

**The Appendix is an integral part of
Certificate of Accreditation No. 22/2023 of 24/01/2023**

Accredited entity according to ČSN EN ISO/IEC 17025:2005:

MATERIÁLOVÝ A METALURGICKÝ VÝZKUM s.r.o.

Laboratories

Pohraniční 693/31, Vítkovice, 703 00 Ostrava

Testing laboratory locations:

1. **LAB1 Chemical Laboratory** Pohraniční 693/31, Vítkovice, 703 00 Ostrava
2. **LAB2 Laboratory for Fatigue and
Brittle Fracture Characteristics** Pohraniční 693/31, Vítkovice, 703 00 Ostrava
3. **LAB3 Metallography** Pohraniční 693/31, Vítkovice, 703 00 Ostrava

1. LAB1 Chemical Laboratory

Tests:

Ordinal number ¹	Test procedure/ method name	Test procedure/ method identification ²	Tested object
1.01	Determination of elements (Mn, Si, P, Cu, Ni, Cr, Mo, V, Ti, Nb, W, Co, Zr, As, Sb, Sn) by X-ray spectrometry	QI-ISO-LAB1-10-04, cl. 6.1.1 (ThermoFisherScientific manual) ASTM E 322-12, ASTM E 1621	Metallic materials
1.02	Determination of elements (Si, Al, Ca, Mg, Mn, P, Fe, Cr, V, Na, K, Ti, F, Ba, Cl) by X-ray spectrometry	QI-ISO-LAB1-10-04, cl. 6.1.2 (ThermoFisherScientific manual) ASTM E 1621, ČSN EN ISO 12677	Slags, sludges, refractory materials, waste from metallurgical production
1.03	Determination of elements (Mn, Cr, V, Ti, Mo, Ni, Cu) by OES ICP spectrometry	QI-ISO-LAB1-10-03 (ČSN EN ISO 11885, ČSN EN 10355, PERKIN ELMER manual)	Metallic materials
1.04	Measurement of pH (potentiometry)	QI-ISO-LAB1-10-13, cl. 6.1 (ČSN ISO 10523)	Test solutions
1.05	Determination of electrical conductivity	QI-ISO-LAB1-10-13, cl. 6.2 (ČSN EN 27888)	Test solutions
1.06	Assessment of corrosion resistance of material by HIC and SCC tests in hydrogen sulphide – visual method	QI-ISO-LAB1-10-12 (ANSI/NACE Standard TM0284-2017 Item No. 21215, TM0177-2017 Item No. 21212)	Metallic materials
1.07	Determination of carbon and sulphur (IR spectrometry)	QI-ISO-LAB1-10-09 (LECO manual) ASTM E 1019	Technical iron, sludges, slags, waste from metallurgical production
1.08	Determination of oxygen, nitrogen and hydrogen (IR spectrometry, thermal conductivity sensor)	QI-ISO-LAB1-10-10 (LECO manual) ASTM E 1019	Metallic materials

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Ordinal number ¹	Test procedure/ method name	Test procedure/ method identification ²	Tested object
1.09	Determination of forms of aluminium (OES ICP spectrometry) and total aluminium by calculation from measured values	QI-ISO-LAB1-10-15 A PERKIN ELMER manual)	Metallic materials
1.10	Determination of forms of aluminium (flame AAS spectrometry) and total aluminium by calculation from measured values	QI-ISO-LAB1-10-15 B PERKIN ELMER manual)	Metallic materials
1.11	Testing of resistance to intergranular corrosion of stainless steels – visual test	QI-ISO-LAB1-10-17 (ČSN EN ISO 3651-2, ASTM A 262, GOST 6032)	Metallic materials

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² if the document identifying the test procedure is dated, only these specific procedures are used. If the document identifying the test procedure is not dated, the latest edition of the specified procedure is used (including any changes)

Explanations:

QI	Testing Procedure of the Laboratory
ANSI	American National Standards Institute
ASTM	US standard
GOST	Russian standard
X-ray	X-ray fluorescence spectrometry
OES ICP	Inductively Coupled Plasma Optical Emission Spectrometer
AAS	Atomic Absorption Spectrometry
IR	Infrared Spectrometry
NEL	Nonpolar Extractives
HIC	Hydrogen-Induced Cracking
SCC	Stress Corrosion Cracking
Aluminium forms	Dissolved and bound aluminium
Test solutions	liquids not identifiable as water intended for subsequent use at the customer
Metallic materials	materials with ferrous and non-ferrous matrix (applies to all workplaces)

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2. LAB2 Laboratory for Fatigue and Brittle Fracture Characteristics

Tests:

Ordinal number ¹	Test procedure/ method name	Test procedure/ method identification ²	Tested object
2.01	Fracture toughness measurement	QI-ISO-LAB2-10-23 (ČSN 42 0347, ČSN EN ISO 15653, ČSN EN ISO 12737, ČSN ISO 12135, ASTM E 399, ASTM E 1820, ASTM E 1921, BS 7448-1)	Metallic materials
2.02	Determination of nil ductility temperature	QI-ISO-LAB2-10-24 (ČSN 42 0349, ASTM E 208)	Metallic materials
2.03	Fatigue test at constant stress amplitude	QI-ISO-LAB2-10-26 (ČSN 42 0363, ASTM E 466, ČSN ISO 1143, ČSN ISO 1099, ČSN ISO 12107)	Metallic materials
2.04	Low-cycle fatigue test	QI-ISO-LAB2-10-27 (ASTM E 606)	Metallic materials
2.05	Measurement of fatigue crack growth rate	QI-ISO-LAB2-10-28 (ČSN ISO 12108, ASTM E 647)	Metallic materials
2.06	Performance of tensile tests	QI-ISO-LAB2-10-29 (ČSN EN ISO 6892-1, ČSN EN ISO 6892-2, ČSN EN ISO 6892-3, ČSN 42 0313, ČSN EN ISO 4136, ASTM E 8, ASTM E 21, ASTM E 111, ASTM E 646, GOST 1497, GOST 9651)	Metallic materials

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Ordinal number ¹	Test procedure/ method name	Test procedure/ method identification ²	Tested object
2.07	Hardness measurement	QI-ISO-LAB2-10-40	Metallic materials
	- Brinell	(ČSN EN ISO 6506-1, ASTM E 10)	
	- Vickers	(ČSN EN ISO 6507-1, ČSN EN ISO 642, ASTM E 384)	
	- Rockwell	(ČSN EN ISO 6508-1, ČSN EN ISO 642, ASTM E 18, ASTM A 255)	
2.08	Impact bend test	QI-ISO-LAB2-10-41 (ČSN EN ISO 148-1, ČSN 42 0382, ČSN 42 0383, ČSN 42 0350, ČSN EN ISO 9016, ASTM E 23, GOST 9454)	Metallic materials
2.09	Determination of strength and yield stress by small punch test	QI-ISO-LAB2-10-42 (ČSN EN 10371)	Metallic materials
2.10	Bend test	QI-ISO-LAB2-10-25 (ČSN EN ISO 7438, ČSN EN ISO 5173)	Metallic materials
2.11	Drop weight tear test	QI-ISO-LAB2-10-07 (ASTM E 436, ČSN EN 10274)	Metallic materials
2.12	Determination of FATT transition temperature by small punch test	QI-ISO-LAB2-10-53 (ČSN EN 10371)	Metallic materials
2.13	Determination of fracture toughness of steel at ambient temperature from the results of small punch tests	QI-ISO-LAB2-10-57 (ČSN EN 10371)	Metallic materials
2.14	Instrumented indentation test for hardness	QI-ISO-LAB2-10-56 (ČSN EN ISO 14577-1)	Metallic materials
2.15	Assessment of the resistance of weld joints to stress corrosion cracking in high-temperature and high-pressure water environment	QI-ISO-LAB2-10-58	Metallic materials

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Ordinal number ¹	Test procedure/ method name	Test procedure/ method identification ²	Tested object
2.16	Determination of stress intensity factor of metallic materials in high pressure gaseous environment	QI-ISO-LAB2-10-67 (ČSN EN ISO 11114-4, method B and C, ASME BVPC, Sect. VIII-3 cl. KD-10, ASTM E 1681)	Metallic materials

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Explanations:

QI	Testing Procedure of the Laboratory
ASTM	US standard
GOST	Russian standard
BS	British standard
ASME	American Society of Mechanical Engineers

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3. LAB3 Metallography

Tests:

Ordinal number ¹	Test procedure/ method name	Test procedure/ method identification ²	Tested object
3.01	Testing of macrostructure by etching	QI-ISO-LAB3-40-01 (ČSN 42 0467, ASTM E 340, ASTM E 381, GOST 10243)	Metallic materials
3.02	Testing of macrostructure by sulphur prints	QI-ISO-LAB3-40-02 (ISO 4968, ASTM E 1180)	Metallic materials
3.03	Determination of microstructure	QI-ISO-LAB3-40-03 ČSN 42 0015, ČSN EN ISO 945-1, ČSN 42 0469, ČSN 42 1240, ASTM E 407)	Metallic materials
3.04	Determination of ferritic/austenitic grain size	QI-ISO-LAB3-40-04 (ČSN EN ISO 643, ASTM E 112, GOST 5639)	Metallic materials
3.05	Determination of the content of non-metallic inclusions in steel	QI-ISO-LAB3-40-05 (ČSN ISO 4967, DIN 50602:1985, ASTM E45, GOST 1778)	Metallic materials
3.06	Detection of defects in weld joints	QI-ISO-LAB3-40-06 (ČSN EN ISO 6520-1, ČSN EN ISO 6520-2, ČSN EN ISO 5817, ČSN EN ISO 10042, ČSN EN ISO 15614-1, ČSN EN ISO 15614-2, ČSN EN ISO 15614-7, ČSN EN ISO 15614-12, ČSN EN ISO 14555, ČSN EN 1708-2, ČSN EN ISO 17639)	Metallic materials

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Explanations:

QI	Testing Procedure of the Laboratory
ASTM	US standard
GOST	Russian standard
DIN	German Standard