

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-PL-11278-01-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 12.05.2016 to 11.05.2021

Date of issue: 12.05.2016

Holder of certificate:

Salzgitter Mannesmann Forschung GmbH
Standort Duisburg
Ehinger Straße 200, 47259 Duisburg

Tests in the fields:

mechanic-technological testing of metallic materials; technological testing of metallic components; metallographic tests of steels; corrosion tests on various steels; optical spark emission spectrometry (OES) of steel-, iron- and nickel-based materials; testing of effectiveness of plastic coatings

abbreviations used: see last page

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

Metallographic tests of steels

DIN 50602 1985-09	Metallographic examination - Microscopic examination of special steels using standard diagrams to assess the content of non-metallic inclusions <i>(withdrawn standard)</i>
ASTM E 45 2013	Standard Practice for Determining the Inclusion Content of Steel
DIN EN 10247 2007-07	Metallographic examination of the non-metallic inclusion content of steels using standard pictures

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ISO 4967 2013-07	Steel - Determination of content of non-metallic inclusions - Micro-graphic method using Standard Diagrams
ASTM E 1181 2002	Standard Test Methods for Characterizing Duplex Grain Sizes
ASTM E 930 1999	Standard Test Methods for Estimating the Largest Grain Observed in a Metallographic Section (ALA Grain Size)
ASTM E 112 2013	Standard Test Methods for Determining Average Grain Size
ASTM E 1382 1997 (reapproved 2004)	Standard Test Methods for Determining Average Grain Size Using Semiautomatic and Automatic Image Analysis
DIN EN ISO 643 2013-05	Steels - Micrographic determination of the apparent grain size
ASTM E 562 2011	Standard Test Method for Determining Volume Fraction by systematic Manual Point Count
ISO 9042 1988-12	Steels - Manual point counting for statistically estimating the Volume fraction of a constituent with a point grid
DIN EN ISO 3887 2003-10	Steels - Determination of depth of decaburization
ASTM E 1268 2001 (reapproved 2007)	Standard Practice for Assessing the Degree of Bending or Orientation of Microstructures
ASTM E 407 2007	Standard Practice for Microetching Metals and Alloys
ASTM A 923 2014	Standard Test Methods for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels
DIN EN ISO 1463 2004-08	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method
ASTM E 1351 2001	Standard Practice for Production and Evaluation of Field Metallographic Replicas

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DIN 54150 1977-08	Non-destructive testing - Impression methods for surface examination (Replica-technique) <i>(withdrawn standard)</i>
ISO 3057 1998	Non-destructive testing - Metallographic replica techniques of surface examination

Analytical surface and surface-imaging studies using electron microscopy

A-EDWW-011 2015-10 A-EDWW-012 2015-10	Qualitative spatially resolved surface analysis of chemical elements typical of steels and nickel-base alloys by means of wavelength dispersive (WDS) or energy dispersive (EDS) X-ray spectroscopy using the electron beam microprobe (EPMA)
A-EDWW-011 2015-10	Quantitative spatially resolved surface analysis of chemical elements typical of steels and nickel-base alloys by means of wavelength dispersive X-ray spectroscopy (WDS) using the electron beam microprobe (EPMA)
A-EDWW-007 2015-10	Qualitative point and area analyses of chemical elements typical of steels, nickel-base alloys and non-ferrous metals by means of energy dispersive X-ray spectroscopy (EDS) using the scanning electron microscope (SEM)
A-EDWW-010 2015-03	Point and area analysis of the crystal structure and crystallographic orientations by means of electron backscatter diffraction (EBSD) of steels, nickel-base alloys and non-ferrous metals using the scanning electron microscope (SEM)

Corrosion tests of unalloyed and low-alloyed steels

NACE Standard TM0284 2011	Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking
NACE Standard M0177 2005	Laboratory Testing of Metals for Resistance to Sulfide Stress Cracking and Corrosion Cracking in H ₂ S Environments (Method A-D)
EFC Publ. No. 16 Annex A 2009	Guidelines on Materials Requirements for Carbon and Low Alloy Steels for H ₂ S-Containing Environments in Oil and Gas Production

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ASTM G 39 1999 (reapproved 2005)	Standard Practice for Preparation and Use of Bent-Beam Stress-Corrosion Test Specimens
OTI 95635 1996	A test method to determine the susceptibility to cracking of linepipe steels in sour service
DIN 50915 1993-09	Testing the resistance of unalloyed and low alloy steels to intergranular stress corrosion cracking by attack of nitrate medium - Welded and unwelded materials
DIN EN ISO 7539-1 2013-04	Corrosion of metals and alloys - Stress corrosion testing - Part 1: General guidance on testing procedures
DIN EN ISO 7539-2 1995-08	Corrosion of metals and alloys - Stress corrosion testing - Part 2: Preparation and use of bent-beam specimen
DIN EN ISO 7539-3 1995-08	Corrosion of metals and alloys - Stress corrosion testing - Part 3: Preparation and use of U-bend specimens
DIN EN ISO 7539-4 1995-08	Corrosion of metals and alloys - Stress corrosion testing - Part 4: Preparation and use of uniaxially loaded tension specimens
DIN EN ISO 7539-5 1995-08	Corrosion of metals and alloys - Stress corrosion testing - Part 5: Preparation and use of C-ring specimens
DIN EN ISO 7539-7 2005-05 + Corrigendum 2006-02	Corrosion of metals and alloys - Stress corrosion testing - Part 7: Method for slow strain rate testing

Corrosion tests at high alloyed steels

ASTM G 28-02 2008	Standard Reference Test Method for Detecting Susceptibility to Intergranular Corrosion in Wrought, Nickel-Rich, Chromium-Bearing Alloys
ASTM G 36 1994	Standard Practice for Evaluating Stress-Corrosion-Cracking Resistance of Metals and Alloys in a Boiling Magnesium Chloride Solution
ASTM G 46 1994	Standard Guide for Examination and Evaluation of Pitting Corrosion

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ASTM G 48 2011	Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution
ASTM G 78 2001 (reapproved 2007)	Standard Guide for Crevice Corrosion Testing of Iron-Base and Nickel-Base Stainless Alloys in Seawater and Other Chloride-Containing Aqueous Environments
ASTM A 262 2014	Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels <i>(withdrawn standard)</i>
ASTM A 763 2015	Standard Practices for Detecting Susceptibility to Intergranular Attack in Ferritic Stainless Steels
DIN EN ISO 3651-1 1998-08	Determination of resistance to intergranular corrosion of stainless steels - Part 1: Austenitic and ferritic-austenitic (duplex) stainless steels - Corrosion test in nitric acid medium by measurement of loss in mass (Huey test)
DIN EN ISO 3651-2 1998-08	Determination of resistance to intergranular corrosion of stainless steels - Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels - Corrosion test in media containing sulfuric acid

Oxidation test in hot gases

A14310/60 2015-03	Determination of resistance to oxidation of metallic materials in water vapour atmosphere with elevated temperature
ISO 21608 2012-03	Corrosion of metals and alloys - Test method for isothermal-exposure oxidation testing under high-temperature corrosion conditions for metallic materials
ISO 26146 2012-12	Corrosion of metals and alloys - Method for metallographic examination of samples after exposure to high temperature corrosive environments

Testing of plastics and coatings

DIN EN ISO 6270-2 2005-09	Paints and varnishes - Determination of resistance to humidity - Part 2: Procedure for exposing test specimens in condensation water atmospheres
DIN EN ISO 9227 2012-09	Corrosion tests in artificial atmospheres - Salt spray tests
DIN 30670 2012-04 + Corrigenda 1 2012-10	Polyethylen coatings of steel pipes and fittings - Requirements and testings (Annex A: Inspection of thickness; Annex C: Cathodic disbondment (CD test); Annex D: Peel strength; Annex E: Continuity (holiday detection); Annex G: Measuring the melt mass-flow rate (MFR); Annex H: Impact resistance and low temperature impact resistance; Annex I: Indentation resistance; Annex J: Specific electrical coating resistance; Annex K: UV resistance; Annex L: Thermal ageing resistance)
DIN 30678 2013-09	Polypropylene coatings on steel pipes and fittings - Requirements and testing (Annex A: Inspection of thickness; Annex C: CD Test (cathodic disbondment); Annex D: Peel strength; Annex E: Continuity (holiday detection); Annex G: Measuring the melt mass-flow rate (MFR); Annex H: Impact resistance and low temperature impact resistance; Annex I: Indentation resistance; Annex J: Specific electrical coating resistance; Annex K: UV resistance; Annex L: Thermal ageing resistance)
DIN EN ISO 4892-2 2013-06	Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps
DIN EN ISO 1133-1 2012-03	Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics - Part 1: Standard method
DIN EN ISO 21809-1 2011-10	Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 1: Polyolefin coatings (3-layer PE and 3-layer PP) (Annex A: Inspection of thickness; Annex B: Holiday detection test; Annex C: Peel strength test; Annex E: Impact test; Annex F: Indentation test; Annex G: UV ageing and thermal ageing test; Annex H: Cathodic disbondment test; Annex I: Flexibility test; Annex K: Total volatile/moisture content of the epoxy powder - Mass loss; Annex M: Hot water immersion test)

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ISO 21809-2
2015-03

Petroleum and natural gas industries - External coatings for buried or submerged pipelines used in pipeline transportation systems - Part 2: Single layer fusion-bonded epoxy coatings
(Annex A.4: Dry adhesion test; Annex A.5: Total volatile/moisture content of the epoxy powder - Mass loss; Annex A.9: Cathodic disbondment of coatings for standard temperatures up to 95 °C; A.13: Flexibility of the coating; Annex A.14: Resistance to impact of the coating; Annex A.15: Cathodic disbondment of strained coating; Annex A.16 Hot-water adhesion of the coating)

Physical tests

A-EDWW-005
2015-10

Determination of the chemical composition of steel and nickel-based materials using spark emission spectroscopy for the determination of up to 30 elements

A-EDWW-006
2015-03

Quantitative determination of the oxygen and nitrogen contents by the carrier gas method

DIN EN ISO 3690
2012-07

Welding and allied processes - Determination of hydrogen content in arc weld metal

AWS A4.4M
2001

Standard Procedures for determination of the Moisture content of Welding Fluxes and Welding Electrode Coverings

Mechanical tests, Fracture mechanics

ASTM A 370
2014

Standard Test Methods and Definitions for Mechanical Testing of Steel products

DIN EN ISO 642
2000-01

Steel - Hardenability test by end quenching (Jominy test)

Tensile test

DIN EN ISO 6892-1
2009-12

Metallic materials - Tensile testing - Part 1: Method of test at room temperature
(here: *Method B*)

DIN EN ISO 6892-2
2011-05

Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature
(here: *Method B*)

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ASTM E 8/E 8M
2013a Standard Test Methods for Tension Testing of Metallic Materials

ASTM E 21
2009 Standard Test Methods for Elevated Temperature Tension Tests of
Metallic Materials

Compression test

DIN 50106
1978-12 Testing of Metallic Materials - Compression Test

Pendulum impact test

DIN EN ISO 148-1
2011-01 Metallic materials - Charpy pendulum impact test - Part 1: Test
method

DIN EN ISO 148-1
Supplement 1
2014-02 Metallic materials - Charpy pendulum impact test - Part 1: Test
method - Supplement 1: Special test pieces

ASTM E 23-12c
2012 Standard Test Method for Notched Bar Testing of Metallic
Materials

Drop weight tear test

API RP 5L3
2014 Conducting Drop Weight Tear Test on Line Pipe

DIN EN 10274
1999-07 Metallic materials - Drop weight tear test

SEP 1325
1982-12 Falling weight test according to W. S. Pellini

ASTM E 436-03
2014 Standard Test Method for Drop-Weight Tear Tests of Ferritic Steels

Hardness test

DIN EN ISO 6506-1 2015-02	Metallic materials - Brinell hardness test - Part 1: Test method (here: <i>5 mm and 10 mm ball</i>)
DIN EN ISO 6507-1 2006-03	Metallic materials - Vickers hardness test - Part 1: Test method
DIN EN ISO 6508-1 2015-06	Metallic materials - Rockwell hardness test - Part 1: Test method (here: <i>Scales A, B, C</i>)

Technological tests

DIN EN ISO 7438 2012-03	Metallic materials - Bend test
DIN EN ISO 5173 2012-02	Destructive tests on welds in metallic materials - Bend tests
DNV-OS-F101 2013-10 + 2007-10	Submarine pipeline systems (Appendix B, Pre-straining and aging of materials, B1102 to B1110, Appendix B, Pre-straining and aging of materials, A1202 to A1210)
ASTM E 190 2014	Standard Test Method for Guided Bend Test for Ductility of Welds

High-temperature strength test

DIN EN ISO 204 2009-10	Uniaxial creep testing in tension
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Sphere of competence fracture mechanic

Within the test ranges specified in the table below 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.

Testing of metallic materials for determining the toughness under quasi-static, monotone increasing load

Type of tests

Type of test	Measurement category/ Test parameter	Measurement and test range	Maximum uncertainty according to	Characteristical test methods
Quasi-static and monotonically increasing load	Strength (Tensile, Pressure)	2,5 to 250 kN 6,0 to 600 kN 8,0 to 500 kN	Category 1 (DIN EN ISO 7500-2)	ASTM E 1820:2013 BS 7448 Part 1:1991 BS EN ISO 15653:2010
	Displacement	0 mm to 5 mm ($L_0 = 2$ mm) 0 mm to 12 mm ($L_0 = 6$ mm)	Category 1 (DIN EN ISO 9513)	ISO 12135

Pressure vessel test

DIN EN 12245 2009-06	Transportable gas cylinders - Fully wrapped composite cylinders <i>(withdrawn standard)</i>
DIN EN ISO 9809-1 2010-10	Gas cylinders - Refillable seamless steel gas cylinders - Design, construction and testing - Part 1: Quenched and tempered steel cylinders with tensile strength less than 1.100 MPa
DIN EN ISO 9809-2 2010-10	Gas cylinders - Refillable seamless steel gas cylinders - Design, construction and testing - Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1.100 MPa
DIN EN ISO 11439 2013-09	Gas cylinders - High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles <i>(withdrawn standard)</i>

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ECE 110
2002-02

Uniform provisions concerning the approval of
I. Specific components of motor vehicles using compressed natural Gas (CNG) in their propulsion system
II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) in their propulsion system
Annex 3, Attachment A
(here:
A.6 : Leak Before Break (LBB) performance test
A.11: Hydrostatic test / Option 2: Proof pressure test
A.12: Hydrostatic pressure burst test
A.13: Ambient temperature pressure cycle test
A.14: Acid environmental test
A.17: Composite flaw tolerance test)

abbreviations used:

A-EDXX -XXX	House procedures, work instructions of the laboratories of the Salzgitter Mannesmann Forschung GmbH, Standort Duisburg
API	American Petrol Industry
ASTM	American Society of Testing and Materials
AVS	Working instruction of the Kraftwerkunion (KWU)
AWS	American Welding Society
BS	British Standards
DNV	Det Norske Veritas
ECE	Economic Commission for Europe
EFC	European Federation of Corrosion
IACS	International Association of Classification Societies
JIS	Japanese Industrial Standards
NACE	National Association of Corrosion Engineers
OTI	Offshore Technology Information
SEP	Stahl-Eisen-Prüfblatt des Vereins Deutscher Eisenhüttenleute e. V.