

Certificate No: AOSS0000M6B

APPROVAL OF SERVICE SUPPLIERS

This is to certify that

Element Materials Technology Hamburg GmbH

Hamburg, Germany

is granted acceptance for

Laboratories performing mechanical and analytical testing, in accordance with Class Programme DNV-CP-0630.

This service supplier certificate will be accepted for use with all rule sets published by DNV. See the following page(s) for details regarding application.

This Certificate is valid from 2024-04-15 to (inclusive) 2027-04-14.

This Certificate is issued on 2024-04-15.



for **DNV**

This document has been digitally signed and will therefore not have handwritten signatures

Kühne, Dennis Surveyor

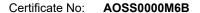
This Certificate may be withdrawn if:

- The service provided has been improperly carried out or the results improperly reported.
- 2. The surveyor has found any deficiencies in the accepted operating systems of the service supplier.
- 3. The firm has failed to inform of any major changes having effect on the quality of the service rendered.
- 4. The conditions listed in the certificate are changed and/or are not fulfilled.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



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Application:

See Annex to the Certificate (10 pages).

Remarks:

- Material and test requirements are based on the actual valid DNV Rules and international standards accepted by DNV.
- Reference is made to the actual Accreditation Certificate acc. to EN ISO 17025:2018, No.: D-PL-11166-01-01.
- A condition for retention of the AOSS certificate in its validity period is that periodical assessments are successfully carried out (at least every 18 month alternating between apllicable agents). The objective of the periodical assessment is to verify that the conditions have not been altered. It is further to be noted that the Society shall be informed of any: Modifications to the testing facilities which are liable to affect its characteristics and functions, as originally specified and tested.

Agents:

Name	City	Country
Element Materials Technology Hamburg GmbH	Esslingen	Germany
Element Materials Technology Hamburg GmbH	Hamburg	Germany
Element Materials Technology Hamburg GmbH	Mülheim an der Ruhr	Germany

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Annex to the AOSS Certificate no. AOSS0000M6B

The test methodes are indicated with the following symbols for the locations in which they are conducted:

MH = Mülheim, ES = Esslingen-Mettingen, HH = Hamburg

1 Mechanical testing

DIN EN ISO 642 2000-01	Steel - Hardenability test by end quenching (Jominy test)	МН
DIN EN ISO 9016 2022-07	Destructive tests on welds in metallic materials - Impact tests - Test specimen location, notch orientation and examination	MH, ES, HH
DIN EN ISO 4136 2022-09	Destructive tests on welds in metallic materials - Transverse tensile test	MH, ES, HH
DIN EN ISO 5173 2021-03	Destructive tests on welds in metallic materials - Bend tests	MH, ES, HH
DIN EN ISO 9015-1 2011-05	Destructive tests on welds in metallic materials - Hardness testing - Part 1: Hardness test on arc welded joints	MH, ES, HH
DIN EN ISO 9015-2 2016-10	Destructive tests on welds in metallic materials - Hardness testing - Part 2: Microhardness testing of welded joints	MH, ES, HH
DIN EN ISO 9017 2018-04	Destructive tests on welds in metallic materials - Fracture test	MH, ES, HH
DIN EN 1561 2012-01	Founding - Grey cast irons	MH, ES, HH
DIN EN 1562 2019-06	Founding - Malleable cast irons	MH, ES, HH

DIN EN ISO 6506-1	Metallic materials - Brinell hardness test - Part 1: Test method	MH, ES, HH
2015-02		
DIN EN ISO 6507-1	Metallic materials - Vickers hardness test - Part 1: Test method	MH, ES, HH
2018-07	Matallia watawiala Dadwooll bando asa tast. Datt 4. Tast wath ad	NAUL 50
DIN EN ISO 6508-1	Metallic materials - Rockwell hardness test - Part 1: Test method	MH, ES, HH
2016-12	(here: Scale A, B, C, D, F and G)	
DIN EN ISO 7438	Metallic materials - Bend test	MH, ES, HH
2021-03		
DIN EN ISO 6892-1 2020-06	Metallic materials - Tensile testing - Part 1: Method of test at room temperature	MH, ES, HH
2020 00	(Method B in MH, ES, HH)	
	(Method A nur in MH)	
DIN EN ISO 6892-2	Metallic materials - Tensile testing - Part 2: Method of test at elevated	MH, ES,
2018-09	temperature	НН
	(Method B in MH, ES, HH)	
	(Method A nur in MH)	
DIN EN ISO 148-1	Metallic materials - Charpy pendulum impact test - Part 1: Test method	MH, ES,
2017-05		НН
DIN EN ISO 898-1	Mechanical properties of fasteners made of carbon steel and alloy steel -	MH, ES,
2013-05	Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread	НН
	(here: section 9 excpect 9.13)	
DIN EN 10164	Steel products with improved deformation properties perpendicular to the	MH, ES,
2018-12	surface of the product - Technical delivery conditions	НН
DIN EN ISO 8492	Metallic materials - Tube - Flattening test	MH, ES,
2014-03		НН
DIN EN ISO 8493	Metallic materials - Tube - Drift-expanding test	MH, ES,
2004-10		НН

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DIN EN ISO 8495	Metallic materials - Tube - Ring-expanding test	MH, ES
2014-03		
DIN EN ISO 8496	Metallic materials - Tube - Ring tensile test	MH, ES,
2014-03		НН
DIN EN ISO 2639	Steels - Determination and verification of the depth of carburized and	MH, ES,
2003-04	hardened cases	НН
DIN EN 10328	Iron and steel - Determination of the conventional depth of hardening after	MH, ES,
2005-04	surface heating	НН
DIN 50190-3	Hardness depth of heat-treated parts; determination of the effective depth	MH, ES,
1979-03	of hardening after nitriding	НН
DIN EN ISO 18203	Steel - Determination of the thickness of surface-hardened layers	MH, ES,
2022-07		НН
SEP 1390	Weld bead bend test	MH, ES,
1996-07		НН
ASTM E 10	Standard Test Method for Brinell Hardness of Metallic Materials	MH, ES,
2018		НН
ASTM E 18	Standard Test Methods for Rockwell Hardness of Metallic Materials	MH, ES,
2022		НН
ASTM E 8/ E 8Ma	Standard Test Methods for Tension Testing of Metallic Materials	MH, ES,
2022		НН
ASTM E 21	Standard Test Methods for Elevated Temperature Tension Tests of Metallic	MH, ES,
2020	Materials	НН

ASTM A 370 2022	Standard Test Methodsand Definitions for Mechanical Testing of Steel Products	MH, ES, HH
	(here: section 6 - 32)	
ASTM A 770/ A 770M 2018	Standard Specification for Through-Thickness Tension Testing of Steel Plates for Special Applications	MH, ES, HH
ASTM E 384 2022	Standard Test Method for Microindentation Hardness of Materials	MH, ES
ASTM E 23	Test Methods for Notched Bar Impact Testing of Metallic Materials	HH, MH
2018	(only: Durchführung nach Charpy)	
DIN EN ISO 17660-1	Welding - Welding of reinforcing steel - Part 1: Load-bearing welded joints	MH, HH
2006-12 +	(here: Cl. 14: examin ation and testing of samplesn	
Berichtigung 1	Abs. 14.2: tenisle testing	
2007-08	Abs. 14.3: shear test	
	Abs. 14.4: bend test)	
DIN EN ISO 17660-2	Welding - Welding of reinforcing steel - Part 2: Non load-bearing welded joints	МН, НН
2006-12 +		
Berichtigung 1		
2007-08		
DIN EN 15048-2	Non-preloaded structural bolting assemblies - Part 2: Fitness for purpose	MH, ES, HH
2016-09		

DIN EN ISO 5178 2019-05	Destructive tests on welds in metallic materials - Longitudinal tensile test on weld metal in fusion welded joints	MH, ES, HH
ASTM E 111 2017	Standard Test Method for Young's Modulus, Tangent Modulus, and Chord Modulus	МН
ASTM B 557 2015	Standard Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products	МН
DIN EN 2002-001 2006-11	Aerospace series - Metallic materials - Test methods - Part 1: Tensile testing at ambient temperature	МН
ASTM E 92 2017	Standard Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials	МН
ASTM E 190 2021	Standard Test Method for Guided Bend Test for Ductility of Welds	МН
ASTM E 290 2022	Standard Test Methods for Bend Testing of Material for Ductility	МН
DIN EN ISO 9018 2016-02	Destructive tests on welds in metallic materials - Tensile test on cruciform and lapped joints	МН

2 Metallographic tests

DIN EN ISO 945-1	Microstructure of cast irons - Part 1: Graphite classification by visual	MH, HH,
	analysis	ES

DIN EN ISO 1463 2021-08	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method	MH, ES, HH
DIN EN ISO 17639 2022-05	Destructive tests on welds in metallic materials - Macroscopic and microscopic examination of welds	MH, ES, HH
ISO 4968 2022-03	Steel; Macrographic examination by sulfur print (Baumann method)	MH, ES, HH
DIN EN ISO 3887 2018-05	Steels - Determination of the depth of decarburization	MH, ES, HH
DIN EN ISO 643 2020-06	Steels - Micrographic determination of the apparent grain size	MH, ES, HH
DIN 54150 1977-08	Non-destructive testing; impression methods for surface examination (Replica-Technic) (zurückgezogenes Dokument)	МН, НН
ISO 3057 1998-03	Non-destructive testing - Metallographic replica techniques of surface examination	MH, ES, HH
ASTM E 1351 2012	Standard Practice for Production and Evaluation of Field Metallographic Replicas	МН, НН
DIN EN 10247 2017-09	Micrographic examination of the non-metallic inclusion content of steels using standard pictures	MH, ES, HH

ISO 4967 2013-07	Steel - Determination of content of non-metallic inclusions - Micrographic method using standard diagrams	МН
SEP 1520 1998-09	Microscopic examination of carbide structure in steels by means of diagram series	MH, ES, HH
ASTM E 112 2013	Standard Test Methods for Determining Average Grain Size	MH, ES, HH
ASTM E 340 2015	Standard Practice for Macroetching Metals and Alloys	MH, ES, HH
ASTM E 407 2015	Standard Practice for Microetching Metals and Alloys	MH, ES, HH
ASTM E 45a 2018	Standard Test Methods for Determining the Inclusion Content of Steel	MH, ES, HH
ASTM E 381 2022	Standard Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings	MH, ES, HH
DIN EN ISO 2624 1995-08	Copper and copper alloys - Estimation of average grain size	MH, ES, HH
ASTM E 562 2019	Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count	MH, ES, HH

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ASTM A 923	Standard Test Methods for Detecting Detrimental Intermetallic Phase in	MH, ES,
2022	Duplex Austenitic/Ferritic Stainless Steels	HH
ASTM E 930	Standard Test Methods for Estimating the Largest Grain Observed in a	МН
2018	Metallographic Section (ALA Grain Size)	
ASTM E 1181	Standard Test Methods for Characterizing Duplex Grain Sizes	МН
2002		
DIN 30901	Heat treatment of ferrous materials - Determination of the depth and form of appearance of the internal oxidation	MH
2016-12	appearance of the internal oxidation	

3 Chemical testing using stationary and mobile vacuum emission spectrometers

EHH-3-002D 2024-03	Determination by vacuum emission spectrometer of C, Si, Mn, P, S, Ni, Cr, Mo, V, Al, Cu, W, Co, Nb, Ti, B, As, Zr, Ca, Pb, Te, Sb, Fe, Zn, Mg, Sn, N in Ni-, Al-, Cu alloys, in low-alloy and high-alloy steels as well as in white-hardened cast iron (only S) and in Co alloys (only S), Ti and Mg alloys (only HH+S, without gases)	MH, ES, HH
EHH-3-003D	Determination by emission spectrometer of C, Si, Mn, P, S, Ni, Cr, Mo, V, Al,	ES
2024-04	Cu, W, Co, Nb, Ti, B, As, Zr, Ca, Pb, Te, Sb, Fe, Zn, Mg, Sn, in Ni-, Al-, Cu-alloys, in low- and high-alloy steels - Spectral analysis with the transportable Belec-Compactport A device	
EHH-3-004D	Bestimmung mittels Emissionsspektrometer von C, Si, Mn, P, S, Ni, Cr, Mo, V,	мн, нн
2024-03	Al, Cu, W, Co, Nb, Ti, B, As, Zr, Ca, Pb, Te, Sb, Fe, Zn, Mg, Sn, in Ni-, Al-, Cu- Legierun-gen, in niedrig- und hochlegierten Stählen - Durchführung von Verwechselungsprüfungen und die Ermittlung der chemischen Zusammen- setzung von Eisen- und Nichteisenmetallen mit dem transportablen Spektralanalysegerät "WAS PMI-MASTER PLUS"	

EHH-3-005DE Work instruction Positive Material Identification (PMI) Positive Alloy Material MH, ES, Identification (PMI)

2024-01

Abbreviations used:

ASME American Society of Mechanical Engineers

ASTM American Society of Testing and Materials

DIN German Institute for Standardization

EN European Standard

ISO International Organization for Standardization

SEP Steel-Iron Test Methods – publication from German Steel Institute of the Association of German

Iron Works (VDEh)

EHH In house method of the Element Materials Technology Hamburg GmbH