

SCOPE OF ACCREDITATION FOR CALIBRATION LABORATORY No AP 173

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 AP 173	Name and address SONEL S.A. TESTING AND CALIBRATION LABORATORY Wokulskiego 11 58-100 Świdnica
Activity conducted: at permanent location (S)	Calibration: number and name of mesurand^{*)} 7.01 voltage DC^{*)} 7.02 current DC^{*)} 7.03 voltage AC^{*)} 7.04 current AC^{*)} 7.05 resistance DC^{*)} 7.06 resistance AC^{*)} 7.07 impedance^{*)} 7.13 power AC^{*)} 10.01 time (interval)^{*)} 10.02 frequency^{*)} 19.03 temperature (radiation thermometry)^{*)}

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^{*)} The numbering of mesurand in accordance with the classification given in the Annex to document DAP-04, available at PCA website www.pca.gov.pl

Testing and Calibration Laboratory Wokulskiego 11, 58-100 Świdnica				
Object of calibration /measuring	Measurement range	Measurement uncertainty for CMC	Place of activity	Identyfication of the method
Voltage (DC)				
Digital voltmeters Multimeters Meters for electrical installation parameters Clamp meters	0,2 mV do 200 mV 0,2 V do 2 V 2 V do 20 V 20 V do 200 V 200 V do 1000 V	$1 \cdot 10^{-5} \cdot U + 0,6 \mu V$ $1 \cdot 10^{-5} \cdot U + 0,3 \mu V$ $1,5 \cdot 10^{-5} \cdot U + 0,6 \mu V$ $1,5 \cdot 10^{-5} \cdot U + 0,03 mV$ $1,5 \cdot 10^{-5} \cdot U + 0,9 mV$ $U - measurand (V)$	S	Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method
Calibrators Referece sources	10 mV do 200 mV 0,2 V do 1000 V	0,0005 % 0,0004 %		Internal procedure IW02 Direct method
Current (DC)				
Digital current meters Multimeters Meters for electrical installation parameters	2 μA do 200 μA 0,2 mA do 2 mA 2 mA do 20 mA 20 mA do 200 mA 0,2 A do 2 A 2 A do 20 A	$5 \cdot 10^{-5} \cdot I + 0,2 nA$ $4 \cdot 10^{-5} \cdot I + 6 nA$ $4 \cdot 10^{-5} \cdot I + 60 nA$ $8 \cdot 10^{-5} \cdot I + 1,3 \mu A$ 0,02 % 0,04 % $I - measurand (A)$	S	Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method
Clamp meters	10 mA do 2000 A	0,07 %		Internal procedure IW02 Direct/indirect method
Calibrators	2 μA do 200 mA 0,2 A do 2 A 2 A do 20 A	0,004 % 0,02 % 0,05 %		
Voltage (AC)				
Digital voltmeters Multimeters Meters for electrical installation parameters Clamp meters	10 Hz do 40 Hz 10 mV do 200 mV 0,2 V do 2 V 2 V do 20 V 40 Hz do 10 kHz 0,2 mV do 200 mV 0,2 V do 2 V 2 V do 20 V 20 V do 200 V 200 V do 1000 V 10 kHz do 100 kHz 0,2 mV do 200 mV 0,2 V do 2 V 2 V do 20 V 20 V do 300 V	0,021 % 0,015 % 0,016 % $4 \cdot 10^{-4} \cdot U + 12 \mu V$ $2,5 \cdot 10^{-4} \cdot U + 40 \mu V$ $2,5 \cdot 10^{-4} \cdot U + 0,4 mV$ $2 \cdot 10^{-4} \cdot U + 0,3 mV$ $2,5 \cdot 10^{-4} \cdot U + 4 mV$ $6 \cdot 10^{-4} \cdot U + 15 \mu V$ $4 \cdot 10^{-4} \cdot U + 70 \mu V$ $4,5 \cdot 10^{-4} \cdot U + 0,8 mV$ $4 \cdot 10^{-4} \cdot U + 7 mV$ $U - measurand (V)$	S	Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method
RCD testers	0 V do 100 V	0,25 %		Internal procedure IW09 Direct method
Calibrators	40 Hz do 100 Hz 10 mV do 200 mV 0,2 V do 200 V 200 V do 1000 V 100 Hz do 2000 Hz 10 mV do 200 mV 0,2 V do 200 V 200 V do 1000 V 2 kHz do 10 kHz 10 mV do 200 mV 0,2 V do 200 V 200 V do 1000 V 10 kHz do 30 kHz 10 mV do 200 mV 0,2 V do 200 V 200 V do 1000 V 30 kHz do 100 kHz 10 mV do 200 mV 0,2 V do 200 V 200 V do 1000 V	0,05 % 0,011 % 0,015 % 0,031 % 0,01 % 0,015 % $1,4 \cdot 10^{-4} \cdot U + 0,004 mV$ 0,012 % 0,013 % $3,4 \cdot 10^{-4} \cdot U + 0,008 mV$ 0,024 % 0,026 % $7,7 \cdot 10^{-4} \cdot U + 0,02 mV$ 0,067 % 0,077 % $U - measurand (V)$		Internal procedure IW02 Direct method

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Object of calibration /measuring	Measurement range	Measurement uncertainty for CMC	Place of activity	Identyfication of the method
Current (AC)				
Digital current meters Multimeters Meters for electrical installation parameters	10 Hz do 1 kHz 10 μA do 20 μA 0,2 mA do 200 mA 0,2 A do 2 A 2 A do 20 A 20 A do 150 A 1 kHz do 5 kHz 10 μA do 200 μA 0,2 mA do 200 mA 0,2 A do 2 A 2 A do 10 A	0,068 % 0,057 % 0,042 % 0,061 % 0,2 % 0,045 % 0,03 % 0,062 % 0,12 %	S	Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method Internal procedure IW09 RCD setting current measurement Indirect method
Clamp meters	10 Hz ÷ 1 kHz 10 mA do 1000 A 1000 A do 1900 A	0,15 % 0,06 %		Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method
Calibrators	40 Hz do 1 kHz 10 μA do 200 μA 0,2 mA do 200 mA 0,2 A do 2 A 2 A do 20 A 1 kHz do 10 kHz 10 μA do 200 μA 0,2 mA do 200 mA 0,2 A do 2 A 2 A do 20 A 10 kHz do 20 kHz 0,2 mA do 200 mA 50 Hz / 60 Hz 2 A do 100 A	0,061 % 0,03 % 0,04 % 0,1 % 0,25 % 0,13 % 0,16 % 0,35 % 0,17 % 0,05 %		Internal procedure IW02 Direct/indirect method
Portable appliance testers (substitute leakage current)	0,04 mA do 20 mA	0,01 · I + 0,01 mA I – measurand (A)		Internal procedure IW01 Substitute leakage current Direct method
Resistance (DC)				
Digital resistance meters Multimeters	20 μΩ 80 μΩ 150 μΩ 375 μΩ 750 μΩ 0,001 Ω do 1 Ω 0,1 Ω do 10,9999 Ω 11 Ω do 32,9999 Ω 33 Ω do 109,9999 Ω 110 Ω do 329,9999 Ω 330 Ω do 1,0999999 kΩ 1,1 kΩ do 3,299999 kΩ 3,3 kΩ do 32,99999 kΩ 33 kΩ do 109,9999 kΩ 110 kΩ do 329,9999 kΩ 330 kΩ do 1,0999999 MΩ 1,1 MΩ do 3,299999 MΩ 3,3 MΩ do 10,99999 MΩ 11 MΩ do 32,99999 MΩ 33 MΩ do 109,9999 MΩ 110 MΩ do 329,9999 MΩ 330 MΩ do 1100 MΩ	0,3 % 0,1 % 0,3 % 0,3 % 0,3 % 0,02 % 0,03 % 0,008 % 0,008 % 0,005 % 0,005 % 0,005 % 0,005 % 0,005 % 0,005 % 0,008 % 0,02 % 0,05 % 0,06 % 0,4 % 2 %	S	Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method
Insulation resistance meters	napięcie pomiarowe do 15 kV 50 kΩ do 10 TΩ 11 TΩ 20 TΩ	0,6 % 0,5 % 0,5 %		Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method

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Object of calibration /measuring	Measurement range	Measurement uncertainty for CMC	Place of activity	Identification of the method
Shunts Resistance standards Adjustable resistors Resistance calibrators	20 $\mu\Omega$ do 80 $\mu\Omega$ 80 $\mu\Omega$ do 0,01 Ω 0,01 Ω do 0,1 Ω 0,1 Ω do 2 Ω 2 Ω do 20 Ω 20 Ω do 200 k Ω 200 k Ω do 2 M Ω 2 M Ω do 20 M Ω 20 M Ω do 200 M Ω 200 M Ω do 2 G Ω 2 G Ω do 20 G Ω	0,1 % 0,06 % 0,02 % 0,002 % 0,002 % 0,002 % 0,003 % 0,004 % 0,006 % 0,01 % 0,11 %		Internal procedure IW02; IW04 Direct/indirect method
Resistance standards Adjustable resistors Resistance calibrators	napięcie pomiarowe do 15 kV 50 k Ω do 2,2 T Ω 2,2 T Ω do 10 T Ω 11 T Ω 20 T Ω napięcie pomiarowe do 1 kV 20 T Ω do 42 T Ω	0,6 % 0,5 % 0,5 % 0,5 % 2,6 %		Internal procedure IW03 Indirect method
Resistance AC				
Digital resistance meters Meters for installation parameters	50 Hz do 200 Hz 0,1 Ω do 0,4 Ω 0,4 Ω do 3 Ω 3 Ω do 19,9 k Ω	0,7 % 0,6 % 0,15 %	S	Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method
Short-circuit loop impedance meters RCD testers	50 Hz / 60 Hz 100 m Ω do 250 m Ω 250 m Ω do 1000 m Ω 1000 m Ω do 2000 m Ω 2 Ω do 19 Ω 19 Ω do 2 k Ω	0,6 % 0,3 % 0,12 % 0,3 % 0,06 %	S	Internal procedure IW07; IW09 Direct method
Digital resistance meters Portable appliance testers	prąd do 25 A 50 Hz do 200 Hz 20 m Ω do 50 m Ω 50 m Ω do 30 Ω	2 % 1 %	S	Internal procedure IW01 Based on EURAMET cg-15 v. 3.0 Direct method
Impedance				
Impedance meters Meters for installation parameters	100 m Ω do 250 m Ω 250 m Ω do 1000 m Ω 1000 m Ω do 2000 m Ω 2 Ω do 19 Ω 19 Ω do 2 k Ω	0,6 % 0,3 % 0,12 % 0,3 % 0,06 %	S	Internal procedure IW07 Direct method
Earth resistance meter Meters for electrical installation parameters (impedance measurement impuls method)	0,2 Ω do 200 Ω	$0,01 \cdot R + 0,1 \Omega$ $R - \text{measurand } (\Omega)$		Internal procedure IW07 Impedance measurement impuls method Direct method
Power AC				
Digital single-phase active power meters Digital three-phase active power meters Meters for installation parameters Meters for electrical installation parameters	100 W do 150 kW 40 Hz do 70 Hz 1 A do 1000 A 100 V do 500 V $\cos\varphi = 1$	0,05 %	S	Internal procedure IW11 Direct method
Digital single-phase apparent power meters Digital three-phase apparent power meters Meters for installation parameters Meters for electrical installation parameters	100 VA do 150 kVA 40 Hz do 70 Hz 1 A do 1000 A 100 V do 500 V	0,05 %		
Time (interval)				
Meters for installation parameters	5 ms do 190 ms 190 ms do 390 ms 390 ms do 1000 ms	1,1 ms 1,2 ms 8,2 ms	S	Internal procedure IW09 Direct method
Frequency				
Meter for installation parameters Multimeters Digital frequency meters	10 Hz do 100 Hz 100 Hz do 1000 Hz 1 kHz do 10 kHz 10 kHz do 100 kHz 100 kHz do 500 kHz	$3 \cdot 10^{-6} \cdot F$ $F - \text{measurand } (\text{Hz})$	S	Internal procedure IW10 Direct method
Temperature (radiation thermometry)				
Pyrometers (including radiation pyrometers, photoelectric, multiband, cameras thermovision)	0 $^{\circ}\text{C}$ do 50 $^{\circ}\text{C}$ 50 $^{\circ}\text{C}$ do 100 $^{\circ}\text{C}$ 100 $^{\circ}\text{C}$ do 400 $^{\circ}\text{C}$ 400 $^{\circ}\text{C}$ do 500 $^{\circ}\text{C}$	1,1 $^{\circ}\text{C}$ 1,4 $^{\circ}\text{C}$ 1,6 $^{\circ}\text{C}$ 3,5 $^{\circ}\text{C}$	S	Internal procedure W06

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The Calibration and Measurement uncertainty for CMC is the expanded uncertainty at a confidence level of app. 95 %. Value expressed as a percentage refers to the percentage of the measured value. In other cases, the CMC is expressed in units of the measured value.

List of changes

Accreditation Scope No. AP 173

Status of changes: the original version - A