Deutsche Akkreditierungsstelle GmbH

# Annex to the Accreditation Certificate D-PL-11075-16-00 according to DIN EN ISO/IEC 17025:2018

**Valid from:** **11.09.2020**

Date of issue: 11.09.2020

Holder of certificate:

**Bundesanstalt für Materialforschung und -prüfung (BAM)**
**Unter den Eichen 87, 12205 Berlin**

with its laboratories

**in den Fachbereichen FB 5.1, 5.2, 5.5 und 5.6 der Abteilung 5 / Werkstofftechnik**
and
**im Bereich 9.0 sowie in den Fachbereichen FB 9.1 und 9.4 der Abteilung 9 / Komponentensicherheit**

Tests in the fields:

**tests of materialography and fractography of technical materials;**
**mechanical-technological testing, fracture mechanics testing and testing of service loading of metallic materials;**
**tests of glass, ceramics and components;**
**vibrations, shock testing, temperature- and climatic testing**

**Within the given testing field marked with *, the testing laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use standard testing methods listed here with different issue dates.**

*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*

**Within the testing fields marked with **, the laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, the free choice of standard or equivalent test methods as well as the modification, development and refinement of 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 of materialography and fractography of technical materials

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|---|---|
| DIN EN 16882<br>2017-06 | Road vehicles - Security of the mechanical seals used on tachographs – Requirements and test procedures<br>(here: *Chapter 6: Signs of Tampering*) |
| - | |
| DIN EN ISO 945-1<br>2018-05 | Microstructure of cast irons - Part 1: Graphite classification by visual analysis |
| ASTM E 562<br>2011 | Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count |

## 2 Mechanical-technological tests of metallic materials *

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|---|---|
| DIN EN ISO 6506-1<br>2015-02 | Metallic materials - Brinell hardness test - Part 1: Test method |
| DIN EN ISO 6508-1<br>2016-12 | Metallic materials - Rockwell hardness test - Part 1: Test method<br>(here: *Scale C*) |
| DIN EN ISO 6507-1<br>2018-07 | Metallic materials - Vickers hardness test - Part 1: Test method |
| DIN EN ISO 6892-1<br>2020-06 | Metallic materials - Tensile testing - Part 1: Method of test at room temperature<br>(here: *Method A + B*) |
| DIN EN ISO 6892-2<br>2018-09 | Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature<br>(here: *Method A + B*) |
| ASTM E 8/E 8M<br>2016 | Standard Test Methods for Tension Testing of Metallic Materials |
| ASTM E 21 | Standard Test Method for Elevated Temperature Tension Test of |

| | |
|---|---|
| 2017 | Metallic Materials |
| DIN EN ISO 204<br>2019-04 | Metallic materials - Uniaxial creep testing in tension - Method of test |
| DIN EN ISO 26203-2<br>2012-01 | Metallic materials - Tensile testing at high strain rates - Part 2: Servo-hydraulic and other test systems |

**3 Fracture mechanical and fatigue strength tests of metallic materials ***

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|---|---|
| ASTM E 466<br>2015 | Standard Practice for Conducting Force Controlled Constant Amplitude Axial Fatigue Tests of Metallic Materials |
| DIN 50100<br>2016-12 | Load controlled fatigue testing - Execution and evaluation of cyclic tests at constant load amplitudes on metallic specimens and components |
| DIN 50113<br>2018-03 | Testing of metallic materials - Rotating bar bending fatigue test |
| DIN 50142<br>1982-03 | Testing of metallic materials - Flat bending fatigue test |
| ISO 1099<br>2017-06 | Metallic materials - Fatigue testing - Axial force-controlled method |
| ASTM E 647<br>2013 | Standard Test Method for Measurement of Fatigue Crack Growth Rates |
| BS ISO 12108<br>2018-07 | Metallic materials - Fatigue testing - Fatigue crack growth method |
| DIN EN ISO 148-1<br>2017-05 | Metallic materials - Charpy pendulum impact test - Part 1: Test method |
| ISO 12106<br>2017-03 | Metallic materials - Fatigue testing - Axial-strain-controlled method |
| ASTM E 139<br>2011 | Standard Test Method for Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials |
| ASTM E 606/E 606M<br>2019 | Standard Test Method for Strain-Controlled Fatigue Testing |

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|---|---|
| ASTM E 2368<br>2010 | Standard Practice for Strain Controlled Thermomechanical Fatigue Testing |
| ISO 12111<br>2011-08 | Metallic materials - Fatigue testing - Strain-controlled thermo-mechanical fatigue testing method |
| DIN EN ISO 14556<br>2017-05 | Metallic materials - Charpy V-notch pendulum impact test - Instrumented test method |
| ASTM E 399<br>2020 | Standard Test Method for Linear-Elastic Plain-Strain Fracture Toughness KIc of Metallic Materials |

## 4 Tests of glass, ceramics and components *

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| DIN EN 820-1<br>2003-01 | Advanced technical ceramics - Methods of testing monolithic ceramics - Thermo-mechanical properties - Part 1: Determination of flexural strength at elevated temperatures |
| DIN EN 820-5<br>2009-10 | Advanced technical ceramics - Thermomechanical properties of monolithic ceramics - Part 5: Determination of elastic moduli at elevated temperatures |
| DIN EN 843-1<br>2008-08 | Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 1: Determination of flexural strength |
| DIN EN 843-2<br>2007-03 | Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 2: Determination of Young's modulus, shear modulus and Poisson's ratio |
| DIN EN 843-5<br>Berichtigung 1<br>2007-06 | Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 5: Statistical analysis |
| ASTM E 1875<br>2013 | Standard Test Method for Dynamic Young´s Modulus, Shear Modulus, and Poisson´s Ratio by Sonic Resonance |
| ASTM C 1198<br>2009<br>(reapproved) | Standard Test Method for Dynamic Young's Modulus, Shear Modulus, and Poisson's Ratio for Advanced Ceramics by Sonic Resonance |
| ASTM C 623<br>1992<br>(2015 reapproved) | Standard Test Method for Young's Modulus, Shear Modulus and Poisson's Ratio for Glass and Glass-Ceramics by Resonance |

| | |
|---|---|
| ASTM E 1876<br>2015 | Standard Test Method for Dynamic Young´s Modulus, Shear Modulus and Poisson's Ratio by Impulse Excitation of Vibration |
| DIN EN 13763-5<br>2004-02 | Explosives for civil uses - Detonators and relays - Part 5: Determination of resistance to cutting damage of leading wires and shock tubes |
| DIN EN 13763-6<br>2004-02 | Explosives for civil uses - Detonators and relays - Part 6: Determination of resistance to cracking at low temperatures of leading wires |
| ISO 13320<br>2009-10 | Particle Size Analysis - Laser Diffraction Methods |
| DIN ISO 7991<br>1998-02 | Glass - Determination of coefficient of mean linear thermal expansion |
| DIN ISO 7884-8<br>1998-02 | Glass - Viscosity and viscometric fixed points - Part 8: Determination of (dilatometric) transformation temperature |
| DIN EN 1159-1<br>Berichtigung 1<br>2009-02 | Advanced technical ceramics - Ceramic composites - Thermophysical properties - Part 1: Determination of thermal expansion |

## 5 Characteristic of environmental behavior by means of vibration, vibration and shock tests as well as temperature and climate tests of samples, components and products **

| Type of test | Quantity to be measure / Test parameter | Testing and measuring range | Characteristic test methods |
|---|---|---|---|
| Vibration test | Frequency of vibration test | > 0 … 9.000 Hz | DIN EN 60068-2-6<br>DIN EN 60068-2-64<br>MIL-STD 810F<br>ASTM D 4728 |
| | Acceleration | > 0 … 1.000 m/s² bei 5 … 1000 Hz | |
| | Displacement amplitude | > 0 … 200 mm bei > 0-…-10 Hz | |
| Shock test | Acceleration | < 1.600 m/s² bei $D_{max}$=4,5 ms | DIN EN 60068-2-27 |
| Dry heat test | Temperature | RT … 70 °C<br>70 … 200 °C | DIN EN 60068-2-2 |
| Damp heat test | Temperature | +10 … +70 °C<br>+70 … +95 °C | DIN EN 60068-2-30<br>DIN EN 60068-2-78 |

| Type of test | Quantity to be measure / Test parameter | Testing and measuring range | Characteristic test methods |
|---|---|---|---|
| Damp heat test | Relative humidity | 10 … 35 % r.F.<br>35 … 80 % r.F.<br>80 … 95 % r.F. | |
| Cold test | Temperature | -60 …- 20°C<br>-20 °C … RT | DIN EN 60068-2-1 |

### 5.1 Characteristic test methods

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|---|---|
| DIN EN 60068-2-6<br>2008-10 | Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal) |
| DIN EN 60068-2-64<br>2009-04 | Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance |
| DIN EN 60068-2-27<br>2010-02 | Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock |
| DIN EN ISO 13355<br>2017-03 | Packaging - Complete, filled transport packages and unit loads - Vertical random vibration test |
| DIN EN 61373<br>2011-04 | Railway applications - Rolling stock equipment - Shock and vibration tests |
| 49CFR178.608<br>2017-10 | Title 49: Transportation - Chapter I: Research and special programs administration - Department of Transportation - Part 178: Specification for Packagings - Subpart M: Testing of non-bulk Packagings and Packages - Sec. 178.608: Vibration standard |
| 49CFR178.819<br>2013-10 | Title 49: Transportation - Chapter I: Department of Transportation - Part 178: Specification for Packagings - Subpart O: Testing of IBCs - Sec. 178.819: Vibration test |

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|---|---|
| ASTM D 4169<br>2016 | Standard Practice for Performance Testing of Shipping Containers and Systems |
| ASTM D 4728<br>2017 | Standard Test Method for Random Vibration Testing of Shipping Containers |
| MIL-STD-810G<br>Change 1<br>2014-04 | Department of Defense (U.S.A.) - Test Method Standard for Environmental Engineering Considerations and Laboratory Tests - Method 514.6: Vibration, Method 516.6: Shock |
| DIN EN 60068-2-1<br>2008-01 | Environmental testing - Part 2-1: Tests - Test A: Cold |
| DIN EN 60068-2-2<br>2008-05 | Environmental testing - Part 2-2: Tests - Test B: Dry heat |
| DIN EN 60068-2-30<br>2006-06<br>(IEC 60068-2-30:2005) | Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) |
| DIN EN 60068-2-78<br>2014-02 | Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state |

**abbreviations used:**

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|---|---|
| ASTM | American Society for Testing and Materials |
| BS | British Standard |
| CFR | Code of Federal Regulations |
| IEC | International Electrotechnical Commission |
| MIL-STD | Military Standard |