

**Mass and Related Quantities, Russian Federation,**

VNIIM (D.I. Mendeleev Institute for Metrology, Rosstandart),

VNIIMS (All-Russian Scientific Research Institute for Metrological Service, Rosstandart),

VNIIFTRI (All-Russian Scientific Research Institute of Physical Technical and Radiotechnical Measurements, Rosstandart),

SNIIM (Siberian Scientific Research Institute for Metrology, Rosstandart), and

VNIIR (All-Russian Scientific Research Institute for Flow Metering, Rosstandart).

UNIIM (Ural Scientific Research Institute for Metrology, Rosstandart).



Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	Service provider	NMI internal identifier
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Mass	Mass standards	Subdivision method	1	100	mg			0.6 to 1.2	µg	2	95%	No	The volume of the mass standards is known	VNIIM	2
Mass	Mass standards	Subdivision method	0.1	1	g			1.2 to 2.0	µg	2	95%	No	The volume of the mass standards is known	VNIIM	3
Mass	Mass standards	Subdivision method	1	10	g			2 to 5	µg	2	95%	No	The volume of the mass standards is known	VNIIM	4
Mass	Mass standards	Subdivision method	10	100	g			5 to 10	µg	2	95%	No	The volume of the mass standards is known	VNIIM	5
Mass	Mass standards	Subdivision method	0.1	1	kg			10 to 50	µg	2	95%	No	The volume of the mass standards is known	VNIIM	6
Mass	Mass standards	Direct comparison	1	1	kg			50	µg	2	95%	No	The volume of the mass standards is known	VNIIM	1
Mass	Mass standards	Multiplication method	1	20	kg			0.05 to 3.0	mg	2	95%	No	The volume of the mass standards is known	VNIIM	7
Mass	Mass standards	Calibration method	500	500	kg			5.0	g	2	95%	No	Temperature and humidity measured	SNIIM	8

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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Force: tension and compression	Force transducers	Direct loading, deadweight	10	1000	kN			0.002	%	2	95%	Yes		VNIIM	01
Force: tension and compression	Force transducers	Direct loading, deadweight	2	100	kN			0.002	%	2	95%	Yes		VNIIM	02
Force: tension and compression	Force transducers	Direct loading, deadweight	0.1	5	kN			0.002	%	2	95%	Yes		VNIIM	03
Force: tension and compression	Force transducers	Direct loading, deadweight	10	200	N			0.002	%	2	95%	Yes		VNIIM	04
Force: tension	Force measuring device	Reference force transducers	5	50	kN			0.01	%	2	95%	Yes		VNIIM	11
Force: tension	Force measuring device	Reference force transducers	10	100	kN			0.01	%	2	95%	Yes		VNIIM	12
Force: tension	Force measuring device	Reference force transducers	20	200	kN			0.01	%	2	95%	Yes		VNIIM	13
Force: tension	Force measuring device	Reference force transducers	50	500	kN			0.01	%	2	95%	Yes		VNIIM	14
Force: tension	Force measuring device	Reference force transducers	100	1000	kN			0.01	%	2	95%	Yes		VNIIM	15
Force: compression	Force measuring device	Reference force transducers	10	100	kN			0.01	%	2	95%	Yes		VNIIM	21
Force: compression	Force measuring device	Reference force transducers	20	200	kN			0.01	%	2	95%	Yes		VNIIM	22
Force: compression	Force measuring device	Reference force transducers	50	500	kN			0.01	%	2	95%	Yes		VNIIM	23
Force: compression	Force measuring device	Reference force transducers	100	1000	kN			0.01	%	2	95%	Yes		VNIIM	24
Force: compression	Force measuring device	Reference force transducers	200	2000	kN			0.05	%	2	95%	Yes		VNIIM	25

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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Force: compression	Force measuring device	Reference force transducers	300	3000	kN			0.05	%	2	95%	Yes		VNIIM	26
Force: compression	Force measuring device	Reference force transducers	400	4000	kN			0.05	%	2	95%	Yes		VNIIM	27
Force: compression	Force measuring device	Reference force transducers	500	5000	kN			0.05	%	2	95%	Yes		VNIIM	28
Force: tension and compression	Force transducers	Lever-type amplification	40	2000	kN			0.05	%	2	95%	Yes		VNIIM	31
Viscosity	Capillary viscometers	Flow due to gravity	0.001	0.003	mm <sup>2</sup> /s <sup>2</sup>	Temperature	20 °C	0.1	%	2	95%	Yes		VNIIM	1
Viscosity	Capillary viscometers	Flow due to gravity	0.01	0.3	mm <sup>2</sup> /s <sup>2</sup>	Temperature	20 °C	0.2	%	2	95%	Yes		VNIIM	2
Viscosity	Capillary viscometers	Flow due to gravity	1	100	mm <sup>2</sup> /s <sup>2</sup>	Temperature	20 °C	0.3	%	2	95%	Yes		VNIIM	3
Viscosity	Newtonian liquids	Reference liquids	1.2	6.0	mm <sup>2</sup> /s	Temperature	20 °C	0.2	%	2	95%	Yes		VNIIM	4
Viscosity	Newtonian liquids	Reference liquids	10	600	mm <sup>2</sup> /s	Temperature	20 °C	0.25	%	2	95%	Yes		VNIIM	5
Viscosity	Newtonian liquids	Reference liquids	1000	10000	mm <sup>2</sup> /s	Temperature	20 °C	0.4	%	2	95%	Yes		VNIIM	6
Viscosity	Newtonian liquids	Reference liquids	20000	100000	mm <sup>2</sup> /s	Temperature	20 °C	0.5	%	2	95%	Yes		VNIIM	7
Viscosity	Newtonian liquids	Reference liquids	0.9	4.8	mPa s	Temperature	20 °C	0.2	%	2	95%	Yes		VNIIM	8
Viscosity	Newtonian liquids	Reference liquids	8	480	mPa s	Temperature	20 °C	0.25	%	2	95%	Yes		VNIIM	9
Viscosity	Newtonian liquids	Reference liquids	800	7900	mPa s	Temperature	20 °C	0.4	%	2	95%	Yes		VNIIM	10
Viscosity	Newtonian liquids	Reference liquids	16000	90000	mPa s	Temperature	20 °C	0.5	%	2	95%	Yes		VNIIM	11
Gauge pressure: liquid medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	5E+04	1E+07	Pa			8E-06 to 2E-05		2	95%	Yes	Working fluid: aviation kerosene	VNIIM	1

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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Gauge pressure: liquid medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	1E+07	6E+07	Pa			5E-05		2	95%	Yes	Working fluid: oil	VNIIM	2
Gauge pressure: liquid medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	6E+07	2.5E+08	Pa			5E-04		2	95%	Yes	Working fluid: oil	VNIIM	3
Negative gauge pressure: gas medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	-9.5E+04	4E+04	Pa			20	Pa	2	95%	No		VNIIM	4
Gauge pressure: gas medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	4E+04	6.3E+05	Pa			2E-04		2	95%	Yes		VNIIMS	5
Gauge pressure: liquid medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	2.5E+08	1.6E+09	Pa			3E-04		2	95%	Yes	Working fluid: oil	VNIIFTRI	6
Absolute pressure: gas medium	Vacuum gauge, capacitance diaphragm gauge	Direct comparison with standard	0.1	1E+03	Pa	Temperature	19.6 °C to 20.4 °C	7.2E-03 + 1.0E-04p, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 7.2E-03 Pa to 0.1 Pa Approved on 8 May 2018	VNIIM	7
						Gas species	dry air, nitrogen								
						Gas purity	99.9 or better								

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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Absolute pressure: gas medium	Pressure gauge	Direct comparison with standard	1.0E+03	1.0E+04	Pa	Temperature	19.6 °C to 20.4 °C	8.0E-01 + 1.0E-05p, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.8 Pa to 0.9 Pa Approved on 8 May 2018	VNIIM	8
						Gas species	nitrogen								
						Gas purity	99.9 or better								
Absolute pressure: gas medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	2.7E+02	1.3E+05	Pa			6.7	Pa	2	95%	No		VNIIM	9
Absolute pressure: gas medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	1.3E+05	7.2E+05	Pa			5 to 36	Pa	2	95%	No		VNIIM	10
Differential pressure: liquid medium	Pressure measuring device, standard pressure generator	Direct comparison with standard	0.1	100	Pa	Line pressure, $p_{line}$	1E+05 Pa	0.1	Pa	2	95%	No	Working fluid: ethanol	VNIIM	11
Differential pressure: liquid medium	Pressure measuring device, standard pressure generator	Direct comparison with standard	100	5E+03	Pa	Line pressure, $p_{line}$	1E+05 Pa	0.34	Pa	2	95%	No	Working fluid: water	VNIIM	12
Differential pressure: gas medium	Pressure measuring device, standard pressure generator	Direct comparison with standard, crossfloat	5E+03	4E+04	Pa	Line pressure, $p_{line}$	1E+05 Pa	1.1	Pa	2	95%	No		VNIIM	13

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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Absolute pressure: gas medium	Pressure measuring device, standard pressure generator	Direct comparison with standard	1E-03	1E+03	Pa			1E-04 to 6.6	Pa	2	95%	No		VNIIM	14
Absolute pressure: gas medium	Vacuum gauge	Direct comparison with standard	1E-07	1E-03	Pa			7E-09 to 4E-05	Pa	2	95%	No		VNIIM	15
Hardness	Primary hardness reference block	Rockwell A, C (with diamond indenter) according to ISO 6508:3 and GOST 9013	According to ISO 6508:1 and GOST 9013	According to ISO 6508:1 and GOST 9013	HR	Preliminary test force	98.07 N	3.0E-01	HRC	2	95%	No	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-01
						Total test force	588.4 N to 1471 N								
Hardness	Primary hardness reference block	Rockwell N (with diamond indenter) according to ISO 6508:3 and GOST 22975	According to ISO 6508:1 and GOST 22975	According to ISO 6508:1 and GOST 22975	HRN	Preliminary test force	29.4 N	5.0E-01	HRN	2	95%	No	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-02
						Total test force	147.1 N to 441.3 N								
Hardness	Primary hardness reference block	Rockwell B (with ball indenter) according to ISO 6508:3 and GOST 9013	According to ISO 6508:1 and GOST 9013	According to ISO 6508:1 and GOST 9013 According to ISO 6508:1 and GOST 22975	HRB	Preliminary test force	98.07 N	4.0E-01	HRB	2	95%	No	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-03
						Total test force	980.7 N								

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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?				
Hardness	Primary hardness reference block	Rockwell T (with ball indenter) according to ISO 6508:3 and GOST 22975	According to ISO 6508:1 and GOST 22975	According to ISO 6508:1 and GOST 9013 According to ISO 6508:1 and GOST 22975	HRT	Preliminary test force	29.4 N	6.0E-01	HRT	2	95%	No	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-04	
						Total test force	147.1 N to 441.3 N									
Hardness	Primary hardness reference block	Vickers (HV1 to HV3) according to ISO 6507:3 and GOST 2999	According to ISO 6507:1 and GOST 2999	According to ISO 6507:1 and GOST 2999	HV	Total force	9.81 N to 29.42 N	12.0E-01	%	2	95%	Yes	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-05	
Hardness	Primary hardness reference block	Vickers (HV5 to HV100) according to ISO 6507:3 and GOST 2999	According to ISO 6507:1 and GOST 2999	According to ISO 6507:1 and GOST 2999	HV	Total force	49.03 N to 980.7 N	10.0E-01	%	2	95%	Yes	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-06	
Hardness	Primary hardness reference block	Brinell (HB 2.5/187.5) according to ISO 6506:3 and GOST 9012	According to ISO 6506:1 and GOST 9012	According to ISO 6506:1 and GOST 9012	HB	Total force	1839 N	10.0E-01	%	2	95%	Yes	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-07	
Hardness	Primary hardness reference block	Brinell (HB5/750 - HB 10/3000) according to ISO 6506:3 and GOST 9012	According to ISO 6506:1 and GOST 9012	According to ISO 6506:1 and GOST 9012	HB	Total force	7355 N to 29420 N	8.0E-01	%	2	95%	Yes	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-08	
Hardness	Primary hardness reference block	Shore D (with diamond-tipped impact body) according to GOST 23273	According to GOST 8.426	According to GOST 8.426	HSD	Height of fall of the impact body	19.0 mm	12.0E-01	HSD	2	95%	No	Approved on 30 May 2005	VNIIFTRI	VNIIFTRI-09	

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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Gas flow speed	Air speed instrumentation	Thermal, ultrasonic, vane anemometers	0.5	25	m/s	Fluid	air	0.5	%	2	95%	Yes	Flow in open or close wind tunnel Approved on 27 January 2014	VNIIM	255
						Temperature	15 °C to 25 °C								
						Pressure	95 kPa to 105 kPa								
Gas flow speed	Air speed instrumentation	Pitot static tubes, thermal, ultrasonic, vane anemometers	10	100	m/s	Fluid	air	0.55 to 1.0	%	2	95%	Yes	Flow in open or close wind tunnel Approved on 27 January 2014	VNIIM	255
						Temperature	15 °C to 25 °C								
						Relative humidity	50% to 80%								
Density of liquid	Liquid	Hydrostatic weighing	600	1000	kg/m <sup>3</sup>	Fluid	liquid	0.010 to 0.013	kg/m <sup>3</sup>	2	95%	No	Approved on 28 March 2014	VNIIM	2302
						Temperature	20 °C								
						Pressure	101325 Pa								
Density of liquid	Liquid	Hydrostatic weighing	1000	2000	kg/m <sup>3</sup>	Fluid	liquid	0.013 to 0.028	kg/m <sup>3</sup>	2	95%	No	Approved on 28 March 2014	VNIIM	2302
						Temperature	20 °C								
						Pressure	101325 Pa								
Flowrate volume (low pressure gas)	Gas flow meters	Critical nozzles, vortex, turbine, ultrasonic, rotary meters, etc.	0.12	4	m <sup>3</sup> /h	Gas	air	0.25	%	2	95%	Yes	Approved on 18 March 2015	VNIIR	VNIIR-13.01
						Pressure	96 kPa to 104 kPa								
						Temperature	15 °C to 25 °C								
						Pipe size	DN 10, DN 25								



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Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?			
Flowrate volume (low pressure gas)	Gas flow meters	Critical nozzles, vortex, turbine, ultrasonic, rotary meters, etc.	100	800	m <sup>3</sup> /h	Gas	air	0.2	%	2	95%	Yes	Approved on 18 March 2015	VNIIR	VNIIR-13.02
						Pressure	96 kPa to 104 kPa								
						Temperature	15 °C to 25 °C								
						Pipe size	DN 50 to DN 200								
Flowrate volume (low pressure gas)	Gas flow meters	Critical nozzles, vortex, turbine, ultrasonic, rotary meters, etc.	4	160	m <sup>3</sup> /h	Gas	air	0.2	%	2	95%	Yes	Approved on 18 March 2015	VNIIR	VNIIR-13.03
						Pressure	96 kPa to 104 kPa								
						Temperature	15 °C to 25 °C								
						Pipe size	DN 25 to DN 100								
Flowrate volume (low pressure gas)	Gas flow meters	Critical nozzles	1	100	m <sup>3</sup> /h	Gas	air	0.15	%	2	95%	Yes	Approved on 31 May 2017	VNIIR	VNIIR-13.04
						Pressure	96 kPa to 104 kPa								
						Temperature	15 °C to 25 °C								
						Pipe size	< DN100								
Torque	Torque measuring devices	Lever deadweight system	100	2500	N·m	Mode	Clockwise, anticlockwise	2.0E-04		2	95%	Yes	Approved on 30 October 2017	UNIIM	