☐ Ms./Mrs.

E-Mail:

Address:

Zip code:

City:

Country:

**Type of
samples/material:**

Number of pieces:

**Single dimension in
mm (or drawing) and
weight:**

length/width/depth

weight

Test method/norm:

Test duration:

Product number:

**Evaluation norm
(if available):**

Report:

☐ yes

☐ no

Samples back:

☐ yes

☐ no

NOTES



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