



Potvrda o akreditaciji Accreditation Certificate

Ovime se utvrđuje da je
This is to recognize that

MARUS-ATM d.o.o.
MARUSLab
IX Južna obala 18, 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 tlaka i mjerila temperature
Calibration of pressure gauges and temperature gauges

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.: 2069
Klasa/Ref.No.: 383-02/20-80/008
Urbroj/Id.No.: 569-02/12-20-45
Zagreb, 2020-12-14

Akreditacija istječe-Accreditation expiry: 2025-12-13
Prva akreditacija-Initial accreditation: 2005-02-28

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

v. d. ravnateljica:
Acting Director General:
Ankica Barišić, dipl. ing.



Hrvatska akreditacijska agencija
Croatian Accreditation Agency



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Croatian Accreditation Agency

PRILOG POTVRDI O AKREDITACIJI br.: 2069

Annex to the Accreditation Certificate No.:

Klasa/Ref. No.: 383-02/20-80/008

Urbroj/Id. No.: 569-02/12-20-44

Datum izdanja priloga /Annex Issued on: 2020-12-14

Norma: HRN EN ISO/IEC 17025:2017

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

Akreditacija istječe: 2025-12-13

Accreditation expiry:

Prva akreditacija: 2015-07-01

Initial accreditation:

Akreditirani laboratorij

Accredited laboratory

MARUS-ATM d.o.o.

MARUSLab

IX južna obala 18, HR-10020 Zagreb

Područje akreditacije:

Scope of Accreditation:

Umjeravanje mjerila tlaka i mjerila temperature

Calibration of pressure gauges and temperature gauges

Važeće izdanje Priloga dostupno je na web adresi: www.akreditacija.hr

Valid issue of the Annex is available at the web address:

v.d. Ravnatelja:

Acting Director General:

Ankica Barišić, dipl. ing.

PODRUČJE AKREDITACIJE / SCOPE OF ACCREDITATION

Umjeravanje u laboratoriju / Calibration performed in the 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
1.	Tlak/Opružni manometri, digitalni manometri s pokazivanjem i pretvornici tlaka s električnim izlazom <i>Pressure/Bourdon tube, pressure gauges, electrical pressure gauges and pressure transmitters with electrical output</i>	-7 kPa do/to 7 kPa (-70 mbar do/to 70 mbar)	5 Pa	Vlastiti postupak <i>In-house procedure</i> RUP-05/13, 2020-10-01 EURAMET/cg-17 v.4.0, 2019-04	Tlačni medij: plin (dušik, zrak) <i>Pressure medium: gas (nitrogen, air)</i>
		(-0,095) MPa do/to -35 kPa (-0,95 bar do/to -350 mbar)	50 Pa		
		-35 kPa do/to 0,2 MPa (-350 mbar do/to 2 bar)	1 mbar		
		0,2 MPa do/to 2 MPa (2 bar do/to 20 bar)	10 mbar		
		0 MPa do/to 20 MPa (0 bar do/to 200 bar)	50 mbar		
		1 MPa do/to 60 MPa (10 bar do/to 600 bar)	$5 \cdot 10^{-3} p_p$ ali ne manje od <i>but not less than</i> 38 mbar		
		60 MPa do/to 70 MPa (600 bar do/to 700 bar)	350 mbar		Tlačni medij: ulje <i>Pressure medium: oil</i> p_p - tlak/ <i>pressure</i>

Umjeravanje u laboratoriju / Calibration performed in the 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
2.	Temperatura/Otpornički termometri, termometri s direktnim pokazivanjem ili sa ugrađenim pretvornikom temperature s otporničkim osjetnicima <i>Temperature/Resistance thermometers, thermometers with direct display or with built-in temperature transmitter, having resistance temperature sensors</i>	−40 °C do/to 80 °C	100 mK	Vlastiti postupak <i>In-house procedure</i> RUP-07/16, 2020-10-01	Usporedba s etalonskim otporničkim termometrom u kupelji/suhom bloku <i>Comparison with standard resistance thermometer in bath/dry block</i> <i>t</i> - temperatura u / <i>temperature in</i> : °C
		80 °C do/to 140 °C	130 mK	DKD R 5-1:2018	
		140 °C do/to 300 °C	$(1 \cdot t)$ mK		
		300 °C do/to 500 °C	$(1,25 \cdot t)$ mK		
3.	Temperatura/Manometarski termometri, bimetalni termometri, kapilarni termometri <i>Temperature/Manometric thermometers, bimetal thermometers, capillary thermometers</i>	−40 °C do/to 80 °C	250 mK	Vlastiti postupak <i>In-house procedure</i> RUP-15/03, 2020-10-01 DKD R 5-1:2003	Usporedba s etalonskim otporničkim termometrom u kupelji/suhom kalibratoru <i>Comparison with standard resistance thermometer in bath/dry block</i>
		80 °C do/to 140 °C	300 mK		
		140 °C do/to 300 °C	400 mK		
		300 °C do/to 500 °C	600 mK		
4.	Temperatura/Termometri s direktnim pokazivanjem ili sa ugrađenim pretvornikom temperature s termoparovima kao osjetnicima <i>Temperature/Thermometers with direct display or with built-in temperature transmitter, having thermocouples sensors</i>	−40 °C do/to 300 °C	1,0 K	Vlastiti postupak <i>In-house procedure</i> RUP-08/16, 2020-10-01 DKD R 5-1:2018	Usporedba s etalonskim otporničkim termometrom u kupelji/suhom kalibratoru <i>Comparison with standard resistance thermometer in bath/dry block</i>
		300 °C do/to 500 °C	1,6 K		
5.	Temperatura/Termoelementi <i>Temperature /Thermoelements</i>	−40 °C do/to 300 °C	1,0 K	Vlastiti postupak <i>In-house procedure</i> RUP-08/16, 2020-10-01 EURAMET/cg-08 v.3.1, 2020-02	Usporedba s etalonskim otporničkom termometrom <i>Comparison with standard resistance thermometer</i>
		300 °C do/to 500 °C	1,6 K		

Umjeravanje u laboratoriju / Calibration performed in the 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
6.	Temperatura/Indikatori i simulatori za otporničke termometre <i>Temperature/Indicators and simulators for resistance thermometers</i>	-200 °C do/to 1600 °C	200 mK	Vlastiti postupak <i>In-house procedure</i> RUP-09/11, 2020-10-01	Usporedba s etalonskim multifunkcijskim kalibratorom <i>Comparison with standard multifunctional calibrator</i>
7.	Temperatura/Indikatori i simulatori za termoelemente <i>Temperature/Indicators and simulators for resistance thermoelements</i>		400 mK	EURAMET/cg-11 v. 2.0, 2011-03	
8.	Temperatura/Blok kalibratori <i>Temperature/Block calibrators</i>	-40 °C do/to 100 °C	0,6 K	Vlastiti postupak <i>In-house procedure</i> RUP-06/12, 2020-10-01	Usporedba s etalonskim otporničkim termometrom <i>Comparison with standard resistance thermometer</i> <i>t - temperatura u / temperature in: °C</i>
		100 °C do/to 500 °C	(6 · t) mK	EURAMET/cg-13 v.4.0, 2017-09	
9.	Temperatura/Umjeravanje staklenih termometara <i>Temperature/Calibration of glass thermometers</i>	- 40 °C do/to 80 °C	300 mK	Vlastiti postupak <i>In-house procedure</i> RUP-12/11, 2020-10-01	Kupka <i>Bath</i>
		- 80 °C do/to 140 °C	350 mK		
		140 °C do/to 200 °C	500 mK	NIST Liquid-in-glass Thermometer Calibration Service 1988	Blok <i>Block</i>
		200 °C do/to 500 °C	800 mK		
10.	Temperatura/Umjeravanje termostatiranih klima komora <i>Temperature/ Calibration of climate chambers</i>	- 20 °C do/to 100 °C	1 K	Vlastiti postupak <i>In-house procedure</i> RUP-11/15, 2020-10-01	Podmetoda A i B za V < 2000 l; <i>Methods A and B for V < 2000 l</i> Podmetoda C za sve objeme <i>Method C for all volumes</i>
		100 °C do/to 200 °C	1,5 K	DKD R 5-7:2018 Metode/Methods A, B, C	

Umjeravanje na terenu / On site calibration

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
T1.	Tlak/Opružni manometri, digitalni manometri s pokazivanjem i pretvornici tlaka s električnim izlazom <i>Pressure/Bourdon tube, pressure gauges, electrical pressure gauges and pressure transmitters with electrical output</i>	-7 kPa do/to 7 kPa (-70 mbar do/to 70 mbar)	5 Pa	Vlastiti postupak <i>In-house procedure</i> RUP-05/13, 2020-10-01 EURAMET/cg-17 v.4.0, 2019-04	Tlačni medij: plin (dušik, zrak) <i>Pressure medium: gas (nitrogen, air)</i>
		(-0,095) MPa do/to -35 kPa (-0,95) bar do/to -350 mbar	50 Pa		
		-35 kPa do/to 0,2 MPa (-350 mbar do/to 2 bar)	1 mbar		
		0,2 MPa do/to 2 MPa (2 bar do/to 20 bar)	10 mbar		
		0 MPa do/to 20 MPa (0 bar do/to 200 bar)	50 mbar		
		20 MPa do/to 70 MPa (600 bar do/to 700 bar)	350 mbar		
T2.	Temperatura/Otpornički termometri, termometri s direktnim pokazivanjem ili sa ugrađenim pretvornikom temperature s otporničkim osjetnicima <i>Temperature/Resistance thermometers, thermometers with direct display or with built-in temperature transmitter, having resistance temperature sensors</i>	-40 °C do/to -20 °C	200 mK	Vlastiti postupak <i>In-house procedure</i> RUP-07/16, 2020-10-01 DKD R 5-1:2018	Usporedba s etalonskim otporničkim termometrom u suhom kalibratoru <i>Comparison with standard resistance thermometer in dry block</i> <i>t</i> - temperatura u / temperature in: °C
		-20 °C do/to +140 °C	150 mK		
		140 °C do/to +300 °C	(1,25 · <i>t</i>) mK		
		300 °C do/to 500 °C	(1,4 · <i>t</i>) mK		

Umjeravanje na terenu / On site calibration					
Br. No.	Mjerna veličina/Mjerilo <i>Measurand/Calibration item</i>	Mjerno područje <i>Measurement range</i>	Mjerna sposobnost* <i>Calibration and measurement capability*</i> (CMC)	Metode umjeravanja <i>Calibration methods</i>	Napomene <i>Remarks</i>
T3.	Temperatura/Manometarski termometri, bimetalni termometri, kapilarni termometri <i>Temperature/Manometric thermometers, bimetal thermometers, capillary thermometers</i>	-40 °C do/to -20 °C	300 mK	Vlastiti postupak <i>In-house procedure</i> RUP-15/03, 2020-10-01 DKD R 5-1:2018	Usporedba s etalonskim otporničkim termometrom u kupelji/suhom kalibratoru <i>Comparison with standard resistance thermometer in bath/dry block</i>
		-20 °C do/to 140 °C	350 mK		
		140 °C do/to 300 °C	500 mK		
		300 °C do/to 500 °C	700 mK		
T4.	Temperatura/Termometri s direktnim pokazivanjem ili sa ugrađenim pretvornikom temperature s termoparovima kao osjetnicima <i>Temperature/Thermometers with direct display or with built-in temperature transmitter, having thermocouples sensors</i>	-40 °C do/to 300 °C	1,2 K	Vlastiti postupak <i>In-house procedure</i> RUP-08/16, 2020-10-01 DKD R 5-1:2018	Usporedba s etalonskim otporničkim termometrom u kupelji/suhom kalibratoru <i>Comparison with standard resistance thermometer in bath/dry block</i>
		300 °C do/to 500 °C	1,9 K		
T5.	Temperatura/Termoelementi <i>Temperature /Thermoelements</i>	-40 °C do/to 300 °C	1,2 K	Vlastiti postupak <i>In-house procedure</i> RUP-08/16, 2020-10-01 EURAMET/cg-08 v.3.1, 2020-02	Usporedba s etalonskim otporničkom termometrom <i>Comparison with standard resistance thermometer</i>
		300 °C do/to 500 °C	1,9 K		
T6.	Temperatura/Indikatori i simulatori za otporničke termometre <i>Temperature/Indicators and simulators for resistance thermometers</i>	-200 °C do/to 1600 °C	300 mK	Vlastiti postupak <i>In-house procedure</i> RUP-09/11, 2020-10-01 EURAMET/cg-11 v. 2.0, 2011-03	Usporedba s etalonskim multifunkcijskim kalibratorom <i>Comparison with standard multifunctional calibrator</i>
T7.	Temperatura/Indikatori i simulatori za termoelemente <i>Temperature/Indicators and simulators for resistance thermoelements</i>		500 mK		

Umjeravanje na terenu / On site calibration					
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
T8.	Temperatura/Umjeravanje termostatiranih klima komora <i>Temperature/Calibration of climate chambers</i>	-20 °C do/to 100 °C	1,3 K	Vlastiti postupak <i>In-house procedure</i> RUP-11/15, 2020-10-01	Usporedba s etalonskim multifunkcijskim kalibratorom <i>Comparison with standard multifunctional calibrator</i>
		100 °C do/to 200 °C	1,9 K	DKD R 5-7:2018 Metode/Methods A, B, C	
T9.	Temperatura/Blok kalibratori <i>Temperature/Block calibrators</i>	-40 °C do/to 100 °C	0,6 K	Vlastiti postupak <i>In-house procedure</i> RUP-06/12, 2020-10-01	Usporedba s etalonskim otporničkim termometrom <i>Comparison with standard resistance thermometer</i>
		100 °C do/to 500 °C	(6 · t) mK	EURAMET/cg-13 v.4.0, 2017-09	

- * Mjerna sposobnost 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 drukčije navedeno, faktor k iznosi 2.
CMC je izračunata u skladu s EA 4/02 M:2013 *Evaluation of the Uncertainty of measurement in Calibration*.
Calibration and measurement capability (CMC) 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 EA 4/02 M:2013 Evaluation of the Uncertainty of measurement in Calibration.