

**The Appendix is an integral part of
Certificate of Accreditation No: 246/2024 of 29/05/2024**

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

Výzkumný ústav pivovarský a sladařský, a.s.
CAB number 1309, Analytical Testing Laboratory – Brewing Institute Prague
Lípová 511/15, Nové Město, 120 00 Praha 2

The laboratory applies a flexible approach to the scope of accreditation.

The current list of activities carried out within the flexible scope is available on the laboratory's website <https://beerresearch.cz/download-category/sluzbyanalyzy/> in the form of „List of activities within the flexible scope of accreditation“.

Detailed information on activities within the scope of accreditation (determined analytes / source literature) is given in the section „Specification of the scope of accreditation“.

Tests:

Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
1	Determination of apparent and real extract, relative density, alcohol, apparent and real attenuation, original beer extract by densitometric and NIR methods and energy value by calculation from measured data	SOP č. 2 (EBC, chap. 9.2.1, 9.2.6 and 9.4, 9.45)	Beer and flavoured beer, malt beverages, beercoolers	A
2	Determination of bitter substances by spectrophotometry	SOP č. 3 (EBC, chap. 9.8)	Beer	A
3	Determination of colour by spectrophotometry	SOP č. 4 (EBC, chap. 9.6)	Beer	-
4	Determination of pH by potentiometry	SOP č. 5 (EBC chap 9.35)	Beer, sweet-wort, wort	A
5	Determination of clarity (turbidity) by nephelometry	SOP č. 6 (EBC, chap 9.29; MEBAK, chap. 2.14.1.2)	Beer	A
6	Determination of carbon dioxide by the expansion method	SOP č. 7 (MEBAK, chap. 2.26.1.5)	Beer, carbonated beverages, sparkling wine, mineral water	A
7	Determination of foaming by a special method of measuring the drop in foam level using NIBEM	SOP č. 8 (MEBAK, chap. 2.18.2)	Beer	-
8	Determination of NDMA and other volatile N-nitrosamines by GC-NCD	SOP č. 9	Malt, cereals, beer, alcoholic beverages, water	A

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Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
9	Determination of NDMA and other volatile N-nitrosamines by GC-NCD	SOP č. 9-A (NIOSH 2522:1994)	Solid sorbents	-
10	Determination of NDMA and other volatile N-nitrosamines by GC-NCD	SOP č. 9-B (ČSN EN 12868; ČSN EN 14350-2)	Rubber products	-
11	Determination of ATNC (total N-nitroso compounds) by NCD	SOP č. 10	Sweet-wort, wort, beer	A
12	Determination of nitrate by HPLC-UV	SOP č. 11	Malt, hops, hop products, beer and brewery intermediates, non-alcoholic and low-alcoholic beverages, brewing water	A
13	Determination of wt. % of α - and β -bitter acids by HPLC-UV	SOP č. 12 (EBC, chap. 7.2, 7.7)	Hops and hop products	-
14	Determination of the conductometric value of hops by titration	SOP č. 13 (EBC, chap. 7.2, 7.4, 7.5, 7.6)	Hops and hop products	-
15	Determination of metals by flame AAS	SOP č. 14 (EBC, chap. 9.13.3, 9.14.3, 9.16, 9.17, 9.18, 9.19, 9.20)	Beer, sweet-wort, wort, non-alcoholic and low-alcoholic beverages, water	A
16	Determination of metals by flame AAS	SOP č. 14A (MEBAK, chap. 1.1.1.4.2., 1.1.1.5.2, 1.1.1.6)	Diatomaceous earth, perlite	A
17	Determination of Hg using AMA single-purpose mercury analyser	SOP č. 15 (Single-purpose mercury analyser manual, AMA 254- HSC, ALTEC s.r.o.)	Beer, malt, sweet-wort, wort, hops and hop products, cereals, beverages	A
18	Determination of lower aliphatic halocarbons by GC-ECD	SOP č. 16 (EPA Method 601)	Beer, non-alcoholic and low-alcoholic beverages	A
19	Determination of thiobarbituric acid number (TBA) by spectrophotometry	SOP č. 17 (MEBAK, chap. 2.4)	Sweet-wort, wort, beer	-

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Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
20	Determination of total polyphenols by spectrophotometry	SOP č. 18 (EBC, chap. 9.11)	Beer	-
21	Determination of tetrahydroiso-alpha acids by HPLC-UV	SOP č. 19	Beer	-
22	Determination of carbohydrates by HPLC-RI	SOP č. 20	Beer, sweet-wort, wort, flavoured beers, beercoolers, malt beverages, soft drinks and syrups	A, B
23	Determination of nitrogenous substances according to Kjeldahl	SOP č. 21 (EBC, chap. 8.9.1, 9.9.1)	Sweet-wort, wort, beer	A
24	Determination of nitrogenous substances coagulated by boiling according to Kjeldahl	SOP č. 21A (PSA, 6.8.2)	Wort, beer	A
25	Determination of achievable attenuation by densitometry	SOP č. 22 (EBC, chap. 8.6.1, 9.7)	Wort, beer	-
26	Determination of dimethyl sulphide and its precursors by GC-FID	SOP č. 24 (EBC, chap. 9.39)	Sweet-wort, wort, beer	-
27	Sensory evaluation	SOP č. 25 (ČSN 56 0186-2; ČSN EN ISO 5495; ČSN ISO 8587; ČSN EN ISO 4120)	Beer, beer-based mixed drinks	A
28	Determination of pesticide residues by LC-MS	SOP č. 26 (SANTE/11312/2021 V2)	Hops and hop products	A, B
29	Determination of pesticide residues by LC-MS	SOP č. 27	Beer, cider, beer-based mixed drinks	A, B
30	Determination of melamine by GC-MS	SOP č. 28	Beer, beer-based mixed drinks	-

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Ordinal number ¹	Test procedure / method name	Test procedure / method identification ²	Tested subject	Degrees of freedom ³
31	Determination of biogenic amines by HPLC-FLD	SOP č. 29	Beer, alcoholic beverages	A, B
32	Determination of metals by ICP-MS	SOP č. 30A	Drinking water, beer, ciders, lemonades, wort, alcoholic beverages	A, B
33	Determination of metals by ICP-MS	SOP č. 30B	Cereals, hops, hop products, yeasts	A, B
34	Determination of polyaromatic hydrocarbons by HPLC-FLD	SOP č. 31	Beer, beer-based alcoholic beverages, wine, soft drinks	A, B
35	Determination of polyaromatic hydrocarbons by HPLC-FLD	SOP č. 32	Cereals	A, B

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 degrees of freedom: A – Flexibility concerning materials/products (subject of the test), B – Flexibility concerning components/parameters/characteristics, C – Flexibility concerning the performance of the method, D – Flexibility concerning the method

The laboratory can modify the test procedures with the specified degree(s) of freedom in the scope of accreditation while maintaining the principle of measurement. If no degree of freedom is specified, the laboratory cannot apply a flexible approach to the scope of accreditation for the test.

Specification of the scope of accreditation:

Ordinal test number	Detailed information on activities within the scope of accreditation (determined analytes)
8, 9	N-nitrosamines: N-nitrosodimethylamine (NDMA), N-nitrosodiethylamine (NDEA), N-nitrosodibutylamine (NDBA), N-nitrosopiperidine (NPIP), N-nitrosopyrrolidine (NPYR) and N-nitrosomorfoline (NMOR)
10	N-nitrosamines: N-nitrosodimethylamine (NDMA), N-nitrosodiethylamine (NDEA), N-nitrosodipropylamine (NDPA), N-nitrosodibutylamine (NDBA), N-nitrosopiperidine (NPIP), N-nitrosopyrrolidine (NPYR) and N-nitrosomorfolin (NMOR)
15	K, Na, Ca, Cu, Zn, Mg, Mn, Al, Fe, Cd, Pb, Ni, Cr, Sn
16	Ca, Al, Fe

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Ordinal test number	Detailed information on activities within the scope of accreditation (determined analytes)
18	Dichloromethane, 1,1-dichloroethane, 1,2-dichloroethane, trichloromethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloroethene, 1,1,2,2-tetrachloroethene, tetrachloromethane, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane
22	Glucose, fructose, total carbohydrates by enzymatic analysis
28	Acephate, Acetamiprid, Avamectin B1A, Azoxystrobin, Bifenthrin, Boscalid, Carbendazim, Chlorpyrifos, Clothianidin, Cyazofamid, Cymoxanil, Dimethomorph (sum of isomers), Etoxazole, Fenpyroximate, Flonicamid, Hexythiazox, Imazalil, Imidacloprid, Malaaxon, Malathion (sum of malathionu and malaaxonu expressed as malathion), Mandipropamid, Mepanipyrim, Metalaxyl, Myclobutanil, Dibrom/Naled, Oxadiazon, Penconazol, Pendimethalin, Pirimicarb, Propamocarb, Propargite, Propiconazole, Pymetrozin, Pyraclostrobin, Pyridaben, Quinoxifen, Spirodiclofen, Spirotetramat, Spiroxamine, Tebuconazole, Tebufenpyrad, Thiabendazole, Thiamethoxam, Triadimefon, Triadimenol, Trifloxystrobin and Triflumizole
29	Acephate, Acetamiprid, Ametoctradin, Avamectin B1A, Azoxystrobin, Bifenthrin, Boscalid, Bupirimate, Carbendazim, Chlorpyrifos, Chlorantraniliprole, Clothianidin, Cymoxanil, Dimethomorph, Etoxazole, Fenarimol, Fenpropimorph, Fenpyroximate, Flonicamid, Hexythiazox, Imazalil, Imidacloprid, Indoxacarb, Mandipropamid, Mepanipyrim, Metalaxyl, Methoxyfenozid, Metrafenone, Myclobutanil, Oxadiazon, Penconazol, Pendimethalin, Pirimicarb, Propamocarb, Propargite, Propiconazole, Pymetrozin, Pyraclostrobin, Pyridaben, Quinoxifen, Spiroxamine, Tebuconazole, Tebufenozide, Tebufenpyrad, Thiabendazole, Thiadiazol, Thiamethoxam, Triadimefon, Triadimenol, Trifloxystrobin and Triflumizole
31	Benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthrene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene
32	Histamine, tyramine
33	Sn, Al, Cr, Co, Mn, Cu, Mo, Ni, Pb, Cd, Zn, Fe
34	Sn, Al, Cr, Co, Mn, Cu, Mo, Ni, Pb, Cd, Zn, Fe
35	Anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]pepylene, benzo[a]pyrene, chrysene, dibenz[a,h]anthracene, fluorene, indenol[1,2,3-cd]pyrene, fenanthrene, pyrene

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Ordinal test number	Detailed information on activities within the scope of accreditation (source literature)
1-4, 20, 23, 25, 26	EBC – European Brewery Convention Analysis Committee: Analytica-EBC, Verlag Hans Carl Getränke- Fachverlag, Nürnberg, 2009
5, 6, 7, 16, 19	MEBAK (2013). Wort, Beer, Beer-based Beverages Methodensammlung der Mitteleuropäischen Brautechnischen Analysenkommission, MEBAK, Freising-Weihenstephan, Germany, ISBN 978-3-9805814-7-9, 2013
8	Egan, H., Preussmann, R., O'Neill, I.K., Eisenbrand, G., Spiegelhalder, B., Bartsch, H., eds. (1982). Environmental Carcinogens: Selected Methods of Analysis Volume 6: N-Nitroso Compounds IARC Scientific Publication No. 45. ISBN 978-92-832-1145-7; Čulík, J., Kellner, V., Špinar, B., Prokeš, J., Basařová, G. (1989). Těkavé N-nitrosaminy ve sladu. I. Vliv pesticidů a dusíkatých hnojiv aplikovaných ve vegetačním období na obsah těkavých N-nitrosaminů ječmeni a sladu (Volatile N-nitrosamines in malt. I. Effect of pesticides and nitrogen fertilizers applied during the growing season on the volatile N-nitrosamines content of barley and malt). Kvasný průmysl, 35(10), 289–292. DOI 10.18832/kp1989037
9	NIOSH 2522 (1994)., Nistrosamines. NIOSH Manual of Analytica Methods, 4th Edition. https://www.cdc.gov/niosh/docs/2003-154/pdfs/2522.pdf
11	Vrzal, T., Malečková, M. Olšovská, J. (2021). Miniaturized and improved method for Apparent Total N-Nitroso Compounds determination in beer. Kvasný průmysl, 67(5), 498–502. DOI 10.18832/kp2021.67.498
12	Garaj J., Bustin D., Hladký Z. (1987). Analytická chémie. Alfa, Bratislava, s. 158. ISBN 063-553-87; Čepička, J., Baudyš, P., Víznerová, E. Krausová, J. (1991). Obsah dusičnanů ve varních vodách a v pivech východočeských pivovarů (Nitrate content in brewing waters and beers of East Bohemian breweries). Kvasný průmysl, 37(8-9), 230–234. DOI 10.18832/kp1991024
21	De Cooman, L., Aerts, G., Overmeire, H., De Keukeleire, D. (2000). Alterations of the Profiles of Iso- α -Acids During Beer Ageing, Marked Instability of Trans-Iso- α -Acids and Implications for Beer Bitterness Consistency in Relation to Tetrahydroiso- α -Acids. Journal of the Institute of Brewing, 106(3), 169–178. DOI 10.1002/j.2050-0416.2000.tb00054.x
22	Jurková, M., Čejka, P., Štěrba, K., Olšovská, J. (2014). Determination of Total Carbohydrate Content in Beer Using Its Pre-column Enzymatic Cleavage and HPLC-RI. Food Analytical Methods, 7, 1677–1686. DOI 10.1007/s12161-014-9805-y
29	Dušek, M., Jandovská, V., Olšovská, J. (2018). Tracking, Behavior and Fate of 58 Pesticides Originated from Hops during Beer Brewing. Journal of Agricultural and Food Chemistry, 66, 10113–10121. DOI 10.1021/acs.jafc.8b03416

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Ordinal test number	Detailed information on activities within the scope of accreditation (source literature)
30	Malečková, M., Vrzal, T., Olšovská, J. (2020). Development of a method for melamine determination in beer and beer-type beverages by GC-MS/MS. <i>Kvasný průmysl</i> , 66(5), 331–335. DOI 10.18832/kp2019.66.331
31	Zušťáková, V., Jurková, M, Olšovská, M. (2019). Stanovení biogenních aminů v pivu pomocí vysokoúčinné kapalinové chromatografie s fluorescenční detekcí (Determination of biogenic amines in beer by high-performance liquid chromatography with fluorescence detection). <i>Kvasný, speciál</i> , 71–75
32	Analytik Jena (2015). Analysis of Food and Agricultural Samples Using PlasmaQuant®MS, application note. https://www.analytik-jena.fr/fileadmin/content/pdf_analytical_instrumentation/ICP/ICP-MS/SpecialApp_ICP_MS_food_en.pdf
33	Analytik Jena (2015). Analysis of Food and Agricultural Samples Using PlasmaQuant®MS, application note. https://www.analytik-jena.fr/fileadmin/content/pdf_analytical_instrumentation/ICP/ICP-MS/SpecialApp_ICP_MS_food_en.pdf
34	Horák, T., Jurková, M., Čulík, J., Kellner, V. (1999). Stanovení polycyklických aromatických uhlovodíků a polychlorovaných bifenylů v pivě (Determination of polycyclic aromatic hydrocarbons and polychlorinated biphenyls in beer). <i>Kvasný průmysl</i> , 45, 190–192. DOI 10.18832/kp1999015
35	Restek Corporation [online]. EPA 8310 PAH Mix on Pinnacle® II PAH (FLD) [29-04-2024]. https://ez.restek.com/images/cgram/lc_ev0522.pdf ; Anastassiades M., Lehotay, S.J. (2003). Fast and Easy Multiresidue Method Employing Acetonitrile Extraction/Partitioning and “Dispersive Solid-Phase Extraction” for the Determination of Pesticide Residues in Produce. <i>Journal of AOAC INTERNATIONAL</i> , 86(2), 412–431.

Explanations:

- NIR – Near InfraRed
- AMA – Advanced Mercury Analyser
- ICP-MS – Inductively Coupled Plasma Mass Spectrometry
- LC-MS – Liquid Chromatography Mass Spectrometry
- GC-FID – Gas Chromatography Flame Ionization Detector
- GC-NCD – Gas Chromatography Nitrogen Chemiluminescence Detector
- NIBEM – name of the instrument from Pentair Haffmans (Netherlands Institute for Brewery En Maltery);
NIBEM method – the rate of foam drop is monitored using an electrode
- NDMA – N-nitrosodimethylamine
- HPLC-UV – High Performance Liquid Chromatography UltraViolet detection
- HPLC-RI – High Performance Liquid Chromatography Refractive Index detector
- HPLC-FLD – High Performance Liquid Chromatography Fluorescence Detector

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AAS – Atomic Absorption Spectrometry
NCD – Nitrogen Chemiluminescence Detector
NIOSH – National Institute for Occupational Safety and Health

"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. "