

**PRILOG POTVRDI O AKREDITACIJI br.: 2137**

*Annex to the Accreditation Certificate No.:*

Klasa/Ref. No.: 383-02/17-80/006

Urbroj/Id. No.: 569-02/4-18-34

Datum izdanja priloga /Annex Issued on: 2018-03-29

**Norma: HRN EN ISO/IEC 17025:2007**

*Standard:(ISO/IEC 17025:2005+Cor.1:2006; EN ISO/IEC 17025:2005+AC:2006)*

**Akreditacija istječe: 2023-03-28**

*Accreditation expiry:*

**Prva akreditacija: 2008-03-06**

*Initial accreditation:*

**Akreditirani laboratorij**

*Accredited laboratory*

**TEHNIČAR-SERVAG d.o.o.**

**Mjeriteljski laboratorij**

Crnojezerska 18, HR-10000 Zagreb

Prilaz baruna Filipovića 25, HR-10000 Zagreb

**Područje akreditacije:**

*Scope of Accreditation:*

**Umjeravanje neautomatskih vaga i utega, mjerila temperature i relativne vlažnosti, mjerila tlaka, vremenskog intervala i frekvencije**

*Calibration of non-automatic weighing instruments and weights, temperature and relative humidity gauges, pressure gauges, time interval and frequency gauges*

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)*

**Ravnatelj:**

**Director General:**

**Tihomir Babić, dipl. ing.**

**PODRUČJE AKREDITACIJE / SCOPE OF ACCREDITATION**

Lokacija/Location Crnojezerska 18, HR-10000 Zagreb

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
1.	Masa/ Neautomatske vage Mass/Non-automatic weighing instruments	$m \leq 5 \text{ mg}$	0,0013 mg	Vlastiti postupak/ In house procedure CTL10U01 Izdanje/Issue 2016-10-01  EURAMET/ cg-18/v.04:2015	
		$5 \text{ mg} < m \leq 10 \text{ mg}$	0,0015 mg		
		$10 \text{ mg} < m \leq 20 \text{ mg}$	0,0016 mg		
		$20 \text{ mg} < m \leq 50 \text{ mg}$	0,0020 mg		
		$50 \text{ mg} < m \leq 100 \text{ mg}$	0,0024 mg		
		$100 \text{ mg} < m \leq 200 \text{ mg}$	0,0030 mg		
		$200 \text{ mg} < m \leq 500 \text{ mg}$	0,0039 mg		
		$0,5 \text{ g} < m \leq 1 \text{ g}$	0,0047 mg		
		$1 \text{ g} < m \leq 2 \text{ g}$	0,0060 mg		
		$2 \text{ g} < m \leq 5 \text{ g}$	0,0078 mg		
		$5 \text{ g} < m \leq 10 \text{ g}$	0,011 mg		
		$10 \text{ g} < m \leq 20 \text{ g}$	0,014 mg		
		$20 \text{ g} < m \leq 50 \text{ g}$	0,018 mg		
		$50 \text{ g} < m \leq 600 \text{ g}$	$m \cdot (3,5 \cdot 10^{-7}) \text{ mg}$ , $m \text{ u/in mg}$		
		$600 \text{ g} < m \leq 25000 \text{ g}$	$m \cdot (8,0 \cdot 10^{-7}) \text{ mg}$ $m \text{ u/in mg}$		
		$25 \text{ kg} < m \leq 100 \text{ kg}$	$m \cdot (3,0 \cdot 10^{-6}) \text{ g}$ $m \text{ u/in g}$		
		$100 \text{ kg} < m \leq 600 \text{ kg}$	$m \cdot (3,0 \cdot 10^{-6}) \text{ g}$ $m \text{ u/in g}$		
		$600 \text{ kg} < m \leq 6000 \text{ kg}$	$m \cdot (1,5 \cdot 10^{-4}) \text{ g}$ $m \text{ u/in g}$		
		$6 \text{ t} < m \leq 37,5 \text{ t}$	$m \cdot (2,5 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$		
$37,5 \text{ t} < m \leq 50 \text{ t}$	$m \cdot (3,5 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$				
$50 \text{ t} < m \leq 75 \text{ t}$	$m \cdot (4,0 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$				
$75 \text{ t} < m \leq 100 \text{ t}$	$m \cdot (5,0 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$				

<b>Umjeravanje u laboratoriju / Calibration performed in a laboratory</b>					
<b>Br. No.</b>	<b>Mjerna veličina/ Mjerilo Measurand / Calibration item</b>	<b>Mjerno područje Measurement range</b>	<b>Mjerna sposobnost* Calibration and measurement capability* (CMC)</b>	<b>Metode umjeravanja Calibration methods</b>	<b>Napomene Remarks</b>
2.	Masa/ Utezi Mass/Weight $M_1, M_2, M_3$	10 kg	160 mg	Vlastiti postupak/ In house procedure CTL10U02 Izdanje/Issue 2018-02-05  OIML R111-1:2004	
		20 kg	300 mg		
		50 kg	800 mg		
3.	Vremenski interval / Ručni sekundomjeri (štoperice, tajmeri)  Time interval / Hand timers (stopwatches and timers)	30 s do/to 24 h	0,15 s	Vlastiti postupak/ In house procedure CTL10U111 Izdanje/Issue 2018-02-05	
4.	Frekvencija / Mjerila okretaja Frequency / Tachometers	do/to 60 min <sup>-1</sup>	0,01 min <sup>-1</sup>	Vlastiti postupak/ In house procedure CTL10U138 Izdanje/Issue 2018-02-05	Mjerila okretaja s optičkim ulazom / Tachometers with optical input
		(60 do/to 100) min <sup>-1</sup>	0,02 min <sup>-1</sup>		
		(100 do/to 600) min <sup>-1</sup>	0,03 min <sup>-1</sup>		
		(600 do/to 1000) min <sup>-1</sup>	0,20 min <sup>-1</sup>		
		(1000 do/to 6000) min <sup>-1</sup>	0,21 min <sup>-1</sup>		
		(6000 do/to 10000) min <sup>-1</sup>	2,0 min <sup>-1</sup>		
		(10000 do/to 60000) min <sup>-1</sup>	2,1 min <sup>-1</sup>		
(60000 do/to 100020) min <sup>-1</sup>	3,5 min <sup>-1</sup>				

<b>Umjeravanje na terenu / On-site calibration</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.	Masa/ Neautomatske vage <i>Mass/Non-automatic weighing instruments</i>	$m \leq 5 \text{ mg}$	0,0013 mg	Vlastiti postupak/ <i>In house procedure</i> CTL10U01 Izdanje/Issue 2016-10-01  EURAMET/ cg-18/v.04:2015	
		$5 \text{ mg} < m \leq 10 \text{ mg}$	0,0015 mg		
		$10 \text{ mg} < m \leq 20 \text{ mg}$	0,0016 mg		
		$20 \text{ mg} < m \leq 50 \text{ mg}$	0,0020 mg		
		$50 \text{ mg} < m \leq 100 \text{ mg}$	0,0024 mg		
		$100 \text{ mg} < m \leq 200 \text{ mg}$	0,0030 mg		
		$200 \text{ mg} < m \leq 500 \text{ mg}$	0,0039 mg		
		$0,5 \text{ g} < m \leq 1 \text{ g}$	0,0047 mg		
		$1 \text{ g} < m \leq 2 \text{ g}$	0,0060 mg		
		$2 \text{ g} < m \leq 5 \text{ g}$	0,0078 mg		
		$5 \text{ g} < m \leq 10 \text{ g}$	0,011 mg		
		$10 \text{ g} < m \leq 20 \text{ g}$	0,014 mg		
		$20 \text{ g} < m \leq 50 \text{ g}$	0,018 mg		
		$50 \text{ g} < m \leq 600 \text{ g}$	$m \cdot (3,5 \cdot 10^{-7}) \text{ mg}$ , $m \text{ u/in mg}$		
		$600 \text{ g} < m \leq 25000 \text{ g}$	$m \cdot (8,0 \cdot 10^{-7}) \text{ mg}$ $m \text{ u/in mg}$		
		$25 \text{ kg} < m \leq 100 \text{ kg}$	$m \cdot (3,0 \cdot 10^{-6}) \text{ g}$ $m \text{ u/in g}$		
		$100 \text{ kg} < m \leq 600 \text{ kg}$	$m \cdot (3,0 \cdot 10^{-6}) \text{ g}$ $m \text{ u/in g}$		
		$600 \text{ kg} < m \leq 6000 \text{ kg}$	$m \cdot (1,5 \cdot 10^{-4}) \text{ g}$ $m \text{ u/in g}$		
		$6 \text{ t} < m \leq 37,5 \text{ t}$	$m \cdot (2,5 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$		
$37,5 \text{ t} < m \leq 50 \text{ t}$	$m \cdot (3,5 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$				
$50 \text{ t} < m \leq 75 \text{ t}$	$m \cdot (4,0 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$				
$75 \text{ t} < m \leq 100 \text{ t}$	$m \cdot (5,0 \cdot 10^{-4}) \text{ kg}$ $m \text{ u/in kg}$				

<b>Umjeravanje na terenu / On-site calibration</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>
2.	Masa/ Utezi <i>Mass/Weight</i> $M_1, M_2, M_3$	10 kg	160 mg	Vlastiti postupak/ <i>In house procedure</i> CTL10U02 Izdanje/Issue 2018-02-05  OIML R111-1:2004	
		20 kg	300 mg		
		50 kg	800 mg		
3.	Vremenski interval / Ručni sekundomjeri (štoperice, tajmeri) <i>Time interval / Hand timers (stopwatches and timers)</i>	30 s do/to 24 h	0,15 s	Vlastiti postupak/ <i>In house procedure</i> CTL10U111 Izdanje/Issue 2018-02-05	

Lokacija/Location Prilaz baruna Filipovića 25, 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.	Masa/ Utezi <i>Mass/Weight</i> $E_2, F_1, F_2,$ $M_1, M_2, M_3$	1 mg	0,002 mg	Vlastiti postupak/ <i>In house procedure</i> CTL10U02 Izdanje/Issue 2018-02-05  OIML R111-1:2004	
		2 mg	0,002 mg		
		5 mg	0,002 mg		
		10 mg	0,002 mg		
		20 mg	0,003 mg		
		50 mg	0,004 mg		
		100 mg	0,005 mg		
		200 mg	0,006 mg		
		500 mg	0,008 mg		
		1 g	0,010 mg		
		2 g	0,012 mg		
		5 g	0,016 mg		
		10 g	0,020 mg		
		20 g	0,025 mg		
		50 g	0,03 mg		
		100 g	0,05 mg		
		200 g	0,10 mg		
	500 g	0,25 mg			
	1 kg	0,5 mg			
	2 kg	1,2 mg			
	Masa/ Utezi <i>Mass/Weight</i> $F_1, F_2,$ $M_1, M_2, M_3$	5 kg	8 mg		
10 kg		16 mg			
20 kg		30 mg			
Masa/ Utezi <i>Mass/Weight</i> $F_2, M_1, M_2, M_3$	50 kg	250 mg			

<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>
2.	Temperatura/ Termometri s direktnim pokazivanjem <i>Temperature/ Direct reading thermometers</i>	(-80 do/to 200) °C	0,04 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U26 Izdanje/Issue 2018-02-05	
		(200 do/to 400) °C	0,2 °C		
3.	Temperatura/ Stakleni termometri <i>Temperature/ Glass thermometers</i>	(-50 do/to 100) °C	0,05 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U26 Izdanje/Issue 2018-02-05	
		(100 do/to 200) °C	0,06 °C		
4.	Temperatura/ Termoparovi <i>Temperature /Termocouples</i>	(-80 do/to -40) °C	0,13 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U159 Izdanje/Issue 2016-10-01  EURAMET cg-8/ v2.1, 2011-10	
		(-40 do/to +50) °C	0,10 °C		
		(50 do/to 100) °C	0,15 °C		
		(100 do/to 150) °C	0,20 °C		
		(150 do/to 200) °C	0,25 °C		
		(200 do/to 300) °C	0,40 °C		
5.	Temperatura/ Otpornički termometri <i>Temperature/ Resistance thermometers</i>	(-80 do/to 0) °C	0,07 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U161 Izdanje/Issue 2016-10-01  DAkS-DKD-R 5-1:2010	
		(0 do/to 200) °C	0,18 °C		
		(200 do/to 400) °C	0,27 °C		

<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>
6.	Temperatura/ Temperaturne komore - zamrzivači, hladnjaci, termostati, inkubatori, sušionici, sterilizatori i kupelji <i>Temperature/ Temperature chambers</i>	(-80 do/to -40) °C	0,61 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U12 Izdanje/Issue 2016-10-01	DAkKS DKD-R 5-7: Podmetoda A i B za komore V < 2000 l, podmetoda C za sve obujme DAkKS DKD-R 5-7: Methods A and B for chambers with volume less than 2000 l, method C for all volumes
		(-40 do/to 0) °C	0,20 °C		
		(0 do/to 20) °C	0,19 °C	EURAMET cg-20/v.5.0, 2017-09	
		(20 do/to 150) °C	0,20 °C	DAkKS DKD-R 5-7:2009 Metode/Methods A, B, C	
		(150 do/to 250) °C	0,50 °C		
7.	Temperatura/ Peći <i>Temperature/ Furnaces</i>	(500 do/to 1000) °C	2,5 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U149 Izdanje/Issue 2016-10-01	
8.	Relativna vlažnost/ Higrometri i pretvornici vlažnosti <i>Relative humidity/ Hygrometers and humidity transducers</i>	5 % do/to 95 % (5 do/to 50) °C	1,4 %	Vlastiti postupak/ <i>In house procedure</i> CTL10U62 Izdanje/Issue 2016-10-01	
9.	Pretlak/ Elektromehanički i mehanički manometri <i>Gauge pressure/ Electromechanical and mechanical manometers</i>	-0,95 bar do/to -50 Pa	$3 \cdot 10^{-4} \cdot p_e$	Vlastiti postupci/ <i>In house procedures</i> CTL10U31 Izdanje/Issue 20018-02-05	Tlačni medij: plin/ <i>Pressure medium : gas</i>
		-50 Pa do/to 2500 Pa	1 Pa		
		2500 Pa do/to 1 bar	$2 \cdot 10^{-4} \cdot p_e$	CTL10U55 Izdanje/Issue 2016-10-01	
		1 bar do/to 25 bar	$2 \cdot 10^{-4} \cdot p_e$	EURAMET cg-17/ v.3.0 (04/2017) DKD-R 6-1:2014	
		1 bar do/to 120 bar	$2 \cdot 10^{-4} \cdot p_e$ ali ne manje /not less than 2 mbar		Tlačni medij: ulje/ <i>Pressure medium :oil</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>
10.	Apsolutni tlak/ Elektromehanički i mehanički manometri <i>Absolute Pressure/ Electromechanical and mechanical manometers</i>	0,1 bar do/to 7 bar	1 mbar	Vlastiti postupci/ <i>In house procedures</i> CTL10U31 Izdanje/Issue 2018-02-05 CTL10U55 Izdanje/Issue 2016-10-01  EURAMET cg-17/ v.3.0 (04/2017) DKD-R 6-1:2014	

<b>Umjeravanje na terenu / On-site calibration</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 pokazivanjem <i>Temperature/ Direct reading thermometers</i>	(-25 do/to 200) °C	0,11 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U26 Izdanje/Issue 2018-02-05	
		(200 do/to 400) °C	0,2 °C		
2.	Temperatura/ Temperaturne komore - zamrzivači, hladnjaci, termostati, inkubatori, sušionici, sterilizatori i kupelji <i>Temperature/ Temperature chambers</i>	(-80 do/to -40) °C	0,61 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U12 Izdanje/Issue 2016-10-01	DAkks DKD-R 5-7: Podmetoda A i B za komore V < 2000 l, podmetoda C za sve obujme DAkks DKD-R 5-7: Methods A and B for chambers with volume less than 2000 l, method C for all volumes
		(-40 do/to 0) °C	0,20 °C		
		(0 do/to 20) °C	0,19 °C	EURAMET cg-20/v.4.0, 2015-02	
		(20 do/to 150) °C	0,20 °C	DAkks DKD-R 5-7:2010 Metode/Methods A, B, C	
		(150 do/to 250) °C	0,50 °C		
3.	Temperatura/ Peći <i>Temperature/ Furnaces</i>	(500 do/to 1000) °C	2,5 °C	Vlastiti postupak/ <i>In house procedure</i> CTL10U149 Izdanje/Issue 2016-10-01	
4.	Relativna vlažnost/ Higrometri i pretvornici vlažnosti <i>Relative humidity/ Hygrometers and humidity transducers</i>	5 % do/to 95 % (5 do/to 50) °C	1,4 %	Vlastiti postupak/ <i>In house procedure</i> CTL10U62 Izdanje/Issue 2016-10-01	

<b>Umjeravanje na terenu / On-site calibration</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>
5.	Pretlak/ Elektromehanički i mehanički manometri <i>Gauge pressure/ Electromechanical and mechanical manometers</i>	-0,9 bar do/to -2000 Pa	1,5 mbar	Vlastiti postupci/ <i>In house procedures</i> CTL10U31 Izdanje/Issue 2018-02-05 CTL10U55 Izdanje/Issue 2016-10-01	Tlačni medij:plin/ <i>Pressure medium :gas</i>
		-2000 Pa do/to +2000 Pa	2 Pa		
		2000 Pa do/to 7 bar	1,5 mbar		
6.	Apsolutni tlak/ Elektromehanički i mehanički manometri <i>Absolute Pressure/ Electromechanical and mechanical manometers</i>	0,1 bar do/to 7 bar	1 mbar	Vlastiti postupci/ <i>In house procedures</i> CTL10U31 Izdanje/Issue 2018-02-05 CTL10U55 Izdanje/Issue 2016-10-01  EURAMET cg-17/ v.3.0 (04/2017) DKD-R 6-1:2014	

\* 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.*