LightingLab Calibration Laboratory Ltd.
CALIBRATION LABORATORY
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NAH-2-0368/2023
KALIBRÁLÓLABORATÓRIUM

SCOPE OF ACCREDITATION (2)

registered under NAH-2-0368/2023 accreditation registration number

1) Name and address of the accredited organization:
LightingLab Calibration Laboratory Ltd.
Calibration Laboratory
8200 Veszprém, Cholnoky J. str. 11/b

2) Accreditation standard:

MSZ EN ISO/IEC 17025:2018

Category of accreditation:

calibration laboratory

3) Validity of the accredited status:

Start date of accredited state (Y.M.D): **2023 May 11**

End date of accredited state (Y.M.D): **2028 May 11**

4) Accredited fields:

I. Accredited laboratory calibration services at LightingLab Calibration Laboratory:

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
Electricity measurement DC and AC				
1.	Multimeters, voltmeters DC voltage	1 mV … 10 mV 10 mV … 100 mV 100 mV … 1 V 1 V … 280 V 280 V … 600 V 600 V … 1050 V	10 µV … 11 µV 11 µV … 12 µV 12 µV … 20 µV 20 µV … 9.5 mV 9.5 mV … 20 mV 20 mV … 28 mV	LL-VILL-01-2023
2.	Multimeters, current meters, clamp meters DC current	1 µA ... 10 µA 10 µA ... 100 µA 100 µA ... 1 mA 1 mA ... 1 A 1 A ... 10 A 10 A ... 30 A *With current clamp only:* 30…1500 A	20 nA ... 22 nA 22 nA ... 41 nA 41 nA ... 0.2 µA 0.2 µA … 0.2 mA 0.2 mA ... 3.2 mA 3.2 mA ... 14 mA 60 mA ... 3.5 A	LL-VILL-01-2023
3.	Multimeters, voltmeters AC voltage	15 Hz...10 kHz 1 mV…1050 V 10 kHz...30 kHz 1 mV…280 V 30 kHz...100 kHz 1 mV…20 V 100 kHz...300 kHz 1 mV…2 V	8.8 µV ... 0.37 V 8.8 µV ... 42 mV 8.8 µV ... 5 mV 8.8 µV ... 0.3 mV	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
4.	Multimeters, current meters, clamp meters AC current	15 Hz...1 kHz 10 µA … 30 A 1 kHz...5 kHz 10 µA … 2 A 5 kHz...10 kHz 10 µA … 200 mA 45 Hz...65 Hz with current clamp only 30…1500 A	9.3 nA ... 44.2 mA 9.3 nA ... 0.7 mA 9.3 nA ... 75 µA 0.3%	LL-VILL-01-2023
5.	Multimeters, resistance meters	*2-wire* 2 Ω …10 Ω 10 Ω …100 Ω 0.1 kΩ …1 kΩ 1 kΩ …10 kΩ 10 kΩ …100 kΩ 100 kΩ …1 MΩ 1 MΩ …10 MΩ 10 MΩ …100 MΩ 100 MΩ … 1.1 GΩ	32 mΩ … 3 mΩ 3 mΩ … 48 mΩ 48 mΩ … 0.15 Ω 0.15 Ω … 0.97 Ω 0.97 Ω … 9.4 Ω 9.4 Ω … 151 Ω 151 Ω … 2 kΩ 2 kΩ … 0.2 MΩ 0.2 MΩ … 11 MΩ	LL-VILL-01-2023
		Fixed points with standard resistors: 75 µΩ 150 µΩ 1 mΩ 10 mΩ 100 mΩ 1 Ω	 18.1 nΩ 26.1 nΩ 1.5 µΩ 5.2 µΩ 1.8 µΩ 0.13 mΩ	
6.	Multimeters, resistance meters	*4-wire* 1 Ω … 10 Ω 10 Ω … 100 Ω 0.1 kΩ …1 kΩ 1 kΩ …10 kΩ 10 kΩ …100 kΩ 100 kΩ …1 MΩ	2.3 mΩ … 5 mΩ 5 mΩ … 18 mΩ 18 mΩ … 0.1 Ω 0.1 Ω … 0.9 Ω 0.9 Ω … 9.4 Ω 9.4 Ω … 151 Ω	LL-VILL-01-2023
		Fixed point with standard resistors: 75 µΩ 150 µΩ 1 mΩ 10 mΩ 100 mΩ 1 Ω	 18.1 nΩ 26.1 nΩ 1.5 µΩ 5.2 µΩ 1.8 µΩ 0.13 mΩ	
7.	Multimeters, other conductance meters	*2-wire* 0.9 nS … 10 nS 10 nS … 100 nS 100 nS … 1 µS 1 µS … 10 µS 10 µS … 100 µS 100 µS … 1 mS 1 mS … 10 mS 10 mS … 100 mS 0.1 S … 0.5 S	9 pS … 20 pS 20 pS … 0.2 nS 0.2 nS 0.2 nS … 2 nS 2 nS … 10 nS 10 nS … 0.1 µS 0.1 µS … 2 µS 2 µS … 50 µS 50 µS … 8 mS	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
		Fixed points with standard resistors: 75 µΩ 150 µΩ 1 mΩ 10 mΩ 100 mΩ 1 Ω	18.1 nΩ 26.1 nΩ 1.5 µΩ 5.2 µΩ 1.8 µΩ 0.13 mΩ	
8.	Multimeters, other conductance meters	*4-wire* 1 µS … 10 µS 10 µS …100 µS 0.1 mS …1 mS 1 mS …10 mS 10 mS …100 mS 0.1 S…1 S	0.2 nS … 4 nS 4 nS … 10 nS 10 nS … 0.1 µS 0.1 µS … 2 µS 2 µS … 50 µS 50 µS … 2.9 mS	LL-VILL-01-2023
		Fixed points with standard resistors: 1 S 10 S 100 S 1 kS 6.667 kS 13.33 kS	0.13 mS 0.2 mS 52 mS 1.5 S 1.1 S 3.2 S	
9.	Multimeters, capacitance meters	800 pF … 3 nF 3 nF … 10 mF 10 mF … 20 mF 20 mF … 100 mF	16 pF … 60 pF 60 pF … 57 µF 57 µF … 0.15 mF 0.15 mF … 1.2 mF	LL-VILL-01-2023
10.	Resistance thermometer input temperature display function of multimeters, other resistance thermometer display devices (calibration with electronically simulated resistance thermometer)	*Resistance thermometer characteristics, temperature:* Pt385 (68): -200°C…850°C Pt385 (90): -200°C…850°C Pt3916: -200°C…850°C Pt3926: -200°C…850°C Ni120: -60°C…300°C	0.10 °C 0.11 °C 0.11 °C 0.11 °C 0.06 °C	LL-VILL-01-2023
11.	Thermocouple input temperature display function of multimeters, other thermocouple display devices (calibration with electronically simulated thermocouple)	*Thermocouple type, temperature:* R: -50°C…1767.6°C S: -50°C…1767.6°C B: 400°C…1820°C J: -210°C…1200°C T: -200°C…400°C E: -250°C…1000°C K: -200°C…1372°C N: -200°C…1300°C M: -50°C…1410°C C: 0°C…2315°C D: 0°C…2315°C G2: 100°C…2315°C	0.39 °C 0.40 °C 0.41 °C 0.18 °C 0.18 °C 0.19 °C 0.25 °C 0.23 °C 0.20 °C 0.47 °C 0.47 °C 0.39 °C	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
12.	Frequency measuring mode of multimeters, electrical frequency meters	With sine wave (max. 1.5 V_{pk}) 15 Hz…100 kHz 100 kHz…1 GHz With sine wave (max. 1.0 Vpk) 1 GHz…1,1 GHz With square wave (max. 10.5 V_{pk}) 0.1 Hz…1 Hz 1 Hz…100 kHz	 $35 \cdot 10^{-4}$ % $29 \cdot 10^{-4}$ % $29 \cdot 10^{-4}$ % 0,1% $38 \cdot 10^{-4}$ %	LL-VILL-01-2023
13.	Signal period measurement function of multimeters, other electrical signal period measuring devices	1 µs…10 s	$4 \cdot 10^{-4}$ %	LL-VILL-01-2023
14.	Analog oscilloscopes, Vertical deflection calibration	*With sine wave* (1.4 mV_{PK} … 1.5 V_{PK}) 15 Hz … 100 kHz 100 kHz … 500 kHz 0.5 MHz … 10 MHz 10 MHz … 100 MHz 100 MHz … 400 MHz 400 MHz … 1 GHz (1,.4 mV_{PK} … 1 V_{PK}) 1 GHz … 1,1 GHz [1] (1.5 V_{PK} … 25 V_{PK}) 15 Hz … 100 kHz (25 V_{PK} … 280 V_{PK}) 15 Hz … 30 kHz (280 V_{PK} … 390 V_{PK}) 15 Hz … 10 kHz (390 V_{PK} … 1484 V_{PK}) 15 Hz … 1 kHz *With square wave* (0 V_{PK} … 200 V_{PK}. 0.1 Hz … 1 kHz) (0 V_{PK} … 10.5 V_{PK}. 0.1 Hz … 100 kHz)	 0.5% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.06% 0.05% 0.03% 0.04% 0.3% 0.15%	LL-VILL-02-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
	Analog oscilloscopes, Vertical deflection calibration	*Current measurement* (15 Hz … 5 kHz) 0 A_{PK} … 2.5 A_{PK} sine wave (15 Hz … 1 kHz) 2,5 A_{PK} … 42,4 A_{PK} sine wave 0 A_{PK} … 2120 A_{PK} sine wave 0 A_{PK} … 2 A_{PK} square wave 0 A_{PK} … 100 A_{PK} square wave [1]	0.13% 0.07% 0.3% 0.3% 0.42%	LL-VILL-02-2023
15.	Digital oscilloscopes, Vertical deflection calibration	*With sine wave* (1.4 mV_{PK} … 1.5 V_{PK}) 15 Hz … 100 kHz 100 kHz … 500 kHz 0.5 MHz … 10 MHz 10 MHz … 100 MHz 100 MHz … 400 MHz 400 MHz … 1 GHz (1.4 mV_{PK} … 1 V_{PK}) 1 GHz … 1,1 GHz [1] (1.5 V_{PK} … 25 V_{PK}) 15 Hz … 100 kHz (25 V_{PK} … 280 V_{PK}) 15 Hz … 30 kHz (280 V_{PK} … 390 V_{PK}) 15 Hz … 10 kHz (390 V_{PK} … 1484 V_{PK}) 15 Hz … 1 kHz *With square wave* (0 V_{PK} … 200 V_{PK}. 0.1 Hz … 1 kHz) (0 V_{PK} … 10.5 V_{PK}. 0.1 Hz … 100 kHz)	0.52% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.14% 0.13% 0.13% 0.13% 0.33 % 0.1 %	LL-VILL-02-2023
		Current measurement (15 Hz … 5 kHz) 0 A_{PK} … 2.5 A_{PK} sine wave (15 Hz … 1 kHz) 2.5 A_{PK} … 42.4 A_{PK} sine wave 0 A_{PK} … 2120 A_{PK} sine wave 0 A_{PK} … 2 A_{PK} square wave 0 A_{PK} … 100 A_{PK} square wave	0.19% 0.16% 0.33% 0.33% 0.44%	LL-VILL-02-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
16.	Oscilloscopes, Horizontal deflection calibration	1 µs … 10 s square wave period	$4 \cdot 10^{-4}$ %	LL-VILL-02-2023
17.	Electric power meters (DC)	40 µW … 31.5 kW (20 mV…1050 V 20 mA…30 A) *With current clamp only:* 40 µW … 1575 kW (30…1500 A)	0.1 % 0.2%	LL-VILL-03-2023
18.	Electric power meters (AC)	40 µW … 0.1 W 0.1 W … 10 kW 10 kW … 31.5 kW (0≤cosφ≤1. 15 Hz…1 kHz) *With current clamp only:* 40 µW … 5 W 5 W … 1575 kW (0≤cosφ≤1, 15 Hz…100 Hz)	0.2 % 0.1 % 0.2 % 0.4% 0.3%	LL-VILL-03-2023
19.	Phase angle measurement function of electrical power meters	-360° … +360°	0.19°	LL-VILL-03-2023
20.	Voltage and current harmonics function of electrical power meters	Voltage and current 1st - 50th harmonic (calibration capability is a function of output current): 100 mA … 1 A 1 A … 5 A 5 A … 10 A 10 A … 20 A 20 A … 30 A	 0.88 % 1.91 % 1.12 % 0.78 % 0.72 %	LL-VILL-03-2023
21.	Power supplies and other voltage sources, calibrators, DC voltage	0.01 µV … 100 mV 0.1 V … 1 V 1 V … 10 V 10 V … 100 V 100 V … 1000 V 1000 V … 10000 V	$5.4 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $4.7 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $5.5 \cdot 10^{-4}$ % $188 \cdot 10^{-4}$ %	LL-VILL-04-2023
22.	Power supplies and other current sources, calibrators, DC current	0 nA … 2 nA [1] 2 nA … 20 nA[1] 20 nA …200 nA [1] 200 nA … 2 µA [1] 2 µA … 10 µA 10 µA … 100 µA 100 µA … 1 mA 1 mA … 10 mA 10 mA … 100 mA 100 mA…1 A 1A … 3 A 3A … 10 A 10 A… 100 A 100 A… 500 A 500 A… 1000 A	$315 \cdot 10^{-4}$ % $255 \cdot 10^{-4}$ % $250 \cdot 10^{-4}$ % $80 \cdot 10^{-4}$ % $25 \cdot 10^{-4}$ % [1] $16 \cdot 10^{-4}$ % [1] $8 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % $34 \cdot 10^{-4}$ % 0.01% 0.07% 0.15% 0.08% 0.08%	LL-VILL-04-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
23.	Power supplies and other voltage sources, calibrators, AC voltage	*15 Hz ... 20 kHz* 0.1 µV … 10 mV 10 mV … 100 mV 0.1 V … 1 V 1 V… 10 V 10 V… 100 V 100 V… 700 V *15 Hz ... 600 Hz* 500 V … 1 kV 1 kV … 5 kV 5 kV … 10 kV *20 kHz ... 50 kHz* 0.1 µV … 10 mV 10 mV … 100 mV 0.1 V … 1 V 1 V… 10 V 10 V… 100 V 100 V… 700 V *50 kHz ... 100 kHz* 0.1 µV … 10 mV 10 mV … 100 mV 0.1 V … 1 V 1 V… 10 V 10 V… 100 V 100 V… 700 V *100 kHz ... 1 MHz* 0.1 µV … 100 mV 100 mV … 1 V 1 V … 10 V	 0.049% 0.013% 0.004% 0.001% 0.005% 0.007% $37 \cdot 10^{-4}$ % $164 \cdot 10^{-4}$ % $356 \cdot 10^{-4}$ % 0.054% 0.020% 0.007% 0.007% 0.008% 0.021% 0.074% 0.041% 0.012% 0.012% 0.016% 0.060% 0.28% 0.16% 0.21%	LL-VILL-04-2023
24.	Power supplies and other current sources, calibrators, AC current	*10 Hz ... 1 kHz* 0.1 nA … 100 µA 100 µA … 1 mA 1 mA … 10 mA 10 mA … 100 mA 100 mA … 1 A 1 A … 3 A 3 A … 10 A 10 A … 100 A *10 Hz ... 100 Hz* 100 A … 500 A 500 A … 1000 A	 $118 \cdot 10^{-4}$ % $91 \cdot 10^{-4}$ % $38 \cdot 10^{-4}$ % $100 \cdot 10^{-4}$ % $204 \cdot 10^{-4}$ % $161 \cdot 10^{-4}$ % 0.069% 0.15% 0.085% 0.085%	LL-VILL-04-2023
25.	ESD test equipment, other high-voltage resistance meters	100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 1 GΩ 1 GΩ…10 GΩ 100 GΩ fixed reference value	0.2% 0.3% 0.5% 1% 3 GΩ	LL-VILL-05-2022
26.	Frequency of signal generators, function generators, frequency generators	0.001 Hz … 1 Hz 1 Hz … 1 GHz 1 GHz… 6.5 GHz	$81.65 \cdot 10^{-8}$ % $5.77 \cdot 10^{-8}$ % $1.36 \cdot 10^{-8}$ %	LL-VILL-06-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
27.	Signal power of signal generators, function generators, frequency generators	*3 Hz ...300 kHz* -100 dBm … -20 dBm -20 dBm … -10 dBm -10 dBm … 0 dBm 0 dBm … +10 dBm +10 dBm … +70,51 dBm *300 kHz ...1 MHz* -100 dBm … -20 dBm -20 dBm … -10 dBm -10 dBm … 0 dBm 0 dBm … +10 dBm +10 dBm … +69,91 dBm *1 MHz ...10 MHz* -100 dBm … -20 dBm -20 dBm … -10 dBm -10 dBm … 0 dBm 0 dBm … +10 dBm +10 dBm … +33.01 dBm *10 MHz ...6,5 GHz* -70 dBm … -30 dBm -30 dBm … +5 dBm +5 dBm … +23 dBm	 14.5 dB 0.012 dB 0.001 dB 0.007 dB 0.002 dB 8.08 dB 0.0021 dB 0.0017 dB 0.0002 dB 0.0004 dB 9.24 dB 0.0032 dB 0.0119 dB 0.0068 dB 0.1047 dB 0.14 dB 0.13 dB 0.12 dB	LL-VILL-06-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
28.	Measurement capabilities of electrical safety test instruments			
	Measuring voltage	10 mV … 100 mV 0.1 V … 1 V 1 V … 10 V 10 V … 100 V 100 V … 1000 V	$15 \cdot 10^{-4}$ % $57 \cdot 10^{-4}$ % $41 \cdot 10^{-4}$ % $60 \cdot 10^{-4}$ % $61 \cdot 10^{-4}$ %	LL-VILL-04-2023
	AC current	15 Hz...1 kHz 10 µA … 30 A	9.3 nA …44.2 mA	LL-VILL-01-2023
	AC current with clamp meter	30…1500 A	0.3 %	LL-VILL-03-2023
	Power	40 µW … 0.1 W 0.1 W … 10 kW 10 kW … 31.5 kW (0≤cosφ≤1. 15 Hz…1 kHz)	0.2 % 0.1 % 0.2 %	LL-VILL-03-2023
		Current measurement with clamp: 40 µW … 5 W 5 W … 1575 kW [1] (0≤cosφ≤1, 15 Hz…100 Hz)	0.4% 0.3%	LL-VILL-03-2023
	Phase angle	-360° … +360°	0.19°	LL-VILL-03-2023
	Insulation resistance	100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 1 GΩ 1 GΩ…10 GΩ	0.2 % 0.3 % 0.5 % 1 %	LL-VILL-05-2022
		100 GΩ fixed reference value	3 GΩ	LL-VILL-05-2022
29.	DC and AC hi-pot testers	*DC voltage:* 0 kV … 2kV 2 kV … 6 kV 6 kV … 10 kV	80 mV … 120 mV 120 mV … 0.58 V 0.58 V … 1.88 V	LL-VILL-07-2022
		AC voltage: 0 kV … 2 kV 2 kV … 6 kV 6 kV … 10 kV (0.1 Hz – 600 Hz)	80 mV … 160 mV 160 mV … 1.2 V 1.2V … 3.56 V	

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
30.	Standard resistors (resistance)	*With current generator, max. power up to 1W:* 0.1 mΩ … 1 MΩ *With direct measurement:* 1 mΩ … 10 mΩ 10 mΩ … 100 mΩ 100 mΩ … 1 Ω 1 Ω … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ 100 MΩ … 1 GΩ	$61 \cdot 10^{-4}$ % 0.1% 0.01% $11 \cdot 10^{-4}$ % $5 \cdot 10^{-4}$ % $6 \cdot 10^{-4}$ % $9 \cdot 10^{-4}$ % $23 \cdot 10^{-4}$ %	LL-VILL-08-2023
31.	Standard resistors (conductance)	*With current generator, max. power up to 1W:* 1 mS … 10 kS *With direct measurement:* 1 nS … 10 nS 10 nS … 100 nS 100 nS … 1 µS 1 µS … 1 S 1 S … 10 S 10 S … 100 S 100 S … 1 kS [1]	$61 \cdot 10^{-4}$ % $23 \cdot 10^{-4}$ % $9 \cdot 10^{-4}$ % $6 \cdot 10^{-4}$ % $5 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % 0,01% 0,1%	LL-VILL-08-2023
32.	RLC (LCR) meters (AC resistance, capacitance, inductance, dissipation factor D, quality factor Q) using measuring frequency 20Hz-300kHz	Resistance 100 mΩ … 100 kΩ 100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ	 0.017% 0.018% 0.019% 0.2%	LL-VILL-09-2023
		Capacity 100 pF … 100 µF 100 µF … 500 µF 500 µF … 1000 µF	 0.018 % 0.021% 0.026%	LL-VILL-09-2023
		Inductance 1 µH … 10 µH 10 µH … 100 µH 100 µH … 10 H 10 H … 12 H	 0.053% 0.020% 0.018% 0.033%	LL-VILL-09-2023
		Dissipation factor (tg δ) D 10^{-4} … 10^{-3} 10^{-3} … 10^{-2} 10^{-2} … 10^{-1} 10^{-1} … 10^{0} 10^{0} … 10^{1}	 0.00001 … 0.00003 0.00003 … 0.00006 0.00006 … 0.00036 0.00036 … 0.0004 0.0004 … 0.00177	LL-VILL-09-2023
		Quality factor (tg φ) Q 10^{-1} … 10^{0} 10^{0} … 10^{1} 10^{1} … 10^{2} 10^{2} … 10^{3} 10^{3} … 10^{4}	 0.00816 … 0.00817 0.00817 … 0.037 0.037 … 0.6 0.6 … 30 30 … 1000	LL-VILL-09-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
33.	Decade boxes, calibrators, other sources (resistance, inductance, capacitance)	*DC resistance:* 1 mΩ … 10 mΩ 10 mΩ … 100 mΩ 100 mΩ … 1 Ω 1 Ω … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ 100 MΩ … 1 GΩ	 0.1% 0.01 % $11 \cdot 10^{-4}$ % $5 \cdot 10^{-4}$ % $6 \cdot 10^{-4}$ % $9 \cdot 10^{-4}$ % $23 \cdot 10^{-4}$ %	LL-VILL-10-2023
		AC resistance (20 Hz ... 300 kHz measuring frequency) 100 mΩ … 100 kΩ 100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ	 0.017% 0.018% 0.019% 0.2%	
		Capacitance (20 Hz ... 300 kHz measuring frequency) 100 pF … 100 µF 100 µF … 500 µF 500 µF … 1 mF	 0.018 % 0.021% 0.026%	
		Inductance (20 Hz ... 300 kHz measuring frequency) 1 µH … 10 µH 10 µH … 100 µH 100 µH … 10 H 10 H … 12 H	 0.053% 0.020% 0.018% 0.031%	
34.	Calibrators, electronic DC loads, other sources (DC power)	*DC voltage* 0.01 µV … 100 mV 0.1 V … 1 V 1 V … 10 V 10 V … 100 V 100 V … 1000 V 1000 V … 10000 V	 $5.4 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $4.7 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $5.5 \cdot 10^{-4}$ % $188 \cdot 10^{-4}$ %	LL-VILL-11-2023
		DC current 0 nA … 2 nA 2 nA … 20 nA 20 nA …200 nA 200 nA … 2 µA 2 µA … 10 µA 10 µA … 100 µA 100 µA … 1 mA 1 mA … 10 mA 10 mA … 100 mA 100 mA…1 A 1A … 3 A 3A … 10 A 10 A… 100 A 100 A… 500 A 500 A… 1000 A	 $315 \cdot 10^{-4}$ % $255 \cdot 10^{-4}$ % $250 \cdot 10^{-4}$ % $80 \cdot 10^{-4}$ % $25 \cdot 10^{-4}$ % $16 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % $34 \cdot 10^{-4}$ % 0.01% 0.07% 0.15% 0.08% 0.08%	
		Resistance 0.1 mΩ … 1 mΩ 1 mΩ … 10 mΩ 10 mΩ … 1 MΩ	 0.5% 0.089% 0.058%	
		DC power 1 mW … 10 MW	0.06%	

Temperature				
35.	Digital contact thermometers (calibrated with dry block calibrator)	-30°C … 0°C 0°C … 70°C 70°C … 100°C 100°C … 150°C 150°C … 250°C 250°C … 450°C 450°C … 600 °C	0.066°C … 0.065°C 0.065°C … 0.066°C 0.066°C … 0.067°C 0.067°C … 0.073°C 0.073°C … 0.11°C 0.11°C … 0.22°C 0.22 °C … 0.31°C	LL-HŐM-01-2022
36.	Resistance thermometers (calibrated with dry block calibrator)	-30°C … 0°C 0°C … 70°C 70°C … 100°C 100°C … 150°C 150°C … 250°C 250°C … 450°C 450°C … 600 °C	0.09°C 0.09°C 0.09°C … 0.091°C 0.091°C … 0.095°C 0.095°C … 0.13°C 0.13°C … 0.22°C 0.22 °C … 0.32°C	LL-HŐM-01-2022
37.	Thermocouples (calibrated with dry block calibrator)	-30°C … 0°C 0°C … 70°C 70°C … 100°C 100°C … 150°C 150°C … 250°C 250°C … 450°C 450°C … 600 °C	0.09°C … 0.089°C 0.089°C … 0.09°C 0.09°C … 0.091°C 0.091°C … 0.095°C 0.095°C … 0.13°C 0.13°C … 0.22°C 0.22 °C … 0.32°C	LL-HŐM-01-2022
38.	Digital contact thermometers (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.035°C … 0.033°C 0.033°C … 0.034°C 0.035°C … 0.07°C 0.07°C … 0.1°C	LL-HŐM-02-2022
39.	Resistance thermometers (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.071°C … 0.07°C 0.07°C 0.07°C … 0.09°C 0.09°C … 0.12°C	LL-HŐM-02-2022
40.	Thermocouples (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.07°C … 0.069°C 0.069°C 0.069°C … 0.09°C 0.09°C … 0.12°C	LL-HŐM-02-2022
41.	Glass thermometers (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.035°C … 0.033°C 0.033°C … 0.034°C 0.034°C … 0.07 °C 0.07°C … 0.1°C	LL-HŐM-03-2022
42.	Infrared thermometer (surface type black body radiator ε=0,95)	25°C … 150°C 150°C … 200°C 200°C … 300°C 300°C … 500°C	0.6°C … 0.7°C 0.7 °C … 0.7°C 0.7°C … 0.9°C 0.9°C … 1.4°C	LL-HŐM-04-2022
43	Infrared thermometer (cavity type black body radiator ε=0,995)	300°C … 400°C 400°C … 500°C 500°C … 600°C 600°C … 700°C 700°C … 800°C 800°C … 900°C 900°C … 1000 °C	1.4°C … 1.9°C 1.9°C … 2.5°C 2.5°C … 2.7°C 2.7°C … 2.5°C 2.5°C … 2.3°C 2.3°C … 2.4°C 2.4°C … 4.0°C	LL-HŐM-04-2022
44.	Air temperature measuring instruments with own display, temperature data loggers	-40°C … 150°C	0.27 °C	LL-HŐM-05-2022
Humidity				

45.	Hygrometers, relative humidity meters and transmitters, data loggers	10 %RH ... 25 %RH 25 %RH … 49.8 %RH 49.8 %RH … 75 %RH 75 %RH … 98 %RH	0.73%RH-0.88%RH 0.88%RH 0.88%RH-1.13%RH 1.13%RH	LL-NED-01-2022
Mass				
46.	Non-automatic digital scales, where Max/ d ≥ 5 000 000 d ≤ 1 µg	1 mg – 411.111 g	1.53 µg – 7.12 mg	LL-TÖM-01-2024
47.	Non-automatic digital scales, where Max/ d > 220 000 d <1 mg	1 mg – 411.111 g	2.31 µg – 7.12 mg	LL-TÖM-01-2024
48.	Non-automatic digital scales, where 220 000 ≥ Max / d > 34 000 1 g > d ≥ 0,001 g	1 mg – 2522.222 g	0.86 mg – 44 mg	LL-TÖM-01-2024
49.	Non-automatic digital scales, where 34 000 ≥ Max / d > 15 000 d ≥ 1 g	1 g – 41522 g	0.86 g – 1.29 g	LL-TÖM-01-2024
50.	Non-automatic digital scales, where 15 000 ≥ Max / d d ≥ 0,5 g	1 g – 141.522 kg	0.43 g – 2.65 g	LL-TÖM-01-2024
51.	Non-automatic digital scales, where 10 000 ≥ Max / d d ≥ 100 g	100 g – 2600 kg	86.6 g – 450 g	LL-TÖM-01-2024
Torque				
52.	Torque wrenches, torque screwdrivers, clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	0.66 % - 0.14 % 1.75 % - 0.2 % 0.52 % - 0.18 % 0.84 % - 0.16 %	LL-TOR-01-2022
53.	Torque wrenches, torque screwdrivers, counter clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	1.31 % - 0.16 % 1.21 % - 0.21 % 0.62 % - 0.17 % 1.24 % - 0.15 %	LL-TOR-01-2022
Optics				
54.	Spectral radiant flux, total luminous flux using integrating sphere	0.1 lm – 20 000 lm, 0.01 W – 100W	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022
55.	Spectral radiant flux, total luminous flux using goniometer	1 lm – 100 000 lm, 1 W – 1600 W	3.8 %	LL-OPT-01-2022
56.	Spectral radiant flux, total luminous flux	integrating sphere measuring system	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022
57.	Spectral radiant flux, total luminous flux	goniophotometer measuring system	3.8 %	LL-OPT-01-2022
58.	Illuminance meter	illuminance 1 lx – 4000 lx	1.6 %	LL-OPT-02-2024

59.	Illuminance meter	illuminance 1 lx – 200 klx	1.7 %	LL-OPT-02-2024
60.	Spectral reflectance standard	relative spectral reflectance factor, 0.001…2R 380 nm – 740 nm	1.17 %	LL-OPT-03-2022
61.	Reflectance measurement capability of spectrophotometer	relative spectral reflectance factor, 0.001…1R 380 nm – 760 nm	0.9 %	LL-OPT-03-2022
62.	Wavelength accuracy of spectrophotometer	380 nm – 760 nm	0.16 nm	LL-OPT-03-2022
63.	Focimeter	dioptre, - 25D…0….25D	0.44 %	LL-OPT-04-2022
64.	Displays	luminance, 0 cd/m2 – 4000 cd/m2	2.8 %	LL-OPT-05-2022
65.	Displays	spectral power distribution, W/nm	3.9 %	LL-OPT-05-2022
66.	Spectral irradiance surface power	spectral irradiance surface power, 250 nm – 2500 nm	2.3 %	LL-OPT-06-2024
67.	Irradiance surface power	irradiance surface power, 250 nm – 2500 nm	2.3%	LL-OPT-06-2024
68.	Spectroradiometer	spectroradiometer: 250 nm – 2500 nm	2.3%	LL-OPT-06-2024
69.	UV power meter	UV power: 0…15000 µW/cm2	2.3%	LL-OPT-06-2024
70.	Spectral responsivity	spectral responsivity, A/W, V/W, 220nm – 399nm	2.12-1.42%	LL-OPT-07-2022
71.	Spectral responsivity	spectral responsivity, A/W, V/W, 400nm – 899nm	0.66%	LL-OPT-07-2022
72.	Spectral responsivity	spectral responsivity, A/W, V/W, 900nm – 990nm	0.76-1.04%	LL-OPT-07-2022
73.	Luminance meter, luminance standard	luminance, 0 cd/m2 – 5000 cd/m2	3.0%	LL-OPT-08-2022
74.	Spectral transmittance standard	relative spectral transmittance factor, 0.01T-0.1T 360 nm – 740 nm	0.0006T-0.0012T	LL-OPT-09-2023

75.	Spectral transmittance standard	relative spectral transmittance factor, 0.1T-1T 360 nm – 740 nm	0.0012T-0.008T	LL-OPT-09-2023
76.	Spectral transmittance Car glass tint meter	relative spectral transmittance factor, 0.01T-0.1T 175 nm – 1600 nm	0.0005T-0.0011T	LL-OPT-09-2023
77.	Spectral transmittance Car glass tint meter	relative spectral transmittance factor, 0.1T-1T 175 nm – 1600 nm	0.0011T- 0.007T	LL-OPT-09-2023
78.	Spectrophotometer transmittance measurement capability	relative spectral transmittance factor, 0.01T-0.1T 175 nm – 1600 nm	0.0005T-0.0011T	LL-OPT-09-2023
79.	Spectrophotometer transmittance measurement capability	relative spectral transmittance factor, 0.1T-1T 175 nm – 1600 nm	0.0011T- 0.007T	LL-OPT-09-2023
80.	Wavelength accuracy of spectrophotometer	175 nm – 900 nm	0.16 nm	LL-OPT-09-2023
81.	Visual investigation booth, test room, ageing chamber	spectral/integral irradiance surface power	0.6…2.1 %	LL-OPT-10-2023
82.	Visual investigation booth, test room, ageing chamber	spectral power distribution, W/nm	3.6 %	LL-OPT-10-2023
83.	Visual investigation booth, test room, ageing chamber	illuminance 1-200 klx	2.0 %	LL-OPT-10-2023
84.	Gloss meter	Gloss Measurement geometry: 20°, 60°, 85°	1.0 %	LL-OPT-11-2022

II. Accredited on-site calibration services of LightingLab Calibration Laboratory:

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
Electricity measurement DC and AC				
1.	Multimeters, voltmeters DC voltage	1 mV … 10 mV 10 mV … 100 mV 100 mV … 1 V 1 V … 280 V 280 V … 600 V 600 V … 1050 V	10 µV … 11 µV 11 µV … 12 µV 12 µV … 20 µV 20 µV … 9.5 mV 9.5 mV … 20 mV 20 mV … 28 mV	LL-VILL-01-2023
2.	Multimeters, current meters, clamp meters DC current	1 µA ... 10 µA 10 µA ... 100 µA 100 µA ... 1 mA 1 mA ... 1 A 1 A ... 10 A 10 A ... 30 A *With current clamp only:* 30…1500 A	20 nA ... 22 nA 22 nA ... 41 nA 41 nA ... 0.2 µA 0.2 µA … 0.2 mA 0.2 mA ... 3.2 mA 3.2 mA ... 14 mA 60 mA ... 3.5 A	LL-VILL-01-2023
3.	Multimeters, voltmeters AC voltage	15 Hz...10 kHz 1 mV…1050 V 10 kHz...30 kHz 1 mV…280 V 30 kHz...100 kHz 1 mV…20 V 100 kHz...300 kHz 1 mV…2 V	8.8 µV ... 0.37 V 8.8 µV ... 42 mV 8.8 µV ... 5 mV 8.8 µV ... 0.3 mV	LL-VILL-01-2023
4.	Multimeters, current meters, clamp meters AC current	15 Hz...1 kHz 10 µA … 30 A 1 kHz...5 kHz 10 µA … 2 A 5 kHz...10 kHz 10 µA … 200 mA 45 Hz...65 Hz with current clamp only 30…1500 A	9.3 nA ... 44.2 mA 9.3 nA ... 0.7 mA 9.3 nA ... 75 µA 0.3%	LL-VILL-01-2023
5.	Multimeters, resistance meters	*2-wire* 2 Ω …10 Ω 10 Ω …100 Ω 0.1 kΩ …1 kΩ 1 kΩ …10 kΩ 10 kΩ …100 kΩ 100 kΩ …1 MΩ 1 MΩ …10 MΩ 10 MΩ …100 MΩ 100 MΩ … 1.1 GΩ	32 mΩ … 3 mΩ 3 mΩ … 48 mΩ 48 mΩ … 0.15 Ω 0.15 Ω … 0.97 Ω 0.97 Ω … 9.4 Ω 9.4 Ω … 151 Ω 151 Ω … 2 kΩ 2 kΩ … 0.2 MΩ 0.2 MΩ … 11 MΩ	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
		Fixed point with standard resistors: 75 µΩ 150 µΩ 1 mΩ 10 mΩ 100 mΩ 1 Ω	 18.1 nΩ 26.1 nΩ 1.5 µΩ 5.2 µΩ 1.8 µΩ 0.13 mΩ	
6.	Multimeters, resistance meters	*4-wire* 1 Ω … 10 Ω 10 Ω … 100 Ω 0.1 kΩ …1 kΩ 1 kΩ …10 kΩ 10 kΩ …100 kΩ 100 kΩ …1 MΩ	 2.3 mΩ … 5 mΩ 5 mΩ … 18 mΩ 18 mΩ … 0.1 Ω 0.1 Ω … 0.9 Ω 0.9 Ω … 9.4 Ω 9.4 Ω … 151 Ω	LL-VILL-01-2023
		Fixed point with standard resistors: 75 µΩ 150 µΩ 1 mΩ 10 mΩ 100 mΩ 1 Ω	 18.1 nΩ 26.1 nΩ 1.5 µΩ 5.2 µΩ 1.8 µΩ 0.13 mΩ	
7.	Multimeters, other conductance meters	*2-wire* 0.9 nS … 10 nS 10 nS … 100 nS 100 nS … 1 µS 1 µS … 10 µS 10 µS … 100 µS 100 µS … 1 mS 1 mS … 10 mS 10 mS … 100 mS 0.1 S … 0.5 S	 9 pS … 20 pS 20 pS … 0.2 nS 0.2 nS 0.2 nS … 2 nS 2 nS … 10 nS 10 nS … 0.1 µS 0.1 µS … 2 µS 2 µS … 50 µS 50 µS … 8 mS	LL-VILL-01-2023
		Fixed point with standard resistors: 75 µΩ 150 µΩ 1 mΩ 10 mΩ 100 mΩ 1 Ω	 18.1 nΩ 26.1 nΩ 1.5 µΩ 5.2 µΩ 1.8 µΩ 0.13 mΩ	
8.	Multimeters, other conductance meters	*4-wire* 1 µS … 10 µS 10 µS …100 µS 0.1 mS …1 mS 1 mS …10 mS 10 mS …100 mS 0.1 S…1 S	 0.2 nS … 4 nS 4 nS … 10 nS 10 nS … 0.1 µS 0.1 µS … 2 µS 2 µS … 50 µS 50 µS … 2.9 mS	LL-VILL-01-2023
		Fixed point with standard resistors: 1 S 10 S 100 S 1 kS 6.667 kS 13.33 kS	 0.13 mS 0.2 mS 52 mS 1.5 S 1.1 S 3.2 S	

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
9.	Multimeters, capacitance meters	800 pF … 3 nF 3 nF … 10 mF 10 mF … 20 mF 20 mF … 100 mF	16 pF … 60 pF 60 pF … 57 µF 57 µF … 0.15 mF 0.15 mF … 1.2 mF	LL-VILL-01-2023
10.	Resistance thermometer input temperature display function of multimeters, other resistance thermometer display devices (calibration with electronically simulated resistance thermometer)	*Resistance thermometer characteristics, temperature:* Pt385 (68): -200°C…850°C Pt385 (90): -200°C…850°C Pt3916: -200°C…850°C Pt3926: -200°C…850°C Ni120: -60°C…300°C	0.10 °C 0.11 °C 0.11 °C 0.11 °C 0.06 °C	LL-VILL-01-2023
11.	Thermocouple input temperature display function of multimeters, other thermocouple display devices (calibration with electronically simulated thermocouple)	*Thermocouple type, temperature:* R: -50°C…1767.6°C S: -50°C…1767.6°C B: 400°C…1820°C J: -210°C…1200°C T: -200°C…400°C E: -250°C…1000°C K: -200°C…1372°C N: -200°C…1300°C M: -50°C…1410°C C: 0°C…2315°C D: 0°C…2315°C G2: 100°C…2315°C	0.39 °C 0.40 °C 0.41 °C 0.18 °C 0.18 °C 0.19 °C 0.25 °C 0.23 °C 0.20 °C 0.47 °C 0.47 °C 0.39 °C	LL-VILL-01-2023
12.	Frequency measuring mode of multimeters, electrical frequency meters	With sine wave (max. 1.5 V_{pk}) 15 Hz…100 kHz 100 kHz…1 GHz With sine wave (max. 1.0 Vpk) 1 GHz…1,1 GHz With square wave (max. 10.5 V_{pk}) 0.1 Hz…1 Hz 1 Hz…100 kHz	 $35 \cdot 10^{-4}$ % $29 \cdot 10^{-4}$ % $29 \cdot 10^{-4}$ % 0,1% $38 \cdot 10^{-4}$ %	LL-VILL-01-2023
13.	Signal period measurement function of multimeters, other electrical signal period measuring devices	1 µs…10 s	$4 \cdot 10^{-4}$ %	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
14.	Analog oscilloscopes, Vertical deflection calibration	*With sine wave* (1.4 mV_{PK} … 1.5 V_{PK}) 15 Hz … 100 kHz 100 kHz … 500 kHz 0.5 MHz … 10 MHz 10 MHz … 100 MHz 100 MHz … 400 MHz 400 MHz … 1 GHz (1,.4 mV_{PK} … 1 V_{PK}) 1 GHz … 1,1 GHz [1] (1.5 V_{PK} … 25 V_{PK}) 15 Hz … 100 kHz (25 V_{PK} … 280 V_{PK}) 15 Hz … 30 kHz (280 V_{PK} … 390 V_{PK}) 15 Hz … 10 kHz (390 V_{PK} … 1484 V_{PK}) 15 Hz … 1 kHz *With square wave* (0 V_{PK} … 200 V_{PK}. 0.1 Hz … 1 kHz) (0 V_{PK} … 10.5 V_{PK}. 0.1 Hz … 100 kHz)	0.5% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.06% 0.05% 0.03% 0.04% 0.3% 0.15%	LL-VILL-02-2023
		Current measurement (15 Hz … 5 kHz) 0 A_{PK} … 2.5 A_{PK} sine wave (15 Hz … 1 kHz) 2,5 A_{PK} … 42,4 A_{PK} sine wave 0 A_{PK} … 2120 A_{PK} sine wave 0 A_{PK} … 2 A_{PK} square wave 0 A_{PK} … 100 A_{PK} square wave [1]	0.13% 0.07% 0.3% 0.3% 0.42%	

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
15.	Digital oscilloscopes, Vertical deflection calibration	*With sine wave* (1.4 mV_{PK} … 1.5 V_{PK}) 15 Hz … 100 kHz 100 kHz … 500 kHz 0.5 MHz … 10 MHz 10 MHz … 100 MHz 100 MHz … 400 MHz 400 MHz … 1 GHz (1.4 mV_{PK} … 1 V_{PK}) 1 GHz … 1,1 GHz [1] (1.5 V_{PK} … 25 V_{PK}) 15 Hz … 100 kHz (25 V_{PK} … 280 V_{PK}) 15 Hz … 30 kHz (280 V_{PK} … 390 V_{PK}) 15 Hz … 10 kHz (390 V_{PK} … 1484 V_{PK}) 15 Hz … 1 kHz *With square wave* (0 V_{PK} … 200 V_{PK}. 0.1 Hz … 1 kHz) (0 V_{PK} … 10.5 V_{PK}. 0.1 Hz … 100 kHz)	0.52% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.14% 0.13% 0.13% 0.13% 0.3 % 0.15 %	LL-VILL-02-2023
		Current measurement (15 Hz … 5 kHz) 0 A_{PK} … 2.5 A_{PK} sine wave (15 Hz … 1 kHz) 2.5 A_{PK} … 42.4 A_{PK} sine wave 0 A_{PK} … 2120 A_{PK} sine wave 0 A_{PK} … 2 A_{PK} square wave 0 A_{PK} … 100 A_{PK} square wave	0.19% 0.16% 0.33% 0.33% 0.44%	
16.	Oscilloscopes, Horizontal deflection calibration	0.4 µs … 10 s square wave period	$4 \cdot 10^{-4}$ %	LL-VILL-02-2023
17.	Electric power meters (DC)	40 µW … 31.5 kW (20 mV…1050 V 20 mA…30 A) *With current clamp only:* 40 µW … 1575 kW (30…1500 A)	0.2 % 0.2%	LL-VILL-03-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
18.	Electric power meters (AC)	40 µW … 0.1 W 0.1 W … 10 kW 10 kW … 31.5 kW (0≤cosφ≤1. 15 Hz…1 kHz) *With current clamp measurement:* 40 µW … 5 W 5 W … 1575 kW (0≤cosφ≤1, 15 Hz…100 Hz)	0.2 % 0.1 % 0.2 % 0.4% 0.3%	LL-VILL-03-2023
19.	Phase angle measurement function of electrical power meters	-360° … +360°	0.19°	LL-VILL-03-2023
20.	Voltage and current harmonics function of electrical power meters	Voltage and current 1st - 50th harmonic (calibration capability is a function of output current): 100 mA … 1 A 1 A … 5 A 5 A … 10 A 10 A … 20 A 20 A … 30 A	 0.88 % 1.91 % 1.12 % 0.78 % 0.72 %	LL-VILL-03-2023
21.	Power supplies and other voltage sources, calibrators, DC voltage	0.01 µV … 100 mV 0.1 V … 1 V 1 V … 10 V 10 V … 100 V 100 V … 1000 V 1000 V … 10000 V	$5.4 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $4.7 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $5.5 \cdot 10^{-4}$ % $188 \cdot 10^{-4}$ %	LL-VILL-04-2023
22.	Power supplies and other current sources, calibrators, DC current	0 nA … 2 nA [1] 2 nA … 20 nA[1] 20 nA …200 nA [1] 200 nA … 2 µA [1] 2 µA … 10 µA 10 µA … 100 µA 100 µA … 1 mA 1 mA … 10 mA 10 mA … 100 mA 100 mA…1 A 1A … 3 A 3A … 10 A 10 A… 100 A 100 A… 500 A 500 A… 1000 A	$315 \cdot 10^{-4}$ % $255 \cdot 10^{-4}$ % $250 \cdot 10^{-4}$ % $80 \cdot 10^{-4}$ % $25 \cdot 10^{-4}$ % [1] $16 \cdot 10^{-4}$ % [1] $8 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % $34 \cdot 10^{-4}$ % 0.01% 0.07% 0.15% 0.08% 0.08%	LL-VILL-04-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability k=2	Calibration process reference
23.	Power supplies and other voltage sources, calibrators, AC voltage	*15 Hz ... 20 kHz* 0.1 µV … 10 mV 10 mV … 100 mV 0.1 V … 1 V 1 V… 10 V 10 V… 100 V 100 V… 700 V *15 Hz ... 600 Hz* 500 V … 1 kV 1 kV … 5 kV 5 kV … 10 kV *20 kHz ... 50 kHz* 0.1 µV … 10 mV 10 mV … 100 mV 0.1 V … 1 V 1 V… 10 V 10 V… 100 V 100 V… 700 V *50 kHz ... 100 kHz* 0.1 µV … 10 mV 10 mV … 100 mV 0.1 V … 1 V 1 V… 10 V 10 V… 100 V 100 V… 700 V *100 kHz ... 1 MHz* 0.1 µV … 100 mV 100 mV … 1 V 1 V … 10 V	 0.049% 0.013% 0.004% 0.001% 0.005% 0.007% $37 \cdot 10^{-4}$ % $164 \cdot 10^{-4}$ % $356 \cdot 10^{-4}$ % 0.054% 0.020% 0.007% 0.007% 0.008% 0.021% 0.074% 0.041% 0.012% 0.012% 0.016% 0.060% 0.28% 0.16% 0.21%	LL-VILL-04-2023
24.	Power supplies and other current sources, calibrators, AC current	*10 Hz ... 1 kHz* 0.1 nA … 100 µA 100 µA … 1 mA 1 mA … 10 mA 10 mA … 100 mA 100 mA … 1 A 1 A … 3 A 3 A … 10 A 10 A … 100 A *10 Hz ... 100 Hz* 100 A … 500 A 500 A … 1000 A	 $118 \cdot 10^{-4}$ % $91 \cdot 10^{-4}$ % $38 \cdot 10^{-4}$ % $100 \cdot 10^{-4}$ % $204 \cdot 10^{-4}$ % $161 \cdot 10^{-4}$ % 0.069% 0.15% 0.085% 0.085%	LL-VILL-04-2023
25.	ESD test equipment, other high-voltage resistance meters	100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 1 GΩ 1 GΩ…10 GΩ 100 GΩ fixed reference value	0.2% 0.3% 0.5% 1% 3 GΩ	LL-VILL-05-2022
26.	Frequency of signal generators, function generators, frequency generators	0.001 Hz … 1 Hz 1 Hz … 1 GHz 1 GHz… 6.5 GHz	$81.65 \cdot 10^{-8}$ % $5.77 \cdot 10^{-8}$ % $1.36 \cdot 10^{-8}$ %	LL-VILL-06-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
27.	Signal power of signal generators, function generators, frequency generators	*3 Hz ...300 kHz* -100 dBm … -20 dBm -20 dBm … -10 dBm -10 dBm … 0 dBm 0 dBm … +10 dBm +10 dBm … +70,51 dBm *300 kHz ...1 MHz* -100 dBm … -20 dBm -20 dBm … -10 dBm -10 dBm … 0 dBm 0 dBm … +10 dBm +10 dBm … +69,91 dBm *1 MHz ...10 MHz* -100 dBm … -20 dBm -20 dBm … -10 dBm -10 dBm … 0 dBm 0 dBm … +10 dBm +10 dBm … +33.01 dBm *10 MHz ...6,5 GHz* -70 dBm … -30 dBm -30 dBm … +5 dBm +5 dBm … +23 dBm	14.5 dB 0.012 dB 0.001 dB 0.007 dB 0.002 dB 8.08 dB 0.0021 dB 0.0017 dB 0.0002 dB 0.0004 dB 9.24 dB 0.0032 dB 0.0119 dB 0.0068 dB 0.1047 dB 0.14 dB 0.13 dB 0.12 dB	LL-VILL-06-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
28.	Measurement capabilities of electrical safety test instruments			
	Measuring voltage	10 mV … 100 mV 0.1 V … 1 V 1 V … 10 V 10 V … 100 V 100 V … 1000 V	$15 \cdot 10^{-4}$ % $57 \cdot 10^{-4}$ % $41 \cdot 10^{-4}$ % $60 \cdot 10^{-4}$ % $61 \cdot 10^{-4}$ %	LL-VILL-04-2023
	AC current	15 Hz...1 kHz 10 µA … 30 A	9.3 nA …44.2 mA	LL-VILL-01-2023
	AC current with current clamp	30…1500 A	0.3 %	LL-VILL-03-2023
	Power	40 µW … 0.1 W 0.1 W … 10 kW 10 kW … 31.5 kW (0≤cosφ≤1. 15 Hz…1 kHz)	0.2 % 0.1 % 0.2 %	LL-VILL-03-2023
		Current measurement with current clamp: 40 µW … 5 W 5 W … 1575 kW [1] (0≤cosφ≤1, 15 Hz…100 Hz)	0.4% 0.3%	LL-VILL-03-2023
	Phase angle	-360° … +360°	0.19°	LL-VILL-03-2023
	Insulation resistance	100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 1 GΩ 1 GΩ…10 GΩ	0.2 % 0.3 % 0.5 % 1 %	LL-VILL-05-2022
		100 GΩ fixed reference value	3 GΩ	LL-VILL-05-2022
29.	DC and AC hi-pot testers	*DC voltage:* 0 kV … 2kV 2 kV … 6 kV 6 kV … 10 kV	80 mV … 120 mV 120 mV … 0.58 V 0.58 V … 1.88 V	LL-VILL-07-2022
		AC voltage: 0 kV … 2 kV 2 kV … 6 kV 6 kV … 10 kV (0.1 Hz – 600 Hz)	80 mV … 160 mV 160 mV … 1.2 V 1.2V … 3.56 V	

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
30.	Standard resistors (resistance)	*With current generator, max. power up to 1W:* 0.1 mΩ … 1 MΩ *With direct measurement:* 1 mΩ … 10 mΩ 10 mΩ … 100 mΩ 100 mΩ … 1 Ω 1 Ω … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ 100 MΩ … 1 GΩ	$61 \cdot 10^{-4}$ % 0.1% 0.01% $11 \cdot 10^{-4}$ % $5 \cdot 10^{-4}$ % $6 \cdot 10^{-4}$ % $9 \cdot 10^{-4}$ % $23 \cdot 10^{-4}$ %	LL-VILL-08-2023
31.	Standard resistors (conductance)	*With current generator, max. power up to 1W:* 1 mS … 10 kS *With direct measurement:* 1 nS … 10 nS 10 nS … 100 nS 100 nS … 1 µS 1 µS … 1 S 1 S … 10 S 10 S … 100 S 100 S … 1 kS [1]	$61 \cdot 10^{-4}$ % $23 \cdot 10^{-4}$ % $9 \cdot 10^{-4}$ % $6 \cdot 10^{-4}$ % $5 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % 0,01% 0,1%	LL-VILL-08-2023
32.	RLC (LCR) meters (AC resistance, capacitance, inductance, dissipation factor D, quality factor Q) using measuring frequency 20Hz-300kHz	Resistance 100 mΩ … 100 kΩ 100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ	 0.017% 0.018% 0.019% 0.2%	LL-VILL-09-2023
		Capacity 100 pF … 100 µF 100 µF … 500 µF 500 µF … 1000 µF	 0.018 % 0.021% 0.026%	
		Inductance 1 µH … 10 µH 10 µH … 100 µH 100 µH … 10 H 10 H … 12 H	 0.053% 0.020% 0.018% 0.033%	
		Dissipation factor (tg δ) D 10^{-4} … 10^{-3} 10^{-3} … 10^{-2} 10^{-2} … 10^{-1} 10^{-1} … 10^{0} 10^{0} … 10^{1}	 0.00001 … 0.00003 0.00003 … 0.00006 0.00006 … 0.00036 0.00036 … 0.0004 0.0004 … 0.00177	
		Quality factor (tg φ) Q 10^{-1} … 10^{0} 10^{0} … 10^{1} 10^{1} … 10^{2} 10^{2} … 10^{3} 10^{3} … 10^{4}	 0.00816 … 0.00817 0.00817 … 0.037 0.037 … 0.6 0.6 … 30 30 … 1000	

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
33.	Decade boxes, calibrators, other sources (resistance, inductance, capacitance)	*DC resistance:* 1 mΩ … 10 mΩ 10 mΩ … 100 mΩ 100 mΩ … 1 Ω 1 Ω … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ 100 MΩ … 1 GΩ	 0.1% 0.01 % $11 \cdot 10^{-4}$ % $5 \cdot 10^{-4}$ % $6 \cdot 10^{-4}$ % $9 \cdot 10^{-4}$ % $23 \cdot 10^{-4}$ %	LL-VILL-10-2023
		AC resistance (20 Hz ... 300 kHz measuring frequency) 100 mΩ … 100 kΩ 100 kΩ … 1 MΩ 1 MΩ … 10 MΩ 10 MΩ … 100 MΩ	 0.017% 0.018% 0.019% 0.2%	
		Capacitance (20 Hz ... 300 kHz measuring frequency) 100 pF … 100 µF 100 µF … 500 µF 500 µF … 1 mF	 0.018 % 0.021% 0.026%	
		Inductance (20 Hz ... 300 kHz measuring frequency) 1 µH … 10 µH 10 µH … 100 µH 100 µH … 10 H 10 H … 12 H	 0.053% 0.020% 0.018% 0.031%	
34.	Calibrators, electronic DC loads, other sources (DC power)	*DC voltage* 0.01 µV … 100 mV 0.1 V … 1 V 1 V … 10 V 10 V … 100 V 100 V … 1000 V 1000 V … 10000 V	 $5.4 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $4.7 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $5.5 \cdot 10^{-4}$ % $188 \cdot 10^{-4}$ %	LL-VILL-11-2023
		DC current 0 nA … 2 nA 2 nA … 20 nA 20 nA …200 nA 200 nA … 2 µA 2 µA … 10 µA 10 µA … 100 µA 100 µA … 1 mA 1 mA … 10 mA 10 mA … 100 mA 100 mA…1 A 1A … 3 A 3A … 10 A 10 A… 100 A 100 A… 500 A 500 A… 1000 A	 $315 \cdot 10^{-4}$ % $255 \cdot 10^{-4}$ % $250 \cdot 10^{-4}$ % $80 \cdot 10^{-4}$ % $25 \cdot 10^{-4}$ % $16 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % $34 \cdot 10^{-4}$ % 0.01% 0.07% 0.15% 0.08% 0.08%	
		Resistance 0.1 mΩ … 1 mΩ 1 mΩ … 10 mΩ 10 mΩ … 1 MΩ	 0.5% 0.089% 0.058%	
		DC power 1 mW … 10 MW	0.06%	
Temperature				

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
35.	Digital contact thermometers (calibrated with dry block calibrator)	-30°C … 0°C 0°C … 70°C 70°C … 100°C 100°C … 150°C 150°C … 250°C 250°C … 450°C 450°C … 600 °C	0.066°C … 0.065°C 0.065°C … 0.066°C 0.066°C … 0.067°C 0.067°C … 0.073°C 0.073°C … 0.11°C 0.11°C … 0.22°C 0.22 °C … 0.31°C	LL-HŐM-01-2022
36.	Resistance thermometers (calibrated with dry block calibrator)	-30°C … 0°C 0°C … 70°C 70°C … 100°C 100°C … 150°C 150°C … 250°C 250°C … 450°C 450°C … 600 °C	0.09°C 0.09°C 0.09°C … 0.091°C 0.091°C … 0.095°C 0.095°C … 0.13°C 0.13°C … 0.22°C 0.22 °C … 0.32°C	LL-HŐM-01-2022
37.	Thermocouples (calibrated with dry block calibrator)	-30°C … 0°C 0°C … 70°C 70°C … 100°C 100°C … 150°C 150°C … 250°C 250°C … 450°C 450°C … 600 °C	0.09°C … 0.089°C 0.089°C … 0.09°C 0.09°C … 0.091°C 0.091°C … 0.095°C 0.095°C … 0.13°C 0.13°C … 0.22°C 0.22 °C … 0.32°C	LL-HŐM-01-2022
38.	Digital contact thermometers (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.035°C … 0.033°C 0.033°C … 0.034°C 0.035°C … 0.07°C 0.07°C … 0.1°C	LL-HŐM-02-2022
39.	Resistance thermometers (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.071°C … 0.07°C 0.07°C 0.07°C … 0.09°C 0.09°C … 0.12°C	LL-HŐM-02-2022
40.	Thermocouples (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.07°C … 0.069°C 0.069°C 0.069°C … 0.09°C 0.09°C … 0.12°C	LL-HŐM-02-2022
41.	Glass thermometers (calibrated with liquid bath)	-30°C … 0°C 0°C … 90°C 90°C … 150°C 150°C … 300°C	0.035°C … 0.033°C 0.033°C … 0.034°C 0.034°C … 0.07 °C 0.07°C … 0.1°C	LL-HŐM-03-2022
42.	Infrared thermometer (surface type black body radiator ε=0,95)	25°C … 150°C 150°C … 200°C 200°C … 300°C 300°C … 500°C	0.6°C … 0.7°C 0.7 °C … 0.7°C 0.7°C … 0.9°C 0.9°C … 1.4°C	LL-HŐM-04-2022
43.	Infrared thermometer (cavity type black body radiator ε=0,995)	300°C … 400°C 400°C … 500°C 500°C … 600°C 600°C … 700°C 700°C … 800°C 800°C … 900°C 900°C … 1000 °C	1.4°C … 1.9°C 1.9°C … 2.5°C 2.5°C … 2.7°C 2.7°C … 2.5°C 2.5°C … 2.3°C 2.3°C … 2.4°C 2.4°C … 4.0°C	LL-HŐM-04-2022
44.	Air-conditioned chambers, climate chambers, thermostatically controlled cabinets (temperature)	-30°C … 0°C 0°C … 70°C 70°C … 100°C 100°C … 150°C 150°C … 200°C	0.65°C … 1.72°C 1.72°C … 2.45°C 2.45°C … 2.51°C 2.51°C … 2.50°C 2.50°C …2.91°C	LL-HŐM-06-2022

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
45.	Air-conditioned chambers, climate chambers, thermostatically controlled cabinets (relative humidity)	5 RH% … 25 RH% 25 RH% … 50 RH% 50 RH% … 75 RH% 75 RH% … 98 RH%	0.51RH%...0.75RH% 0.75 RH%...0.86RH% 0.86RH%...1.25RH% 1.25RH%...1.38RH%	LL-HŐM-06-2022
Mass				
46.	Non-automatic digital scales, where Max/ d ≥ 5 000 000 d ≤ 1 µg	1 mg – 411.111 g	1.53 µg – 7.12 mg	LL-TÖM-01-2024
47.	Non-automatic digital scales, where Max/ d > 220 000 d <1 mg	1 mg – 411.111 g	2.31 µg – 7.12 mg	LL-TÖM-01-2024
48.	Non-automatic digital scales, where 220 000 ≥ Max / d > 34 000 1 g > d ≥ 0,001 g	1 mg – 2522.222 g	0.86 mg – 44 mg	LL-TÖM-01-2024
49.	Non-automatic digital scales, where 34 000 ≥ Max / d > 15 000 d ≥ 1 g	1 g – 41522 g	0.86 g – 1.29 g	LL-TÖM-01-2024
50.	Non-automatic digital scales, where 15 000 ≥ Max / d d ≥ 0,5 g	1 g – 141.522 kg	0.43 g – 2.65 g	LL-TÖM-01-2024
51.	Non-automatic digital scales, where 10 000 ≥ Max / d d ≥ 100 g	100 g – 2600 kg	86.6 g – 450 g	LL-TÖM-01-2024
Torque				
52.	Torque wrenches, torque screwdrivers, clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	0.66 % - 0.14 % 1.75 % - 0.2 % 0.52 % - 0.18 % 0.84 % - 0.16 %	LL-TOR-01-2022
53.	Torque wrenches, torque screwdrivers, counter clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	1.31 % - 0.16 % 1.21 % - 0.21 % 0.62 % - 0.17 % 1.24 % - 0.15 %	LL-TOR-01-2022
Force				
54.	Force measuring systems of tensile and compression testing machines and appliances	*Tensile* 30 – 300 N 300 N – 3 kN 3 kN – 30 kN	 0.32% – 0.21% 0.45% – 0.21% 0.84% – 0.22%	LL-ERO-01-2023
		Compression 30 – 300 N 300 N – 3 kN 3 kN – 30 kN 20 – 200 kN 160 – 1600 kN	 0.23% – 0.21% 0.45% – 0.21% 0.94% – 0.21% 0.58% – 0.23% 1.54% – 0.36%	
Optics				

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
55.	Spectral radiant flux, total luminous flux using integrating sphere	0.1 lm – 20 000 lm, 0.01 W – 100W	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022
56.	Spectral radiant flux, total luminous flux using goniometer	1 lm – 100 000 lm, 1 W – 1600 W	3.8 %	LL-OPT-01-2022
57.	Spectral radiant flux, total luminous flux	integrating sphere measuring system	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022
58.	Spectral radiant flux, total luminous flux	goniophotometer measuring system	3.8 %	LL-OPT-01-2022
59.	Illuminance meter	illuminance 1 lx – 4000 lx	1.6 %	LL-OPT-02-2024
60.	Illuminance meter	illuminance 1 lx – 200 klx	1.7 %	LL-OPT-02-2024
61.	Spectral reflectance standard	relative spectral reflectance factor, 0.001…2R 380 nm – 740 nm	1.17 %	LL-OPT-03-2022
62.	Reflectance measurement capability of spectrophotometer	relative spectral reflectance factor, 0.001…1R 380 nm – 760 nm	0.9 %	LL-OPT-03-2022
63.	Wavelength accuracy of spectrophotometer	380 nm – 760 nm	0.16 nm	LL-OPT-03-2022
64.	Focimeter	dioptre, - 25D…0….25D	0.44 %	LL-OPT-04-2022
65.	Displays	luminance, 0 cd/m2 – 4000 cd/m2	2.8 %	LL-OPT-05-2022
66.	Displays	spectral power distribution, W/nm	3.9 %	LL-OPT-05-2022
67.	Spectral irradiance surface power	spectral irradiance surface power, 250 nm – 2500 nm	2.3 %	LL-OPT-06-2024
68.	Irradiance surface power	irradiance surface power, 250 nm – 2500 nm	2.3%	LL-OPT-06-2024
69.	Spectroradiometer	spectroradiometer: 250 nm – 2500 nm	2.3%	LL-OPT-06-2024

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
70.	UV power meter	UV power: 0…15000 µW/cm2	2.3%	LL-OPT-06-2024
71.	Spectral responsivity	spectral responsivity, A/W, V/W, 220nm – 399nm	2.12-1.42%	LL-OPT-07-2022
72.	Spectral responsivity	spectral responsivity, A/W, V/W, 400nm – 899nm	0.66%	LL-OPT-07-2022
73.	Spectral responsivity	spectral responsivity, A/W, V/W, 900nm – 990nm	0.76-1.04%	LL-OPT-07-2022
74.	Luminance meter, luminance standard	luminance, 0 cd/m2 – 5000 cd/m2	3.0%	LL-OPT-08-2022
75.	Spectral transmittance standard	relative spectral transmittance factor, 0.01T-0.1T 360 nm – 740 nm	0.0006T-0.0012T	LL-OPT-09-2023
76.	Spectral transmittance standard	relative spectral transmittance factor, 0.1T-1T 360 nm – 740 nm	0.0012T-0.008T	LL-OPT-09-2023
77.	Spectral transmittance Car glass tint meter	relative spectral transmittance factor, 0.01T-0.1T 175 nm – 1600 nm	0.0005T-0.0011T	LL-OPT-09-2023
78.	Spectral transmittance Car glass tint meter	relative spectral transmittance factor, 0.1T-1T 175 nm – 1600 nm	0.0011T- 0.007T	LL-OPT-09-2023
79.	Spectrophotometer transmittance measurement capability	relative spectral transmittance factor, 0.01T-0.1T 175 nm – 1600 nm	0.0005T-0.0011T	LL-OPT-09-2023
80.	Spectrophotometer transmittance measurement capability	relative spectral transmittance factor, 0.1T-1T 175 nm – 1600 nm	0.0011T- 0.007T	LL-OPT-09-2023
81.	Wavelength accuracy of spectrophotometer	175 nm – 900 nm	0.16 nm	LL-OPT-09-2023
82.	Visual investigation booth, test room, ageing chamber	spectral/integral irradiance surface power	0.6…2.1 %	LL-OPT-10-2023
83.	Visual investigation booth, test room, ageing chamber	spectral power distribution, W/nm	3.6 %	LL-OPT-10-2023
84.	Visual investigation booth, test room, ageing chamber	illuminance 1-200 klx	2.0 %	LL-OPT-10-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability *k*=2	Calibration process reference
85.	Gloss meter	Gloss Measurement geometry: 20°, 60°, 85°	1.0 %	LL-OPT-11-2022