Hellenic Accreditation System

ACCREDITATION CERTIFICATE

No. 345-4

The Hellenic Accreditation System (ESYD), as the national accreditation body of Greece in accordance with the Law 4468/2017,

ACCREDITS

the

Calibration Laboratory

of

ALGOSYSTEMS S.A.

in N. Smyrni, Attiki, Greece

under the terms of the ELOT EN ISO/IEC 17025: 2017 Standard and the ESYD Criteria, to carry out measurements, as specified in the attached Scope of the Accreditation, which may be revised by decisions of ESYD.

The initial accreditation was issued on 22nd May 2007. This Certificate is valid until 21st May 2023, provided that the accredited body will comply with the above Standard and the ESYD Criteria.

Athens, 21.11.2019

ΕΘΝΙΚΟ ΣΥΣΤΗΜΑ ΔΙΑΠΙΣΤΕΥΣΗΣ
ΑΦΜ: 997000397 - ΔΟΥ: ΚΑΛΛΙΘΕΑΣ

Spyridon Podaras
Managing Director of ESYD

ESYD is a signatory of the European co-operation for Accreditation (EA) Multilateral Agreement for the activities covered by this certificate.

Hellenic Accreditation System

Annex F2/18 to the Certificate No. **345**-4

SCOPE of ACCREDITATION
of the
Calibration laboratory
of
ALGOSYSTEMS S.A.

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Temperature measurements			
Temperature/ Temperature block calibrators	-80 ºC … 0 ºC	0,08 ºC	Using platinum resistance thermometers, according to guide: EURAMET/cg-13/v.4:2017
	0 ºC … 270 ºC	0,10 ºC	
	270 ºC … 400 ºC	0,20 ºC	
	400 ºC … 1000 ºC	1,30 ºC	Using thermocouple type S, according to guide: EURAMET/cg-13/v.4:2017
Thermocouples	-25 ºC … 125 ºC	0,25 ºC	Using temperature block calibrator and platinum resistance thermometer, according to guide: EURAMET/cg-08/ v.2.1:2011
	125 ºC … 400 ºC	0,60 ºC	
	400 ºC … 1000 ºC	1,40 ºC	Using temperature block calibrator and thermocouple type S, according to guide: EURAMET/cg-08/v.2.1:2011
Liquid-in-glass thermometers of total immersion	35 ºC … 90 ºC	0,16 ºC	Comparative calibration in water bath using platinum resistance thermometer
Climatic chambers, Furnaces, Ovens, Incubators, Autoclaves, Refrigerators, Freezers of volume up to 2000 l	-80 ºC … 400ºC	0,40 ºC	Using platinum resistance thermometer positioned at one point within the chamber
	-25 ºC … 400 ºC	1 ºC	Using type K thermocouples covering the volume of the chamber
	-25 ºC … 70 ºC	0,30 ºC	Using temperature data loggers covering the volume of the chamber
			All calibrations are based on guide DKD-R 5-7 : 2004 and standard ELOT EN 60068-3-5:2002, and can also be performed on-site
Chambers, Furnaces, Ovens	400 ºC … 1000 ºC	1,60 ºC	Using thermocouple type K, located at a point in the center of the cabin

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Chambers, Storage rooms of volume > 2000 l	10 ºC … 70ºC	0,4 ºC	Using platinum resistance thermometer at one point within the chamber
		1 ºC	Using type K thermocouples at one point within the chamber
Liquid baths	-80 ºC … 300 ºC	0,10 ºC	Using platinum resistance thermometer Calibration can also be performed on-site
Dissolution testers, Disintegration testers	35 °C … 45 °C	0,10 ºC	Calibration at one point of sample placement using platinum resistance thermometer Calibration can also be performed on-site
Temperature sensors with analog or digital display unit, Analog – digital temperature recorders	-40 ºC … 0 ºC	0,13 ºC	Using climatic chamber
	0 ºC -90 ºC	0,10 ºC	
	90 ºC -170 ºC	0,46 ºC	
	-40 ºC … 140 ºC	0,10 ºC	Using temperature block calibrator and platinum resistance thermometer Instruments under calibration must have external temperature probes Calibration can also be performed on-site
	140 ºC … 400 ºC	0,50 ºC	
	50 ºC … 200 ºC	0,10 ºC	Using liquid bath and platinum resistance thermometer Instruments under calibration must have external temperature probes Calibration can also be performed on-site
	400 ºC … 1000 ºC	1,7 ºC	Using temperature block calibrator and thermocouple type S Instruments under calibration should have external temperature probes Calibration can also be performed on-site
Temperature / Temperature transmitter (span 100°C) with analog signal output (in mA or Volts), connected to temperature sensor	-40 ºC … 140 ºC	0,10 ºC	Calibration method is based on guide DKD-R 5-1:2003 Calibration can also be performed on-site
	140 ºC … 420 ºC	0,50 ºC	
	420 ºC … 1000 ºC	1,7 ºC	
Humidity measurements			
Relative humidity/ Analog - digital humidity meters, Humidity recorders	15 %RH … 95 %RH at 25 ºC	1,0 %RH… 1,4 %RH	Using climatic chamber
Climatic chambers	15 %RH … 95 %RH at 25 ºC	1,1 %RH… 1,5 %RH	Calibration based on guide: DKD-R 5-7:2004 Calibration can also be performed on-site
Φυσικές Μετρήσεις			

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Velocity / Fixed speed limit monitoring systems	30 km/h ... 250 km/h	2,5 km/h	Calibration is performed on-site
Density Measurements			
Hydrometers	850 g/cm^3 – 1200 g/cm^3	6,0·10^{-4} g/cm^3 – 6,5·10^{-4} g/cm^3	Based on Cuckow methodology
Volume Measurements			
Volume / Mechanical – digital Pipettes, Dispensers	10 µl … 100 µl	0,8 % … 0,19 %	Calibration according to guide: EURAMET/cg-19/v2.1:2012
	100 µl … 1000 µl	0,19 % … 0,042 %	
	1000 µl … 10ml	0,042 % … 0,009 %	
Volume / Titrators	0,05 ml … 1 ml	0,9 % … 0,094 %	
	1 ml … 10 ml	0,094 % … 0,024 %	
	10 ml … 100 ml	0,024 % … 0,018 %	
Volume / Siphons – Burettes, type «Ex» and «In» with volume V (ml), internal neck diameter D (mm)	0,2 ml … 1 ml/ D=5mm	1,1% ... 0,1 %	
	0,2 ml … 1 ml/ D=10mm	4,5% ... 0,5%	
	1 ml … 10 ml/ D=5mm	0,1% ... 0,02 %	
	1 ml … 10 ml/ D=10mm	0,5% ... 0,05 %	
	1 ml … 10 ml/ D=15mm	1,0% ... 0,1 %	
	10 ml … 50 ml/ D=5mm	0,02% ... 0,009 %	
	10 ml … 50 ml/ D=10mm	0,05% ... 0,01 %	
	10 ml … 50 ml/ D=15mm	0,1% ... 0,02 %	
	10 ml … 50 ml/ D=20mm	0,2% ... 0,04 %	
	10 ml … 50 ml/ D=30mm	0,4% ... 0,08 %	
	50 ml … 100 ml/ D=5mm	0,009% ... 0,08 %	
	50 ml … 100 ml/ D=10mm	0,01% ... 0,08 %	
	50 ml … 100 ml/ D=15mm	0,02% ... 0,08 %	
	50 ml … 100 ml/ D=20mm	0,04% ... 0,08 %	
	50 ml … 100 ml/ D=30mm	0,08% ... 0,08 %	
	50 ml … 100 ml/ D=40mm	0,15% ... 0,09 %	
Volume / Glass - Plastic - Metallic Volumetric vessels, Flasks, Containers, type «Ex» and «In» with volume V (ml), and internal neck diameter D (mm)	1 ml … 10 ml / D=5mm	0,12 % … 0,016 %	Calibration according to standards: ASTM E542:2007 OIML R-120:1996 OIML R-43:1981 ISO 4787:2010 ISBN 978-963-88410-0-1:2009 IMEKO (p. 2344)
	1 ml … 10 ml / D=10mm	0,47 % … 0,05 %	
	1 ml … 10 ml / D=15mm	1,1 % … 0,1 %	
	1 ml … 10 ml / D=20mm	1,9 % … 0,2 %	
	10 ml … 100 ml/ D=5mm	0,016 % … 0,01 %	
	10 ml … 100 ml/ D=10mm	0,05 % … 0,01 %	
	10 ml … 100 ml/ D=15mm	0,1 % … 0,01 %	
	10 ml … 100 ml/ D=20mm	0,2 % … 0,02 %	
	10 ml … 100 ml/ D=30mm	0,4 % … 0,04 %	
	100 ml .. 1 l / D(5mm-10mm)	0,01 % … 0,008 %	
	100 ml … 1 l / D=15mm	0,01 % … 0,008 %	
	100 ml … 1 l / D=20mm	0,02 % … 0,009 %	
	100 ml … 1 l / D=30mm	0,04% … 0,009 %	
	1 l… 5 l / D(5mm-15mm)	0,008 % … 0,037 %	
	1 l… 5 l / D(20mm-30mm)	0,009 % … 0,037 %	
	1 l… 5 l / D(40mm-60mm)	0,02 % … 0,037 %	
	5 l … 20 l / D=60mm	0,037 % … 0,032 %	
	5 l … 20 l / D=80mm	0,039 % … 0,032 %	
	5 l … 20 l / D=100mm	0,040 % … 0,032 %	
Dimensional Measurements			

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Calipers, analog - digital	0 mm … 300 mm d = (0,01 … 0,1) mm	0,6 d	Comparative calibration using gauge blocks and gauge rods
Depth calipers	0 mm … 300 mm d = (0,01 … 0,1) mm	0,6 d	
External Micrometers, analog - digital	0 mm … 200 mm		
	d = 0,001 mm	0,6 μm … 3,7 μm	
	d = 0,01mm	6 μm … 6,9 μm	
Sieves	Ονομαστικό άνοιγμα 20 μm … 125 mm	3,5 μm (με φακό x50) 6,5 μm (με φακό x30)	Calibration according to standards: ISO 3310-1:2000 ISO 3310-2:1999 ASTM E11:2009 ISO 5223:1995 EN 933-3:1997
Profile projectors / Micrometers with scale	0 mm …. 50 mm	(d=0,0001mm) 0,87 μm (d=0,001mm) 1,1 μm (x30 < lens< x50)	Using glass mircoscales Calibration can also be performed on-site
	50 mm …. 300 mm	(d=0,0001mm) 2,9 μm (d=0,001mm) 3,0 μm (lens < x30)	
Dial gauges	0 mm … 25 mm		Comparative measurement In laboratory calibration
	R = 2 μm	3,6 μm	
	R = 5 μm	4,0 μm	
	R = 10 μm	6,4 μm	
	R = 20 μm	12 μm	
	R = 100 μm	58 μm	
	R = 5 μm	13 μm	On site calibration
	R = 10 μm	14 μm	
	R = 20 μm	17 μm	
	R = 100 μm	59 μm	
	0 mm … 100 mm	0,5 μm	Comparative measurement using gauge blocks
Cubic moulds for concrete specimens 150x150x150 mm	Internal dimensions	0,02 mm	Tolerances according to EN 12390-1:2000
	Perpedicularity	4 μm	Pass / fail check
	Flatness	3 μm	Pass / fail check
Cylindrical moulds (Standard proctor moulds) 4 in	Internal diameter: 101,6 mm or 152,4 mm	0,02mm	Tolerances according to ASTM D698:2007 §6.1.1, §6.1.2
Cylindrical moulds (Modified proctor moulds) 6 in	Height A: 116,4 mm or 177,8 mm	0,03mm	Tolerances according to ASTM D698:2007 §6.1.1 and §6.1.2
CBR cylindrical moulds (CBR moulds) 6 in	Height B: 50,8 mm	0,04mm	Tolerances according to ASTM D1883:2007 §5.2
Graduated rulers	0 mm … 3000 mm	0,25d d: minimum scale division in mm with d≥1mm	OIML R35-2 §7.5, §7.6

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Extensionmeters	0 mm … 50 mm	0,6µm + (0,85µm per mm)	According to standards: ISO 9513 ASTM E83
Electrical measurements			
DC Voltage (Generation) / DC Voltage Measuring Equipment	0 … 329,9999 mV	$1,8\cdot 10^{-5}$	Using standard multifunction calibrator
	0 … 3,299999 V	$8,3\cdot 10^{-6}$	
	0 … 32,99999 V	$1,0\cdot 10^{-5}$	
	30 … 329,9999 V	$1,5\cdot 10^{-5}$	
	100 … 1020.000 V	$1,5\cdot 10^{-5}$	
DC Voltage (Measurement) / DC Voltage Generators	100 µV … 200 mV	$1,5\cdot 10^{-5}$	Using standard high-accuracy multimeter
	>200 mV … 2 V	$9,0\cdot 10^{-6}$	
	> 2 V … 20 V	$8,0\cdot 10^{-6}$	
	>20 V … 200 V	$1,1\cdot 10^{-5}$	
	>200 V … 1000 V	$1,3\cdot 10^{-5}$	
DC Voltage (Measurement)/ DC Voltage Calibrators	100 mV	$8,0\cdot 10^{-6}$	Using standard multimeter (transfer standard)
	1 V	$4,0\cdot 10^{-6}$	
	10 V	$2,0\cdot 10^{-6}$	
	100 V	$3,0\cdot 10^{-6}$	
	1000 V	$4,0\cdot 10^{-6}$	
AC Voltage (Generation) / AC Voltage Measuring Equipment	1,0 mV ... 32,999 mV 10 Hz ... 45 Hz	$8,1\cdot 10^{-4}$	Using standard multifunction calibrato
	45 Hz ... 10 kHz	$2,8\cdot 10^{-4}$	
	10 kHz ... 20 kHz	$2,8\cdot 10^{-4}$	
	20 kHz ... 50 kHz	$9,3\cdot 10^{-4}$	
	50 kHz ... 100 kHz	$9,4\cdot 10^{-4}$	
	100 kHz ... 500 KHz	$3,0\cdot 10^{-3}$	
	33,0 mV ... 329,999 mV 10 Hz ... 45 Hz	$2,6\cdot 10^{-4}$	
	45 Hz ... 10 kHz	$4,6\cdot 10^{-4}$	
	10 kHz ... 20 kHz	$1,4\cdot 10^{-4}$	
	20 kHz ... 50 kHz	$1,5\cdot 10^{-4}$	
	50 kHz ... 100 kHz	$2,9\cdot 10^{-4}$	
	100 kHz ... 500 KHz	$7,1\cdot 10^{-4}$	
	0,33 V ... 3,29999 V 10 Hz ... 45 Hz	$2,8\cdot 10^{-4}$	
	45 Hz ... 10 kHz	$2,7\cdot 10^{-4}$	
	10 kHz ... 20 kHz	$1,6\cdot 10^{-4}$	
	20 kHz ... 50 kHz	$2,5\cdot 10^{-4}$	
	50 kHz ... 100 kHz	$5,8\cdot 10^{-4}$	
	100 kHz ... 500 KHz	$5,8\cdot 10^{-4}$	
	3,3 V ... 32,9999 V 10 Hz ... 45 Hz	$2,5\cdot 10^{-4}$	
	45 Hz ... 10 kHz	$4,0\cdot 10^{-4}$	
	10 kHz ... 20 kHz	$1,3\cdot 10^{-4}$	
	20 kHz ... 50 kHz	$2,0\cdot 10^{-4}$	
	50 kHz ... 100 kHz	$2,9\cdot 10^{-4}$	
	33 V ... 329,999 V 10 Hz ... 45 Hz	$2,1\cdot 10^{-4}$	
	45 Hz ... 10 kHz	$1,5\cdot 10^{-4}$	
	10 kHz ... 20 kHz	$1,7\cdot 10^{-4}$	
	20 kHz ... 50 kHz	$2,7\cdot 10^{-4}$	
	50 kHz ... 100 kHz	$2,7\cdot 10^{-4}$	
	330 V ... 1020 V 45 Hz ... 1 kHz	$2,6\cdot 10^{-4}$	
	1 kHz ... 5 kHz	$2,0\cdot 10^{-4}$	
	5 kHz ... 10 kHz	$2,1\cdot 10^{-4}$	
AC Voltage (Generation) / AC Voltage Measuring	10 mV … 200 mV 20 Hz … 40 Hz	$1,3\cdot 10^{-3}$	Using standard high-accuracy multimeter

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Equipment	40 Hz … 1 kHz	$5{,}0\cdot 10^{-4}$	
	1 kHz … 10 kHz	$6{,}2\cdot 10^{-4}$	
	10 kHz … 30 kHz	$3{,}6\cdot 10^{-2}$	
	30 kHz … 100 kHz	$3{,}6\cdot 10^{-2}$	
	> 200 mV … 2 V 20 Hz … 40 Hz	$1{,}4\cdot 10^{-3}$	
	40 Hz … 1 kHz	$3{,}3\cdot 10^{-4}$	
	1 kHz … 10 kHz	$4{,}8\cdot 10^{-4}$	
	10 kHz … 30 kHz	$2{,}4\cdot 10^{-3}$	
	30 kHz … 100 kHz	$2{,}4\cdot 10^{-3}$	
	100 kHz … 300 kHz	$3{,}3\cdot 10^{-2}$	
	300 kHz … 1 MHz	$3{,}6\cdot 10^{-2}$	
	> 2 V … 20 V 20 Hz … 40 Hz	$1{,}3\cdot 10^{-3}$	
	40 Hz … 1 kHz	$3{,}3\cdot 10^{-4}$	
	1 kHz … 10 kHz	$3{,}6\cdot 10^{-4}$	
	10 kHz … 30 kHz	$2{,}4\cdot 10^{-3}$	
	30 kHz … 100 kHz	$2{,}4\cdot 10^{-3}$	
	100 kHz … 300 kHz	$3{,}6\cdot 10^{-2}$	
	300 kHz … 1 MHz	$3{,}6\cdot 10^{-2}$	
	> 20 V … 200 V 40 Hz … 1 kHz	$3{,}3\cdot 10^{-4}$	
	1 kHz … 10 kHz	$3{,}6\cdot 10^{-4}$	
	10 kHz … 30 kHz	$2{,}4\cdot 10^{-3}$	
	30 kHz … 100 kHz	$2{,}5\cdot 10^{-3}$	
	> 200 V … 700 V 20 Hz … 40 Hz	$1{,}3\cdot 10^{-3}$	
	40 Hz … 1 kHz	$5{,}6\cdot 10^{-4}$	
AC Voltage (Measurement)/ AC Voltage Calibrators	1 mV 10 Hz … 1 kHz	$4{,}2\cdot 10^{-3}$ … $4{,}1\cdot 10^{-3}$	Using standard multimeter (transfer standard)
	1 kHz … 100 kHz	$4{,}1\cdot 10^{-3}$ … $5{,}4\cdot 10^{-3}$	
	100 kHz … 500 kHz	$5{,}4\cdot 10^{-3}$ … $2{,}2\cdot 10^{-2}$	
	500 kHz … 1 MHz	$2{,}2\cdot 10^{-2}$ … $2{,}3\cdot 10^{-2}$	
	10 mV 10 Hz … 1 kHz	$6{,}0\cdot 10^{-4}$ … $4{,}7\cdot 10^{-4}$	
	1 kHz … 100 kHz	$4{,}7\cdot 10^{-4}$ … $9{,}0\cdot 10^{-4}$	
	100 kHz … 500 kHz	$9{,}0\cdot 10^{-4}$ … $3{,}1\cdot 10^{-3}$	
	500 kHz … 1 MHz	$3{,}1\cdot 10^{-3}$ … $4{,}4\cdot 10^{-3}$	
	100 mV 10 Hz … 1 kHz	$3{,}2\cdot 10^{-4}$ … $1{,}4\cdot 10^{-4}$	
	1 kHz … 100 kHz	$1{,}4\cdot 10^{-4}$ … $5{,}7\cdot 10^{-4}$	
	100 kHz … 500 kHz	$5{,}7\cdot 10^{-4}$ … $1{,}4\cdot 10^{-3}$	
	500 kHz … 1 MHz	$1{,}4\cdot 10^{-3}$ … $2{,}9\cdot 10^{-3}$	
	1 V 10 Hz … 1 kHz	$2{,}4\cdot 10^{-4}$ … $4{,}5\cdot 10^{-5}$	
	1 kHz … 100 kHz	$4{,}5\cdot 10^{-5}$ … $1{,}3\cdot 10^{-4}$	
	100 kHz … 500 kHz	$1{,}3\cdot 10^{-4}$ … $1{,}0\cdot 10^{-3}$	
	500 kHz … 1 MHz	$1{,}0\cdot 10^{-3}$ … $1{,}6\cdot 10^{-3}$	
	10 V 10 Hz … 1 kHz	$2{,}4\cdot 10^{-4}$ … $4{,}2\cdot 10^{-5}$	
	1 kHz … 100 kHz	$4{,}2\cdot 10^{-5}$ … $1{,}1\cdot 10^{-4}$	
	100 kHz … 500 kHz	$1{,}1\cdot 10^{-4}$ … $1{,}0\cdot 10^{-3}$	
	500 kHz … 1 MHz	$1{,}0\cdot 10^{-3}$ … $1{,}6\cdot 10^{-3}$	
	19 V, 1 kHz	$4{,}0\cdot 10^{-5}$	
	100 V 10 Hz … 1 kHz	$2{,}4\cdot 10^{-4}$ … $5{,}1\cdot 10^{-5}$	
	1 kHz … 100 kHz	$5{,}1\cdot 10^{-5}$ … $1{,}5\cdot 10^{-4}$	
	100 kHz … 200 kHz	$1{,}5\cdot 10^{-4}$ … $8{,}6\cdot 10^{-4}$	
	700V 50 kHz … 100 kHz	$2{,}5\cdot 10^{-4}$ … $6{,}7\cdot 10^{-4}$	

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
	1000 V 40 Hz … 1 kHz	$7{,}9\cdot 10^{-5}$	
	1 kHz … 30 kHz	$7{,}9\cdot 10^{-5}$ … $2{,}5\cdot 10^{-4}$	
DC Current (Generation) / DC Current Measuring Equipment	0 ... 329.999 mA	$2{,}0\cdot 10^{-4}$	Using standard multifunction calibrator
	0 ... 3.29999 mA	$9{,}0\cdot 10^{-5}$	
	0 ... 32.9999 mA	$9{,}2\cdot 10^{-5}$	
	0 ... 329.999 mA	$9{,}2\cdot 10^{-5}$	
	0 ... 1.09999 A	$1{,}9\cdot 10^{-4}$	
	1.1 ... 2.99999 A	$3{,}1\cdot 10^{-4}$	
	0 ... 10.0000 A	$4{,}5\cdot 10^{-4}$	
DC Current (Generation) / DC Current Clamp Meters	2 A	$5{,}1\cdot 10^{-4}$	Using standard current calibrator with its 10-turn Current Coil as current source
	20 A	$5{,}1\cdot 10^{-4}$	
	100 A	$7{,}1\cdot 10^{-4}$	
	1000 A	$6{,}4\cdot 10^{-3}$	
DC Current (Measurement) / DC Current Calibrators up to 10 A	100 µA	$9{,}2\cdot 10^{-5}$	Using standard multimeter (transfer standard)
	1 mA	$3{,}2\cdot 10^{-5}$	
	10 mA	$2{,}9\cdot 10^{-5}$	
	100 mA	$4{,}2\cdot 10^{-5}$	
	1 A	$6{,}2\cdot 10^{-5}$	
	10 A	$3{,}8\cdot 10^{-4}$	
DC Current (Measurement) / DC Current Calibrators - Generators up to 100 A	2 mA … 20 mA	$1{,}1\cdot 10^{-4}$	Using standard current shunts and standard high-accuracy multimeter
	20 mA … 200 mA	$1{,}1\cdot 10^{-4}$	
	200 mA … 2 A	$1{,}1\cdot 10^{-4}$ … $2{,}1\cdot 10^{-4}$	
	2 A … 20 A	$2{,}1\cdot 10^{-4}$	
	20 A … 100 A	$2{,}1\cdot 10^{-4}$ … $5{,}1\cdot 10^{-4}$	
DC Current (Measurement) / DC Current Generators up to 2 A	100 µA … 2 A	$1{,}6\cdot 10^{-4}$	Using standard high-accuracy multimeter
AC Current (Generation) / AC Current Measuring Equipment	29,00 … 329,99 µA 10 to 20 Hz	$1{,}8\cdot 10^{-3}$	Using standard multifunction calibrator
	20 to 45 Hz	$1{,}6\cdot 10^{-3}$	
	45 Hz to 1 kHz	$1{,}4\cdot 10^{-3}$	
	1 to 5 kHz	$2{,}7\cdot 10^{-3}$	
	5 to 10 kHz	$7{,}0\cdot 10^{-3}$	
	10 to 30 kHz	$9{,}2\cdot 10^{-3}$	
	0,33 … 3,29999 mA 10 to 20 Hz	$1{,}6\cdot 10^{-3}$	
	20 to 45 Hz	$1{,}0\cdot 10^{-3}$	
	45 Hz to 1 kHz	$8{,}1\cdot 10^{-4}$	
	1 to 5 kHz	$2{,}1\cdot 10^{-3}$	
	5 to 10 kHz	$6{,}7\cdot 10^{-3}$	
	10 to 30 kHz	$8{,}4\cdot 10^{-4}$	
	3,3 … 32,9999 mA 10 to 20 Hz	$1{,}6\cdot 10^{-3}$	
	20 to 45 Hz	$1{,}0\cdot 10^{-3}$	
	45 Hz to 1 kHz	$8{,}1\cdot 10^{-4}$	
	1 to 5 kHz	$1{,}6\cdot 10^{-3}$	
	5 to 10 kHz	$3{,}9\cdot 10^{-3}$	
	10 to 30 kHz	$7{,}9\cdot 10^{-3}$	
	33 … 329,999 mA 10 to 20 Hz	$1{,}4\cdot 10^{-3}$	
	20 to 45 Hz	$7{,}5\cdot 10^{-3}$	
	45 Hz to 1 kHz	$3{,}7\cdot 10^{-4}$	
	1 to 5 kHz	$4{,}0\cdot 10^{-4}$	
	5 to 10 kHz	$1{,}6\cdot 10^{-3}$	
	10 to 30 kHz	$3{,}2\cdot 10^{-3}$	
	0,33 … 1,09999 A 10 to 45 Hz	$1{,}5\cdot 10^{-3}$	
	45 to 1 kHz	$1{,}5\cdot 10^{-3}$	
	1 to 5 kHz	$4{,}8\cdot 10^{-4}$	

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
	5 to 10 kHz	$2{,}0\cdot 10^{-2}$	
	1,1 … 2,09999 A 10 to 45 Hz	$1{,}5\cdot 10^{-3}$	
	45 to 1 kHz	$5{,}0\cdot 10^{-4}$	
	1 to 5 kHz	$5{,}0\cdot 10^{-4}$	
	5 to 10 kHz	$2{,}1\cdot 10^{-2}$	
	3 … 10,9999 A 45 to 100 Hz	$6{,}3\cdot 10^{-4}$	
	100 Hz to 1 kHz	$1{,}3\cdot 10^{-3}$	
	1 to 5 kHz	$1{,}6\cdot 10^{-2}$	
AC Current (Generation) / AC Current Clamp Meters, 50 Hz	2 A	$2{,}5\cdot 10^{-3}$	Using standard current calibrator with its 10-turn current coil as current source
	20 A	$2{,}9\cdot 10^{-3}$	
	100 A	$4{,}7\cdot 10^{-3}$	
	1000 A	$6{,}4\cdot 10^{-3}$	
AC Current (Measurement) / AC Current Calibrators up to 10 A	100 µA 10 Hz … 5 kHz	$3{,}7\cdot 10^{-4}$ … $3{,}6\cdot 10^{-4}$	Using standard multimeter (transfer standard)
	1 mA 10 Hz … 5 kHz	$2{,}5\cdot 10^{-4}$ … $2{,}8\cdot 10^{-4}$	
	10 mA 10 Hz … 5 kHz	$2{,}5\cdot 10^{-4}$ … $2{,}3\cdot 10^{-4}$	
	100 mA 10 Hz … 5 kHz	$2{,}5\cdot 10^{-4}$ … $2{,}1\cdot 10^{-4}$	
	1 A 20 Hz … 5 kHz	$2{,}7\cdot 10^{-4}$ … $4{,}3\cdot 10^{-4}$	
	10 A 40 Hz … 10 kHz	$3{,}9\cdot 10^{-4}$ … $3{,}1\cdot 10^{-3}$	
AC Current (Measurement) / AC Current Calibrators - Generators up to 100 A	2 mA … 20 mA 50 Hz … 1 kHz	$1{,}2\cdot 10^{-3}$	Using standard current shunts and standard high-accuracy multimeter
	20 mA … 200 mA 50 Hz … 1 kHz	$1{,}2\cdot 10^{-3}$	
	200 mA … 2 A 50 Hz … 1 kHz	$1{,}2\cdot 10^{-3}$	
	2 A … 20 A 50 Hz … 1 kHz	$1{,}2\cdot 10^{-3}$	
	20 A … 100 A 50 Hz … 1 kHz	$1{,}2\cdot 10^{-3}$	
AC Current (Measurement) / AC Current Generators up to 2 A	10 mA … 2 A 30 Hz … 300 Hz	$1{,}0\cdot 10^{-3}$	A standard high-accuracy multimeter is used for the calibration
	300 Hz … 1 kHz	$1{,}1\cdot 10^{-3}$	
	1 kHz … 5 kHz	$3{,}1\cdot 10^{-3}$	
4-wire Resistance (Generation) / Resistance Measuring Equipment	0 ... 10,9999 Ω	$5{,}8\cdot 10^{-5}$	Using standard multifunction calibrator
	11 ... 32,9999 Ω	$2{,}4\cdot 10^{-5}$	
	33 ... 109,9999 Ω	$2{,}3\cdot 10^{-5}$	
	110 Ω ... 329,9999 Ω	$2{,}2\cdot 10^{-5}$	
	330 Ω ... 1,099999 kΩ	$2{,}2\cdot 10^{-5}$	
	1,1 ... 3,299999 kΩ	$2{,}2\cdot 10^{-5}$	
	3,3 ... 10,99999 kΩ	$2{,}2\cdot 10^{-5}$	
	11 ... 32,99999 kΩ	$2{,}2\cdot 10^{-5}$	
	33 ... 109,9999 kΩ	$2{,}2\cdot 10^{-5}$	
	110 ... 329,99999 kΩ	$2{,}7\cdot 10^{-5}$	
	330 kΩ ... 1,099999 MΩ	$2{,}6\cdot 10^{-5}$	
	1,1 ... 3,299999 MΩ	$4{,}7\cdot 10^{-5}$	
	3,3 ... 10,99999 MΩ	$4{,}8\cdot 10^{-5}$	
	11 ... 32,99999 MΩ	$2{,}0\cdot 10^{-4}$	
	33 ... 109,9999 MΩ	$4{,}0\cdot 10^{-4}$	
2-wire Resistance (Generation) / Resistance Measuring Equipment	10 Ω	$1{,}3\cdot 10^{-3}$	Using standard multifunction calibrator
	100 Ω	$2{,}0\cdot 10^{-4}$	
	1 kΩ	$1{,}7\cdot 10^{-4}$	
	10 kΩ	$2{,}4\cdot 10^{-5}$	
	100 kΩ	$1{,}2\cdot 10^{-5}$	

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
	1 MΩ	$2{,}4\cdot 10^{-5}$	
	10 MΩ	$7\cdot 10^{-4}$	
	100 MΩ	$8\cdot 10^{-3}$	
Resistance / Insulation testers, Megohmmeters	1 MΩ	3,7 kΩ	Using standard resistors
	10 MΩ	37 kΩ	
	100 MΩ	370 kΩ	
	1 GΩ	3,8 MΩ	
	10 GΩ	42 MΩ	
	100 GΩ	0,95 GΩ	
	1 TΩ	17 GΩ	
	10 TΩ	730 GΩ	
	100 TΩ	1,8 TΩ	
Resistance (Measurement) / Resistance Calibrators	10 Ω	$2{,}0\cdot 10^{-5}$	Using standard multimeter (transfer standard)
	100 Ω	$8{,}0\cdot 10^{-6}$	
	1 kΩ	$6{,}5\cdot 10^{-6}$	
	10 kΩ	$6{,}5\cdot 10^{-6}$	
	100 kΩ	$8{,}0\cdot 10^{-6}$	
	1 MΩ	$1{,}3\cdot 10^{-5}$	
	10 MΩ	$2{,}7\cdot 10^{-5}$	
	100 MΩ	$8{,}5\cdot 10^{-5}$	
4-wire Resistance (Measurement) / Standard Resistors	0,1 Ω … 200 Ω	$1{,}6\cdot 10^{-5}$	Using standard high-accuracy multimeter
	>200 Ω … 2 kΩ	$1{,}3\cdot 10^{-5}$	
	>2 kΩ … 20 kΩ	$1{,}3\cdot 10^{-5}$	
	>20 kΩ … 200 kΩ	$1{,}4\cdot 10^{-5}$	
	>200 kΩ … 2 MΩ	$2{,}7\cdot 10^{-5}$	
	>2 MΩ … 20 MΩ	$5{,}1\cdot 10^{-5}$	
	>20 MΩ … 200 MΩ	$2{,}3\cdot 10^{-4}$	
2-wire Resistance (Measurement) / Standard Resistors	0,1 Ω … 200 Ω	$1{,}2\cdot 10^{-3}$	Using standard high-accuracy multimeter
	>200 Ω … 2 kΩ	$2{,}1\cdot 10^{-4}$	
	>2 kΩ … 20 kΩ	$2{,}8\cdot 10^{-5}$	
	>20 kΩ … 200 kΩ	$1{,}6\cdot 10^{-5}$	
	>200 kΩ … 2 MΩ	$2{,}8\cdot 10^{-5}$	
	>2 MΩ … 20 MΩ	$5{,}1\cdot 10^{-5}$	
	>20 MΩ … 200 MΩ	$2{,}3\cdot 10^{-4}$	
Resistance (Measurement) / Current shunts	0,001 Ω	$5{,}0\cdot 10^{-4}$	Using standard current source and standard high-accuracy multimeter
	0,01 Ω	$2{,}8\cdot 10^{-4}$	
	0,1 Ω	$1{,}5\cdot 10^{-4}$	
	1 Ω	$8{,}4\cdot 10^{-5}$	
	10 Ω	$8{,}0\cdot 10^{-5}$	
	100 Ω	$8{,}0\cdot 10^{-5}$	
DC Voltage (Generation) / Temperature Indicators without cold junction compensation	±100 mV (-270 °C…1700 °C)	0,07 ºC	Calibrations based on guide: EURAMET/ cg-11/v.2:2011 Calibrations can also be performed on-site
DC Voltage (Generation) / Temperature Indicators with cold junction compensation	±100 mV (-270 °C…1700 °C)	0,27 ºC	
Time / Frequency measurements			
Time / Timers	0 s ... 21.600 s	0,23 s	Using Rubidium frequency standard and standard frequency counter
Frequency / Frequency counters	1 MHz	14 µHz	Using Rubidium frequency standard
	10 MHz	230 µHz	

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Frequency / Optical tachometers	600 rpm (10 Hz)	$14{,}2 \cdot 10^{-2}$ rpm	Using standard multifunction calibrator and standard frequency counter
	900 rpm (15 Hz)	$14{,}3 \cdot 10^{-2}$ rpm	
	3.000 rpm (50 Hz)	$16 \cdot 10^{-2}$ rpm	
	15.000 rpm (250 Hz)	$23 \cdot 10^{-2}$ rpm	
	30.000 rpm (500 Hz)	$31 \cdot 10^{-2}$ rpm	
	60.000 rpm (1000 Hz)	0,5 rpm	
	90.000 rpm (1500 Hz)	0,8 rpm	
Revolution frequency / Centrifuges, Centrifuge extractors, Mixers	0 rpm …. .90 000 rpm	3,0 rpm	Using tachometer Calibration can also be performed on-site
Mass Measurements			
Mass / Standard weights	1 mg … 10 mg	0,01 mg	Capability to calibrate standard weights up to (including): OIML Class F2
	20 mg … 100 mg	0,01 mg	,, F1 ,,
	200 mg	0,01 mg	,, F1 ,,
	500 mg	0,01 mg	,, F1 ,,
	1 g	0,01 mg	,, F1 ,,
	2 g	0,02 mg	,, F1 ,,
	5 g	0,02 mg	,, F1 ,,
	10 g	0,03 mg	,, F1 ,,
	20 g	0,03 mg	,, F1 ,,
	50 g	0,04 mg	,, F1 ,,
	100 g	0,06 mg	,, F1 ,,
	200 g	0,12 mg	,, F1 ,,
	500 g	0,90 mg	,, F2 ,,
	1 kg	1,0 mg	,, F1 ,,
	2 kg	1,4 mg	,, F1 ,,
	5 kg	3,1 mg	,, F1 ,,
	10 kg	82 mg	,, M1 ,,
	20 kg	82 mg	,, F2 ,,
	50 kg	170 mg	,, F2 ,,
Mass / Non-automatic weighing instruments	1 mg	2 µg	According to guide EURAMET/cg-18/v.04:2015 Available Standard Weights OIML Class E2 in the range from 1mg to 5kg. Max. grouped load: 11,1 kg Available Standard Weights OIML Class F1 in the range from 1mg to 5kg. Max. grouped load: 11,1 kg Available Standard Weights OIML Class F2 in the range from 1mg to 5kg. Max. grouped load: 11,1 kg Available Standard Weights OIML Class F2 in the range from 10kg to 20kg. Max. grouped load: 50 kg Available Standard Weights OIML
	2 mg	2 µg	
	5 mg	2 µg	
	10 mg	2 µg	
	20 mg	3 µg	
	50 mg	3 µg	
	100 mg	5 µg	
	200 mg	6 µg	
	500 mg	7 µg	
	1 g	10 µg	
	2 g	10 µg	
	5 g	15 µg	
	10 g	20 µg	
	20 g	30 µg	
	50 g ... 1 kg	$1 \cdot 10^{-6}$	

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
	2 kg ... 5 kg	$2 \cdot 10^{-6}$	Class M1 in the range from 10kg to 700kg. Max. grouped load: 700 kg
	5 kg … 10 kg	$6 \cdot 10^{-6}$	
	10 kg … 60 kg	$5 \cdot 10^{-5}$	
	60 kg … 750 kg	$6 \cdot 10^{-5}$	
	700 kg … 6,84 t	$(5{,}3 \cdot 10^{-5} m + 1{,}2 \cdot N)$ kg where m: value of mass expressed in kg N: number of substitution loads	According to guide EURAMET/cg-18/v.v.04:2015 using substitution loads of known density, which are provided by the client according to lab suggestion Calibrations are performed on-site
Force measurements			
Force / Compression testing machines	0 kN … 1 kN	0,03 %	Class 0.5 machines
	2 kN… 20 kN	0,12 %	,, 1 ,,
	20 kN … 45 kN	0,07 %	,, 0.5 ,,
	45 kN … 450 kN	0,14 %	,, 1 ,,
	600 kN … 3000 kN	0,26 %	,, 1 ,,
Force / Tensile testing machines	0 kN … 1 kN	0,03%	Class 0.5 machines
	2 kN … 22 kN	0,11 %	,, 0.5 ,,
	20 kN … 45 kN	0,10 %	,, 0.5 ,,
	45 kN … 220 kN	0,13 %	,, 0.5 ,,
	220 kN … 450 kN	0,13 %	,, 0.5 ,, According to ISO 7500-1:2018 Calibrations can be performed on-site
Force / Compression testing machines:			According to EN 12390-4:2000 Calibrations can be performed on-site
- Force transfer	Force ratio in load 200 kN - 2000 kN	0.01	
- Force rate	1 kN/s … 100 kN/s	0,8 %	
- Flatness of machine plates	5 µm … 30 µm	3,5 µm	
- Hardness of machine plates	24 HRC … 63 HRC	1 HRC	
- Roughness of machine plates	0.2 Ra … 5 Ra (µm)	0,011 µm ….0,18 µm	
Force / Load rings, CBR, MARSHAL Loading machines	0 kN … 100 kN	0,07 %	According to ISO 7500-1: 2018 & BS 1377-1:2016 Calibrations can be performed on-site
Torque Measurements			
Torque calibrators	1 Nm … 85 Nm	0,25 %	Using standard weights
	85 Nm … 700 Nm	0,15 %	
Torque meters	1 Nm … 700 Nm	0,6 %	Using torque calibrators
Pressure measurements			
Relative Pressure/ Relative pressure gauges of direct reading, analog – digital, Pressure recorders	3,5 kPa … 100 kPa	$3{,}3 \cdot 10^{-5} \cdot P + 1{,}0 \cdot 10^{-4}$ (kPa) όπου P : τιμή πίεσης εκφρασμένη σε kPa	Using dead weight testers Medium: gas According to Guide EURAMET/cg-17/ v.4:04/2019

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
	0,1 MPa … 10 MPa	$1{,}4 \cdot 10^{-5} \cdot P + 4{,}5 \cdot 10^{-4}$ (MPa) όπου P : τιμή πίεσης εκφρασμένη σε MPa	
	0,5 MPa … 5,5 MPa	$5{,}9 \cdot 10^{-5} \cdot P + 8{,}1 \cdot 10^{-5}$ (MPa) όπου P : τιμή πίεσης εκφρασμένη σε MPa	Using dead weight testers Medium: oil According to guide: EURAMET/cg-17/v.4:04/2019
	5,5 MPa … 55 MPa	$3{,}7 \cdot 10^{-5} \cdot P + 9{,}5 \cdot 10^{-4}$ (MPa) Όπου P : τιμή πίεσης εκφρασμένη σε MPa	
	-1000 Pa … -200 Pa	3,6 Pa	Using standard pressure transducers Medium: gas According to guide: EURAMET/cg-17/v.4:04/2019 Calibration can also be performed on-site
	200 Pa … 1000 Pa	3,6 Pa	
	10 kPa… 100 kpa	4,6 Pa	Using standard pressure transducers Medium: gas, oil According to guide: EURAMET/cg-17/v.4:04/2019 Calibration can also be performed on-site
	200 kPa… 2 Mpa	0,91 kPa … 1,1 kPa	
	2 Mpa … 10,3 MPa	0,82 kPa	
	10,3 Mpa … 34,3 MPa	4,8 kPa … 5,4 kPa	
	34,3 Mpa … 100 MPa	7,9 kPa	Using standard pressure transducers Medium: oil According to guide: EURAMET/cg-17/v.4:04/2019 Calibration can also be performed on-site
Absolute Pressure / Absolute pressure gauges of direct reading, analog – digital, Pressure recorders	10 kPa… 100 kpa	4,6 Pa	Using standard pressure transducers Medium: gas According to guide: EURAMET/cg-17/v.4:04/2019 Calibration can also be performed on-site
	200 kPa… 2 Mpa	0,91 kPa … 1,1 kPa	
	2 Mpa … 10,3 MPa	0,82 kPa	

Measurand / Calibration item	Range of measurement	Calibration & Measurement Capability(k=2)*	Remarks
Barometric Pressure	900 hPa … 1050 hPa	0,19 hPa	Using standard pressure transducers Medium: gas According to guide: EURAMET/cg-17/v.3:2017 Calibration can also be performed on-site

* *Where uncertainty is accompanied by the corresponding unit, it is absolute, while where it is not accompanied by a unit, it is relative.*

Site of assessment: **Permanent laboratory premises, 46, N. Plastira Str., GR-171 21, N. Smyrni, Attiki, Greece.**

Approved Signatories: **T. Manaras, K. Mavroethakos, E. Tsoumpos, S. Karabetis, G. Katsamakis, G. Kasapas, E. Athanasiadis.**

This Scope of Accreditation replaces the previous one dated 12.09.2019.
The Accreditation Certificate No. **345**-4, to ELOT EN ISO/IEC 17025:2017,) is valid until 21.05.2023.

Athens, 21.11.2019

ΕΘΝΙΚΟ ΣΥΣΤΗΜΑ ΔΙΑΠΙΣΤΕΥΣΗΣΕΩΝ ΕΣΥΔ ΑΦΜ: 997000397 - ΔΟΥ: ΚΑΛΛΙΘΕΑ

Spyridon Podaras
Managing Director of ESYD