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This Certificate may be withdrawn if:
1. 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.

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

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

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

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

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	MH
ASTM B 557 2015	Standard Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products	MH
DIN EN 2002-001 2006-11	Aerospace series - Metallic materials - Test methods - Part 1: Tensile testing at ambient temperature	MH
ASTM E 92 2017	Standard Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials	MH
ASTM E 190 2021	Standard Test Method for Guided Bend Test for Ductility of Welds	MH
ASTM E 290 2022	Standard Test Methods for Bend Testing of Material for Ductility	MH
DIN EN ISO 9018 2016-02	Destructive tests on welds in metallic materials - Tensile test on cruciform and lapped joints	MH

2 Metallographic tests

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

2019-10		
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)*	MH, HH
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	MH, HH
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	MH
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

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

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 2024-04	Determination by 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, in Ni-, Al-, Cu-alloys, in low- and high-alloy steels - Spectral analysis with the transportable Belec-Compactport A device	ES
EHH-3-004D 2024-03	Bestimmung mittels Emissionsspektrometer von 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, 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"	MH, HH

EHH-3-005DE 2024-01	Work instruction Positive Material Identification (PMI) Positive Alloy Material Identification (PMI)	MH, ES, HH

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 theElement Materials Technology Hamburg GmbH