

**The Appendix is an integral part of  
Certificate of Accreditation No. 527/2022 of 07/11/2022**

**Accredited entity according to ČSN EN ISO/IEC 17025:2018:**

**Liberty Ostrava a.s.**

Metallurgical and Chemical Laboratories

Vratimovská 689/117, Kunčice, 719 00 Ostrava

**Testing laboratory locations:**

- |  |                                     |
|--|-------------------------------------|
| <b>1. Mechanical Testing Laboratory</b>  | Vratimovská 689/117, 719 00 Ostrava |
| <b>2. Structural Analysis Laboratory</b> | Vratimovská 689/117, 719 00 Ostrava |
| <b>3. Spectrometric Laboratory</b>       | Vratimovská 689/117, 719 00 Ostrava |
| <b>4. Water Management Laboratory</b>    | Vratimovská 689/117, 719 00 Ostrava |
| <b>5. Field Laboratories</b>             | Vratimovská 689/117, 719 00 Ostrava |

**1. Mechanical Testing Laboratory**

**Tests:**

Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
1	Tensile test at room temperature	PP-L/Z/1 (ČSN EN ISO 6892-1, ASTM E8/E8M)	Metallurgical product, semiproduct
2	Impact bend test	PP-L/Z/2 (ČSN EN ISO 148-1, ASTM E23)	Metallurgical product, semiproduct
3	Rockwell hardness test	PP-L/Z/3 (ČSN EN ISO 6508-1, ASTM E18)	Metallurgical product, semiproduct
4	Vickers hardness test	PP-L/Z/4 (ČSN EN ISO 6507-1)	Metallurgical product, semiproduct
5	Brinell hardness test	PP-L/Z/5 (ČSN EN ISO 6506-1, ASTM E10)	Metallurgical product, semiproduct
6	Technological tube bend test	PP-L/Z/6 (ČSN EN ISO 8491, ASTM A106/A106M)	Metallurgical product
7	Technological tube widening test	PP-L/Z/6 (ČSN EN ISO 8493)	Metallurgical product
8	Technological tube flattening test	PP-L/Z/6 (ČSN EN ISO 8492)	Metallurgical product
9	Technological tube ring-expanding test	PP-L/Z/6 (ČSN EN ISO 8495)	Metallurgical product
10	Technological tube ring tensile test	PP-L/Z/6 (ČSN EN ISO 8496)	Metallurgical product
11	Bend test	PP-L/Z/11 (ČSN EN ISO 7438, ČSN EN ISO 5173)	Metallurgical product

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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
12	Fatigue test of metals at rotation	PP-L/Z/12 (ČSN 42 0363)	Metallurgical product, semiproduct
13	Measurement of the geometry of ribs and match plane by optical method	PP-L/Z/17 (ČSN EN ISO 15630-1, ČSN EN ISO 15630-3)	Metallurgical product, concrete reinforcing steel, thread bars

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**2. Structural Analysis Laboratory**

**Tests:**

Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
1	Macroscopic tests	PP-L/M/10 (ČSN 42 0467, ISO 4969, ČSN EN ISO 17 639)	Metallurgical product, semiproduct
2	Metallographic determination of non-metallic inclusions in steel	PP-L/M/12 (ČSN ISO 4967, ASTM E 45, DIN 50 602:1985)	Metallurgical product, semiproduct
3	Micrographic determination of grain size of steels and non-ferrous metals	PP-L/M/13 (ČSN 42 0462, ČSN EN ISO 643, ASTM E 112)	Metallurgical product, semiproduct
4	Metallographic evaluation of wrought metallurgical products	PP-L/M/14 (ČSN 42 0469)	Metallurgical product
5	Determination of depth of decarburization by metallographic method	PP-L/M/15 (ČSN EN ISO 3887)	Metallurgical product, semiproduct
6	Quantitative metallographic tests using image analysis	PP-L/M/16 (ASTM E 45, DIN 50602:1985, ČSN ISO 4967)	Metallurgical product, semiproduct
7	Metallographic evaluation of cast iron structure	PP-L/M/17 (ČSN EN ISO 945-1, ČSN 42 0461:1975)	Metallurgical product, semiproduct
8	Determination of resistance of steels for pressure vessels and tubes to hydrogen- induced cracking (HIC) and their metallographic assessment	PP-L/M/18 (ANSI/NACE Standard TM0284, ČSN EN 10229)	Metallurgical product
9	Testing of resistance of metals to sulfide stress cracking (SSC)	PP-L/M/19 (ANSI/NACE Standard TM0177)	Metallurgical product

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### 3. Spectrometric Laboratory

#### Tests:

Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
1	Determination of Mn, Cu, Ni, Cr, Mo, V, Ti, Co by ICP-OES method	SOP-L/AS/1-2-1 (Spectro manual)	Technical iron
2	Determination of Al <sub>tot.</sub> , Al <sub>sol.</sub> by ICP-OES method	SOP-L/AS/1-2-2 (ČSN EN 29658)	Technical iron
3	Determination of SiO <sub>2</sub> , CaO, MnO, MgO, Al <sub>2</sub> O <sub>3</sub> , TiO <sub>2</sub> , Na <sub>2</sub> O, K <sub>2</sub> O by ICP-OES method	SOP-L/AS/1-1-1 (Spectro manual)	Iron ores, agglomerates, blast-furnace slags, steel furnace slags, dolomitic sands, lime
4	Determination of Fe by ICP-OES method	SOP-L/AS/1-1-5 (ČSN 722030-1, ČSN 722030-8)	Blast-furnace slags
5	Determination of Cr (VI) by ICP-OES method	SOP-L/AS/1-1-7 (ČSN 722030-13)	Blast-furnace slags, steel furnace slags
6	Determination of Fe, Zn, Mn, Cu, Cr, Ni, Cd, Pb by ICP-OES method	SOP-L/AS/1-4-1 (ČSN EN ISO 11 885)	Waste water, drinking and service water, surface water, service make-up water, ground water,
7	Determination of Hg by AMA-254 analyzer	SOP-L/AS/2-1-1 (ČSN 75 7440)	Waste water, drinking and service water, surface water, service make-up water, ground water,
8	Determination of Si by photometry	SOP-L/AC/1-1-2 (ČSN EN 24829-1, ČSN EN 24829-2)	Technical iron
9	Determination of Mn by titration	SOP-L/AC/1-1-4 (ČSN EN 10071)	Technical iron

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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
10	Determination of Cr by titration	SOP-L/AC/1-1-6 (ČSN EN 24937)	Technical iron
11	Determination of V by titration	SOP-L/AC/1-1-7 (ČSN ISO 4947)	Technical iron
12	Determination of Cr by titration	SOP-L/AC/1-2-1/1 (ČSN 420550-2)	Ferrochromium
13	Determination of V by titration	SOP-L/AC/1-2-2/1 (ČSN 420553-1)	Ferrovandium
14	Determination of Si by gravimetry	SOP-L/AC/1-1 (ČSN 420512, ČSN 420550-5, ČSN 420552-1)	Technical iron, ferrochromium, ferrosilicon
15	Determination of SiO <sub>2</sub> by gravimetry	SOP-L/AC/1-2 (ČSN 441827, ČSN 722030-2:1992, ČSN 722041-2:1992, ČSN 722041-3:1992)	Iron ores, agglomerates, dolomitic sands, lime, blast- furnace slags, steel furnace slags
16	Determination of P by photometry	SOP-L/AC/1-3 (ČSN 420550-6, ČSN 420552-4, ČSN 420553-7)	Technical iron, ferrochromium, ferrosilicon, ferrovandium
17	Determination of P <sub>2</sub> O <sub>5</sub> by photometry	SOP-L/AC/1-4 (ČSN 441805, ČSN 722030-9:1992)	Iron ores, agglomerates, dolomitic sands, lime, blast- furnace slags
18	Determination of Fe, FeO, Fe <sub>met.</sub> by titration	SOP-L/AC/1-5 (ČSN ISO 9507, ČSN 722041-10:1992, ČSN 722041-12:1992, ČSN 722041-9:1992)	Iron ores, agglomerates, steel furnace slags
19	Determination of B,C, Al <sub>soluble</sub> , Al <sub>total</sub> , Si, P, S, Ca,Ti, V, Cr, Mn, Co, Ni, Cu, As, Mo, Sn, Nb, N by OES method	SOP-L/S/4 (ASTM E 415-17)	Steel

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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
20	Determination of Si, P, S, Ti, Cr, Mn, Ni, Cu, Mo, V, As by X-ray method	SOP-L/S/3 (ASTM E322-12)	Pig iron, cast iron
21	Determination of MgO, Al <sub>2</sub> O <sub>3</sub> , SiO <sub>2</sub> , P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O, CaO, TiO <sub>2</sub> , Mn, Fe tot., Cr by X-ray method	SOP-L/S/3 (ISO 9516-1)	Iron ore materials
228	Determination of MgO, Al <sub>2</sub> O <sub>3</sub> , SiO <sub>2</sub> , K <sub>2</sub> O, CaO, Fe <sub>2</sub> O <sub>3</sub> by X-ray method	SOP-L/S/3 (ČSN EN ISO 12677)	Dolomitic sands and lime
23	Determination of C, S, O, N by an analyzer with IR detection (C,S,O) and thermal conductivity detection (N)	SOP-L/S/4-4 (ČSN ISO 4935, ČSN ISO 9556, ČSN EN ISO 15349-2, ČSN EN 10276-2, ČSN EN ISO 10720)	Technical iron, iron ore materials, agglomerates
24	Determination of loss on ignition by gravimetry	SOP-L/S/3-1-20 (ČSN 720103, ČSN EN 12677, ČSN EN 15169)	Oxide materials, iron ore materials

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#### 4. Water Management Laboratory

##### Tests:

Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
1	Determination of hydrocarbons C10 – C40 in water by GC-FID method after extraction with a solvent	SOP-L/AM/9 (ČSN EN ISO 9377-2)	Waste water, drinking and service water, surface water, service make-up water,

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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
2*	Determination of temperature	SOP-L/AV1 (ČSN 75 7342)	Waste water, drinking and service water, surface water, service make-up water, hot water made from drinking water, hot water made from service water
3	Determination of pH	SOP-L/AV2 (ČSN ISO 10 523)	Waste water, drinking and service water, surface water, service make-up water, hot water made from drinking water, hot water made from service water
4	Determination of conductivity	SOP-L/AV3 (ČSN EN 27 888)	Waste water, drinking and service water, surface water, service make-up water,
5	Determination of colour by spectrophotometry	SOP-L/AV4 (KN 75 7364)	Drinking and service water, surface water, service make-up water, hot water made from drinking water, hot water made from service water
6	Determination of turbidity by nephelometry	SOP-L/AV5(ČSN EN ISO 7027)	Drinking and service water, surface water, service make-up water, hot water made from drinking water, hot water made from service water
7	Determination of free and total chlorine by spectrophotometry	SOP-L/AV6 (ČSN ISO 7393- 2)	Drinking and service water, hot water made from drinking water, hot water made from service water
8	Determination of dissolved solids and DIS by gravimetry	SOP-L/AV7 (ČSN 75 7346, ČSN 75 7347)	Waste water, drinking and service water, surface water, service make-up water

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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
9	Determination of suspended solids by gravimetry	SOP-L/AV8 (ČSN EN 872)	Waste water, drinking and service water, surface water, service make-up water
10	Determination of chemical oxygen demand with permanganate (COD <sub>Mn</sub> ) by titration	SOP-L/AV9 (ČSN EN ISO 8467)	Waste water, drinking and service water, surface water, service make-up water, hot water made from drinking water, hot water made from service water
11	Determination of chemical oxygen demand with dichromate (COD <sub>Cr</sub> ) by titration	SOP-L/AV10 (ČSN ISO 6060)	Waste water, drinking and service water, surface water, service make-up water
12	Determination of biochemical oxygen demand (BOD <sub>5</sub> ) by titration	SOP-L/AV11 (ČSN EN 1899-1)	Waste water, drinking and service water, surface water, service make-up water
13	Determination of chlorides by titration	SOP-L/AV12 (KN 75 7503)	Waste water, drinking and service water, surface water, service make-up water
14	Determination of sulphate by titration	SOP-L/AV13 (ČSN 75 7477)	Waste water, drinking and service water, surface water, service make-up water
15	Determination of nitrite by spectrophotometry and nitrite nitrogen by calculation from measured values	SOP-L/AV14 (ČSN EN 26777)	Waste water, drinking and service water, surface water, service make-up water
16	Determination of nitrate by spectrophotometry, nitrate and inorganic nitrogen by calculation from measured values	SOP-L/AV15 (ČSN ISO 7890-3)	Waste water, drinking and service water, surface water, service make-up water
17	Determination of total phosphorus by spectrophotometry	SOP-L/AV16 (ČSN EN ISO 6878)	Waste water, drinking and service water, surface water, service make-up water



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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
18	Determination of total cyanide by spectrophotometry	SOP-L/AV17 (ČSN 75 7415)	Waste water, service make-up water
19	Determination of ammonium by titration and ammonia nitrogen by calculation from measured values	SOP-L/AV18 (ČSN ISO 5664)	Waste water, drinking and service water, surface water, service make-up water
20	Determination of univalent phenols by spectrophotometry	SOP-L/AV19 (ČSN ISO 6439)	Waste water, drinking and service water, surface water, service make-up water
21	Determination of ammonium by spectrophotometry and ammonia nitrogen by calculation from measured values	SOP-L/AV20 (ČSN ISO 7150-1)	Waste water, drinking and service water, surface water, service make-up water
22	Determination of adsorbable organically bound halogens (AOX) by coulometry	SOP-L/AV21 (ČSN EN ISO 9562)	Waste water, service make-up water, surface water
23	Determination of total Fe by photometry	SOP-L/AV23 (ČSN ISO 6332)	Waste water, drinking and service water, surface water, service make-up water
24	Determination of acid neutralizing capacity (ANC) by titration	SOP-L/AV24 (ČSN EN ISO 9963-1)	Waste water, drinking and service water, surface water, service make-up water
25	Determination of base neutralizing capacity (BNC) by titration	SOP-L/AV25 (ČSN 75 7372)	Waste water, drinking and service water, surface water, service make-up water
26	Determination of BNC <sub>8,3</sub> , ANC <sub>4,5</sub> , ANC <sub>8,3</sub> and calculation of carbon dioxide forms	SOP-L/AV26 (ČSN 75 7373)	Waste water, drinking and service water, surface water, service make-up water
27	Determination of Ca by titration	SOP-L/AV27 (ČSN ISO 6058)	Waste water, drinking and service water, surface water, service make-up water

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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
28	Determination of hardness: (sum of Ca and Mg) by titration	SOP-L/AV28 (ČSN ISO 6059)	Waste water, drinking and service water, surface water, service make-up water

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**Sampling:**

Ordinal number	Sampling procedure name	Sampling procedure identification <sup>1</sup>	Sampled object
1	Drinking, service and hot water, manual sampling	SOP-L/AV36 (ČSN EN ISO 5667-1, ČSN EN ISO 5667-3, ČSN ISO 5667-5, ČSN ISO 5667-14)	Drinking water, hot water made of drinking water, service water, hot water made of service water
2	Sampling of waste water, by an automatic sampler	SOP-L/AV37 (ČSN EN ISO 5667-1, ČSN EN ISO 5667-3, ČSN ISO 5667-10, ČSN ISO 5667- 14)	Waste water
3	Sampling of surface water, manual sampling	SOP-L/AV38 (ČSN EN ISO 5667-1, ČSN EN ISO 5667-3, ČSN ISO 5667-4, ČSN ISO 5667-6 ČSN ISO 5667- 14)	Surface water, service make-up water

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**5. Field Laboratories**

**Tests:**

Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
1	Determination of water content in analytical sample of coal by gravimetry	PP-L/KP/1 (ČSN 44 1377)	Solid fuels <sup>4</sup>
2	Determination of moisture in general analysis test sample of coke by gravimetry	PP-L/KP/2 (ČSN ISO 687)	Solid fuels <sup>4</sup>
3	Determination of ash content in solid fuel by gravimetry	PP-L/KP/3 (ČSN ISO 1171)	Solid fuels <sup>4</sup>
4	Determination of the content of volatile combustible matter in black coal and coke by gravimetry	PP-L/KP/4 (ČSN ISO 562)	Solid fuels <sup>4</sup>
5	Determination of gross calorific value and net calorific value by a calorimeter	PP-L/KP/11 (ČSN ISO 1928)	Solid fuels <sup>4</sup>
6	Determination of C, H, N in coal and coke using LECO TruSpec C,H,N combustion analyzer	PP-L/KP/22 (ASTM D 5373, ČSN ISO 29541)	Solid fuels <sup>4</sup>
7	Determination of S in coal and coke using LECO TruSpec S combustion analyzer	PP-L/KP/23 (ASTM D 4239, ČSN ISO 19579)	Solid fuels <sup>4</sup>
8	Gravimetric determination of ash content in solid fuels by the method of sample insertion into a hot furnace	PP-L/KP/25 (ČSN ISO 1171)	Solid fuels <sup>4</sup>
9	Determination of water and ash content in coal and coke by a thermogravimetric analyzer	PP-L/KP/26 (ČSN ISO 1171, ČSN 44 1377, ČSN ISO 687)	Solid fuels <sup>4</sup>

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Ordinal number <sup>1</sup>	Test procedure/ method name	Test procedure/ method identification <sup>2</sup>	Tested object
10	Determination of gas composition <sup>3</sup> by GC-FID, GC-TCD, calculation of net calorific value, gross calorific value, density and relative density	PP-L/KG/1 (ČSN EN ISO 6974 ČSN EN ISO 6976 ČSN EN ISO 14912)	Heating gas
11	Determination of total moisture in coal by gravimetry	PP-L/KP/28 (ISO 589 ČSN 44 1377)	Hard coal
12	Determination of the swelling properties using a dilatometer	PP-L/KP/8 (ČSN ISO 349, ČSN ISO 8264)	Hard coal

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<sup>3</sup> CH<sub>4</sub>, H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>, CO, hydrocarbons C<sub>2</sub> – C<sub>4</sub>

<sup>4</sup> Solid fuels = black coal, brown coal, coke, anthracite, carburizing agent, carbon profile, solid alternative fuels

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Abbreviations and explanations:

ICP OES	– Inductively Coupled Plasma Atomic Emission Spectrometry
IR	– Infrared Spectrometry
OES	– Optical Emission Spectrometry
X-ray	– X-ray fluorescence spectrometry
GC-ECD	– Gas Chromatography with Electron Capture Detector
GC-FID	– Gas Chromatography with Flame Ionization Detector
GC-TCD	– Gas Chromatography with Thermal Conductivity Detector
ANSI/NACE	– American National Standards Institute / National Association of Corrosion Engineers
ASTM	– American Society for Testing and Materials
DIN	– Deutsche Industrie-Norm
RAS	– Dissolved Inorganic Salts