ACCREDITATION SCOPE

Federal Budgetary Institution “State Regional Centre for Standardization,
Metrology and Testing in Sverdlovsk region”
(FBI “URALTEST”)

name of the legal entity or family name, first name and patronymic of an individual entrepreneur (if any)

RUSSIAN FEDERATION, Sverdlovsk region, Ekaterinburg,
Krasnoarmeyskaya str., 2a;
624070, RUSSIAN FEDERATION, Sverdlovsk region, Sredneuralsk, Gashev str., 2a;
RUSSIAN FEDERATION, Sverdlovsk region, Verkhnyaya Pyshma, automobile road Ekaterinburg –
Nizhny Tagil – Serov from 17 to 23 km. (geodesic test site / calibration linear base line – “Sverdlovsk base line”)

address of the place of activity

For compliance with the requirements of
GOST ISO/IEC 17025-2019 “General requirements for the competence of testing and calibration laboratories”

Calibration of measurement instruments

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
Address of the place of activity: RUSSIAN FEDERATION, Sverdlovsk region, Ekaterinburg, Krasnoarmeyskaya str., 2a								
1	Measurements of geometric quantities	Plane angle	Goniometers GS-1, GS-2	(0 – 360)º		$U_{0,95}$ = 0,6″	MK 070-4303-034 “Goniometers GS-1, GS-2. Calibration methodology”	
2	Measurements of geometric quantities	Plane angle	Measures of plane angle	(0 – 360)º		$U_{0,95}$ = 0,6″	MK 070-4303-033 “Measures of plane angle. Calibration methodology”	

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1	2	3	4	5	6	7	8	9
3	Measurements of geometric quantities	Plane angle	Collimating stands	(0 – 360)º		$U_{0,95}$ = 1,0"	MK 070-4304-005 “Collimating stands. Calibration methodology”	
4	Measurements of geometric quantities	Plane angle	Electronic tacheometers (including theodolites)	(0 – 360)º		$U_{0,95}$ = 1,0"	MK 070-4304-009 “Electronic tacheometers and theodolites. Calibration methodology»”	
5	Measurements of geometric quantities	Length	Horizontal length gauges Labconcept, Precimar	(100 – 550) mm		$U_{0,95}$ = 0,4 μm	MK 070-4303-035 “Horizontal length gauges. Calibration methodology”	
6	Measurements of geometric quantities	Length	Measures of internal diameter	(100 – 250) mm		$U_{0,95}$ = 0,4 μm	MK 070-4303-036 “Measures of internal diameter. Calibration methodology”	
7	Measurements of geometric quantities	Length	Laser range finders	(1,5 – 1000) m		$U_{0,95}$ = 0,32 mm	MK 070-4304-004 “Laser range finders. Calibration methodology”	

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1	2	3	4	5	6	7	8	9
				(1000 – 3000) m		$U_{0,95}$ = 0,40 mm		
8	Measurements of geometric quantities	Length	Geodesic baselines	(1,5 – 2999) m		$U_{0,95}$ = 0,4 μm	МК 070-4304-011 “Geodesic baselines and полигоны. Calibration methodology”	
9	Measurements of geometric quantities	Length	Electronic tacheometers (including theodolites)	(1,5 – 3000) m		$U_{0,95}$ = 0,4 μm	МК 070-4304-009 “Electronic tacheometers and theodolites. Calibration methodology”	
10	Measurements of geometric quantities	Length	Нивелиры (в т.ч. цифровые)	(0,5 – ∞) m		$U_{0,95}$ = 0,1 mm	МК 070-4304-002 “Calibration methodology. Нивелиры”	
11	Measurements of geometric quantities	Length	Defect detectors, ultrasonic devices with ultrasonic transducers	(0,2 – 500) mm		$U_{0,95}$ = 0,002 mm	МК 070-4201-033 “Defect detectors, ultrasonic devices with ultrasonic transducers. Calibration methodology”	
		Time intervals		(0,2 – 10000) μs		$U_{0,95\ o} = 1 \cdot 10^{-6}$		

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1	2	3	4	5	6	7	8	9
		Ratio of signal amplitudes		(1 – 120) dB	in frequency range from 0,025 to 50 MHz	$U_{0,95}$ = 0,05 dB		
12	Measurements of mechanical quantities	Weight	Weights (measures of mass, including weights) including classes	1 mg – 40,0 kg	Accuracy class E_1	$U_{0,95} = 0,5 \cdot 10^{-3}$ mg	GOST OIML R 111-1 Interstate System for Standardization. Weights of classes E1, E2, F1, F2, M1, M1-2, M2, M2-3 and M3 E_1, E_2, F_1, F_2, M_1, M_{1-2}, M_2, M_{2-3} и M_3 Annex C	
				1 mg – 40,0 kg	Accuracy class E_2	$U_{0,95} = 2 \cdot 10^{-3}$ mg		
				1 mg – 40,0 kg	Accuracy class F_1	$U_{0,95} = 0,7 \cdot 10^{-2}$ mg		
				1 mg – 500 kg	Accuracy class F_2	$U_{0,95} = 2 \cdot 10^{-2}$ mg		
				1 mg – 40 kg	Accuracy class M_1	$U_{0,95} = 0,7 \cdot 10^{-1}$ mg		
				100 mg – 40 kg	Accuracy class M_2	$U_{0,95}$ = 0,5 mg		
				1 g – 40 kg	Accuracy class M_3	$U_{0,95}$ = 3,3 mg		
13	Measurements of mechanical quantities	Weight	Non-automatic scales of weighing device on strain gauge (weight-measuring) sensors	0,01 mg – 64 kg	Accuracy class special	$U_{0,95} = 4 \cdot 10^{-2}$ mg	MK 070-4301-002 “Non-automatic scales of weighing device on strain gauge (weight-measuring) sensors. Calibration methodology”	
				20 mg – 300 kg	Accuracy class high	$U_{0,95} = 2,9 \cdot 10^{-1}$ mg		
				200 mg - $2 \cdot 10^5$ kg	Accuracy class intermediate	$U_{0,95}$ = 29 mg		
				1 g - $2 \cdot 10^5$ kg	Accuracy class ordinary	$U_{0,95} = 1,4 \cdot 10^3$ g		

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14	Measurements of mechanical quantities	Weight	Weight batchers of discrete action	1 g – 20 t		$U_{0,95} = 2 \cdot 10^{-5}$ g	MK 070-4301-005 “Weight batchers of discrete action. Calibration methodology”	
15	Measurements of mechanical quantities	Force	Presses, testing ma-chines and hydraulic jacks	(0,01 – 0,1) kN		$U_{0,95\ o} = 0,26$ %	MK 070-4302-03 “Presses, testing ma-chines and hydraulic jacks. Calibration methodology”	
				(0,04 – 2000) kN		$U_{0,95\ o} = 0,12$ %		
16	Measurements of mechanical quantities	Force	Dynamometers	(0,03 – 1) kN		$U_{0,95\ o} = 0,014$ %	MK 070-4302-21 “Dynamometers. Calibration methodology” GOST R 55223-2021 Force instruments. General metrological and technical requirements p. 6, Annex B	
				(1 - 500) kN		$U_{0,95\ o} = 0,022$ %		

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1	2	3	4	5	6	7	8	9
17	Measurements of parameters of flow, consumption, level, volume of substances	Volume of liquid	Truck tankers for liquid petroleum prod-ucts	up to 50 m^3		$U_{0,95\ o}$ = 0,17 %	MK 070-4301-001 “Truck tankers for liq-uid petroleum prod-ucts. Calibration methodology”	
18	Measurements of parameters of flow, consumption, level, volume of substances	Volume of liquid	Steel horizontal cylindrical tanks	(3 – 200) m^3		$U_{0,95\ o}$ = 0,17 %	MK 070-4301-003 “Steel horizontal cylin-drical tanks. Calibration methodology”	
19	Measurements of parameters of flow, consumption, level, volume of substances	Volume of liquid	Steel vertical cylindrical tanks	(100 – 50000) m^3		$U_{0,95\ o}$ = 0,033 %	MK 070-4301-004 “ Steel vertical cylindrical tanks. Calibration methodology”	
20	Measurements of parameters of flow, consumption, level, volume of substances	Volume of liquid	Glass, plastic and metal capacity measures	0,02 cm^3 – 50000 dm^3		$U_{0,95\ o}$ = 0,0096 %	MK 070-4301-006 “Glass, plastic and metal capacity measures. Calibration methodology”	

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1	2	3	4	5	6	7	8	9
21	Measurements of parameters of flow, consumption, level, volume of substances	Volume of liquid	Medical laboratory dispensers	(0,0001 – 50,0) cm^3		$U_{0,95} = 1,7 \cdot 10^{-7}$ cm^3 $U_{0,95\ o} = 0,17$ %	MK 070-4301-007 “Medical laboratory dispensers. Calibration methodology”	
22	Measurements of parameters of flow, consumption, level, volume of substances	Volume of liquid	Volume meters IO-1	(95 – 100) $см^3$		$U_{0,95} = 1,43$ cm^3 $U_{0,95\ o} = 1,5$ %	MK 070-4301-010 “Volume meters IO-1. Calibration methodology”	
23	Measurements of parameters of flow, consumption, level, volume of substances	Volume of liquid	Technological petrole-um pipelines	(0 – 500) m^3		$U_{0,95} = 1 \cdot 10^{-3}$ m^3 $U_{0,95\ o} = 0,1$ %	MK 070-4301-013 “Technological petrole-um pipelines. Calibration methodology”	
24	Measurements of parameters of flow, consumption, level, volume of substances	Liquid level	Level gauges, level transducers	10 mm - 100 m		$U_{0,95\ ph} = 3,3 \cdot 10^{-2}$ mm $U_{0,95\ o\ ph} = 0,33$ %	MK 070-4301-011 «Level gauges, level transducers. Calibration methodology»	
		Liquid density		(650 – 1500) kg/m^3		$U_{0,95\ \rho} = 0,5$ kg/cm^3		
		Liquid temperature		[(- 40) – 65] ºC		$U_{0,95\ t} = 1,7 \cdot 10^{-3}$ °C $U_{0,95\ to} = 0,17$ %		

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
25	Measurements of parameters of flow, consumption, level, volume of substances	Rate of mass flow	Fluid meters, flow-rate meters	(0,02 – 200) m^3/h		$U_{0,95}$ = $= 1 \cdot 10^{-5}$ m^3/h $U_{0,95\ o}$ = 0,05 %	MK 070-4301-009 “Fluid meters, flow-rate meters. Calibration methodology”	
26	Measurements of parameters of flow, consumption, level, volume of substances	Air-flow rate	Air-flow rate meters	(0,1 – 30) m/s		$U_{0,95\ o}$= 0,18 %	MK 070-4602-013 “Instruments for measuring environmental parameters. Calibration methodology”	
27	Pressure measurements, vaccum measurements	Overpressure	Piston overpressure manometers	[(- 0,1) – 0] MPa (0,0014 – 100) MPa		$U_{0,95o}$ = 0,006 %	MK 070-4601-001 “Load-piston overpressure manometers. Calibration methodology”	
28	Pressure measurements, vaccum measurements	Overpressure	Calibrators, controllers, complexes, setting devices, trans-ducers, sensors, digital and overpressure ma-nometers	[(- 0,1) – 0] MPa (0,0014 – 100) MPa		$U_{0,95}$ = $1,8 \cdot 10^{-7}$ MPa $U_{0,95}$ = $8,4 \cdot 10^{-8}$ MPa $U_{0,95o}$ = 0,006 %	MK 070-4601-006 «Manometers, vacuum gauges, vacuum pressure gauge, micronanometers, head gauges, draught meters and draught and pressure gauges indicating, recording and digital. Calibration methodology» MK 070-4601-008 “Measuring pressure transmitters. Calibration methodology”	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
29	Pressure measurements, vaccum measurements	Overpressure	Oxygen manometers	[(- 0,1) – 60] MPa		$U_{0,95\ o}$ = 0,07 %	MK 070-4601-006 “Manometers, vacuum gauges, vacuum pressure gauge, micronanometers, head gauges, draught meters and draught and pressure gauges indicating, recording and digital. Calibration methodology”	
30	Pressure measurements, vaccum measurements	Absolute pressure	Barometric pressure measurement instru-ments	(5 – 130) kPa		$U_{0,95}$ = 23 Pa	MK 070-4602-013 “Instruments for measuring environmental parameters. Calibration methodology”	
31	Pressure measurements, vaccum measurements	Absolute pressure	Absolute pressure load-piston manometers	(0,0014 – 0,7) MPa		$U_{0,95o}$ = 0,006 %	MK 070-4601-006 “Manometers, vacuum gauges, vacuum pressure gauge, micronanometers, head gauges, draught meters and draught and pressure gauges indicating, recording and digital. Calibration methodology” MK 070-4601-008 “Measuring pressure transmitters. Calibration methodology”	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
32	Pressure measurements, vaccum measurements	Absolute pressure	Calibrators, controllers, complexes, set-ting devices, trans-ducers, sensors, digital absolute pressure ma-nometers	(0,0014 – 0,7) MPa		$U_{0,95}$ = $1,8 \cdot 10^{-7}$ MPa $U_{0,95}$ = $8,4 \cdot 10^{-8}$ MPa $U_{0,95o}$ = 0,006 %	MK 070-4601-006 “Manometers, vacuum gauges, vacuum pressure gauge, micronanometers, head gauges, draught meters and draught and pressure gauges indicating, recording and digital. Calibration methodology” MK 070-4601-008 “Measuring pressure transmitters. Calibration methodology”	
33	Measurements of physico-chemical composition and properties of substances	Liquid density	Fluid densitometers	(0,6 – 2,0) g/cm^3		$U_{0,95}$ = $5 \cdot 10^{-5}$ g/cm^3	MK 070-4501-017 “Liquid density analyzers. Calibration methodology”	
34	Measurements of physico-chemical composition and properties of substances	Negative decimal logarithm of hydrogen ion activity	pH measurement instruments	(0 – 14)		$U_{0,95} \geq 0,012$	MK 070-4501-002 “pH meters. Calibration methodology”	

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1	2	3	4	5	6	7	8	9
35	Measurements of physico-chemical composition and properties of substances	Specific electrical conductivity of liquids	Instruments for measuring specific electrical conductivity of liquids	$(1 \cdot 10^{-4}$ –100) S/m		$U_{0,95}$ = $4 \cdot 10^{-5}$ S/m $U_{0,95\ o}$ = 0,12 %	MK 070-4501-003 “Liquid conductometric analyzers. Calibration methodology”	
36	Measurements of physico-chemical composition and properties of substances	Volume fraction (mass concentration) of analyte in gas mixture	Gas analyzers (industrial emissions, work-place air, clean gases and their mixtures)	(0,000001 –10) %		$U_{0,95}$ = $3,2 \cdot 10^{-5}$ % vol.	MK 070-4501-005 “Gas analyzers and gas detectors. Calibration methodology”	
				(10 – 100) %		$U_{0,95}$ = 0,07 % vol. $U_{0,95o}$ = 0,40 %		
				(0,02 – 1500) mg/m^3		$U_{0,95}$ = 0,52 mg/m^3 $U_{0,95\ o}$ = 5,8 %		
37	Measurements of physico-chemical composition and properties of substances	Humidity of gases (gas mixtures, air)	Hygrometers	(0 – 100) %		$U_{0,95\ o}$ = 0,08 %	MK 070-4602-013 “Instruments for measuring environmental parameters. Calibration methodology”	

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1	2	3	4	5	6	7	8	9
38	Thermophysical and temperature measurements	Temperature	Digital thermometers	[(- 196) – 660] °C		$U_{0,95}$ = 0,006 °C	MK 070-4602-013 “Instruments for measuring environmental parameters. Calibration methodology” MK 070-4602-014 “Digital, liquid, manometric, bimetallic thermometers. Calibration methodology”	
39	Thermophysical and temperature measurements	Temperature	Thermoelectric transducers	[(- 196) – 1800] °C		$U_{0,95}$ = 0,4 °C	MK 070-4602-012 “Thermoelectric transducers. Calibration methodology”	
40	Thermophysical and temperature measurements	Temperature	Resistance temperature transducer	[(- 196) – 660] °C		$U_{0,95} = 1 \cdot 10^{-6}$ Ohm	MK 070-4602-011 “Resistance temperature transducer. Calibration methodology”	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
41	Thermophysical and temperature measurements	Temperature	Liquid glass, manometric, bimetallic thermometers	[(- 80) – 450] °C		$U_{0,95}$ = 0,006 °C	MK 070-4602-014 “Digital, liquid, manometric, bimetallic thermometers. Calibration methodology”	
42	Thermophysical and temperature measurements	Temperature	Temperature recorders	[(- 30) – 25] °C		$U_{0,95}$ = 0,12 °C	MK 070-4302-15 “Temperature recorders. Calibration methodology”	
43	Time and frequency measurements	Frequency	Instruments for frequency and time measurements	(1 Hz – 40 GHz)		$U_{0,95}$ = $(1{,}6\cdot10^{-12}\cdot f)$ Hz	MK 070-4202-017 “Instruments for frequency and time measurements. Calibration methodology”	
		Time		(1 ns – 1000 s)		$U_{0,95}$ = $(1{,}6\cdot10^{-12}\cdot t)$ s $U_{0,95\ o}$ = $1{,}6\cdot10^{-12}$		
44	Measurements of electrotechnical and magnetic quantities	Alternating current voltage	Instruments for measuring strength, voltage and power of alternating current	(6 – 576) V (in frequency range 40 – 70 Hz)		$U_{0,95}$ = $7{,}2\cdot10^{-4}$ V $U_{0,95\ o}$ = 0,012 %	MK 070-4400-015 “Calibration methodology for measuring current strength, voltage and alternating current power”	
		Alternating current force		(0,005 – 120) A (in frequency range 40 – 70 Hz)		$U_{0,95}$ = $6\cdot10^{-7}$ A $U_{0,95\ o}$ = 0,012 %		

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1	2	3	4	5	6	7	8	9
		Alternating current power		(0,03 – 207360) В·А (in frequency range 40 – 70 Hz)		$U_{0,95}$ = $7,5 \cdot 10^{-6}$ V·A $U_{0,95\ o}$ = 0,025 %		
45	Measurements of electrotechnical and magnetic quantities	Alternating current voltage	Instruments for measuring voltage of alternating current	(10 – 22) mV (in frequency range 10 Hz – 1 MGц)		$U_{0,95}$ = $2,3 \cdot 10^{-3}$ mV $U_{0,95\ o}$ = (0,023 –0,23) %	MK 070-4400-013 “Calibration methodology of alternating current voltage measuring instruments for FLUKE 5790A voltmeter ”	
				(22 – 70) mV (in frequency range 10 Hz – 1 MGц)		$U_{0,95}$ = $2,65 \cdot 10^{-3}$ mV $U_{0,95\ o}$ = (0,007 – 0,12) %		
				(70 – 220) mV (in frequency range 10 Hz – 1 MHz)		$U_{0,95}$ = $4,8 \cdot 10^{-3}$ mV $U_{0,95\ o}$ = (0,006 – 0,12) %		
				(220 – 700) mV (in frequency range 10 Hz – 1 MHz)		$U_{0,95}$ = 0,099 mV $U_{0,95\ o}$ = (0,005 – 0,12) %		
				(700 мВ – 2,2 V) (in frequency range 10 Hz – 1 MHz)		$U_{0,95}$ = 0,020 мВ $U_{0,95\ o}$ = (0,004 – 0,12) %		

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
				(2,2 – 7) V (in frequency range 10 Hz – 1 MHz)		$U_{0,95} = 6,9 \cdot 10^{-5}$ V $U_{0,95\ o}$ = (0,003 – 0,14) %		
				(7 – 22) V (in frequency range 10 Hz – 1 MHz)		$U_{0,95} = 2,2 \cdot 10^{-4}$ V $U_{0,95\ o}$ = (0,003 – 0,14) %		
				(22 –70) V (in frequency range 10 Hz – 1 MHz)		$U_{0,95} = 8,5 \cdot 10^{-4}$ V $U_{0,95\ o}$ = (0,004 – 0,14) %		
				(70 – 220) V (in frequency range 10 Hz – 500 kHz)		$U_{0,95} = 3,5 \cdot 10^{-3}$ V $U_{0,95\ o}$ = (0,005 – 0,06) %		
				(220 – 700) V (in frequency range 10 Hz – 100 kHz)		$U_{0,95}$ = 0,011 V $U_{0,95\ o}$ = (0,005 – 0,06) %		
				(700 – 1000) V (in frequency range 10 Hz – 100 kHz)		$U_{0,95}$ = 0,035 V $U_{0,95\ o}$ = (0,005 – 0,06) %		
46	Measurements of electrotechnical and magnetic quantities	Magnetic flux	Magnetic flux measurement instruments	$(1 \cdot 10^{-6}$ – 0,3) Wb		$U_{0,95\ o}$ = 0,05 %	MK 070-4201-042 “Magnetic flux measures and magnetic induction	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
							measuring coils. Calibration methodology”	
		Ratio of magnetic flux to current strength		$(1\cdot10^{-4}$ – $1\cdot10^{-2})$ Wb /A		$U_{0,95\ o}$ = 0,05 %	МК 070-4201-025 “Меры магнитного потока и измерительные катушки магнитной индукции. Calibration methodology”	
47	Measurements of electrotechnical and magnetic quantities	Ratio of magnetic field strength to current strength	Instruments for measuring magnetic induc-tion and intensity of constant and alternat-ing magnetic field	(1 – 200000) m^{-1}	in frequency range (0 – 20) kHz	$U_{0,95\ o}$ = 0,03 %	МК 070-4201-002 “Measures of magnetic induction (intensity) of constant magnetic field. Calibration methodology” МК 070-4201-031 “Measures of magnetic induction (intensity) of constant magnetic field. Calibration using the nuclear magnetic resonance method. Calibration methodology” МК 070-4201-003 «Measures of magnetic induction (intensity) of alternating magnetic field. Calibration methodology»	
		Ratio of magnetic induction to current strength		$(1\cdot10^{-6}$ – 0,25) T/A	in frequency range (0 – 20) kHz			

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
		Magnetic induction		$(1 \cdot 10^{-8} – 2)$ T	in frequency range (0 – 20) kHz	$U_{0,95\ o}$ = 0,03 %	MK 070-4201-028 “Measuring instruments for parameters of electric and magnetic fields. Calibration methodology”	
		Magnetic field intensity		$(1 \cdot 10^{-2} – 1,6 \cdot 10^{6})$ A/m	in frequency range (0 – 20) kHz	$U_{0,95\ o}$ = 0,03 %		
		Ratio of magnetic flux to magnetic induction		$(1 \cdot 10^{-5} – 5)$ Wb/T		$U_{0,95\ o}$ = 0,3 %	MK 070-4201-025 “Magnetic flux measures and magnetic induction measuring coils. Calibration methodology”	
48	Measurements of electrotechnical and magnetic quantities	Gradient of magnetic field intensity	Instruments for measuring the gradient of magnetic field intensity, magnetic induction	(1 – 200000) A/m^2		$U_{0,95\ o}$ = 0,5 %	MK 070-4201-028 “Measuring instruments for parameters of electric and magnetic fields. Calibration methodology”	
		Gradient of magnetic induction		$(1 \cdot 10^{-6} – 0,25)$ T/m				

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
		Ratio of the gradient of magnetic field strength to current strength		$(1 \cdot 10^{3} – 2 \cdot 10^{5})$ m^{-2}		$U_{0,95\ o}$ = 0,4 %	MK 070-4201-023 “Measures of magnetic induction (intensity) gradient of constant magnetic field. Calibration methodology”	
		Ratio of magnetic induction gradient to current strength		$(1 \cdot 10^{-3}$ – 0,25) T/(A·m)				
49	Measurements of electrotechnical and magnetic quantities	Current strength	Measurement instruments and measures of static magnetic characteristics of magnetic materials	$(1 \cdot 10^{-4} – 50)$ A		$U_{0,95\ o}$ = 0,01 %	MK 070-4201-032 “ Magneto-measuring systems. Calibration methodology”	
		Magnetic flux		(1·10-6 – 0,3) Wb		$U_{0,\ 95\ o}$ = 0,05 %		

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1	2	3	4	5	6	7	8	9
		Coercive force		(50 – 25000) A/m		$U_{0,95\ o}$ = 0,12 %	MK 070-4201-039 “Standard samples of coercive force by magnetization. Calibration methodology” MK 070-4201-041 “Coercimeters, magnetic structurescope. Calibration methodology”	
		Ferrite content		(0,1 – 80) % ferrite number		$U_{0,95\ o}$ = 1,5 %	MK 070-4201-038 “Standard samples of ferrite content. Calibration methodology”	
50	Radiotechnical and radioelectronic measurements	Attenuation of electromag-netic oscillations	Instruments for measuring attenuation of electromagnetic oscillations	(0 – 120) dB (in frequency range (0 – 1) GHz)		$U_{0,95}$ = 0,003 dB	MK 070-4202-019 “Instruments for measuring attenuation of electromagnetic oscillations. Calibration methodology”	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
51	Measurements of acoustic quantities	Vibration acceleration	Calibration vibration shakers	$(1 \cdot 10^{-1} – 1 \cdot 10^{4})$ m/s^2 (in frequency range (0,5 – 10000) Hz)		$U_{0,95} = 2,5 \cdot 10^{-3}$ m/s^2	MK 070-4302-20 “Calibration vibration shakers. Calibration methodology”	
52	Measurements of acoustic quantities	Vibrational acceleration	Vibrometers with piezoelectric and induction vibration converters	$(1 \cdot 10^{-1} – 1 \cdot 10^{4})$ m/s^2 (in frequency range (2 – 10000) Hz)		$U_{0,95} = 5 \cdot 10^{-3}$ m/s^2	MK 070-4302-001 “Vibrometers with piezoelectric and induction vibration converters. Calibration methodology”	
		Vibration speed		$(1 \cdot 10^{-4} – 1)$ m/s (in frequency range (2 – 10000) Hz)		$U_{0,95} = 5 \cdot 10^{-5}$ m/s		
		Vibration displacement		$(1 \cdot 10^{-5} – 1 \cdot 10^{-2})$ m (in frequency range (2 – 10000) Hz)		$U_{0,95} = 5 \cdot 10^{-7}$ m		

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
53	Measurements of acoustic quantities	Time of ultrasonic wave propagation	Measuring instruments for time and velocity of ultrasonic waves propagation, measures for testing flaw detectors, thickness gauges, ultrasonic testers	(0,05 – 5000) μs		$U_{0,95}$ = 0,5 ns	MK 070-4201-043 “Ultrasonic wave propagation time and velocity measuring instrument. Calibration methodology” MK 070-4201-033 “Ultrasonic flaw detectors, installations and transmitters. Calibration methodology”	
		Velocity of ultrasonic wave propagation		(1000 – 10000) m/s		$U_{0,95\ o}$ = 0,04 %	MK 070-4201-024 “Samples (measures) for testing and setting basic parameters of ultrasound control. Calibration methodology” MK 070-4201-022 “Measures (standard samples) of propagation velocity of ultrasonic waves and equivalent ultrasonic thickness. Calibration methodology”	
		Length		(0,2 – 600) mm		$U_{0,95\ o}$ = 0,0005 mm		

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
54	Optico-physical measurements	Optical density	Measuring instruments for the optical density of materials in transmitted light	(0 – 4,5) B		$U_{0,95}$ = 0,012 B	MK 070-4501-008 “Measuring instruments for the optical density of materials in transmitted light. Calibration methodology”	
55	Optico-physical measurements	Refraction index	Refractometers	(1,2–1,7) nD		$U_{0,95} = 3 \cdot 10^{-5}$ nD	MK 070-4501-020 “P Refractometers. Calibration methodology” MK 070-4501-018 “ Refractometers for measuring mass fraction of sucrose in aqueous solutions. Calibration methodology”	
				(0–100) % Brix		$U_{0,95}$ = 0,2 % Brix		
56	Optico-physical measurements	Directional transmission coefficient (optical density)	Spectrophotometers	(0–100) % (wave length (190–2500) nm		$U_{0,95}$ = 0,5 %	MK 070-4501-011 “Spectrophotometers. Calibration methodology”	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
Address of the place of activity: 624070, RUSSIAN FEDERATION, Sverdlovsk region, Sredneuralsk, Gashev str., 2a								
57	Measurements of ionizing radiation characteristics and nuclear constants	Power of gamma radiation exposure dose	Power measures of exposure dose level of gamma radiation (kerma power in air)	$(3 \cdot 10^{-12} – 6 \cdot 10^{-6})$ A/kg		$U_{0,95} = 4,5 \cdot 10^{-14}$ A/kg $U_{0,95\ o} = 1,5$ %	MK 070-4101-002 “Measures of exposure dose rate of gamma-radiation (kerma rate in air). Calibration methodology”	
		Power of absorbed dose (kerma) of gamma radiation in the air		$(1 \cdot 10^{-10} – 2 \cdot 10^{-4})$ Gy/s		$U_{0,95} = 1,5 \cdot 10^{-12}$ Gy/s $U_{0,95\ o} = 1,5$ %		
58	Measurements of ionizing radiation characteristics and nuclear constants	Power of exposure dose of X-ray and gamma radiation	Dosimetric instruments for measuring exposure dose, ambient, individual dose equivalents and their powers	$(1 \cdot 10^{-12} – 6 \cdot 10^{-5})$ A/kg		$U_{0,95} = 1,5 \cdot 10^{-14}$ A/kg $U_{0,95\ o} = 1,5$ %	MK 070-4101-007 “Calibration methodology. Reference dosimeters of kerma in air, exposure dose, ambient, individual dose equivalents and their powers	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
		Exposure dose of X-ray and gamma radiation	of x-ray and gamma-radiation	$(1 \cdot 10^{-11}$ – 0,3) C/kg		$U_{0,95}$ = $1,5 \cdot 10^{-13}$ C/kg $U_{0,95\ o}$ = 1,5 %	of x-ray and gamma-radiation with energy from 0.005 to 3 MeV. Calibration methodology" MK 070-4101-004 "Calibration methodology. Dosimeters and radiometers"	
		Equivalent dose rate of X-ray and gamma radiation		$(3 \cdot 10^{-11}$ – $3 \cdot 10^{-3})$ Sv/s		$U_{0,95}$ = $9 \cdot 10^{-13}$ Sv/s $U_{0,95\ o}$ = 3,0 %		
		Equivalent dose of X-ray and gamma radiation		$(1 \cdot 10^{-5}$ – 10) Sv		$U_{0,95}$ = $3 \cdot 10^{-7}$ Sv $U_{0,95\ o}$ = 3,0 %		
59	Measurements of ionizing radiation characteristics and nuclear constants	Absorbed dose of gamma radiation	Dosimetric instruments for measuring exposure dose, ambient, individual dose equivalents and their powers	$(1 \cdot 10^{-9} – 5 \cdot 10^{-2})$ Gy	Gamma radiation energy (0,06 – 3) MeV	$U_{0,95} = 2 \cdot 10^{-11}$ Gy $U_{0,95\ o}$ = 2,0 %	MK 070-4101-006 "Dosimetric reference kerma installations in air, exposure dose, ambient, individual dose equivalents and their gamma radiation capacities. Calibration methodology"	
		Exposure dose of gamma radiation		$(3 \cdot 10^{-11}$ – $1 \cdot 10^{-3})$ C/kg		$U_{0.95}$ = $6 \cdot 10^{-13}$ C/kg $U_{0,95\ o}$ = 2,0 %		

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
		Equivalent dose of gamma radiation	of x-ray and gamma-radiation	$(1 \cdot 10^{-9} – 6 \cdot 10^{-2})$ Sv		$U_{0,95}$ = $2 \cdot 10^{-11}$ Sv $U_{0,95\ o}$ = 2,0 %		
		Power of absorbed dose (kerma) of gamma radiation in air		$(1 \cdot 10^{-10} – 5 \cdot 10^{-5})$ Gy/s		$U_{0,95}$ = $2 \cdot 10^{-12}$ Gy/s $U_{0,95\ o}$ = 2,0 %		
		Power of gamma radiation exposure dose		$(3 \cdot 10^{-12} – 1 \cdot 10^{-6})$ A/kg		$U_{0,95}$ = $6 \cdot 10^{-14}$ A/kg $U_{0,95\ o}$ = 2,0 %		
		Power of gamma radiation equivalent dose		$(1 \cdot 10^{-10} – 3 \cdot 10^{-5})$ Sv/s		$U_{0,95}$ = $2 \cdot 10^{-12}$ Sv/s $U_{0,95\ o}$ = 2,0 %		
60	Measurements of ionizing radiation characteristics and nuclear constants	Specific activity of alpha-radiation	Alpha-radiometers	$(3 \cdot 10^{-3} – 1 \cdot 10^{5})$ Bq·cm^{-2}		$U_{0,95}$ = $0,3 \cdot 10^{-3}$ Bq·cm^{-2} U0,95 o = 10 %	MK 070-4101-004 “Dosimeters and radiometers. Calibration methodology”	

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
		Alpha-particles flux density		(0,1 – $1 \cdot 10^6$) $min^{-1}cm^{-2}$		$U_{0,95}$ = 0,01 $min^{-1}cm^{-2}$ $U_{0,95\ o}$ = 10 %		
		Specific activity of beta-radiation	Beta-spectrometers	(0,1 – $1 \cdot 10^6$) $Bq \cdot cm^{-2}$		$U_{0,95}$ = 0,01 $Bq \cdot cm^{-2}$ $U_{0,95o}$ = 10 %		
		Beta-particles flux density		(1 – 10^6) $min^{-1}cm^{-2}$		$U_{0,95}$ = 0,1 $min^{-1}cm^{-2}$ $U_{0,95o}$ = 10 %		
61	Measurements of ionizing radiation characteristics and nuclear constants	Activity of alpha-emitting radionuclides	Radiometric sources of alpha- radiation	$(2 - 2 \cdot 10^7)$ Bq		$U_{0,95}$ = 0,08 Bq $U_{0,95o}$ = 4 %	MK 070-4101-001 “Calibration methodology. Radiometric sources of alpha, beta radiation of type P9, CO, U8, U4”	
		Activity of beta-emitting radionuclides	Radiometric sources of beta- radiation	$(100 - 2 \cdot 10^8)$ Bq		$U_{0,95}$ = 4 Bq $U_{0,95o}$ = 4 %		

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
62	Measurements of ionizing radiation characteristics and nuclear constants	Activity of alpha radiation source	Alpha-spectrometers	$(1 \cdot 10^{-2} – 1 \cdot 10^{4})$ Bq		$U_{0,95} = 0,1 \cdot 10^{-2}$ Bq $U_{0,95o} = 10$ %)	MK 070-4101-005 “ Alpha-, beta-, gamma-spectrometers. Calibration methodology”	
		Activity of beta radiation source	Beta-spectrometers	$(0,1– 1 \cdot 10^{4})$ Bq		$U_{0,95o} = 6$ %		
		Specific activity of beta radiation source		$(10 – 1 \cdot 10^{4})$ Bq·kg^{-1}		$U_{0,95o} = 6$ %		
		Activity of gamma radiation source	Gamma-spectrometers	$(10 – 1 \cdot 10^{4})$ Bq		$U_{0,95o} = 6$ %		
		Specific activity of gamma radiation source		$(10 – 1 \cdot 10^{4})$ Bq·kg^{-1}		$U_{0,95o} = 6$ %		

Item No.[2]	Measurements	Measurement value	Calibration item	Measurement range	Complementary parameters	Expanded uncertainity[1]	Calibration method/methodology[3]	Note
1	2	3	4	5	6	7	8	9
Address of the place of activity: RUSSIAN FEDERATION, Sverdlovsk region, Verkhnyaya Pyshma, automobile road Ekaterinburg – Nizhny Tagil – Serov from 17 to 23 km (geodesic test site / calibration linear base line – “Sverdlovsk base line”)								
63	Time and frequency measurements	Spatial coordinates	Equipment of global navigation satellite system users	(1,5 – 3000) m		$U_{0,95}$ = 0,4 μm	MK 070-4304-012 “Equipment of global navigation satellite system users. Calibration methodology”	
				(3000 – 50000) m		$U_{0,95\ (\text{in plan view})}$ = 48 mm $U_{0,95\ (\text{by height})}$ = 72 mm		

General director of FBI “URALTEST” — title of authorized position held

signature of authorized person

Yu.M. Sukhanov — initials, surname of authorized person

[1]The extended measurement uncertainty expressed in accordance with ILAC-P14 and EA-4/02, is part of the calibration and measurement capabilities of the laboratory (CMC) and represents the smallest extended uncertainty achievable for the best available calibration object (type (group) of measuring instruments). The probability of coverage corresponds to approximately 95 %, and the coverage coefficient is k=2, unless otherwise specified. The uncertainty values without specifying the units of quantities are relative to the measured value of the quantity, unless otherwise specified.