



## Potvrda o akreditaciji Accreditation Certificate

### Ovime se utvrđuje da je

This is to recognize that

Državni hidrometeorološki zavod  
Samostalna služba za umjerni laboratorij  
Grič 3, HR-10000 Zagreb  
Avenija Većeslava Holjevca 20, HR-10000 Zagreb

### osposobljen prema zahtjevima norme

is competent according to

**HRN EN ISO/IEC 17025:2017**

(ISO/IEC 17025:2017,

EN ISO/IEC 17025:2017)

za/to carry out

**Umjeravanje mjerila temperature, tlaka, relativne vlažnosti, Sunčevog zračenja, analizatora za mjerenje onečišćujućih tvari u zraku i plinskih mješavina te mjerila i regulatora protoka plina**  
Calibration of temperature, pressure, relative humidity gauges, Solar irradiance, analyzers for measurement of pollutants in ambient air and gas mixtures, and gas flow meters and controllers

**u području opisanom u prilogu koji je sastavni dio ove potvrde o akreditaciji.**

for the scope described in the annex which is the constituent part of this accreditation certificate.

Br./No.: 2365

Klasa/Ref.No.: 383-02/16-80/003

Urbroj/Id.No.: 569-02/4-19-40

Zagreb, 2019-10-28

**Akreditacija istječe**•Accreditation expiry: 2022-04-10

**Prva akreditacija**•Initial accreditation: 2012-03-02

**HAA je potpisnica multilateralnog sporazuma s Europskom organizacijom za akreditaciju (EA)**

HAA is a signatory of the European co-operation for Accreditation (EA) Multilateral Agreement

**v.d. Ravnatelja:**

Acting Director General:

Tihomir Babić, dipl. ing.



**Hrvatska akreditacijska agencija**  
Croatian Accreditation Agency

**PRIOLOG POTVRDI O AKREDITACIJI br.: 2365**

*Annex to the Accreditation Certificate No.:*

Klasa/Ref. No.: 383-02/16-80/003

Urbroj/Id. No.: 569-02/8-20-43

Datum izdanja priloga /Annex Issued on: 2020-09-14

Zamjenjuje prilog/Replaces Annex:

Klasa/Ref. No.: 383-02/16-80/003

Urbroj/Id. No.: 569-02/4-19-39

Datum izdanja priloga /Annex Issued on: 2019-10-28

**Norma: HRN EN ISO/IEC 17025:2017**

*Standard: (ISO/IEC 17025:2017; EN ISO/IEC 17025:2017)*

**Akreditacija istječe: 2022-04-10**

*Accreditation expiry:*

**Prva akreditacija: 2012-03-02**

*Initial accreditation:*

**Akreditirani laboratorij**

*Accredited laboratory*

**Državni hidrometeorološki zavod  
Samostalna služba za umjerni laboratorij  
Borongajska cesta 83d/1, HR-10000 Zagreb**

**Područje akreditacije:**

*Scope of Accreditation:*

**Umjeravanje mjerila temperature, tlaka, relativne vlažnosti, Sunčevog zračenja,  
analizatora za mjerenje onečišćujućih tvari u zraku i plinskih mješavina te  
mjerila i regulatora protoka plina**

*Calibration of temperature, pressure, relative humidity gauges, Solar irradiance,  
analyzers for measurement of pollutants in ambient air and gas mixtures, and  
gas flow meters and controllers*

Važeće izdanje Priloga dostupno je na web adresi: [www.akreditacija.hr](http://www.akreditacija.hr) /

*Valid issue of the Annex is available at the web address: [www.akreditacija.hr](http://www.akreditacija.hr)*

**v. d. ravnateljica:**

**Acting Director General:**

**Ankica Barišić, dipl. ing.**

**PODRUČJE AKREDITACIJE / SCOPE OF ACCREDITATION**

**Državni hidrometeorološki zavod**  
**Samostalna služba za umjerna laboratorij**

Lokacija/Location Borongajska cesta 83d/1, HR-10000 Zagreb

<b>Umjeravanje u laboratoriju / Calibration performed in a laboratory</b>					
<b>Br. No.</b>	<b>Mjerna veličina/ Mjerilo</b> <i>Measurand / Calibration item</i>	<b>Mjerno područje</b> <i>Measurement range</i>	<b>Mjerna sposobnost*</b> <i>Calibration and measurement capability* (CMC)</i>	<b>Metode umjeravanja</b> <i>Calibration methods</i>	<b>Napomene</b> <i>Remarks</i>
1.	Temperatura / Termometri s direktnim očitanjem, s termoparovima kao osjetnicima	-50 °C do/to 100 °C	0,9 K	MLQP-1 Izd./Ed. 02 2020-06-16	Etanolska kupelj dubina = 260 mm. <i>Ethanol bath, Immersion = 260 mm</i>
	<i>Temperature / Direct reading thermometers with thermocouples as sensors</i>	100 °C do/to 140 °C	0,9 K	MLQP-1 Izd./Ed. 02 2020-06-16	Suhi termoblok dubina = 150 mm <i>Dry thermoblock Depth = 150 mm</i>
2.	Temperatura / Termometri s direktnim očitanjem, sa platinskim otporničkim osjetnicima	-50 °C do/to 100 °C	48 mK	MLQP-1 Izd./Ed. 02 2020-06-16 DKD-R-5.1:2018	Etanolska kupelj dubina = 260 mm. <i>Ethanol bath, Immersion = 260 mm</i>
	<i>Temperature / Direct reading thermometers with platinum resistance thermometers as sensors</i>	100 °C do/to 140 °C	70 mK	MLQP-1 Izd./Ed. 02 2020-06-16	Suhi termoblok dubina = 150 mm <i>Dry thermoblock Depth = 150 mm</i>
3.	Temperatura / Stakleni termometri rastezanja	-20 °C do/to 50 °C	124 mK	MLQP-1 Izd./Ed. 02 2020-06-16	Vodena / glikolna kupelj dubina = 260 mm. <i>Water/glycol bath Immersion = 260 mm</i>
	<i>Temperature / Liquid-in-glass thermometers</i>				

<b>Umjeravanje u laboratoriju / Calibration performed in a laboratory</b>					
<b>Br. No.</b>	<b>Mjerna veličina/ Mjerilo</b> <i>Measurand / Calibration item</i>	<b>Mjerno područje</b> <i>Measurement range</i>	<b>Mjerna sposobnost*</b> <i>Calibration and measurement capability* (CMC)</i>	<b>Metode umjeravanja</b> <i>Calibration methods</i>	<b>Napomene</b> <i>Remarks</i>
4.	Temperatura / Otpornički termometri <i>Temperature / Resistance thermometers</i>	-60 °C do/to 200 °C	24 mK	MLQP-1 Izd./Ed. 02 2020-06-16  DKD-R-5.1:2018	Etanolsko / silikonsko-uljna kupelj dubina = 225 mm. <i>Ethanol/ Silicone Oil bath Immersion = 225 mm</i>
5.	Temperatura / Mehanički termometri sa zapisom <i>Temperature / Mechanical thermometers with indicator</i>	-30 °C do/to 60 °C	0,5 K	MLQP-1 Izd./Ed. 02 2020-06-16	Medij: zrak Klima komora <i>Medium: air Climatic chamber</i>
6.	Apsolutni tlak, $p_a$ / Pretvornici tlaka s električnim izlazom, manometri sa digitalnim pokazivanjem, opružni manometri <i>Absolute pressure, <math>p_a</math> / Pressure transmitters with electrical output, electrical pressure gauges, Bourdon tube pressure gauges</i>	50 hPa do/to 1700 hPa (50 mbar do/to 1,7 bar)	$5 \cdot 10^{-5} \cdot p_a + 4 \text{ Pa}$	MLQP-3 Izd./Ed. 03 2020-07-06  EURAMET cg 17/v.04 (04/2019)	Tlačni medij: plin (dušak) <i>Pressure medium: gas (nitrogen)</i>

<b>Umjeravanje u laboratoriju / Calibration performed in a laboratory</b>					
<b>Br. No.</b>	<b>Mjerna veličina/ Mjerilo</b> <i>Measurand / Calibration item</i>	<b>Mjerno područje</b> <i>Measurement range</i>	<b>Mjerna sposobnost*</b> <i>Calibration and measurement capability* (CMC)</i>	<b>Metode umjeravanja</b> <i>Calibration methods</i>	<b>Napomene</b> <i>Remarks</i>
7.	Relativna vlažnost / Mjerila vlage s električnim i digitalnim izlazom; mehanička mjerila vlage sa zapisom  <i>Relative Humidity / Hygrometers with electrical and digital output; mechanical hygrometers with indicator</i>	10 % do/to 95 % ( $T = 23 \text{ °C} \pm 5 \text{ °C}$ )	1,5 %	MLQP-2 Izd./Ed. 03 2020-06-16	Medij: zrak Generator relativne vlažnosti Klima komora <i>Medium: gas (Air)</i> <i>Relative humidity generator</i> <i>Climatic chamber</i>
8.	Sunčevo zračenje – piranometri  <i>Solar irradiance - pyranometers</i>	$\approx 500 \text{ W/m}^2$	1,8 %	MLQP-4 Izd./Ed. 02 2020-02-27  ISO 9847:1992 Metoda/Method II c	Metoda usporedbe / <i>Comparison method</i>

Umjeravanje u laboratoriju / Calibration performed in a laboratory					
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks
9.	Koncentracija O <sub>3</sub> / Mjerilo O <sub>3</sub>  O <sub>3</sub> concentration / O <sub>3</sub> analyzer	0 nmol/mol do/to 1000 nmol/mol	$0,020 \cdot c_{O_3} + 1,1$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08  ISO 13964:1998	Metoda usporedbe / Comparison method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14625:2012, Tablice 1. i 6. On demand lack of fit, repeatability and short term drift tests according to EN 14625:2012, Tables 1. and 6.
10.	Koncentracija CO / Analizator CO  CO concentration/ CO analyzer	0 nmol/mol do/to 70000 nmol/mol	$0,023 \cdot c_{CO} + 140$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Izravna metoda / Direct method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14626:2012, Tablice 1. i 6. On demand lack of fit, repeatability and short term drift tests according to EN 14626:2012, Tables 1. and 6.
11.		0 nmol/mol do/to 86000 nmol/mol	$0,031 \cdot c_{CO} + 210$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14626:2012, Tablice 1. i 6. On demand lack of fit, repeatability and short term drift tests according to EN 14626:2012, Tables 1. and 6.
12.			$0,018 \cdot c_{CO} + 105$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda razrjeđenja / Dilution method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14626:2012, Tablice 1. i 6. On demand lack of fit, repeatability and short term drift tests according to EN 14626:2012, Tables 1. and 6.
13.	Koncentracija SO <sub>2</sub> / Analizator SO <sub>2</sub>  SO <sub>2</sub> concentration/ SO <sub>2</sub> analyzer	0 nmol/mol do/to 300 nmol/mol	$0,030 \cdot c_{SO_2} + 1,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Izravna metoda / Direct method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14212:2012 + HRN EN 14212:2012 /Ispr.1:2014, Tablice 1. i 6. On demand lack of fit, repeatability and short term drift tests according to EN 14212:2012 + EN 14212:2012/AC:2014, Tables 1. and 6.

Umjeravanje u laboratoriju / Calibration performed in a laboratory					
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks
14.	Koncentracija SO <sub>2</sub> / Analizator SO <sub>2</sub>	0 nmol/mol do/to 376 nmol/mol	$0,059 \cdot c_{SO_2} + 2,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14212:2012 + HRN EN 14212:2012 /Ispr.1:2014, Tablice 1. i 6. <i>On demand lack of fit, repeatability and short term drift tests according to EN 14212:2012 + EN 14212:2012/AC:2014, Tables 1. and 6.</i>
15.	SO <sub>2</sub> concentration/ SO <sub>2</sub> analyzer		$0,04 \cdot c_{SO_2} + 2,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda razrjeđenja / Dilution method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14212:2012 + HRN EN 14212:2012 /Ispr.1:2014, Tablice 1. i 6. <i>On demand lack of fit, repeatability and short term drift tests according to EN 14212:2012 + EN 14212:2012/AC:2014, Tables 1. and 6.</i>
16.	Koncentracija NO (NO <sub>x</sub> ) / Analizator NO (NO <sub>x</sub> )	0 nmol/mol do/to 962 nmol/mol	$0,049 \cdot c_{NO} + 3,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method Na zahtjev ispitivanje linearnosti, ponovljivosti, kratkotrajnog odmaka i učinkovitosti konvertera prema HRN EN 14211:2012 + HRN EN 14211:2012 /Ispr.1:2014, Tablice 1. i 6. <i>On demand lack of fit, repeatability, short term drift tests and converter efficiency according to EN 14211:2012 + EN 14211:2012/AC:2014, Tables 1. and 6.</i>
17.	NO (NO <sub>x</sub> ) concentration / NO (NO <sub>x</sub> ) Analyzers	0 nmol/mol do/to 800 nmol/mol	$0,023 \cdot c_{NO} + 1,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Izravna metoda / Direct method Na zahtjev ispitivanje linearnosti, ponovljivosti, kratkotrajnog odmaka i učinkovitosti konvertera prema HRN EN 14211:2012 + HRN EN 14211:2012 /Ispr.1:2014, Tablice 1. i 6. <i>On demand lack of fit, repeatability, short term drift tests and converter efficiency according to EN 14211:2012 + EN 14211:2012/AC:2014, Tables 1. and 6.</i>

Umjeravanje u laboratoriju / Calibration performed in a laboratory					
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks
18.	Koncentracija NO (NO <sub>x</sub> ) / Analizator NO (NO <sub>x</sub> )  NO (NO <sub>x</sub> ) concentration / NO (NO <sub>x</sub> ) Analyzers	0 nmol/mol do/to 962 nmol/mol	$0,015 \cdot c_{NO} + 1,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda razrjeđenja / Dilution method Na zahtjev ispitivanje linearnosti, ponovljivosti, kratkotrajnog odmaka i učinkovitosti konvertera prema HRN EN 14211:2012 + HRN EN 14211:2012 /Ispr.1:2014, Tablice 1. i 6. <i>On demand lack of fit, repeatability, short term drift tests and converter efficiency according to EN 14211:2012 + EN 14211:2012/AC:2014, Tables 1. and 6.</i>
19.	Koncentracija NO <sub>2</sub> / Analizator NO <sub>2</sub>	0 nmol/mol do/to 300 nmol/mol	$0,040 \cdot c_{NO_2} + 2,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14211:2012, Tablice 1. i 6. <i>On demand lack of fit, repeatability and short term drift according to HRN EN 14211:2012, Tables 1. and 6</i>
20.	NO <sub>2</sub> concentration / NO <sub>2</sub> analyzers	0 nmol/mol do/to 300 nmol/mol	$0,035 \cdot c_{NO_2} + 1,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda razrjeđenja / Dilution method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14211:2012, Tablice 1. i 6. <i>On demand lack of fit, repeatability and short term drift according to HRN EN 14211:2012, Tables 1. and 6</i>
21.	Koncentracija H <sub>2</sub> S / Analizator H <sub>2</sub> S	0 nmol/mol do/to 300 nmol/mol	$0,060 \cdot c_{H_2S} + 2,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14212:2012 + HRN EN 14212:2012 /Ispr.1:2014, Tablice 1. i 6. <i>On demand lack of fit, repeatability and short term drift tests according to EN 14212:2012 + EN 14212:2012/AC:2014, Tables 1. and 6.</i>
22.	H <sub>2</sub> S concentration/ H <sub>2</sub> S analyzer	0 nmol/mol do/to 300 nmol/mol	$0,025 \cdot c_{H_2S} + 1,0$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda razrjeđenja / Dilution method Na zahtjev ispitivanje linearnosti, ponovljivosti i kratkotrajnog odmaka prema HRN EN 14212:2012 + HRN EN 14212:2012 /Ispr.1:2014, Tablice 1. i 6. <i>On demand lack of fit, repeatability and short term drift tests according to EN 14212:2012 + EN 14212:2012/AC:2014, Tables 1. and 6.</i>



Umjeravanje u laboratoriju / Calibration performed in a laboratory					
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks
23.	Plinska mješavina ugljikovog monoksida (CO) u sintetičkom zraku ili dušiku  Gas mixture of carbon monoxide in synthetic air or nitrogen	200 nmol/mol do/to 86000 nmol/mol	$0,025 \cdot c_{CO} + 100$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method
24.	Plinska mješavina sumporovog dioksida (SO <sub>2</sub> ) u sintetičkom zraku ili dušiku  Gas mixture of sulphur dioxide in synthetic air or nitrogen	2 nmol/mol do/to 376 nmol/mol	$0,029 \cdot c_{SO_2} + 1,3$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method
25.	Plinska mješavina dušikovog monoksida (NO) u sintetičkom zraku ili dušiku  Gas mixture of nitrogen monoxide in synthetic air or nitrogen	2 nmol/mol do/to 962 nmol/mol	$0,028 \cdot c_{NO} + 1,1$ nmol/mol	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method

Umjeravanje u laboratoriju / Calibration performed in a laboratory					
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks
26.	Plinska mješavina dušikovog dioksida (NO <sub>2</sub> ) u sintetičkom zraku ili dušiku  <i>Gas mixture of nitrogen dioxide in synthetic air or nitrogen</i>	2 nmol/mol do/to 300 nmol/mol	$0,038 \cdot c_{NO_2} + 1,5 \text{ nmol/mol}$	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method
27.	Plinska mješavina sumporovodika (H <sub>2</sub> S) u sintetičkom zraku ili dušiku  <i>Gas mixture of hydrogen sulfide in synthetic air or nitrogen</i>	2 nmol/mol do/to 300 nmol/mol	$0,029 \cdot c_{H_2S} + 1,3 \text{ nmol/mol}$	MLQP-11 Izd./Ed. 03 2020-07-08	Metoda usporedbe / Comparison method
28.	Umjeravanje mjerila i regulatora masenog protoka (q)  <i>Mass flow meter and controller calibration</i>	(10 do/to 10000) scm <sup>3</sup> /min	$3 \cdot 10^{-3} \cdot q$	MLQP-12 Izd./Ed. 03 2020-07-31	Metoda usporedbe / Comparison method  Medij: plin (dušik, sintetički zrak) / Medium: gas (nitrogen, UZAM) Raspon tlaka/ Pressure range : 0 kPa - 325 kPa Jedinica scm <sup>3</sup> /min je definirana za zrak pri / unit scm <sup>3</sup> /min is defined for air at 101,325 kPa i 0 °C
		(10000 do/to 100000) scm <sup>3</sup> /min	$4 \cdot 10^{-3} \cdot q$		

<b>Umjeravanje u laboratoriju / Calibration performed in a laboratory</b>					
<b>Br. No.</b>	<b>Mjerna veličina/ Mjerilo</b> <i>Measurand / Calibration item</i>	<b>Mjerno područje</b> <i>Measurement range</i>	<b>Mjerna sposobnost*</b> <i>Calibration and measurement capability* (CMC)</i>	<b>Metode umjeravanja</b> <i>Calibration methods</i>	<b>Napomene</b> <i>Remarks</i>
29.	Umjeravanje mjerila volumetrijskog protoka ( <i>q</i> )	(10 do/to 10000) cm <sup>3</sup> /min	$3 \cdot 10^{-3} \cdot q$	MLQP-12 Izd./Ed. 03 2020-07-31	Metoda usporedbe / <i>Comparison method</i>  Medij: plin (dušik, sintetički zrak) / <i>Medium: gas (nitrogen, UZAM)</i> Raspon tlaka/ <i>Pressure range: 0 kPa - 325 kPa</i>
	<i>Volume flow meter calibration</i>	(10000 do/to 100000) cm <sup>3</sup> /min	$4 \cdot 10^{-3} \cdot q$		

\* CMC (*Calibration and Measurement Capability*) je procijenjena kao proširena mjerna nesigurnost dobivena množenjem standardne nesigurnosti s faktorom pokrivanja *k*, koji odgovara razini povjerenja od oko 95%. Uobičajeno i ako nije drugačije navedeno, faktor *k* iznosi 2.  
CMC je izračunata u skladu s EA 4/02 M:2013 *Evaluation of the Uncertainty of measurement in Calibration*.

*The CMC (Calibration and Measurement Capability) has been estimated as an expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k corresponding to confidence level of about 95 %. Normally and unless stated otherwise, this factor k is 2.*

*The CMC has been determined according to the EA 4/02 M:2013 Evaluation of the Uncertainty of measurement in Calibration.*

Napomena/Remark: Dokumenti s oznakom MLQP su vlastiti postupci laboratorija. *Documents labeled MLQP are in-house laboratory procedures.*