ACCREDITATION SCOPE

Federal Budgetary Institution "State Regional Center
for Standardization, Metrology and Testing in Penza region "

name of the legal entity

440028, Penza, st. Komsomolskaya, 20

address of the place of activity

Calibration of measuring instruments

Calibrationstamp ciphet

Item No	Measurements, type (group) of measuring instruments	Metrologicalrequirements		Note[1]
		Measurement range	uncertainty (error, class, order)[2]	
1	2	3	4	5
Measurements ofgeometric quantities				
1	Length measuring instruments			
1.1	Gaugeblocks	from 0,1 to 0,3 mm over 0,3 to 0,9 mm over 0,9 to 100 mm over 100 to 1000 mm	$U_{0,95}$= 0,05μm $U_{0,95}$= 0,06μm $U_{0,95}$= 0,07μm $U_{0,95}$= (0,3+ + 0,0007·X) μm	Collation with the standard using a comparator
1.2	Line measures of length	from 0 to 1000 mm	$U_{0,95}$= 0,025 mm	Direct collation with the standard
1.3	Gauge blocks calibration instruments, interferometers, optimometers, coordinate measuring machines, length gages	from 0 to 100 mm over 100 to 1000 mm	$U_{0,95}$= 0,070 μm $U_{0,95}$= (0,3+ + 0,00063·X) μm	Direct length measurements, a reproducible measure

[1]The Note indicates the implemented calibration methods (techniques). If the designation of the document establishing the calibration method (method) is dated, only that specific method is used. If the designation of the document establishing the calibration method (procedure) is not dated, the latest revision of the specified procedure (including any changes) is used.

[2]The expanded uncertainty of measurement (U), expressed in accordance with ILAC-P14 and EA-4/02, is part of the CMC and represents the smallest expanded uncertainty attainable for the best available calibration item. Coverage probability corresponds to approximately 95% and coverage ratio k = 2, unless otherwise stated. Uncertainty values without specifying units of quantities are relative to the measured value of a quantity, unless otherwise indicated.

1.4	Calibration testers for measuring heads and indicators	from 0 to 50 mm	$U_{0,95}$= 0,09 μm	Direct length measurements, a reproducible measure
1.5	Beam-type measuring tools	from 0 to 2700 mm	$U_{0,95}$= (0,0011·X + + 8,8) μm	Direct length measurements, a reproducible measure
1.6	Micrometers, micrometer depth gauges, micrometer heads	from 0 to 60 mm over 60 to 100 mm over 100 to 1000 mm	$U_{0,95}$= 0,15 μm $U_{0,95}$= 0,18 μm $U_{0,95}$= (0,0006·X + + 8,65) μm	Direct length measurements, a reproducible measure
1.7	Bore gauges micrometers	from 50 to 1000 mm	$U_{0,95}$= (0,0006·X + + 8,65) μm	Direct collation with the standard
1.8	Measurement head sincluding digital	from0 to 10 mm over 10 to 100 mm	$U_{0,95}$= 0,2μm $U_{0,95}$= (0,002·X + + 0,4) μm	Direct collation with the standard
1.9	Indicator sandinside gauges	from 0 to 450 mm	$U_{0,95}$= 1,7 μm	Direct collation with the standard
1.10	Measuring tapes	from 0 to 30 m	$U_{0,95}$= 0,1 mm	Direct collation with the standard
1.11	Laser distance meters	from0 to 200 m over 200 to 800 m	$U_{0,95}$= (1,016 + + 1,96·10-6·X) mm $U_{0,95}$= (1,602 + + 2,02·10-6·X) mm	Direct collation with the standard
1.12	Roughness measuring instruments	Ra from 0,2 to 1 μm Rz, Rmax from 0,8 to 4 μm Ra from 1 to 100 μm Rz, Rmax from 4 to 400 μm	$U_{0,95}$= (0,04·X - - 0,004) μm $U_{0,95}$= (0,0001·X+ + 0,005) μm	Direct roughness measurements, a reproducible measure

on page 25, page 2

2	Plane angle measuring instruments			
2.1	Goniometers	from 0 to 360°	$U_{0,95}$= 0,4"	Direct plane angle measurements, a reproducible measure
2.2	Plane angle standards	from 0 to 90°	$U_{0,95}$=0,6"	Direct plane angle measurements, a reproduce iblestandard
2.3	Protractors	from 0 to 360°	$U_{0,95}$= 4´	Direct plane angle measurements, a reproducible measure
Mechanical quantities measurements				
3	Mass measuring instruments			
3.1	Measures of mass (weights)	0,001 g	$U_{0,95}$ = 0,0025 mg	Weights collation using a comparator
		0,002 g	$U_{0,95}$ = 0,0025 mg	
		0,005 g	$U_{0,95}$ = 0,0025 mg	
		0,01 g	$U_{0,95}$ = 0,0031 mg	
		0,02 g	$U_{0,95}$ = 0,0037 mg	
		0,05 g	$U_{0,95}$ = 0,0043 mg	
		0,1 g	$U_{0,95}$ = 0,00055 mg	
		0,2 g	$U_{0,95}$ = 0,0068 mg	
		0,5 g	$U_{0,95}$ = 0,0085 mg	
		1 g	$U_{0,95}$ = 0,015 mg	
		2 g	$U_{0,95}$ = 0,016 mg	
		5 g	$U_{0,95}$ = 0,016 mg	
		10 g	$U_{0,95}$ = 0,016 mg	
		20 g	$U_{0,95}$ = 0,017 mg	
		50 g	$U_{0,95}$ = 0,018 mg	
		100 g	$U_{0,95}$ = 0,022 mg	

on page 25, page 3

		200 g	$U_{0,95}$ = 0,037 mg	
		500 g	$U_{0,95}$ = 0,085 mg	
		1kg	$U_{0,95}$ = 0,2 mg	
		2 kg	$U_{0,95}$ = 0,35 mg	
		5 kg	$U_{0,95}$ = 1,1 mg	
		10 kg	$U_{0,95}$= 3,0 mg	
		20 kg	$U_{0,95}$= 4,9 mg	
		500 kg	$U_{0,95}$= 3,2 g	
3.2	Scales	from 0,001 to 50 g	$U_{0,95}$ = (0,00011·X + + 0,01) mg, where X –load, g	Direct mass measurement of weights
		over 50 to 220 g	$U_{0,95}$ = 0,085 mg	
		over 220 to 1200 g	$U_{0,95}$ = 0,75 mg	
		over 1200 to 6200 g	$U_{0,95}$ = 7 mg	
		over 6200 to 64000 g	$U_{0,95}$ = 70 mg	
4	Force measuring instruments			
4.1	Dynamometers, measuring sensors and transducers, measuring channels of measuring-computing and measuring systems, measuring instruments of other names for similar purposes	from 0,1 to 0,2 kH	$U_{0,95}$ = (-0,2·X + + 0,062) %	Direct force measurements, reproducible standard
		over 0,2 to 1,0 kH	$U_{0,95}$ = 0,022 %	
		over 1,0 to 2,0 kH	$U_{0,95}$ = (-0,012·X + + 0,054) %	
		over 2,0 to 10,0 kH	$U_{0,95}$ = 0,03 %	
		over 10,0 to 15,0 kH	$U_{0,95}$ = (-0,0015·X + + 0,045) %	
		over 15,0 to 50,0 kH	$U_{0,95}$ = 0,022 %	
		over 50,0 to 150,0 kH	$U_{0,95}$ = (-0,00016·X + + 0,0048) %	
		over 150,0 to 500,0 kH	$U_{0,95}$ = 0,023 %	

on page 25, page 4

		over 500,0 to 700,0 kH	$U_{0,95} = (-0,00005 \cdot X + + 0,075)$ %	
5	Force measuring instruments			
5.1	Measuring sensors and transducers, torque wrenches, measuring channels of measuring-computing and measuring systems, measuring instruments of other names for a similar purpose	from 30,0 to 200,0 H·m from 200,0 to 500,0 H·m from 500,0 to 1500,0 H·m	$U_{0,95} = (-0,025 \cdot X + + 8)$ %, $U_{0,95} = 1,7$ % $U_{0,95} = (-0,0006 \cdot X + + 1,4)$ %	Direct the moment of force measurements, reproducible standard
Measurements of flow parameters, flow rate, level, and volume				
6	Volume flow rate gas measuring instruments			
6.1	Rotameters, sensors and converters measuring volumetric gas flow rate, measuring channels of measuring-computing and measuring systems, measuring instruments of other names of similar purpose	from 0,003 to 6,5 m^3/h	$U_{0,95} = 0,4\ 10^{-2} \cdot Xm^3/h$	Direct volume flow rate gas measurements, reproducible standard
7	Metal measures of the 1st category	from 2 to 20dm^3 from 50 to 500 dm^3	$U_{0,95} = (0,0004 \cdot X + + 0,01)$ sm^3 $U_{0,95} = 4,5$ sm^3	Indirect measurements of volume by the mass method by comparing the mass of a liquid with the mass of weights
8	Metal measures of the 2st category	from $2 \cdot 10^3$ to $20 \cdot 10^3$ sm^3 from $50 \cdot 10^3$ to $500 \cdot 10^3$ sm^3	$U_{0,95} = 0,05$ sm^3 $U_{0,95} = 4,5$ sm^3	Direct collation with the standard metal measures
9	Pipette dispensers, glass capacity measures	from 0,0005 to 0,01 sm^3 over 0,01 to 1,00 sm^3 over 1,00 to 5,00 sm^3 over 5,00 to 30 sm^3	$U_{0,95} = 0,0015 \cdot 10\text{-}3$ sm^3 $U_{0,95} = 0,015 \cdot 10\text{-}3$ sm^3 $U_{0,95} = 0,015 \cdot 10\text{-}3$ sm^3 $U_{0,95} = 0,017 \cdot 10\text{-}3$ sm^3	Indirect measurements volume by weighing the dishes (capacity measures) in two stages: empty and with water

on page 25, page 5

		over 30 to 500 sm^3 over 500 to 2000sm^3	$U_{0,95} = 0,032 \cdot 10\text{-}3$ sm^3 $U_{0,95} = 0,3 \cdot 10\text{-}3$ sm^3	
10	Anemometers, instruments measuring linear speed including channels for measuring the air flow rate of multifunctional measuring instruments	from 0,1 to 5 m/s over 5 to 30 m/s	$U_{0,95} = 0,06 \cdot X$ m/s $U_{0,95} = 4 \cdot 10\text{-}3 \cdot X$ m/s	Direct collation with the standard
Pressure and vacuum measurements				
11	Pressure measuring instruments			
11.1	Measuring instruments of absolute pressure (meteorological barometers, channels for measuring absolute pressure of multifunctional measuring instruments)	from 0,5 to 110 kPa	$U_{0,95} = (2,5 \cdot 10^{-5} \cdot X + +0,002)$ kPa	Direct collation with the standard
11.2	Overpressure measuring instruments			
11.2.1	Manometers, manovacuum meters, vacuum gauges, pressure sensors and transducers, pressure calibrators, measuring channels of measuring-computing and measuring systems, measuring instruments of other names for similar purposes	from minus 100 kPa to 250 kPa over 0,25 MPa to 25 MPa over 25 MPa to 60 MPa	$U_{0,95} = 2,5 \cdot 10^{-5} \cdot X$ kPa $U_{0,95} = 2,5 \cdot 10^{-5} \cdot X$ MPa $U_{0,95} = 5,5 \cdot 10^{-5} \cdot X$ MPa	Direct measurements pressure reproduced by the standard
Measurements of physicochemical composition and properties of substances				
12	Density measuring instruments			
12.1	Hydrometers, measuring sensors and converters, measuring channels of measuring-computing and measuring systems, measuring instruments of other names for similar purposes	from 650 to 2 000 kg/m^3	$U_{0,95} = 0,023$ kg/m^3	Indirect density measurement through hydrostatic weighing calibrated measures and measures of density
13	Humidity measuring instruments			
13.1	Hygrometers, measuring sensors and converters, measuring channels of multifunctional measuring instruments,	from 5 to 95 %	$U_{0,95} = 0,085$ % (abs.)	Direct measurements relative humidity

on page 25, page 6

	measuring channels of measuring-computing and measuring systems, measuring instruments of other names for similar purposes			reproducible by the standard
14	Gas analyzers	from 0 to10 % of the measured value. over 10 to 100 % of the measured value.	$U_{0,95} = 4,8 \cdot 10\text{-}2 \cdot X$ % of the measured value. $U_{0,95} = 0,7 \cdot 10\text{-}2 \cdot X$ % of the measured value.	Direct measurements concentration of gas reproducible reference materials
15	pH measuring instruments	from 1 to13 pH	$U_{0,95} = 0,013$ pH	Direct measurements pH of the medium reproduced by reference materials
16	Fluid analyzers	from 0,01 to 50 mg/dm^3	$U_{0,95} = 0,018 \cdot X$ mg/dm3	Direct measurements concentration of impurities in the liquid, reproduce my reference materials
Thermophysical and temperature measurements				
17	Temperature measuring instruments			
17.1	Thermometers, measuring sensors and converters, measuring channels of multifunctional measuring instruments, measuring channels of measuring-computing and measuring systems, measuring instruments of other names for similar purposes	from minus 60 to 200°C over 200 to 300 °C over 300 to 1200 °C	$U_{0,95} = 0,015$ °C $U_{0,95} = 0,025$ °C $U_{0,95} = 0,4$ °C	Immediate collation with standard
Time and frequency measurements				
18	Frequency measuring instruments	from $5 \cdot 10^{-3}$ to 9000 Hz from 9 kHz to 300 MHz (from 0,1 to 7 V) from 300 MHz to 6 GHz	$U_{0,95} = 2,4 \cdot 10^{-5}$ Hz $U_{0,95} = (2,2 \cdot 10^{-5} + + 7 \cdot 10^{-11} \cdot X)$ Hz $U_{0,95} = (3,2 \cdot 10^{-11} X + 1,1 \cdot 10^{-5})$ Hz	Direct measurements frequency reproduced standard

on page 25, page 7

		(from 0,1 to 7 V)		
19	Time interval measuring instruments	from 10 ns to 100 μs from 100 μs to 1 s from 1 to $1 \cdot 10^{6}$s	$U_{0,95} = 6 \cdot 10^{-10}$s $U_{0,95} = 2,1 \cdot 10^{-7}$s $U_{0,95} = 1,1 \cdot 10^{-6}$s	Direct measurements time intervals reproduced standard
20	Signal generators	from $1 \cdot 10^{-3}$ to $1 \cdot 10^{4}$Hz from 10 kHz to 100 MHz (from 0,1 to 10 V) from 100 MHz to 1 GHz (from 0,1 to 10 V)	$U_{0,95} = 1 \cdot 10^{-8} \cdot X$ Hz $U_{0,95} = 1 \cdot 10^{-11} \cdot X$ Hz $U_{0,95} = (2,5 \cdot 10^{-11} \cdot X - 0,0019)$ Hz	Direct measurements frequency reproduced standard
Measurements electrical and magnetic quantities				
21	Measuring instruments of electric direct voltage			
21.1	Voltmeters and meters	from 0 to 220 mV over 0,22 to 2,2 V over 2,2to 11 V over 11to 22 V over 22 to 220 V over 220 to 1000 V	$U_{0,95} = (7,5 \cdot 10^{-6} \cdot X + 0,4 \cdot 10^{-3})$ mV $U_{0,95} = (5 \cdot 10^{-6} \cdot X + 0,7 \cdot 10^{-6})$ V $U_{0,95} = (3,5 \cdot 10^{-6} \cdot X + 2,5\ 10^{-6})$ V $U_{0,95} = (3,5 \cdot 10^{-6} \cdot X + 4 \cdot 10^{-6})$ V $U_{0,95} = (5 \cdot 10^{-6} \cdot X + 4 \cdot 10^{-5})$ V $U_{0,95} = (6,5 \cdot 10^{-6} \cdot X + 4 \cdot 10^{-4})$ V	Direct measurements electric voltage reproducible standard
21.2	Calibrators, installations and measures	from 0 to 200 mV over 200 mV to 2 V over 2 to 20 V over 20 to 200 V over 200 to 1000 V	$U_{0,95} = (4,5 \cdot 10^{-6} \cdot X + 1 \cdot 10^{-5})$ V $U_{0,95} = (3,0 \cdot 10^{-6} \cdot X + 4 \cdot 10^{-7})$ V $U_{0,95} = (3,0 \cdot 10^{-6} \cdot X + 4,0 \cdot 10^{-6})$ V $U_{0,95} = (4,5 \cdot 10^{-6} \cdot X + 4,0 \cdot 10^{-5})$ V $U_{0,95} = (4,0 \cdot 10^{-6} \cdot X + 5,0 \cdot 10^{-4})$ V	Direct measurements voltage reproduced by the calibrated SI, using the standard
21.3	Normal cell	1 V	$U_{0,95} = 1,4 \cdot 10^{-7}$ V	Collation calibratable and standard

on page 25, page 8

				measures using a comparator
22	Measuring instruments of electric alternating voltage			
22.1	Voltmeters and meters	over 1 to 32,999 mV (from 10 to 45 Hz)	$U_{0,95} = (2{,}4 \cdot 10^{-4} \cdot X + 4 \cdot 10^{-3})$ mV	Direct measurements voltage reproduced by the standard
		from 400 Hz to 10 kHz	$U_{0,95} = (1{,}5 \cdot 10^{-4} \cdot X + 6 \cdot 10^{-3})$ mV	
		from 10 to 20 kHz	$U_{0,95} = (2 \cdot 10^{-4} \cdot X + 6 \cdot 10^{-3})$ mV	
		from 20 to 50 kHz	$U_{0,95} = (1 \cdot 10^{-3} \cdot X + 6 \cdot 10^{-3})$ mV	
		from 50 to 100 kHz	$U_{0,95} = (3{,}5 \cdot 10^{-3} \cdot X + 1{,}2 \cdot 10^{-2})$ mV	
		over 33 to 329,999 mV (from 10 to 45 Hz)	$U_{0,95} = (3 \cdot 10^{-4} \cdot X + 8 \cdot 10^{-2})$ mV	
		from 400 Hz to10 kHz	$U_{0,95} = (1{,}5 \cdot 10^{-4} \cdot X + 8 \cdot 10^{-3})$ mV	
		from 10 to 20 kHz	$U_{0,95} = (1{,}6 \cdot 10^{-4} \cdot X + 8 \cdot 10^{-3})$ mV	
		from 20 to 50 kHz	$U_{0,95} = (3{,}5 \cdot 10^{-4} \cdot X + 8 \cdot 10^{-3})$ mV	
		from 50 to 100 kHz	$U_{0,95} = (8 \cdot 10^{-4} \cdot X + 3{,}2 \cdot 10^{-2})$ mV	
		over 0,33 to 3,29999 V (from 10 to 45 Hz)	$U_{0,95} = (3 \cdot 10^{-4} \cdot X + 5 \cdot 10^{-5})$ V	
		from 400 Hz to 10 kHz	$U_{0,95} = (1{,}5 \cdot 10^{-3} \cdot X + 6 \cdot 10^{-5})$ V	
		from 10 to 20 kHz	$U_{0,95} = (1{,}9 \cdot 10^{-4} \cdot X + 6 \cdot 10^{-5})$ V	
		from 20 to 50 kHz	$U_{0,95} = (3 \cdot 10^{-4} \cdot X + 5 \cdot 10^{-5})$ V	
		from 50 to 100 kHz	$U_{0,95} = (7 \cdot 10^{-4} \cdot X + 1{,}25 \cdot 10^{-4})$ V	
		over 3,3 to 32,9999 V (from 10 to 45 Hz)	$U_{0,95} = (3 \cdot 10^{-4} \cdot X + 6{,}5 \cdot 10^{-4})$ V	

on page 25, page 9

		from 400 Hz to 10 kHz	$U_{0,95} = (1,5 \cdot 10^{-4} \cdot X + +6 \cdot 10^{-4})$ V	
		from 10 to 20 kHz	$U_{0,95} = (2,4 \cdot 10^{-4} \cdot X + +6 \cdot 10^{-4})$ V	
		from 20 to 50 kHz	$U_{0,95} = (3,5 \cdot 10^{-4} \cdot X + +6 \cdot 10^{-4})$ V	
		from 50 to 100 kHz	$U_{0,95} = (9 \cdot 10^{-4} \cdot X + +1,6 \cdot 10^{-3})$ V	
		over 33 to 329,999 V (from400 Hzto 1 kHz)	$U_{0,95} = (1,9 \cdot 10^{-4} \cdot X + +2 \cdot 10^{-3})$ V	
		from1 to10 kHz	$U_{0,95} = (2,5 \cdot 10^{-4} \cdot X + +6 \cdot 10^{-3})$ V	
		from 10 to 20 kHz	$U_{0,95} = (2,4 \cdot 10^{-4} \cdot X + +6 \cdot 10^{-4})$ B	
		from 20 to 50 kHz	$U_{0,95} = (3,5 \cdot 10^{-4} \cdot X + +6 \cdot 10^{-4})$ B	
		from 50 to 100 kHz	$U_{0,95} = (2 \cdot 10^{-3} \cdot X + +5 \cdot 10^{-2})$ V	
		over 330 to 1 020 V (from 400 Hz to 1 kHz)	$U_{0,95} = (3 \cdot 10^{-4} \cdot X + +1 \cdot 10^{-2})$ V	
		from 1 to 5 kHz	$U_{0,95} = (2,5 \cdot 10^{-4} \cdot X + +1 \cdot 10^{-2})$V	
		from 5 to 10 kHz	$U_{0,95} = (3 \cdot 10^{-4} \cdot X + +1 \cdot 10^{-2})$ V	
22.2	Calibrators, installations and measures	from 0 to 200 mV (from 10 to 40 Hz)	$U_{0,95} = (1,3 \cdot 10^{-4} \cdot X + +4 \cdot 10^{-2})$ mV	Direct measurements voltage reproduced by the calibrated SI, using the standard
		from 40 to 100 Hz	$U_{0,95} = (1,1 \cdot 10^{-4} \cdot X + +4,0 \cdot 10^{-2})$ mV	
		from 100 Hz to 2 kHz	$U_{0,95} = (10,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-3})$ mV	
		from 2 to 10 kHz	$U_{0,95} = (10,5 \cdot 10^{-5} \cdot X + +4,0 \cdot 10^{-3})$ mV	
		from 10 to 30 kHz	$U_{0,95} = (30,5 \cdot 10^{-5} \cdot X + +8,0 \cdot 10^{-3})$ mV	
		from 30 to 100 kHz	$U_{0,95} = (70,5 \cdot 10^{-5} \cdot X + +2 \cdot 10^{-4})$ mV	

on page 25, page 10

		over 0,2 to 2 V (from 10 to 40 Hz)	$U_{0,95} = (10,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-5})$ V	
		from 40 to 100 Hz	$U_{0,95} = (8,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-5})$ V	
		from 100 Hz to 2 kHz	$U_{0,95} = (6,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-5})$ V	
		from2 to 10 kHz	$U_{0,95} = (8,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-5})$ V	
		from 10 to 30 kHz	$U_{0,95} = (20,5 \cdot 10^{-5} \cdot X + +4,0 \cdot 10^{-5})$ V	
		from 30 to 100 kHz	$U_{0,95} = (50,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-4})$ V	
		over 2 to 20 V (from 10 to 40 Hz)	$U_{0,95} = (10,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-4})$ V	
		from 40 to 100 Hz	$U_{0,95} = (8,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-4})$ V	
		from 100 Hz to 2 kHz	$U_{0,95} = (6,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-4})$ V	
		from 2 to 10 kHz	$U_{0,95} = (8,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-4})$ V	
		from 10 to 30 kHz	$U_{0,95} = (20,5 \cdot 10^{-5} \cdot X + +4,0 \cdot 10^{-4})$ V	
		from 30 to 100 kHz	$U_{0,95} = (50,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-3})$ V	
		over 20 to 200 V (from 10 to 40 Hz)	$U_{0,95} = (10,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-3})$ V	
		from 40 to 100 Hz	$U_{0,95} = (8,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-3})$ V	
		from 100 Hz to 2 kHz	$U_{0,95} = (6,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-3})$ V	
		from 2 to 10 kHz	$U_{0,95} = (8,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-3})$ V	
		from 10 to 30 kHz	$U_{0,95} = (20,5 \cdot 10^{-5} \cdot X + +4,0 \cdot 10^{-3})$ V	

on page 25, page 11

		from 30 to 100 kHz	$U_{0,95} = (50,5 \cdot 10^{-5} \cdot X + +2,0 \cdot 10^{-2})$ V	
		over 200 to 1 000 V (from 10 to 40 Hz)	$U_{0,95} = (1,1 \cdot 10^{-4} \cdot X + +7,0 \cdot 10^{-2})$ V	
		from 40 Hz to 10 kHz	$U_{0,95} = (9,5 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-2})$ V	
		from 10 to 30 kHz	$U_{0,95} = (20,5 \cdot 10^{-5} \cdot X + +4,0 \cdot 10^{-2})$ V	
		from 30 to 100 kHz	$U_{0,95} = (5,1 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-1})$ V	
23	Kilovoltmeters of voltage of direct and alternating current	from 0 to 100 kV 50 Hz	$U_{0,95} = 1,2 \cdot 10^{-4} \cdot X$ kV	Direct measuring the voltage reproduced by the standard
		from 0 дto 100 kV	$U_{0,95} = (1,2 \cdot 10\text{-}3 \cdot X + + 0,002)$ kV	
24	Electric direct current measuring instruments			
24.1	Ammeters and meters	from 0 to 220 μA	$U_{0,95} = (4 \cdot 10^{-5} \cdot X + + 6,0 \cdot 10^{-3})$ μA	Direct current measurements, reproducible by the standard
		over 0,22 to 2,2 mA	$U_{0,95} = (3,5 \cdot 10^{-5} \cdot X + +7,0 \cdot 10^{-6})$ mA	
		over 2,2 to 22mA	$U_{0,95} = (3,5 \cdot 10^{-4} \cdot X + +4,0 \cdot 10^{-5})$ mA	
		over 22 to 220 mA	$U_{0,95} = (4,5 \cdot 10^{-5} \cdot X + + 7,0 \cdot 10^{-4})$ mA	
		over 0,22 to 2,2 A	$U_{0,95} = (8,0 \cdot 10^{-5} \cdot X + + 1,2 \cdot 10^{-5})$ A	
		over 2,2 to 11 A	$U_{0,95} = (3,6 \cdot 10^{-4} \cdot X + + 4,8 \cdot 10^{-4})$ A	
		over 11 to 20,5 A	$U_{0,95} = (1,0 \cdot 10^{-3} \cdot X + 7,5 \cdot 10^{-4})$ A	
24.2	Calibrators, installations and measures	from 0 to 200 μA	$U_{0,95} = (1,2 \cdot 10^{-5} \cdot X + + 4,0 \cdot 10^{-4})$ μA	Direct measurements voltage reproduced by the calibrated SI, using the standard
		over 0,2 to 2 mA	$U_{0,95} = (1,2 \cdot 10^{-5} \cdot X + + 4,0 \cdot 10^{-6})$ mA	
		over 2 to 20 mA	$U_{0,95} = (1,3 \cdot 10^{-5} \cdot X + + 4,0 \cdot 10^{-5})$ mA	

on page 25, page 12

		over 20 to 200 mA	$U_{0,95} = (3,6 \cdot 10^{-5} \cdot X + 8,0 \cdot 10^{-4})$ mA	
		over 0,2 to 2 A	$U_{0,95} = (1,7 \cdot 10^{-4} \cdot X + 1,6 \cdot 10^{-5})$ A	
		over 2 to 20 A	$U_{0,95} = (3,8 \cdot 10^{-4} \cdot X + 4,0 \cdot 10^{-4})$ A	
25	Electric alternating current measuring instruments			
25.1	Ammeters and meters	over 29 to 329,99 μA (from 10 to 20 Hz)	$U_{0,95} = (2 \cdot 10^{-3} \cdot X + 0,1)$ μA	Direct current measurements, reproducible by my standard
		from 20 to 45 Hz	$U_{0,95} = (1,5 \cdot 10^{-3} \cdot X + 0,1)$ μA	
		from 400 Hz to 1 kHz	$U_{0,95} = (12,5 \cdot 10^{-4} \cdot X + 0,1)$ μA	
		from 1 to 5 kHz	$U_{0,95} = (3 \cdot 10^{-3} \cdot X + 0,15)$ μA	
		from 5 to 10 kHz	$U_{0,95} = (8 \cdot 10^{-3} \cdot X + 0,2)$ μA	
		from 10 to 30 kHz	$U_{0,95} = (1,6 \cdot 10^{-2} \cdot X + 0,4)$ μA	
		over 0,33 to 3,2999 mA (from 10 to 20 Hz)	$U_{0,95} = (2 \cdot 10^{-3} \cdot X + 0,15 \cdot 10^{-3})$ mA	
		from 20 to 45 Hz	$U_{0,95} = (12,5 \cdot 10^{-4} \cdot X + 0,15 \cdot 10^{-3})$ mA	
		from 400 Hz to 1 kHz	$U_{0,95} = (1 \cdot 10^{-3} \cdot X + 0,15 \cdot 10^{-3})$ mA	
		from 1 to 5 kHz	$U_{0,95} = (2 \cdot 10^{-3} \cdot X + 0,2 \cdot 10^{-3})$ mA	
		from 5 to 10 kHz	$U_{0,95} = (5 \cdot 10^{-3} \cdot X + 0,3 \cdot 10^{-3})$ mA	
		from 10 to 30 kHz	$U_{0,95} = (1 \cdot 10^{-2} \cdot X + 0,6 \cdot 10^{-3})$ mA	
		over 3,3 to 32,999 mA (from 10 to 20 Hz)	$U_{0,95} = (1,8 \cdot 10^{-3} \cdot X + 2 \cdot 10^{-3})$ mA	
		from 20 to 45 Hz	$U_{0,95} = (9 \cdot 10^{-4} \cdot X + 2 \cdot 10^{-3})$ mA	

on page 25, page 13

		from 400 Hz to 1 kHz	$U_{0,95} = (4 \cdot 10^{-4} \cdot X + +2 \cdot 10^{-3})$ mA	
		from 1 to 5 kHz	$U_{0,95} = (8 \cdot 10^{-4} \cdot X + +2 \cdot 10^{-3})$ mA	
		from 5 to 10 kHz	$U_{0,95} = (2 \cdot 10^{-3} \cdot X + +3 \cdot 10^{-3})$ mA	
		from 10 to 30 kHz	$U_{0,95} = (4 \cdot 10^{-3} \cdot X + +4 \cdot 10^{-3})$ mA	
		over 33 to 329,99mA (from 10 to 20 Hz)	$U_{0,95} = (1,8 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-2})$ mA	
		from 20 to 45 Hz	$U_{0,95} = (9,0 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-2})$ mA	
		from 400 Hz to 1 kHz	$U_{0,95} = (4,0 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-2})$ mA	
		from 1 to 5 kHz	$U_{0,95} = (1 \cdot 10^{-3} \cdot X + +5,0 \cdot 10^{-2})$ mA	
		from 5 to 10 kHz	$U_{0,95} = (2,0 \cdot 10^{-3} \cdot X + +1,0 \cdot 10^{-1})$ mA	
		from 10 to 30 kHz	$U_{0,95} = (4,0 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-1})$ mA	
		over 0,33 to 1,09999 A (from 10 to 45 Hz)	$U_{0,95} = (1,8 \cdot 10^{-3} \cdot X + +1,0 \cdot 10^{-4})$ A	
		from 400 Hz to 1 kHz	$U_{0,95} = (5,0 \cdot 10^{-4} \cdot X + +1,0 \cdot 10^{-4})$ A	
		from 1 to 5 kHz	$U_{0,95} = (6,0 \cdot 10^{-3} \cdot X + +1,0 \cdot 10^{-3})$ A	
		from 5 to 10 kHz	$U_{0,95} = (2,5 \cdot 10^{-2} \cdot X + +5,0 \cdot 10^{-3})$ A	
		over 1,1 to 2,99999 A (from 10 to 45 Hz)	$U_{0,95} = (1,8 \cdot 10^{-3} \cdot X + +1,0 \cdot 10^{-4})$ A	
		From 400 Hz to 1 kHz	$U_{0,95} = (6,0 \cdot 10^{-4} \cdot X + +1,0 \cdot 10^{-4})$ A	

on page 25, page 14

		from 1 to 5 kHz	$U_{0,95} = (6,0 \cdot 10^{-3} \cdot X + +1,0 \cdot 10^{-3})$ A	
		from 5 to 10 kHz	$U_{0,95} = (2,5 \cdot 10^{-2} \cdot X + +5,0 \cdot 10^{-3})$ A	
		over 3 to 10,9999 A (from 400 Hz to 1 kHz)	$U_{0,95} = (1,0 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-3})$ A	
		from1 to 5 kHz	$U_{0,95} = (3,0 \cdot 10^{-2} \cdot X + +2,0 \cdot 10^{-3})$ A	
		over 11 to 20,5 A (from 400 Hz to 1 kHz)	$U_{0,95} = (1,5 \cdot 10^{-3} \cdot X + +5,0 \cdot 10^{-3})$ A	
		from 1 to 5 kHz	$U_{0,95} = (3,0 \cdot 10^{-2} \cdot X + +5,0 \cdot 10^{-3})$ A	
25.2	Calibrators, installations and measures	from 0 to 200 μA (from 10 Hz to 10 kHz)	$U_{0,95} = (4,75 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-2})$ μA	Direct measurements voltage reproduced by the calibrated SI, using the standard
		from 10 to 30 kHz	$U_{0,95} = (6,5 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-2})$ μA	
		from 30 to 100 kHz	$U_{0,95} = (4,0 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-2})$ μA	
		over 0,2 to 2 mA (from 10 Hz to 10 kHz)	$U_{0,95} = (2,8 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-4})$ mA	
		from 10 to 30 kHz	$U_{0,95} = (6,5 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-4})$ mA	
		from 30 to 100 kHz	$U_{0,95} = (4,0 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-4})$ mA	
		over 2 to 20 mA (from 10 Hz to 10 kHz)	$U_{0,95} = (2,8 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-3})$ mA	
		from 10 to 30 kHz	$U_{0,95} = (6,5 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-3})$ mA	
		from 30 to 100 kHz	$U_{0,95} = (4,0 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-3})$ mA	
		over 20 to 200 mA (from 400 Hz	$U_{0,95} = (2,5 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-2})$ mA	

on page 25, page 15

		to 10 kHz) from 10 to 30 kHz over 0,2 to 2 A (from 10 Hz to 2 kHz) from 2 to 10 kHz from 10 to 30 kHz over 2 to 20 A (from 400 Hz to2 kHz) from 2 to 10 kHz from10 to 30 kHz	 $U_{0,95} = (6,0 \cdot 10^{-4} \cdot X + +2,3 \cdot 10^{-2})$ мА $U_{0,95} = 6,0 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-4}$ А $U_{0,95} = 7,1 \cdot 10^{-4} \cdot X + +2,0 \cdot 10^{-4}$ А $U_{0,95} = 3,0 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-4}$ А $U_{0,95} = (8,0 \cdot 10^{-4} \cdot X + +2,3 \cdot 10^{-3})$ А $U_{0,95} = (2,5 \cdot 10^{-3} \cdot X + +2,0 \cdot 10^{-3})$ А $U_{0,95} = (3,5 \cdot 10^{-3} \cdot X + +2,3 \cdot 10^{-4})$ А	
26	Shunts	from $1,5 \cdot 10^{-5}$ Ω to $2,5 \cdot 10^{-3}$ Ω over $2,5 \cdot 10^{-3}$ Ω to $7,5 \cdot 10^{-3}$ Ω over $7,5 \cdot 10^{-3}$ Ω to $15 \cdot 10^{-3}$ Ω	$U_{0,95} = 4,4 \cdot 10^{-10}$ Ω $U_{0,95} = 3,4 \cdot 10^{-9}$ Ω $U_{0,95} = 4,4 \cdot 10^{-8}$ Ω	Simultaneous collation falls voltage across the calibrated shunt and reference measure
27	Electrical resistance measuring instruments			
27.1	Measures	$1 \cdot 10^{-3}$ Ω $1 \cdot 10^{-2}$ Ω $1 \cdot 10^{-1}$ Ω 1 Ω 10 Ω $1 \cdot 10^{2}$ Ω $1 \cdot 10^{3}$ Ω $1 \cdot 10^{4}$ Ω $1 \cdot 10^{5}$ Ω	$U_{0,95} = 7,1 \cdot 10^{-9}$ Ω $U_{0,95} = 6,2 \cdot 10^{-8}$ Ω $U_{0,95} = 5,9 \cdot 10^{-7}$ Ω $U_{0,95} = 5,9 \cdot 10^{-6}$ Ω $U_{0,95} = 5,9 \cdot 10^{-5}$ Ω $U_{0,95} = 6,1 \cdot 10^{-4}$ Ω $U_{0,95} = 5,9 \cdot 10^{-3}$ Ω $U_{0,95} = 5,9 \cdot 10^{-2}$ Ω $U_{0,95} = 5,9 \cdot 10^{-1}$ Ω	Simultaneous collation falls voltage across the calibrated and reference measures Direct measurement of resistance with a standard

on page 25, page 16

		$1 \cdot 10^{6}\ \Omega$	$U_{0,95} = 3,1\ \Omega$	
		$1 \cdot 10^{7}\ \Omega$	$U_{0,95} = 2,3 \cdot 10^{1}\ \Omega$	
		$1 \cdot 10^{8}\ \Omega$	$U_{0,95} = 8,2 \cdot 10^{2}\ \Omega$	
27.2	Boxes	from $1 \cdot 10^{-7}\ \Omega$ to $1,2\ \Omega$	$U_{0,95} = 1,0 \cdot 10^{-6}\ \Omega$	Direct measurement of resistance with a standard
		from $1 \cdot 10^{-6}\ \Omega$ to $12\ \Omega$	$U_{0,95} = 1,1 \cdot 10^{-5}\ \Omega$	
		from $1 \cdot 10^{-5}\ \Omega$ to $120\ \Omega$	$U_{0,95} = 1,4 \cdot 10^{-4}\ \Omega$	
		from $1 \cdot 10^{-4}\ \Omega$ to $1,2 \cdot 10^{3}\ \Omega$	$U_{0,95} = 1,3 \cdot 10^{-3}\ \Omega$	
		from $1 \cdot 10^{-3}\ \Omega$ to $12 \cdot 10^{3}\ \Omega$	$U_{0,95} = 1,2 \cdot 10^{-2}\ \Omega$	
		from $1 \cdot 10^{-2}\ \Omega$ to $120 \cdot 10^{3}\ \Omega$	$U_{0,95} = 1,1 \cdot 10^{-1}\ \Omega$	
		from $0,1\ \Omega$ to $1 \cdot 10^{6}\ \Omega$	$U_{0,95} = 1,2\ \Omega$	
		from $1 \cdot 10^{6}\ \Omega$ to $1 \cdot 10^{9}\ \Omega$	$U_{0,95} = 1,2 \cdot 10^{-6} \cdot X\ \Omega$	
27.3	Ohmmeters and resistance meters	$1 \cdot 10^{-3}\ \Omega$	$U_{0,95} = 7,1 \cdot 10^{-9}\Omega$	Direct measurement of resistance reproduced by the standard
		$1 \cdot 10^{-2}\Omega$	$U_{0,95} = 6,2 \cdot 10^{-8}\ \Omega$	
		$1 \cdot 10^{-1}\ \Omega$	$U_{0,95} = 1,5 \cdot 10^{-7}\ \Omega$	
		$1\ \Omega$	$U_{0,95} = 1,0 \cdot 10^{-6}\ \Omega$	
		$10\ \Omega$	$U_{0,95} = 1,0 \cdot 10^{-5}\ \Omega$	
		$1 \cdot 10^{2}\ \Omega$	$U_{0,95} = 1,9 \cdot 10^{-4}\ \Omega$	
		$1 \cdot 10^{3}\ \Omega$	$U_{0,95} = 1,0 \cdot 10^{-3}\ \Omega$	
		$1 \cdot 10^{4}\ \Omega$	$U_{0,95} = 1,0 \cdot 10^{-2}\ \Omega$	
		$1 \cdot 10^{5}\ \Omega$	$U_{0,95} = 1,0 \cdot 10^{-1}\ \Omega$	
		$1 \cdot 10^{6}\ \Omega$	$U_{0,95} = 2,3\ \Omega$	
		$1 \cdot 10^{7}\ \Omega$	$U_{0,95} = 2,2 \cdot 10^{1}\ \Omega$	
		$1 \cdot 10^{8}\ \Omega$	$U_{0,95} = 8,2 \cdot 10^{2}\ \Omega$	

on page 25, page 17

		$1 \cdot 10^{9}$ Ω	$U_{0,95} = 2,4 \cdot 10^{3}$ Ω	
28	Inductance measuring instruments			
28.1	Measures (boxes)	from $1 \cdot 10^{-3}$ to $1 \cdot 10^{3}$ H (100/120 Hz) from $1 \cdot 10^{-4}$ to $1 \cdot 10^{2}$ H (1000 Hz) from $2 \cdot 10^{-5}$ to 10 H (10 kHz) from $4 \cdot 10^{-6}$ to $2 \cdot 10^{-1}$ H (100 kHz)	$U_{0,95} = 3,5 \cdot 10^{-4} \cdot X$ H $U_{0,95} = 3,5 \cdot 10^{-4} \cdot X$ H $U_{0,95} = 3,5 \cdot 10^{-4} \cdot X$ H $U_{0,95} = 2,4 \cdot 10^{-4} \cdot X$ H	Direct measurements inductance standard
28.2	Inductance meters	$5 \cdot 10^{-5}$ H (1000 Hz) $1 \cdot 10^{-4}$ H (1000 Hz) $5 \cdot 10^{-4}$ H (1000 Hz) $1 \cdot 10^{-3}$ H (1000 Hz) $5 \cdot 10^{-3}$ H (1000 Hz) $1 \cdot 10^{-2}$ H (1000 Hz) $5 \cdot 10^{-2}$ H (1000 Hz) $1 \cdot 10^{-1}$ H (1000 Hz) $5 \cdot 10^{-1}$ H (1000 Hz) 1 H (1000 Hz) 10 H (1000 Hz)	$U_{0,95} = 3,0 \cdot 10^{-8}$ H $U_{0,95} = 3,0 \cdot 10^{-8}$ H $U_{0,95} = 1,0 \cdot 10^{-7}$ H $U_{0,95} = 2,0 \cdot 10^{-7}$ H $U_{0,95} = 1,0 \cdot 10^{-6}$ H $U_{0,95} = 1,0 \cdot 10^{-6}$ H $U_{0,95} = 1,0 \cdot 10^{-5}$ H $U_{0,95} = 1,0 \cdot 10^{-5}$ H $U_{0,95} = 7,0 \cdot 10^{-5}$ H $U_{0,95} = 1,4 \cdot 10^{-4}$ H $U_{0,95} = 7,0 \cdot 10^{-3}$ H	Direct measurements inductance standard

on page 25, page 18

29	Capacitance measuring instruments			
29.1	Measures (boxes)	from $1 \cdot 10^{-9}$ to $1 \cdot 10^{-3}$ F (100/120 Hz)	$U_{0,95} = 3,5 \cdot 10^{-4} \cdot X$ F	Direct measurements capacities standard
		from $1 \cdot 10^{-10}$ to $1 \cdot 10^{-4}$ F (1000 Hz)	$U_{0,95} = 3,5 \cdot 10^{-4} \cdot X$ F	
		from $6 \cdot 10^{-11}$ to $1 \cdot 10^{-5}$ F (10 kHz)	$U_{0,95} = 3,5 \cdot 10^{-4} \cdot X$ F	
		from $1 \cdot 10^{-11}$ to $1 \cdot 10^{-6}$ F (100 kHz)	$U_{0,95} = 2,4 \cdot 10^{-4} \cdot X$ F	
29.2	Capacitance meters	$1 \cdot 10^{-11}$ F (1000 Hz)	$U_{0,95} = 1,4 \cdot 10^{-15}$ F	Direct measurements capacity reproducible by the standard
		$2 \cdot 10^{-11}$F (1000 Hz)	$U_{0,95} = 3,4 \cdot 10^{-15}$ F	
		$3 \cdot 10^{-11}$ F (1000 Hz)	$U_{0,95} = 5,1 \cdot 10^{-15}$ F	
		$4 \cdot 10^{-11}$ F (1000 Hz)	$U_{0,95} = 6,4 \cdot 10^{-15}$ F	
		$1 \cdot 10^{-10}$ F (1000 Hz)	$U_{0,95} = 9,0 \cdot 10^{-15}$ F	
		$4 \cdot 10^{-10}$ F (1000 Hz)	$U_{0,95} = 6,0 \cdot 10^{-14}$ F	
		$1 \cdot 10^{-9}$ F (1000 Hz)	$U_{0,95} = 1,0 \cdot 10^{-13}$ F	
		$4 \cdot 10^{-9}$ F (1000 Hz)	$U_{0,95} = 5,6 \cdot 10^{-13}$ F	
		$1 \cdot 10^{-8}$ F (1000 Hz)	$U_{0,95} = 1,0 \cdot 10^{-12}$ F	
		$4 \cdot 10^{-8}$ F (1000 Hz)	$U_{0,95} = 5,6 \cdot 10^{-12}$ F	
		$1 \cdot 10^{-7}$ F (1000 Hz)	$U_{0,95} = 1,0 \cdot 10^{-11}$ F	
		$4 \cdot 10^{-7}$ F (1000 Hz)	$U_{0,95} = 5,6 \cdot 10^{-11}$ F	

on page 25, page 19

		$1 \cdot 10^{-6}$ F (1000 Hz)	$U_{0,95} = 1,4 \cdot 10^{-10}$ F	
		from $1 \cdot 10^{-9}$ F to $9 \cdot 10^{-9}$ F (1000 Hz)	$U_{0,95} = 1,5 \cdot 10^{-4} \cdot X$ F	
		from $1 \cdot 10^{-8}$ F to $9 \cdot 10^{-8}$ F (1000 Hz)	$U_{0,95} = 1,2 \cdot 10^{-4} \cdot X$ F	
		from $1 \cdot 10^{-7}$ F to $9 \cdot 10^{-7}$ F (1000 Hz)	$U_{0,95} = 1,4 \cdot 10^{-2} \cdot X$ F	
		from $1 \cdot 10^{-6}$ F to $1,11 \cdot 10^{-4}$ F (1000 Hz)	$U_{0,95} = 5,0 \cdot 10^{-1} \cdot X$ F	
Radioengineering and radioelectronic measurements				
30	Pulse generators	from $5 \cdot 10^{-10}$ to 10 s	$U_{0,95} = 0,72$ ns	Direct measurements time intervals standard
		from 0,1 to $5 \cdot 10^{8}$ Hz	$U_{0,95} = 2,3 \cdot 10^{-7} \cdot X$ Hz	Direct measurements frequency standard
		from $1 \cdot 10^{-2}$ to $1 \cdot 10^{2}$ V	$U_{0,95} = 0,017 \cdot X$ V	Direct measurements voltage standard
31	Alternating voltage measuring instruments			
31.1	Calibrators alternating voltage measuring instruments	1 V (30 MHz)	$U_{0,95} = 0,15$ %	Direct measurements by the standard of the quantity reproduced by the calibrated measuring instrument
		1 V (100 MHz)	$U_{0,95} = 0,25$ %	
		1 V (200 MHz)	$U_{0,95} = 0,4$ %	
		1 V (400 MHz)	$U_{0,95} = 0,5$ %	
		1 V (600 MHz)	$U_{0,95} = 0,6$ %	
		1 V (800 MHz)	$U_{0,95} = 0,9$ %	
		1 V (1000 MHz)	$U_{0,95} = 1,3$ %	
		1 V (1500 MHz)	$U_{0,95} = 2,5$ %	
		from 3 to 10 V (30 MHz)	$U_{0,95} = (7,1 \cdot 10^{-3} \cdot X + 1,8 \cdot 10^{-1})$ %	

on page 25, page 20

			X- voltage in V	
		from 3 to 10 V (100 MHz)	$U_{0,95} = (7,1 \cdot 10^{-3} \cdot X + +3,8 \cdot 10^{-1})$ % X- voltage in V	
		from 3 to 10 V (200 MHz)	$U_{0,95} = 7,1 \cdot 10^{-3} \cdot X + +4,3 \cdot 10^{-1})$ % X- voltage in V	
		from 3 to 10 V (400 MHz)	$U_{0,95} = 1,4 \cdot 10^{-2} \cdot X + +5,1 \cdot 10^{-1})$ % X- voltage in V	
		from 3 to 10 V (600 MHz)	$U_{0,95} = 1,4 \cdot 10^{-2} \cdot X + + 6,6 \cdot 10^{-1})$ % X- voltage in V	
		from 3 to 10 V (800 MHz)	$U_{0,95} = 1,4 \cdot 10^{-2} \cdot X + +9,6 \cdot 10^{-1})$ % X- voltage in V	
		from 3 to 10 V (1000 MHz)	$U_{0,95} = 1,4 \cdot 10^{-2} \cdot X + + 1,4)$ % X- voltage in V	
31.2	Voltmeters alternating voltage measuring instruments	from 3 to 10 mV (from 10 Hz to 3 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X + + 384$ μV	Direct measurements voltage reproduced by the standard
		from 3 to 10 mV (from 3 to 10 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X + + 512$ μV	
		from 3 to 10 mV (from 10 to 30 kHz)	$U_{0,95} = 6 \cdot 10^{-4} \cdot X + + 960$ μV	
		from 3 to 10 mV (from 30 to 50 kHz)	$U_{0,95} = 9 \cdot 10^{-4} \cdot X + + 1,92$ mV	
		from 3 to 10 mV (from 50 to 100 kHz)	$U_{0,95} = 2 \cdot 10^{-3} \cdot X + + 5,12$ mV	
		from 10 to 32 mV (from 10 Hz to 3 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X + + 96$ μV	
		from 10 to 32 mV (from 3 to 10 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X + + 128$ μV	
		from 10 to 32 mV (from 10 to 30 kHz)	$U_{0,95} = 6 \cdot 10^{-4} \cdot X + + 240$ μV	
		from 10 to 32 mV (from 30 to 50 kHz)	$U_{0,95} = 9 \cdot 10^{-4} \cdot X + + 480$ μV	

on page 25, page 21

		from 10 to 32 mV (from 50 to 100 kHz)	$U_{0,95} = 2 \cdot 10^{-3} \cdot X +$ + 1,28 mV	
		from 32 to 320 mV (from 10 Hz to 3 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X +$ + 19,2 μV	
		from 32 to 320 mV (from 3 to 10 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X +$ + 25,6 μV	
		from 32 to 320 mV (from 10 to 30 kHz)	$U_{0,95} = 6 \cdot 10^{-4} \cdot X +$ + 48 μV	
		from 32 to 320 mV (from 30 to 50 kHz)	$U_{0,95} = 9 \cdot 10^{-4} \cdot X +$ + 96 μV	
		from 32 to 320 mV (from 50 to 100 kHz)	$U_{0,95} = 2 \cdot 10^{-3} \cdot X +$ + 256 μV	
		from 0,32 to 3,2 V (from 10 Hz to 3 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X +$ + 192 μV	
		from 0,32 to 3,2 V (from 3 to 10 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X +$ + 256 μV	
		from 0,32 to 3,2 V (from 10 to 30 kHz)	$U_{0,95} = 6 \cdot 10^{-4} \cdot X +$ + 480 μV	
		from 0,32 to 3,2 V (from 30 to 50 kHz)	$U_{0,95} = 9 \cdot 10^{-4} \cdot X +$ + 960 μV	
		from 0,32 to 3,2 V (from 50 to 100 kHz)	$U_{0,95} = 2 \cdot 10^{-3} \cdot X +$ + 2,56 mV	
		from 3,2 to 32 V (from 10 Hz to 3 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X +$ + 1,92 mV	
		from 3,2 to 32 V (from 3 to 10 kHz)	$U_{0,95} = 6 \cdot 10^{-4} \cdot X +$ + 2,56 mV	
		from 3,2 to 32 V (from 10 to 30 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 4,8 mV	
		from 3,2 to 32 V (from 30 to 50 kHz)	$U_{0,95} = 15 \cdot 10^{-4} \cdot X +$ + 9,6 mV	
		from 3,2 to 32 V (from 50 to 100 kHz)	$U_{0,95} = 35 \cdot 10^{-4} \cdot X +$ + 32 mV	
		from 32 to 105 V (from 10 Hz to 3 kHz)	$U_{0,95} = 4 \cdot 10^{-4} \cdot X +$ + 6,3 mV	
		from 32 to 105 V (from 3 to 10 kHz)	$U_{0,95} = 6 \cdot 10^{-4} \cdot X +$ + 8,4 mV	

on page 25, page 22

		from 32 to 105 V (from 10 to 30 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 15,8 mV	
		from 32 to 105 V (from 30 to 50 kHz)	$U_{0,95} = 15 \cdot 10^{-4} \cdot X +$ + 31,5 mV	
		from 32 to 105 V (from 50 to 100 kHz)	$U_{0,95} = 35 \cdot 10^{-4} \cdot X +$ + 105 mV	
		from 105 to 320 V (from 40 to 100 Hz)	$U_{0,95} = 5 \cdot 10^{-4} \cdot X +$ + 19,2 mV	
		from 105 to 320 V (from 100 Hz to 1 kHz)	$U_{0,95} = 5 \cdot 10^{-4} \cdot X +$ + 19,2 mV	
		from 105 to 320 V (from 1 to 3 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 19,2 mV	
		from 105 to 320 V (from 3 to 10 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 32 mV	
		from 105 to 320 V (from 10 to 20 kHz)	$U_{0,95} = 12 \cdot 10^{-4} \cdot X +$ + 48 mV	
		from 105 to 320 V (from 20 to 30 kHz)	$U_{0,95} = 15 \cdot 10^{-4} \cdot X +$ + 64 mV	
		from 320 to 800 V (from 40 to 100 Hz)	$U_{0,95} = 5 \cdot 10^{-4} \cdot X +$ + 63 mV	
		from 320 to 800 V (from 100 Hz to 1 kHz)	$U_{0,95} = 5 \cdot 10^{-4} \cdot X +$ + 63 mV	
		from 320 to 800 V (from 1 to 3 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 63 mV	
		from 320 to 800 V (from 3 to 10 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 105 mV	
		from 320 to 800 V (from 10 to 20 kHz)	$U_{0,95} = 12 \cdot 10^{-4} \cdot X +$ + 158 mV	
		from 320 to 800 V (from 20 to 30 kHz)	$U_{0,95} = 15 \cdot 10^{-4} \cdot X +$ + 210 mV	
		from 800 to 1050 V (from 40 to 100 Hz)	$U_{0,95} = 5 \cdot 10^{-4} \cdot X +$ + 126 mV	
		from 800 to 1050 V (from 100 Hz to 1 kHz)	$U_{0,95} = 5 \cdot 10^{-4} \cdot X +$ + 126 mV	
		from 800 to 1050 V (from 1 to 3 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 126 mV	

on page 25, page 23

		from 800 to 1050 V (from 3 to 10 kHz) from 800 to 1050 V (from 10 to 20 kHz)	$U_{0,95} = 8 \cdot 10^{-4} \cdot X +$ + 210 mV $U_{0,95} = 12 \cdot 10^{-4} \cdot X +$ + 315 mV	
Acoustic measurements				
32	Sound level meters	94 dB (31,5 Hz; 63 Hz; 125 Hz; 250 Hz; 500 Hz; 1 kHz; 2 kHz; 4 kHz) 94 dB (8 kHz; 12,5 kHz; 16 kHz) 104 dB (31,5 Hz; 63 Hz; 125 Hz; 250 Hz; 500 Hz; 1 kHz; 2 kHz; 4 kHz) 104 dB (8 kHz; 12,5 kHz; 16 kHz) 114 dB (31,5 Hz; 63 Hz; 125 Hz; 250 Hz; 500 Hz; 1 kHz; 2 kHz; 4 kHz) 114 dB (8 kHz; 12,5 kHz; 16 kHz)	$U_{0,95} = 0,15$ dB $U_{0,95} = 0,2$ dB $U_{0,95} = 0,15$ dB $U_{0,95} = 0,2$ dB $U_{0,95} = 0,15$ dB $U_{0,95} = 0,2$ dB	Direct measurements of sound level reproduced acoustic calibrator
33	Vibration measuring instruments	от 0 до 196 m/s^2 (100 Hz от 30 до 2000 Hz от 7 до 10000 Hz) от 0 до 380 mm/s (от 30 до 500 Hz) от 0 до 1,27 mm (от 30 до 150 Hz)	$U_{0,95} = 0,01 \cdot X$ m/s^2 $U_{0,95} = 0,03 \cdot X$ m/s^2 $U_{0,95} = 0,15 \cdot X$ m/s^2 $U_{0,95} = 0,03 \cdot X$ mm/s $U_{0,95} = 0,03 \cdot X$ mm	Direct measurements vibration parameters reproduced by the calibration vibration installation

on page 25, page 24

Optical-physical measurements				
34	Directional transmittance spectral measuring instruments	from 0 to 100 %	$U_{0,95}$ = 0,6 % (abs.)	Direct measurements
35	Spectrometers, atomic absorption spectrophotometers	from $5 \cdot 10^{-6}$ to 50 mg/dm^3	$U_{0,95} = 0,018 \cdot X$ mg/dm^3	Direct measurements
36	Light meters including channels for measuring illumination of multifunctional measuring instruments	from 100 to 6500 lx	$U_{0,95} = 0,02 \cdot X$ lx	Immediate collation with standard
Note: X – measured value				

Director A.A. Danilov

Перевод является верным

Директор ФБУ «Пензенский ЦСМ» А.А. Данилов

04.10.2021