

**The Appendix is an integral part of
Certificate of Accreditation No. 593/2024 of 14/11/2024**

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

Výzkumný a zkušební ústav Plzeň s.r.o.
CAB number 1047, Testing Laboratory
Tylova 1581/46, Jižní Předměstí, 301 00 Plzeň

Testing laboratory locations:

- | | |
|---|---|
| 1. Metallographic Testing Laboratory | Tylova 1581/46, 301 00 Plzeň |
| 2. Mechanical Testing Laboratory
Correspondence address: | Jižní Předměstí 3005, 301 00 Plzeň
Tylova 1581/46, 301 00 Plzeň |
| 3. Dynamics Testing Laboratory
Correspondence address: | Orlík 266/15, Bolevec, 316 00 Plzeň
Tylova 1581/46, 301 00 Plzeň |
| 4. Noise and Vibration Testing Laboratory
Correspondence address: | Orlík 266/15, Bolevec, 316 00 Plzeň
Tylova 1581/46, 301 00 Plzeň |

The laboratory provides opinions and interpretations of the test results.

1. Metallographic Testing Laboratory

Tests:

Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
1	Energy-dispersive microanalysis of element composition	POS-ZL/52/005; ASTM E1508	Metallic materials	-
2	Microstructure test	POS-ZL/52/003	Metallic materials	-
3	Microstructure test	POS-ZL/52/002	Turbine component materials	-
4	Microstructure test	SEP 1614	Tool steel	-
5	Determination of metallographic structure	ČSN EN ISO 945-1; ASTM A247; ASTM E562	Cast iron	-
6	Determination of second-phase volume fraction by grid method	POS-ZL/52/004 (ASTM E562)	Metallic materials	-
7	Determination of second-phase constituent content by image analysis	POS-ZL/52/006 (ASTM E1245)	Metallic materials	-
8*	Non-destructive test of microstructure (metallographic replica technique)	POS-ZL/52/008; DIN 54150:1977	Metallic materials	-
9	Determination of metallographic structure	POS-ZL/52/003; ČSN 42 0491	AlSi type casting alloys	-
10	Micrographic determination of the apparent grain size	ČSN 42 0462; ČSN EN ISO 643; ASTM E112; GOST 5639	Metallic materials	-

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Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
11	Metallographic determination of non-metallic inclusions	DIN 50602:1985; ČSN ISO 4967; ASTM E45; GOST 1778; SS 11 11 16:1987	Metallic materials	-
12	Microscopic measurement of layer thickness	ČSN EN ISO 1463	Metallic materials	-
13	Measurement of depth of heat and chemical-heat treated steel layers	ČSN EN ISO 18203	Metallic materials	-
14	Determination of steel decarburization depth	ČSN EN ISO 3887	Metallic materials	-
15	Test of Vickers micro-hardness	ČSN EN ISO 6507-1; ČSN EN ISO 6507-4; ČSN EN ISO 9015-1; ČSN EN ISO 9015-2	Metallic materials	-
16	Metallographic evaluation of metallurgical products	ČSN 42 0015; ČSN 42 0060; ČSN 42 0062; ČSN 42 0469	Metallic materials	-
17	Determination of macrostructure of material by deep etching	ČSN 42 0467; ČSN EN ISO 5817; ČSN EN ISO 6520-1; ČSN EN ISO 9606-1; ČSN EN ISO 10042; ČSN EN ISO 13919-1; ČSN EN ISO 17639; ČSN EN 12797; ASTM E381; ASTM E340; ASTM A604/A604M-07 (Reapproved 2017); GOST 10243	Metallic materials	-
18*	Determination of sulphur segregation using Bauman's method	POS-ZL/52/001; ISO 4968	Metallic materials	-
19*	Determination of the content of non-metallic inclusions in steel by macroscopic methods	SEP 1584	Metallic materials	-
20	Determination of corrosion resistance	ČSN EN ISO 3651-2; ASTM A262-14; GOST 6032	Steel	-

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Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
21*	Non-destructive test – PT	ČSN EN ISO 3452-1; ČSN EN ISO 23277; ČSN EN 1371-1; ČSN EN 10228-2	Metallic materials	-
22*	Non-destructive test – MT	ČSN EN ISO 9934-1; ČSN EN ISO 17638; ČSN EN ISO 23278; ČSN EN 1369; ČSN EN 10228-1	Metallic materials	-
23*	Non-destructive test – VT	ČSN EN ISO 5817; ČSN EN ISO 6520-1; ČSN EN ISO 10042; ČSN EN ISO 13919-1; ČSN EN ISO 17637; ČSN EN 13018	Metallic materials	-
24*	Non-destructive test – UT	ČSN EN 10160; ČSN EN 10308; ČSN EN 10228-3; ČSN EN 10228-4; ČSN EN 12680-1; ČSN EN 12680-2; ČSN EN 12680-3; ČSN EN ISO 17635; ČSN EN ISO 17640; ČSN EN ISO 11666; ČSN EN ISO 23279 ; ČSN EN ISO 16810	Metallic materials	-
25	Determination of the content of elements by OES method (Al, As, B, C, Co, Cr, Cu, Mg, Mn, Mo, N, Nb, Ni, P, Pb, S, Sb, Si, Sn, Ti, V, W, Zr)	POS-ZL/51/005 (ČSN 42 1211; HŽ 42 0591:1993; ASTM E415-17; ASTM A751-20; ASTM E1086-14)	Technical iron	-

¹ asterisk at the ordinal number identifies the tests, which the laboratory is qualified to carry out outside the permanent laboratory premises

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 valid edition of the specified procedure is used (including any changes)

³ the laboratory does not apply a flexible approach to the scope of accreditation

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Explanations and abbreviations:

HŽ	- Metallurgy standard
MT	- Magnetic particle test
OES	- Optical Emission Spectrometry
POS-ZL	- Designation of the working process of the testing laboratory
PT	- Penetrant Test
SEP	- Designation of standard STAHL-EISEN-Prüfblätter des Vereins Deutscher Eisenhüttenleute
SS	- Designation of standard SVENSK STANDARD
UT	- Ultrasonic test
VT	- Visual test

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2. Mechanical Testing Laboratory

Tests:

Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
1	Tensile test at room temperature	ČSN EN ISO 6892-1; ASTM A370-14	Metallic materials	-
2	Tensile test at elevated temperature	ČSN EN ISO 6892-2, excl. method A1; ASTM E21, excl. Rp and E	Metallic materials	-
3	Tensile test	ČSN 42 0330	Grey cast iron with lamellar graphite	-
4	Determination of tensile properties	ČSN EN ISO 527-1	Plastics	-
5	Determination of tensile properties	ČSN EN ISO 527-2	Moulding and extrusion plastics	-
6	Determination of plastic strain ratio	ČSN ISO 10113	Metallic materials, sheet and strip	-
7	Testing of plane anisotropy	ČSN 42 0437	Metallic materials	-
8	Determination of compressive properties	ČSN EN ISO 604	Plastics	-
9	Impact bend test	ČSN ISO 148-1, excl. KU ₈ and KV ₈ ; ČSN EN ISO 15614, cl. 7.2, 7.4.4	Metallic materials	-
10	Impact bend test – instrumented test method	ČSN EN ISO 14556	Metallic materials	-
11	Determination of brittleness temperature of structural steels	ČSN 42 0350	Metallic materials	-
12	Bend test	ČSN EN ISO 7438	Metallic materials	-
13	Brinell hardness test	ČSN EN ISO 6506-1; ČSN EN ISO 6506-2, tab. 2, tab. 3; ASTM A370-14	Metallic materials	-
14	Vickers hardness test	ČSN EN ISO 6507-1	Metallic materials	-
15	Rockwell hardness test HRC	ČSN EN ISO 6508-1; ASTM A370-14	Metallic materials	-
16	Longitudinal tensile test on weld metal	ČSN EN ISO 5178	Welded joints of metallic materials	-
17	Transverse tensile test	ČSN EN ISO 4136; ČSN EN ISO 15614, cl. 7.2, 7.4.1	Welded joints of metallic materials	-

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Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
18	Bend test	ČSN EN ISO 5173; ČSN EN ISO 15614, cl. 7.2, 7.4.2	Welded joints of metallic materials	-
19	Fracture test	ČSN EN ISO 9017	Welded joints of metallic materials	-
20	Hardness tests	ČSN EN ISO 9015-1; ČSN EN ISO 15614, cl. 7.2, 7.4.5	Welded joints of metallic materials	-
21	Tube – Flattening test	ČSN EN ISO 8492	Metallic materials	-
22	Tube – Flanging test	ČSN EN ISO 8494	Metallic materials	-
23	Tube – Ring expanding test	ČSN EN ISO 8495	Metallic materials	-
24	Tube – Ring tensile test	ČSN EN ISO 8496	Metallic materials	-

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Explanations and abbreviations:

- E - Modulus of elasticity (Young modulus)
- J_{Id} - Fracture toughness under dynamic loading in terms of critical J-integral value
- K_{Id} - Fracture toughness under dynamic loading in terms of critical stress intensity factor value
- KU, KV - Absorbed energy
- POS-ZL - Designation of the working process of the testing laboratory
- R_p - yield stress
- SEP - Designation of standard STAHL-EISEN-Prüfblätter des Vereins Deutscher Eisenhüttenleute

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3. Dynamics Testing Laboratory

Tests:

Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
1	Low-cycle and high-cycle fatigue test	ČSN 42 0362, cl. 1-37; ČSN 42 0363, cl. 10-29, 45-49	Metallic materials, mechanical parts and assemblies	-
2	Strength tests of bogie frames and their components	POS-ZL/54/028 (ČSN EN 13749:2011; VDV152 - 10/2016; CR WAG TSI, cl. 4.2.3.6.1; CR LOC&PAS TSI, cl. 4.2.3.5.1); ČSN EN 13749; VDV152 - 10/2016; UIC Kodex 510-3 – 1.1.1989, reprint 1.7.1994; UIC Kodex 515-4 – 1.1.1993; UIC Kodex 615-4 – 2nd edition, February 2003	Railway vehicles	-
3	Vibration tests	ČSN EN 61373 ed.2, cl. 8, 9, 10; ČSN EN 50206-1 ed.2, cl. 6.4.3, 6.5; ČSN EN 50206-2 ed.2, cl. 6.4.2, 6.5	Electrical equipment and electrical equipment of driving vehicles	-
4	Seismic tests	ČSN IEC 980:1993, cl. 4, 6; ČSN EN 60068-2-6; IEC/IEEE 60980-344 ch. 9	Equipment and units of conventional and nuclear power plants	-
5*	Measurement of residual voltage	ASTM E837	Structural parts	-
6	Tests of dynamic characteristic of spring suspension	POS-ZL/54/017	Two axles freight wagons	-
7*	Residual stress measurement - Ring-Core method	POS-ZL/54/016	Structural parts and assemblies	-
8	Tests of dynamic characteristic of spring suspension	POS-ZL/54/018	Freight wagons with two axle bogie frames	-
9*	Measurement of residual stress by hole drilling method	POS-ZL/54/027	Structural parts	-
10*	Tensometric measurements	POS-ZL/54/029	Printed circuit boards	-

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Explanations and abbreviations:

CR	- Conventional rail system
CR WAG TSI	- TSI relating to the subsystem "Rolling Stock - Freight Wagons" of the trans- European conventional rail system - Commission Decision (EC)
CR LOC&PAS TSI	- TSI relating to the subsystem "Locomotives and passenger rolling stock of the trans-European conventional rail system issued by the Commission Decision (EC)
POS-ZL	- Designation of the working process of the testing laboratory
TSI	- Technical specifications of interoperability
UIC Code	- Designation of the International Union of Railways leaflets
VDV	- VDV Die Verkehrs-unternehmen - Association of German Transport Companies – Recommendations On The Design For Strength Of Urban Rail Rolling Stock

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4. Noise and Vibration Testing Laboratory

Tests:

Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
1*	Noise tests – sound pressure measurement, sound intensity measurement	ČSN EN ISO 1680; ČSN EN ISO 3744; ČSN EN ISO 3746; ČSN EN ISO 9614-1; ČSN EN ISO 9614-3; ČSN EN ISO 11200; ČSN EN ISO 11201; ČSN EN ISO 11202; ČSN EN ISO 11203; ČSN EN ISO 11205; ČSN ISO 9614-2; ČSN EN 61063:1998	Rotating, static and electric equipment and machinery	-
2*	Measurement of vibration	ČSN 01 1413; ČSN 20 0065; ČSN EN IEC 60034-14 ed. 3; ČSN ISO 20816-1; ČSN ISO 20816-2; ČSN ISO 20816-4; ČSN ISO 20816-5; ČSN ISO 10816-6; ČSN ISO 10816-7	Rotating machines	-
3*	Noise tests – measurement of noise	ČSN ISO 1996-1; ČSN ISO 1996-2; ČSN EN ISO 9612; HEM-300-26.4.01-16344; MoH CR Bulletin 2017, Part 11	Outdoor environment, building interiors, transport and workplace environment	-

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Explanations and abbreviations:

HEM - Guideline for the measurement and evaluation of noise in non-workplace environment and for the assessment of noise in protected outdoor areas of buildings issued by the Ministry of Health – Chief Hygienist of the Czech Republic.

MoH CR Bulletin, 2017, part 11 - Bulletin of the Ministry of Health of the Czech Republic.:

Guideline for the measurement and evaluation of noise in non-working environment c

This document is an appendix to the certificate of accreditation. In case of any discrepancies between the English and Czech versions, the Czech version shall prevail, both for the certificate appendix and the certificate itself. "