

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-PL-17315-01-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 09.02.2017 to 08.02.2022

Date of issue: 13.02.2017

Holder of certificate:

**Hydroisotop GmbH, Laboratorium zur Bestimmung von Isotopen in Umwelt und Hydrologie
Woelkestraße 9, 85301 Schweitenkirchen
GERMANY**

Tests in the fields:

**physical, physico-chemical and chemical analysis of water;
isotope analysis of water, gas, solids, selected food and foodstuffs;
analysis of selected radio nuclides and total activity;
analysis of radioactive materials and selected chemical analysis of drinking water according to German Drinking Water Ordinance;
sampling of raw and drinking water, of water from ground water aquifers and surface flowing and stagnant waters;
Specialist module: soil and contaminated sites**

Abbreviations used: see last page

Within Chapters 4 and 5, the testing laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use standards or equivalent testing methods listed here with different issue dates. The testing laboratory maintains a current list of all testing methods within the flexible scope of accreditation.

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1 Isotope analysis

1.1 Isotope analysis of water

QMA 504-2/6
2012-02 Analysis of carbon isotope ratio ($^{13}\text{C}/^{12}\text{C}$) of CO_2 dissolved in water (DIC) by isotope ratio mass spectrometry (IRMS)

QMA 504-2/7
2012-02 Analysis of nitrogen isotope ratio ($^{15}\text{N}/^{14}\text{N}$) in nitrate (NO_3^-) and ammonium (NH_4^+) dissolved in water by isotope ratio mass spectrometry (IRMS)

QMA 504-2/9
2012-02 Analysis of oxygen isotope ratio ($^{18}\text{O}/^{16}\text{O}$) in nitrate (NO_3^-) dissolved in water by isotope ratio mass spectrometry (IRMS)

1.2 Isotope analysis of gases

QMA 504-2/8
2002-04 Analysis of nitrogen isotope ratio ($^{15}\text{N}/^{14}\text{N}$) of volatile nitrogen (N_2) dissolved in water by isotope ratio mass spectrometry (IRMS)

1.3 Isotope analysis of the water molecule and of carbon in water, gases, solids, selected food and foodstuffs

QMA 504-2/2
2012-02 Analysis of hydrogen isotope ratio ($^2\text{H}/^1\text{H}$) in water by isotope ratio mass spectrometry (IRMS)

QMA 504-2/3
2012-02 Analysis of oxygen isotope ratio ($^{18}\text{O}/^{16}\text{O}$) in water by isotope ratio mass spectrometry (IRMS)

QMA 504-2/23
2012-02 Analysis of hydrogen isotope ratio ($^2\text{H}/^1\text{H}$) and of oxygen isotope ratio ($^{18}\text{O}/^{16}\text{O}$) in water by cavity-ringdown-spectrometry (CRDS)

QMA 504-2/16
2012-02 Analysis of carbon isotope ratio ($^{13}\text{C}/^{12}\text{C}$) in carbon of organic compounds by gas chromatography isotope ratio mass spectrometry (GC-IRMS)

QMA 504-2/4
2012-02 Analysis of hydrogen isotope ratio ($^2\text{H}/^1\text{H}$) in hydrogen of organic compounds by gas chromatography isotope ratio mass spectrometry (GC-IRMS)

QMA 504-2/28
2015-03 Analysis of sulfur isotope ratio ($^{34}\text{S}/^{32}\text{S}$) of sulfur in inorganic and organic compounds by isotope ratio mass spectrometry (IRMS)

QMA 504-2/29
2015-03 Analysis of oxygen isotope ratio ($^{18}\text{O}/^{16}\text{O}$) of oxygen in inorganic and organic compounds by isotope ratio mass spectrometry (IRMS)

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QMA 504-2/30
2015-03 Analysis of chlorine isotope ratio ($^{37}\text{Cl}/^{35}\text{Cl}$) of chlorine in inorganic and organic compounds by isotope ratio mass spectrometry (IRMS)

2 Isotope analysis of specific radio nuclides

2.1 Isotope analysis of specific radio nuclides in water

QMA 504-2/17
2011-04 Analysis of activity concentration of the radio nuclide Radon-222 dissolved in water by gamma spectrometry after extractive enrichment (gas extraction) on activated charcoal

QMA504-2/18
2013-10 Analysis of activity concentration of radio nuclides dissolved in water by gamma spectrometry

DIN EN ISO 11704
2015-11 Water quality - measurement of gross alpha and total beta activity in non-saline water – liquid scintillation counting method

2.2 Isotope analysis of specific radio nuclides in solids, selected food and foodstuffs

QMA 504-2/24
2013-10 Analysis of activity concentration of radio nuclides in solids by gamma spectrometry

2.3 Isotope analysis of selected radio nuclides in the water molecule and in carbon of water, gases, solids, selected food and foodstuffs

DIN EN ISO 9698
2015-12 Water quality - determination of tritium activity concentration – liquid scintillation counting method

QMA 504-2/1
2011-09 Analysis of Tritium (^3H) in water after electrolytic enrichment by Liquid Scintillation Counting (LSC) (DIN 38404-C13:1988-05)

QMA 504-2/10
2011-12 Analysis of carbon-14 isotope (^{14}C) in carbon by Liquid Scintillation Counting (LSC)

DIN EN 15440
2011-05 Solid derived fuels –determination of the content of biomass
Adjustment
2012-10 (deviation: ^{14}C method)

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3 Analysis of gas mixtures

QMA 504-2/15 Analysis of the composition of gas mixtures by gas chromatography
2007-04

4 Analysis of water

4.1 Sampling of water from aquifers and flowing waters

DIN EN ISO 5667-1 (A 4) Water quality – Sampling – Part 1: Guidance on the design of
2007-04 sampling programmes and sampling techniques

DIN 38402-A 12 Sampling from barrages and lakes
1985-06

DIN 38402-A 13 Sampling from aquifers
1985-12

DIN 38402-A 15 Sampling from rivers and streams
2010-04

DIN 38402-A 18 sampling of water from mineral springs and spas
1991-05

DIN EN ISO 5667-3 (A 21) Water quality – Sampling – Part 3: Guidance on the preservation
2013-03 and handling of samples

DIN EN ISO 19458 (K 19) Water quality – sampling for microbial analyses
2006-12

4.2 Physical and physico-chemical characteristics

DIN EN ISO 7887 (C 1) Water quality – Examination and determination of colour
2012-04 (deviation: *visual testing*)

DIN EN ISO 7027 (C 2) Water quality – Determination of turbidity
2000-04 (deviation: *visual testing*)

DIN 38404-C 4 Determination of temperature
1976-12

DIN EN ISO 10523 (C 5) Determination of the pH-value
2012-04

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DIN 38404-C 6 1984-05	Determination of the oxidation-reduction potential, O. R. P.
DIN EN 27888 (C 8) 1993-11	Water quality; determination of specific electrical conductivity
DIN 38404-10 (C 10) 2012-12	Determination of calcite saturation of water
DIN EN 12502-1 2005-03	Corrosion control - guidance on the assessment of corrosion likelihood in water distribution and storage systems- Part 1: General remarks
DIN EN 12502-2 2005-03	Corrosion control - guidance on the assessment of corrosion likelihood in water distribution and storage systems- Part 2: Influencing factors for copper and copper alloy
DIN EN 12502-3 2005-03	Corrosion control - guidance on the assessment of corrosion likelihood in water distribution and storage systems- Part 3: Influencing factors for hot-dipped ferrous materials
DIN EN 12502-4 2005-03	Corrosion control - guidance on the assessment of corrosion likelihood in water distribution and storage systems- Part 4: Influencing factors for rustproof steels
DIN EN 12502-5 2005-03	Corrosion control - guidance on the assessment of corrosion likelihood in water distribution and storage systems- Part 5: Influencing factors for cast iron, non-alloyed and low alloyed steels
DIN 4030-1 2008-06	Assessment of water, soil and gases for their aggressiveness to concrete - Part 1: Basics and limit values
DIN 4030-1 2008-06	Assessment of water, soil and gases for their aggressiveness to concrete - Part 1: Sampling and analysis of water and soil samples

4.3 Anions

DIN EN ISO 10304-1 (D 20) 2009-07	Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (deviation: <i>fluoride, chloride, orthophosphate, bromide, nitrate, and sulphate as well as iodide, acetate, and thiosulphate</i>)
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4.4 Cations

DIN EN ISO 14911 (E 34)
1999-12

Water quality – Determination of dissolved Li^+ , Na^+ , NH_4^+ , K^+ , Mn^{2+} , Ca^{2+} , Mg^{2+} , Sr^{2+} , and Ba^{2+} using ion chromatography – Method for water and waste water
(deviation: Na^+ , K^+ , Ca^{2+} , Mg^{2+} , Li^+ , Sr^{2+} , Ba^{2+})

4.5 Summary action and material characteristic parameters

DIN 38409-H 1
1987-01

Determination of the total solids residue, the filtrate solids residue, and the residue on ignition

DIN EN 1484 (H 3)
1997-08

Water analysis – Guidelines for the determination of total organic carbon (TOC), of the dissolved organic carbon (DOC), and the total inorganic carbon (TIC)

DIN 38409-H 7
2005-12

Determination of acid and base capacity

4.6 Jointly determinable substances

DIN 38407-F 3
1998-07

Determination of polychlorinated biphenyls by gas chromatography

DIN EN ISO 10301 (F 4)
1997-08

Water quality – Determination of highly volatile halogenated hydrocarbons – Gas chromatographic methods

DIN 38407-F 9
1991-05

Determination of benzene and its derivatives by gas chromatography

DIN EN ISO 11369 (F 12)
1997-11

Water quality – Determination of selected plant treatment agents – Method using high performance liquid chromatography with UV detection after solid-liquid extraction

DIN EN ISO 17993 (F 18)
2004-03

Water quality – Determination of 15 polycyclic aromatic hydrocarbons (PAH) in water by HPLC with fluorescence detection after liquid-liquid extraction

4.7 Single components

DIN EN ISO 5814 (G 22)
2013-02

Water quality – determination of dissolved oxygen; by electrochemical probe method

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DIN ISO 17289 (G 25) 2014-12	Water quality – determination of dissolved oxygen; by optical sensor method
QMA 504-2/21 2011-01	Determination of the content of fluorescence tracers by HPLC with fluorescence detection

4.8 Selected rapid tests

Merck Spectroquant 1.14752 2013-12	Photometric analysis of ammonia (NH_4^+) in water (<i>measuring range: 0,010 – 3,00 mg/l $\text{NH}_4\text{-N}$, 0,013 – 3,86 mg/l NH_4</i>)
Merck Spectroquant 1.14761 2017-01	Photometric analysis of total iron ($\text{Fe}_{\text{tot.}}$) in water (<i>measuring range: 0,005 – 5,00 mg/l Fe</i>)
Merck Spectroquant 1.14770 2017-02	Photometric analysis of total manganese (Mn_{tot}) in water (<i>measuring range: 0,010 – 10,00 mg/l Mn</i>)
Merck Spectroquant 1.14776 2017-01	Photometric analysis of nitrite (NO_2^-) in water (<i>measuring range: 0,002 – 1,00 mg/l $\text{NO}_2\text{-N}$, 0,007 – 3,28 mg/l NO_2 mg/l</i>)
Merck Spectroquant 1.14779 2016-09	Photometric analysis of sulfide (S^{2-}) in water (<i>measuring range: 0,020 – 1,50 mg/l S</i>)
Merck Spectroquant 1.14794 2016-07	Photometric analysis of silicate in water (<i>measuring range: 0,005 – 5 mg/l S, 00,11 – 10,7 mg/l SiO_2</i>)
Merck Spectroquant 1.14848 2016-01	Photometric analysis of orthophosphate (PO_4^{3-}) in water (<i>measuring range: 0,010– 5,0 mg/l $\text{PO}_4\text{-P}$, 0,03 – 15,3 mg/l PO_4, 0,02 – 11,46 mg/l P_2O_5</i>)

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5 Analysis of drinking water according to German Drinking Water Ordinance 2001

Sampling

Method	Title
DIN EN ISO 5667-5 (A 14) 2011-02	Water quality – Sampling - Part 5: Guidance to sampling of drinking water from treatment installations and piping systems
DIN EN ISO 5667-3 (A 21) 2013-03	Water quality – Sampling – Part 3: Preservation and handling of samples
DIN EN ISO 19458 (K 19) 2006-12	Water quality – Sampling for microbial analysis
DIN 38402-A 12 1985-06	Sampling from barrages and lakes
DIN 38402-A 13 1985-12	Sampling from aquifers
DIN 38402-A 15 2010-04	Sampling from rivers and streams
DIN 38402-A 18 1991-05	Sampling of water from mineral springs and spas

Annex 1: Microbial parameter

idle

Annex 2: Chemical parameter

Part I: Chemical parameter which concentrations generally do not increase within the supply net including drinking water installations

Item	Parameter	Method
1	Acrylamid	idle
2	Benzene	DIN 38407-F 9 1991-05
3	Boron	idle
4	Bromate	idle
5	Chromium	idle
6	Cyanide	idle
7	1,2-Dichloroethene	DIN EN ISO 10301 (F 4) 1997-08
8	Fluoride	DIN EN ISO 10304-1 (D 20) 2009-07
9	Nitrate	DIN EN ISO 10304-1 (D 20) 2009-07
10	plant treatment agents – active agents and biocide product agents	DIN EN ISO 11369 (F12) 1997-11
11	plant treatment agents – active agents and biocide product agents total	DIN EN ISO 11369 (F12) 1997-11
12	Mercury	idle

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Item	Parameter	Method
13	Selenium	idle
14	Tetrachloroethene and Trichloroethene	DIN EN ISO 10301 (F 4) 1997-08
15	Uranium	idle

Part II: Chemical parameter which concentrations can increase within the supply net including drinking water installations

Item	Parameter	Method
1	Antimony	idle
2	Arsenic	idle
3	Benzo-(a)-pyrene	DIN EN ISO 17993 (F 18) 2004-03
4	Lead	idle
5	Cadmium	idle
6	Epichlorhydrine	idle
7	Copper	idle
8	Nickel	idle
9	Nitrite	Merck Spectroquant 1.14776
10	Polycyclic aromatic hydrocarbons	DIN EN ISO 17993 (F 18) 2004-03
11	Trihalogene methane	DIN EN ISO 10301 (F 4) 1997-08
12	Vinyl chloride	idle

Annex 3: Indicator parameter
Part I: Common indicator parameter

Item	Parameter	Method
1	Aluminium	idle
2	Ammonium	Merck Spectroquant 1.14752
3	Chloride	DIN EN ISO 10304-1 (D 20) 2009-07
4	Clostridium perfringens (including spores)	Idle
5	Coliform bacteria	Idle
6	Iron	Merck Spectroquant 1.14761
7	Colour (spectral adsorptions coefficient Hg 436 nm)	idle
8	Smell (an TON)	DIN EN 1622 (B3) Anhang C) 2006-10
9	Taste	DEV B1/2 Part a 1971
10	Colony count at 22 °C	idle
11	Colony count at 36 °C	idle
12	Electrical conductivity	DIN EN ISO 27888 (C 8) 1993-11
13	Manganese	idle
14	Sodium	DIN EN ISO 14911 (E 34) 1999-12

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Item	Parameter	Method
15	Total organic carbon (TOC)	DIN EN 1484 (H 3) 1997-08
16	Oxidizability	idle
17	Sulphate	DIN EN ISO 10304-1 (D 20) 2009-07
18	Turbidity	idle
19	Hydrogen ion concentration	DIN EN ISO 10523 (C 5) 2012-04
20	Calcite dissolution capacity	DIN 38404-C 10 2012-12

Part II: Special requirements for drinking water in systems of drinking water installation
Idle

Annex 3a: Requirements for drinking water regarding radioactive substances

Parameter	Method
Radon-222	QMA504-2/17, 2011-04
Tritium	DIN EN ISO 9698, 2015-12; QMA 504-2/1, 2011-09
Indicative dose (screening method)	
Gross alpha activity concentration (aa*)	DIN EN ISO 11704 2015-11
Gross alpha and beta activity concentration (bb*)	DIN EN ISO 11704 2015-11
Indicative dose (specific nuclide determination)	
U-238	idle
U-234	idle
Ra-226	QMA504-2/18, 2013-10
Ra-228	QMA504-2/18, 2013-10
Pb-210	idle
Po-210	idle
C-14	QMA504-2/10, 2011-12
Sr-90	idle
Pu-239/Pu-240	idle
Am-241	QMA504-2/18, 2013-10
Co-60	QMA504-2/18, 2013-10
Cs-134	QMA504-2/18, 2013-10
CS-137	QMA504-2/18, 2013-10
I-131	QMA504-2/18, 2013-10

(*according to German Drinking Water Ordinance Annex 3a Part III)

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Parameter which are not part of annexes 1 to 3 of drinking water ordinance 2011

Further periodic analysis

Parameter	Method
Calcium	DIN EN ISO 14911 (E 34) 1999-12
Potassium	DIN EN ISO 14911 (E 34) 1999-12
Magnesium	DIN EN ISO 14911 (E 34) 1999-12
Acid capacity	DIN 38409-(H 7) 2005-12
Phosphate	idle

The accreditation does not replace the recognition or approval procedure of the responsible authority according to § 15 clause 4 drinking water ordinance.

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6 List of testing methods to specialist module: soil and contaminated sites, effective 16.08.2012

Examination field 1: Solids
idle

Examination field 2 : Eluates and percolates, aqueous media
Section 2.1 Sampling and on-site inspections

Sampling			
Inspection parameter	Methods/Reference	Procedure	
Sampling strategy and sampling techniques		DIN EN ISO 5667-1: 2007	<input checked="" type="checkbox"/>
Sampling of groundwater	AQS-Merkblatt P 8/2: 1996*	ISO 5667-11: 2009 DIN 38402-13: 1985 DVGW-Arbeitsblatt W 112: 2011*	<input checked="" type="checkbox"/>
Sampling of seepage water		currently no standardised procedure existent, if any E-DWA-M 905: 2008	<input checked="" type="checkbox"/>
Sampling of surface water (flowing)	AQS-Merkblatt P 8/3: 1998*	DIN 38402-15: 2010	<input checked="" type="checkbox"/>
Sampling of surface water (stagnant)		DIN 38402-12: 1985	<input checked="" type="checkbox"/>

(*: in German)

Sampling			
Inspection parameter	Methods/Reference	Procedure	
Colour		DIN EN ISO 7887:2012	<input checked="" type="checkbox"/>
Turbidity		DIN EN ISO 7027: 2000	<input checked="" type="checkbox"/>
Smell		DEV B1/2 1971	<input checked="" type="checkbox"/>
Temperature		DIN 38404-4: 1976	<input checked="" type="checkbox"/>
pH-value		DIN EN ISO 10523:2012	<input checked="" type="checkbox"/>
Oxygen content		DIN EN25814: 1992	<input checked="" type="checkbox"/>
Electrical conductivity		DIN EN 27888: 1993	<input checked="" type="checkbox"/>
Redox potential		DIN 38404-6: 1984	<input checked="" type="checkbox"/>
Sample storage, sample handling, sample transport		DIN EN ISO 5667-3: 2004	<input checked="" type="checkbox"/>

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Section 2.2 Laboratory - Analysis of eluates/percolates of inorganic parameters

idle

Section 2.3 Laboratory - Analysis of eluates/percolates of organic parameters

idle

Examination field 3 – Soil gas, landfill gas

idle

Abbreviations used:

AQS	Analytical quality control Baden-Württemberg
DEV	German institutional method
DIN	German institute for standardisation
EN	European Norm
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardisation
QMA	In-house method Hydroisotop GmbH