

# 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This Certificate may be withdrawn if: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.

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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 applicable 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<br>2000-01    | Steel - Hardenability test by end quenching (Jominy test)                                                                   | MH         |
| DIN EN ISO 9016<br>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<br>2022-09   | Destructive tests on welds in metallic materials - Transverse tensile test                                                  | MH, ES, HH |
| DIN EN ISO 5173<br>2021-03   | Destructive tests on welds in metallic materials - Bend tests                                                               | MH, ES, HH |
| DIN EN ISO 9015-1<br>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<br>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<br>2018-04   | Destructive tests on welds in metallic materials - Fracture test                                                            | MH, ES, HH |
| DIN EN 1561<br>2012-01       | Founding - Grey cast irons                                                                                                  | MH, ES, HH |
| DIN EN 1562<br>2019-06       | Founding - Malleable cast irons                                                                                             | MH, ES, HH |

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

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

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

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

2019-10

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

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

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| ASTM A 923<br>2022   | Standard Test Methods for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels | MH, ES,<br>HH |
| ASTM E 930<br>2018   | Standard Test Methods for Estimating the Largest Grain Observed in a Metallographic Section (ALA Grain Size)       | MH            |
| ASTM E 1181<br>2002  | Standard Test Methods for Characterizing Duplex Grain Sizes                                                        | MH            |
| DIN 30901<br>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

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|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| EHH-3-002D<br>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,<br>HH |
| EHH-3-003D<br>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<br>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-Legierungen, in niedrig- und hochlegierten Stählen - Durchführung von Verwechslungsprüfungen und die Ermittlung der chemischen Zusammensetzung von Eisen- und Nichteisenmetallen mit dem transportablen Spektralanalysegerät "WAS PMI-MASTER PLUS" | MH, HH        |

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| EHH-3-005DE<br>2024-01 | Work instruction Positive Material Identification (PMI) Positive Alloy Material<br>Identification (PMI) | MH, ES,<br>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