Mass and Related Quantities, Germany, PTB (Physikalisch-Technische Bundesanstalt)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	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?	Comments	NMI Service Identifier	Approval Date
Mass	Mass standards	Comparison in air	1	100	mg			0.4 to 0.6	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	0.1	1	g			0.6 to 1	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	1	10	g			1 to 3	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	10	100	g			3 to 5	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	0.1	1	kg			5 to 28	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	1	10	kg			28 to 290	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	10	50	kg			0.29 to 5	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	50	100	kg			5 to 150	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Mass	Mass standards	Comparison in air	100	1000	kg			150 to 600	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Mass	Mass standards	Comparison in air	1000	5000	kg			0.6 to 2.5	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.		Approved on 03 January 2007
Density of solid	Silicon solid density standard	Flotation	2329.03	2329.13	kg/m^3	Reference temperature	20 °C	Q[0.0006, 0.04$\Delta\rho$], $\Delta\rho$ density difference to primary density standard Si2PTB in kg/m^3	kg/m^3	2	95%	No			Approved on 03 January 2007
						Mass	30 g to 1100 g								
Density of solid	Solid density standard	Hydrostatic weighing	800	22000	kg/m^3	Reference temperature	20 °C	(0.003 + 0.5/V), V volume in cm^3	kg/m^3	2	95%	No			Approved on 03 January 2007
						Mass	less than 1030 g								
Density of solid	Mass standard: 20 kg to 50 kg	Hydrostatic weighing	7700	8300	kg/m^3	Reference temperature	20 °C	2	kg/m^3	2	95%	No			Approved on 03 January 2007
Density of solid	Mass standard: 2 kg to 10 kg	Hydrostatic weighing	7700	8300	kg/m^3	Reference temperature	20 °C	0.3	kg/m^3	2	95%	No			Approved on 03 January 2007
Density of solid	Mass standard 1 kg	Hydrostatic weighing	7700	8300	kg/m^3	Reference temperature	20 °C	0.03	kg/m^3	2	95%	No			Approved on 03 January 2007
Density of solid	Mass standard: 0.05 kg to 0.5 kg	Hydrostatic weighing	7700	8300	kg/m^3	Reference temperature	20 °C	(0.05 + 0.04/m), m mass in kg	kg/m^3	2	95%	No			Approved on 03 January 2007
Density of solid	Mass standard: 2 g to 20 g	Hydrostatic weighing	7700	8300	kg/m^3	Reference temperature	20 °C	(1.0 + 18/m), m mass in g	kg/m^3	2	95%	No			Approved on 03 January 2007
Density of solid	Mass standard 1 g	Hydrostatic weighing	7700	8300	kg/m^3	Reference temperature	20 °C	13	kg/m^3	2	95%	No			Approved on 03 January 2007
Density of solid	Mass standard 0.5 g	Hydrostatic weighing	7700	9100	kg/m^3	Reference temperature	20 °C	26	kg/m^3	2	95%	No			Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Volume of solid	Solid density standard	Hydrostatic weighing	50	440	cm^3	Reference temperature	20 °C	(0.15 + 0.0015*V*), *V* volume in cm^3	mm^3	2	95%	No			Approved on 03 January 2007
						Mass	less than 1030 g								
Volume of solid	Mass standard: 20 kg to 50 kg	Hydrostatic weighing	2400	6500	cm^3	Reference temperature	20 °C	600 to 1600	mm^3	2	95%	No			Approved on 03 January 2007
Volume of solid	Mass standard: 2 kg to 10 kg	Hydrostatic weighing	240	1300	cm^3	Reference temperature	20 °C	10 to 50	mm^3	2	95%	No			Approved on 03 January 2007
Volume of solid	Mass standard 1 kg	Hydrostatic weighing	120	130	cm^3	Reference temperature	20 °C	0.5	mm^3	2	95%	No			Approved on 03 January 2007
Volume of solid	Mass standard: 0.05 kg to 0.5 kg	Hydrostatic weighing	6	65	cm^3	Reference temperature	20 °C	0.7 to 1.0	mm^3	2	95%	No			Approved on 03 January 2007
Volume of solid	Mass standard: 2 g to 20 g	Hydrostatic weighing	0.24	2.6	cm^3	Reference temperature	20 °C	0.3 to 0.6	mm^3	2	95%	No			Approved on 03 January 2007
Volume of solid	Mass standard 1 g	Hydrostatic weighing	0.12	0.13	cm^3	Reference temperature	20 °C	0.2	mm^3	2	95%	No			Approved on 03 January 2007
Volume of solid	Mass standard 0.5 g	Hydrostatic weighing	0.055	0.065	cm^3	Reference temperature	20 °C	0.2	mm^3	2	95%	No			Approved on 03 January 2007
Density of liquid	Liquid	Hydrostatic weighing	600	1000	kg/m^3	Liquid temperature	20 °C	0.008 to 0.004	kg/m^3	2	95%	No			Approved on 02 July 2008
						Pressure	101325 Pa								
						Viscosity	max. 1000 mPa s								
Density of liquid	Liquid	Hydrostatic weighing	1000	2000	kg/m^3	Liquid temperature	20 °C	0.004 to 0.018	kg/m^3	2	95%	No			Approved on 02 July 2008
						Pressure	101325 Pa								
						Viscosity	max. 1000 mPa s								
Density of liquid	Liquid	Hydrostatic weighing	600	1000	kg/m^3	Liquid temperature	5 °C to 60 °C	0.010 to 0.006	kg/m^3	2	95%	No			Approved on 02 July 2008
						Pressure	101325 Pa								
						Viscosity	max. 3000 mPa s								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Density of liquid	Liquid	Hydrostatic weighing	1000	2000	kg/m^3	Liquid temperature	5 °C to 60 °C	0.006 to 0.020	kg/m^3	2	95%	No			Approved on 02 July 2008
						Pressure	101325 Pa								
						Viscosity	max. 3000 mPa s								
Density of liquid	Hydrometer	Cuckow method (Hydrostatic weighing)	500	1500	kg/m^3	Liquid temperature	20 °C	0.018 to 0.028	kg/m^3	2	95%	No			Approved on 02 July 2008
						Pressure	101 kPa								
Absolute pressure	Vacuum gauge	Ionisation gauge	1.0E-09	1.0E-07	Pa	Temperature	20 °C to 25 °C	0.10*p* to 0.030*p*, *p* pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.0E-10 Pa to 3.0E-09 Pa	7.5-1.6	Approved on 03 July 2009
						Gas species	Ne, N_2, Ar, Kr, Xe								
						Gas purity	99.9 or better								
Absolute pressure	Vacuum gauge	Ionisation gauge	1.0E-07	2.0E-02	Pa	Temperature	20 °C to 25 °C	0.030*p* to 0.0066*p*, *p* pressure in Pa	Pa	2	95%	No	Uncertainty values range from 3.0E-09 Pa to 1.3E-04 Pa	7.5-1.6	Approved on 03 July 2009
						Gas species	Ne, N_2, Ar, Kr, Xe								
						Gas purity	99.9 or better								
Absolute pressure	Vacuum gauge	Spinning rotor gauge	9.0E-04	1	Pa	Temperature	20 °C to 25 °C	0.0087*p* to 0.0026*p*, *p* pressure in Pa	Pa	2	95%	No	Uncertainty values range from 7.8E-06 Pa to 2.6E-03 Pa	7.5-1.5	Approved on 03 July 2009
						Gas species	He, N_2, Ar								
						Gas purity	99.9 or better								
Absolute pressure	Vacuum gauge	Capacitance diaphragm gauge	1	3.0E+01	Pa	Temperature	20 °C to 25 °C	0.0024*p* to 0.0016*p*, *p* pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.0024 Pa to 0.048 Pa	7.5-1.4	Approved on 03 July 2009
						Gas species	He, Ne, N_2, Ar, Kr, Xe								
						Gas purity	99.9 or better								
Absolute pressure	Vacuum gauge	Resonance silicon gauge	3.0E+01	1.0E+04	Pa	Temperature	20 °C to 25 °C	$(2.8E\text{-}03 + 2.85E\text{-}09p^2)^{0.5}$, *p* pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.053 Pa to 0.54 Pa	7.5-1.7	Approved on 03 July 2009
						Gas species	non condensable								
						Gas purity	99.9 or better								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Absolute pressure	Vacuum gauge	Capacitance diaphragm gauge	1.0E+04	1.0E+05	Pa	Temperature	20 °C to 25 °C	4.2E-04p ; p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.2 Pa to 42 Pa	7.5-1.4	Approved on 03 July 2009
						Gas species	non condensable								
						Gas purity	99.9 or better								
Absolute pressure	Pressure balance	Gas medium	1E+02	1.8E+05	Pa			(0.06 + 6E-06p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.061 Pa to 1.3 Pa	ptb-m-p-003	Approved on 03 July 2009
Absolute pressure	Pressure balance, pressure gauge	Gas medium	1.8E+05	3.5E+05	Pa			(0.2 + 1.2E-05p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.4 Pa to 4.4 Pa	ptb-m-p-004	Approved on 03 July 2009
Absolute pressure	Pressure balance, pressure gauge	Gas medium	3.5E+05	7E+06	Pa			(1.6E-05p + 2E-13p^2), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 5.6 Pa to 120 Pa	ptb-m-p-005	Approved on 03 July 2009
Gauge pressure	Pressure balance, pressure gauge	Gas medium	-1E+05	-4E+03	Pa			(0.16 + 1E-05p), p absolute value of the gauge pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.2 Pa to 1.2 Pa	ptb-m-p-001	Approved on 03 July 2009
Gauge pressure	Pressure balance, pressure gauge	Gas medium	-4E+03	4E+03	Pa			(0.02 + 5E-05p), p absolute value of the gauge pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.02 Pa to 0.22 Pa	ptb-m-p-002	Approved on 03 July 2009
Gauge pressure	Pressure balance	Gas medium	4E+03	1.8E+05	Pa			(0.16 + 6E-06p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 0.18 Pa to 1.3 Pa	ptb-m-p-006	Approved on 03 July 2009
Gauge pressure	Pressure balance	Gas medium	1.8E+05	1E+06	Pa			(0.2 + 8E-06p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.6 Pa to 8.2 Pa	ptb-m-p-007	Approved on 03 July 2009
Gauge pressure	Pressure balance	Gas medium	1E+06	2E+06	Pa			1E-05p, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 10 Pa to 20 Pa	ptb-m-p-008	Approved on 03 July 2009
Gauge pressure	Pressure balance	Gas medium	2.0E+06	1E+07	Pa			(1.6E-05p + 2E-13p^2), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 33 Pa to 180 Pa	ptb-m-p-009	Approved on 03 July 2009
Gauge pressure	Pressure balance	Gas medium	1E+07	1E+08	Pa			(2.2E-05p + 2E-13p^2), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 240 Pa to 4.2E+03 Pa	ptb-m-p-010	Approved on 03 July 2009
Gauge pressure	Pressure balance	Oil medium	1E+05	1E+07	Pa			(5 + 1E-05p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 6 Pa to 105 Pa	ptb-m-p-011	Approved on 03 July 2009

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Gauge pressure	Pressure balance, pressure gauge	Oil medium	1.0E+07	4.0E+08	Pa			(2E-05p + 1E-13p^2), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 210 Pa to 2.4E+04 Pa	ptb-m-p-012	Approved on 03 July 2009
Gauge pressure	Pressure multiplier, pressure gauge	Oil medium	4.0E+08	1.0E+09	Pa			(2.6E-05p + 1E-13p^2), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.6E+04 Pa to 1.3E+05 Pa	ptb-m-p-013	Approved on 03 July 2009
Gauge pressure	Pressure gauge	Oil medium	1.0E+09	1.4E+09	Pa			4E+06	Pa	2	95%	No		ptb-m-p-014	Approved on 03 July 2009
Differential pressure	Pressure gauge	Gas medium	0	1E+04	Pa	Line pressure, p_{line} and differential pressure, p	1E+05 Pa < p_{line} < 1.4E+07 Pa	(0.6 + 3E-08p_{line} + 3E-04p), p_{line} and p in Pa	Pa	2	95%	No		ptb-m-p-015	Approved on 03 July 2009
Differential pressure	Pressure gauge	Gas medium	0	2E+07	Pa	Line pressure, p_{line} and differential pressure, p	5E+05 Pa < p_{line} + p < 2E+07 Pa	(10 + 4E-06p_{line} + 2.2E-05p), p_{line} and p in Pa	Pa	2	95%	No		ptb-m-p-016	Approved on 03 July 2009
Differential pressure	Pressure gauge	Gas medium	0	4E+07	Pa	Line pressure, p_{line} and differential pressure, p	1E+06 Pa < p_{line} + p < 4E+07 Pa	(10 + 4E-06p_{line} + 2.4E-05p), p_{line} and p in Pa	Pa	2	95%	No		ptb-m-p-017	Approved on 03 July 2009
Force: tension and compression	Force measuring device	Deadweight	0.5	200	N			0.002	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Deadweight	2	20	N			0.002	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Deadweight	5	200	N			0.002	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Deadweight	50	2000	N			0.002	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Deadweight	0.25	20	kN			0.002	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Deadweight	2	100	kN			0.002	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Deadweight	20	1000	kN			0.002	%	2	95%	Yes			Approved on 03 January 2007

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Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Force: tension and compression	Force measuring device	Deadweight	50	2000	kN			0.002	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Hydraulic amplification	0.1	5	MN			0.01	%	2	95%	Yes			Approved on 03 January 2007
Force: tension and compression	Force measuring device	Hydraulic amplification	0.1	16.5	MN			0.01	%	2	95%	Yes			Approved on 03 January 2007
Torque	Torque measuring devices	DIN 51309 EA-10/14	0.01	1	Nm	Mode	clockwise, anticlockwise	2.0E-04		2	95%	Yes			Approved on 03 January 2007
Torque	Torque measuring devices	DIN 51309 EA-10/14	1	20 000	Nm	Mode	clockwise, anticlockwise	2.0E-05		2	95%	Yes			Approved on 03 January 2007
Torque	Reference torque wrench	DKD-R 3-7	0.1	5 000	Nm	Mode	clockwise, anticlockwise	2.0E-04		2	95%	Yes			Approved on 03 January 2007
Torque	Torque tools calibration equipment	DKD-R 3-8	0.01	1 000	Nm	Mode	clockwise, anticlockwise	2.0E-03		2	95%	Yes			Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquids	1	1.2	mm^2/s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	1.5	2.1	mm^2/s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	2.1	3	mm^2/s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	3.7	6.1	mm^2/s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

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Quantity	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?	Comments	NMI Service Identifier	Approval Date
Kinematic viscosity	Newtonian liquids	Reference liquid	6.4	12	mm^2/s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	11	23	mm^2/s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	3.5	36	mm^2/s	Temperature	100 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquids	4.7	65	mm^2/s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	8.1	105	mm^2/s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	10	150	mm^2/s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	10	250	mm^2/s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	19	450	mm^2/s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	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?	Comments	NMI Service Identifier	Approval Date
Kinematic viscosity	Newtonian liquids	Reference liquid	19	880	mm^2/s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	34	1000	mm^2/s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	35	1800	mm^2/s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquids	97	4500	mm^2/s	Temperature	100 °C to 20 °C	0.35	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	71	9000	mm^2/s	Temperature	100 °C to 20 °C	0.38	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	110	17000	mm^2/s	Temperature	100 °C to 20 °C	0.45	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	180	21000	mm^2/s	Temperature	100 °C to 20 °C	0.45	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	270	37000	mm^2/s	Temperature	100 °C to 20 °C	0.5	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

Mass and Related Quantities, Germany, PTB (Physikalisch-Technische Bundesanstalt)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Kinematic viscosity	Newtonian liquids	Reference liquid	1300	53000	mm^2/s	Temperature	100 °C to 20 °C	0.5	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	450	100000	mm^2/s	Temperature	100 °C to 20 °C	0.7	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	620	140000	mm^2/s	Temperature	100 °C to 20 °C	0.8	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	1500	360000	mm^2/s	Temperature	100 °C to 20 °C	0.8	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Reference liquid	3200	780000	mm^2/s	Temperature	100 °C to 20 °C	1	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquids	0.7	1	mPa s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	1.1	1.6	mPa s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	1.6	2.4	mPa s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	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?	Comments	NMI Service Identifier	Approval Date
Dynamic viscosity	Newtonian liquids	Reference liquid	3.0	5.0	mPa s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	5.2	9.6	mPa s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	9.1	20	mPa s	Temperature	40 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	2.8	30	mPa s	Temperature	100 °C to 20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquids	3.8	57	mPa s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	6.3	87	mPa s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	8.1	125	mPa s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	8.0	220	mPa s	Temperature	100 °C to 20 °C	0.25	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	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?	Comments	NMI Service Identifier	Approval Date
Dynamic viscosity	Newtonian liquids	Reference liquid	15	380	mPa s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	16	780	mPa s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	27	840	mPa s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	29	1600	mPa s	Temperature	100 °C to 20 °C	0.28	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquids	78	3800	mPa s	Temperature	100 °C to 20 °C	0.35	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	59	7900	mPa s	Temperature	100 °C to 20 °C	0.38	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	92	15000	mPa s	Temperature	100 °C to 20 °C	0.45	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	150	19000	mPa s	Temperature	100 °C to 20 °C	0.45	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Dynamic viscosity	Newtonian liquids	Reference liquid	230	33000	mPa s	Temperature	100 °C to 20 °C	0.5	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	1100	45000	mPa s	Temperature	100 °C to 20 °C	0.5	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	380	91000	mPa s	Temperature	100 °C to 20 °C	0.7	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	530	130000	mPa s	Temperature	100 °C to 20 °C	0.8	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	1300	320000	mPa s	Temperature	100 °C to 20 °C	0.8	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Reference liquid	2700	700000	mPa s	Temperature	100 °C to 20 °C	1	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Capillary viscometer	0.001	0.01	mm^2/s^2	Temperature	20 °C	0.1	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Capillary viscometer	0.01	0.05	mm^2/s^2	Temperature	20 °C	0.12	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Kinematic viscosity	Newtonian liquids	Capillary viscometer	0.05	3	mm^2/s^2	Temperature	20 °C	0.2	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Capillary viscometer	3	30	mm^2/s^2	Temperature	20 °C	0.32	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Capillary viscometer	30	100	mm^2/s^2	Temperature	20 °C	0.39	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Viscosity measurement	1	4	mm^2/s	Temperature, T	20 °C to 100 °C	$100(0.0005^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^{\,2})^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Viscosity measurement	4	10.0	mm^2/s	Temperature, T	20 °C to 100 °C	$100(0.001^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^{\,2})^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Viscosity measurement	10	100	mm^2/s	Temperature, T	20 °C to 100 °C	$100(0.0012^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^{\,2})^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Viscosity measurement	100	1000	mm^2/s	Temperature, T	20 °C to 100 °C	$100(0.0015^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^{\,2})^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Kinematic viscosity	Newtonian liquids	Viscosity measurement	1000	10000	mm^2/s	Temperature, T	20 °C to 100 °C	$100(0.0017^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^{\,2})^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Kinematic viscosity	Newtonian liquids	Viscosity measurement	10000	770000	mm^2/s	Temperature, T	20 °C to 100 °C	$100(0.002^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^2)^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Viscosity measurement	1	4	mPa s	Temperature, T	20 °C to 100 °C	$100(0.0005^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^2)^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Viscosity measurement	4	10	mPa s	Temperature, T	20 °C to 100 °C	$100(0.001^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^2)^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Viscosity measurement	10	100	mPa s	Temperature, T	20 °C to 100 °C	$100(0.0012^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^2)^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Viscosity measurement	100	1000	mPa s	Temperature, T	20 °C to 100 °C	$100(0.0015^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^2)^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Viscosity measurement	1000	10000	mPa s	Temperature, T	20 °C to 100 °C	$100(0.0017^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^2)^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Dynamic viscosity	Newtonian liquids	Viscosity measurement	10000	702000	mPa s	Temperature, T	20 °C to 100 °C	$100(0.002^2 + (0.0049 + 0.000143(T - T_0))^2 U_v^2)^{1/2}$, T_0 = 20 °C and Uv viscosity temperature coefficient in 1/K	%	2	95%	Yes	The uncertainty of the viscosity of water (ISO/TR 3666 (1998), 0.17%) is not taken into account		Approved on 03 January 2007
Hardness	Hardness block	Vickers HV0.2 according to ISO 6507-3	30	3000	HV0.2	Test force	1.961 N	$2E\text{-}05HV^2 + 0.0360HV + 1.76$	HV0.2	2	95%	No			Approved on 02 July 2008

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	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?	Comments	NMI Service Identifier	Approval Date
Hardness	Hardness block	Vickers HV0.3 according to ISO 6507-3	30	3000	HV0.3	Test force	2.942 N	$2E\text{-}05HV^2 + 0.0262HV + 1.26$	HV0.3	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV0.5 according to ISO 6507-3	30	3000	HV0.5	Test force	4.903 N	$1E\text{-}05HV^2 + 0.0201HV + 0.91$	HV0.5	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV1 according to ISO 6507-3	30	3000	HV1	Test force	9.807 N	$8E\text{-}06HV^2 + 0.0145HV + 0.58$	HV1	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV2 according to ISO 6507-3	30	3000	HV2	Test force	19.61 N	$6E\text{-}06HV^2 + 0.0101HV + 0.33$	HV2	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV3 according to ISO 6507-3	30	3000	HV3	Test force	29.42 N	$5E\text{-}06HV^2 + 0.0087HV + 0.24$	HV3	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV5 according to ISO 6507-3	30	3000	HV5	Test force	49.03 N	$4E\text{-}06HV^2 + 0.00850HV$	HV5	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV10 according to ISO 6507-3	30	3000	HV10	Test force	98.07 N	$4E\text{-}06HV^2 + 0.0081HV + 0.13$	HV10	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV20 according to ISO 6507-3	30	3000	HV20	Test force	196.1 N	$2E\text{-}06HV^2 + 0.0076HV + 0.13$	HV20	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV30 according to ISO 6507-3	30	3000	HV30	Test force	294.2 N	$1E\text{-}06HV^2 + 0.0080HV + 0.22$	HV30	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV40 corresponding with ISO 6507-3	40	3000	HV40	Test force	392.2 N	$2E\text{-}06HV^2 + 0.0060HV + 0.10$	HV40	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV50 according to ISO 6507-3	50	3000	HV50	Test force	490.3 N	$2E\text{-}06HV^2 + 0.0053HV + 0.23$	HV50	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV60 corresponding with ISO 6507-3	60	3000	HV60	Test force	588.4 N	$1E\text{-}06HV^2 + 0.006HV$	HV60	2	95%	No			Approved on 02 July 2008
Hardness	Hardness block	Vickers HV100 according to ISO 6507-3	100	3000	HV100	Test force	980.7 N	$7E\text{-}07HV^2 + 0.0064HV + 0.18$	HV100	2	95%	No			Approved on 02 July 2008

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Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Hardness	Hardness block	Brinell (HB1/30 to HB2.5/187.5) according to ISO 6506:3	50	600	HB	Test force	294.2 N to 1839 N	0.8	%	2	95%	Yes			Approved on 02 July 2008
Hardness	Hardness block	Brinell (HB5/750 to HB10/3000) according to ISO 6506:3	50	600	HB	Test force	7355 N to 29420 N	0.6	%	2	95%	Yes			Approved on 02 July 2008
Hardness	Hardness block	Rockwell C according to ISO 6508:3	10	70	HRC	Preliminary test force	98.07 N	0.3	HRC	2	95%	No			Approved on 02 July 2008
						Total test force	1471 N								
Hardness	Hardness block	Rockwell N (with diamond indenter) according to ISO 6508:3	70	94	HR15N	Preliminary test force	29.4 N	0.4	HRN	2	95%	No			Approved on 02 July 2008
						Total test force	147.1 N to 441.3 N								
Hardness	Hardness block	Rockwell N (with diamond indenter) according to ISO 6508:3	42	86	HR30N	Preliminary test force	29.4 N	0.4	HRN	2	95%	No			Approved on 02 July 2008
						Total test force	147.1 N to 441.3 N								
Hardness	Hardness block	Rockwell N (with diamond indenter) according to ISO 6508:3	20	77	HR45N	Preliminary test force	29.4 N	0.4	HRN	2	95%	No			Approved on 02 July 2008
						Total test force	147.1 N to 441.3 N								
Hardness	Hardness block	Rockwell T (with ball indenter) according to ISO 6508:3	67	93	HR15T	Preliminary test force	29.4 N	0.8	HRT	2	95%	No			Approved on 02 July 2008
						Total test force	147.1 N to 441.3 N								

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Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Hardness	Hardness block	Rockwell T (with ball indenter) according to ISO 6508:3	29	82	HR30T	Preliminary test force	29.4 N	0.8	HRT	2	95%	No			Approved on 02 July 2008
						Total test force	147.1 N to 441.3 N								
Hardness	Hardness block	Rockwell T (with ball indenter) according to ISO 6508:3	10	72	HR45T	Preliminary test force	29.4 N	0.8	HRT	2	95%	No			Approved on 02 July 2008
						Total test force	147.1 N to 441.3 N								
Hardness	Rubber hardness test block	IRHD-N according to ISO 48	35	80	IRHD-N	Total test force	5.70 N	0.7	IRHD-N	2	95%	No			Approved on 02 July 2008
Liquid flowrate volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	20	180	m^3/h	Liquid	water	0.2	%	2	95%	Yes		DE3	Approved on 03 January 2007
						Temperature	20 °C to 80 °C								
						Pipe size	DN 50 - 200								
Liquid flowrate volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	0.01	1	m^3/h	Liquid	water	0.4	%	2	95%	Yes		DE7	Approved on 03 January 2007
						Temperature	20 °C to 80 °C								
						Pipe size	DN 10 - 32								
Liquid flowrate volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	0.005	2.5	m^3/h	Liquid	glycol-water solutions	0.5	%	2	95%	Yes		DE15	Approved on 03 January 2007
						Temperature	-15 °C to 80 °C								
						Pipe size	DN 10 - 32								

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Volume flowrate	Flow sensors	e.g. mechanical, electromagnetic, ultrasonic meters	0.3	2100	m^3/h	Liquid	water	0.04	%	2	95%	Yes		DE21	Approved on 03 January 2007
						Temperature	ambient								
						Maximum pressure	6 bar								
						Pipe size	DN 20 - 400								
Liquid flowrate volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	1	20	m^3/h	Liquid	water	0.4	%	2	95%	Yes		DE5	Approved on 03 January 2007
						Temperature	25 °C to 65 °C								
						Pipe size	DN 15 - 50								
Liquid flowrate volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	50	120	m^3/h	Liquid	water	0.4	%	2	95%	Yes		DE11	Approved on 03 January 2007
						Temperature	80 °C to 180 °C								
						Pipe size	DN 40 - 150, PN 25								
Volume flowrate (average)	Flow sensors	e.g. turbine, ultrasonic, positive-displacement meters	0.6	250	m^3/h	Liquid	white spirit (density = 770 kg/m^3, viscosity = 0.77 mPa s)	0.1	%	2	95%	Yes		DE26	Approved on 03 January 2007
						Temperature	ambient								
						Maximum pressure	3.5 bar								
						Pipe size	DN 25 - 150								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Flowrate volume (low pressure gas)	Flowmeters, gasmeters, flowcontroller	LFE, MFC, nozzles, orifice meter, soap film devices	0.005	5	l/h	Gas	inert gas	0.08	%	2	95%	Yes		DE31	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	< 3 bar								
						Pipe size	smaller or equal to DN 10								
Flowrate volume (low pressure gas)	Flowmeters, gasmeters	LFE, MFC, nozzles, orifice meter, soap film devices	0.2	200	l/h	Gas	inert gas	0.25	%	2	95%	Yes		DE32	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	< 3 bar								
						Pipe size	< DN 25								
Flowrate volume (low pressure gas)	Flowmeters, gasmeters	LFE, wet gas meters	15	3500	l/h	Gas	air	0.10	%	2	95%	Yes		DE33	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	< DN 50								
Flowrate volume (low pressure gas)	Flowmeters, gasmeters	LFE, wet gas meters, critical nozzles	1	60	m^3/h	Gas	air	0.06	%	2	95%	Yes		DE34	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	DN 10 - 100								
Flowrate volume (low pressure gas)	Flowmeters, gasmeters	Rotary piston meters, turbine meters, ultrasonic meters, vortex meters, LFE, orifice meters	2	5600	m^3/h	Gas	air	0.08	%	2	95%	Yes		DE35	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	DN 50 - 400								
Flowrate volume (low pressure gas)	Gasmeters	Turbine meters, rotary piston meters	200	24000	m^3/h	Gas	air	0.12	%	2	95%	Yes		DE36	Approved on 03 January 2007
						Temperature	ambient								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
						Pressure	ambient								
						Pipe size	DN 100 - 600								
Flowrate volume (low pressure gas)	Gasmeters	Turbine meters	100	6000	m^3/h	Gas	air	0.10	%	2	95%	Yes		DE37	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	DN 10 - 300								
Flowrate volume (high pressure gas)	Gasmeters	Turbine meters, ultrasonic meters, vortex meters, Coriolis meters	8	6500	m^3/h	Gas	high pressure natural gas	0.16	%	2	95%	Yes	PIGSAR	DE38	Approved on 03 January 2007
						Ambient temperature	15° C to 20° C								
						Pressure	15 bar to 50 bar								
						Pipe size	DN 80 - 400, ANSI 600								
Liquid flowrate mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	20000	180000	kg/h	Liquid	water	0.2	%	2	95%	Yes		DE4	Approved on 03 January 2007
						Temperature	20 °C to 80 °C								
						Pipe size	DN 50 - 200								
Mass flowrate	Flow sensors	e.g. Coriolis-type flowmeters	0.3	2100	t/h	Liquid	water	0.04	%	2	95%	Yes		DE22	Approved on 03 January 2007
						Temperature	ambient								
						Maximum pressure	6 bar								
						Pipe size	DN 20 - 400								
Liquid flowrate mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	1000	20000	kg/h	Liquid	water	0.4	%	2	95%	Yes		DE6	Approved on 03 January 2007
						Temperature	25 °C to 65 °C								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
						Pipe size	DN 15 - 50								
Liquid flowrate mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	10	1000	kg/h	Liquid	water	0.4	%	2	95%	Yes		DE8	Approved on 03 January 2007
						Temperature	20 °C to 80 °C								
						Pipe size	DN 10 - 32								
Liquid flowrate mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	50000	120000	kg/h	Liquid	water	0.4	%	2	95%	Yes		DE12	Approved on 03 January 2007
						Temperature	80 °C to 180 °C								
						Pipe size	DN 40 - 150, PN 25								
Liquid flowrate mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	5	2500	kg/h	Liquid	glycol-water solutions	0.3	%	2	95%	Yes		DE16	Approved on 03 January 2007
						Temperature	-15 °C to 80 °C								
						Pipe size	DN 10 - 32								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Mass flowrate (average)	Flow sensors	e.g. turbine, ultrasonic, positive-displacement meters	0.08	46	t/h	Liquid	white spirit (density = 770 kg/m^3, viscosity = 0.77 mPa s)	0.1	%	2	95%	Yes		DE27	Approved on 03 January 2007
						Temperature	ambient								
						Flowrate	0.2 m^3/h to 60 m^3/h								
						Maximum pressure	3.5 bar								
						Pipe size	DN 25 - 80								
Flowrate mass (low pressure gas)	Flowmeters, gasmeters, flowcontroller	LFE, MFC, nozzles, orifice meter, soap film devices	0.005	5	l/h	Gas	inert gas	0.08	%	2	95%	Yes		DE31	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	< 3 bar								
						Pipe size	smaller or equal to DN 10								
Flowrate mass (low pressure gas)	Flowmeters, gasmeters	LFE, MFC, nozzles, orifice meter, soap film devices	0.2	200	l/h	Gas	inert gas	0.27	%	2	95%	Yes		DE32	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	< 3 bar								
						Pipe size	< DN 25								
Flowrate mass (low pressure gas)	Flowmeters, gasmeters	LFE, wet gas meters	15	3500	l/h	Gas	air	0.15	%	2	95%	Yes		DE33	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	< DN 50								
Flowrate mass (low pressure gas)	Flowmeters, gasmeters	LFE, wet gas meters, critical nozzles	1	60	m^3/h	Gas	air	0.12	%	2	95%	Yes		DE34	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	DN 10 - 100								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Flowrate mass (low pressure gas)	Flowmeters, gasmeters	Rotary piston meters, turbine meters, ultrasonic meters, vortex meters, LFE, orifice meters	2	5600	m^3/h	Gas	air	0.13	%	2	95%	Yes		DE35	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	DN 50 - 400								
Flowrate mass (low pressure gas)	Gasmeters	Turbine meters, rotary piston meters	200	24000	m^3/h	Gas	air	0.16	%	2	95%	Yes		DE36	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	DN 100 - 600								
Flowrate mass (low pressure gas)	Gasmeters	Turbine meters	100	6000	m^3/h	Gas	air	0.15	%	2	95%	Yes		DE37	Approved on 03 January 2007
						Temperature	ambient								
						Pressure	ambient								
						Pipe size	DN 10 - 300								
Flowrate mass (high pressure gas)	Gasmeters	Turbine meters, ultrasonic meters, vortex meters, Coriolis meters	8	6500	m^3/h	Gas	high pressure natural gas	0.19	%	2	95%	Yes	PIGSAR	DE38	Approved on 03 January 2007
						Ambient temperature	15° C to 20° C								
						Pressure	15 bar to 50 bar								
						Pipe size	DN 80 - 400, ANSI 600								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Liquid flowing quantity, volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	50	2800	l	Liquid	water	0.2	%	2	95%	Yes		DE1	Approved on 03 January 2007
						Temperature	20 °C to 80 °C								
						Pipe size	DN 50 - 200								
Volume	Flowmeters	e.g. mechanical, electromagnetic, ultrasonic meters	30	30000	l	Liquid	water	0.02	%	2	95%	Yes		DE23	Approved on 03 January 2007
						Temperature	ambient								
						Maximum pressure	6 bar								
						Pipe size	DN 20 - 400								
Volume	Flowmeters	e.g. mechanical, electromagnetic, ultrasonic meters	250	250	l	Liquid	water	0.03	%	2	95%	Yes		DE25	Approved on 03 January 2007
						Temperature	ambient								
						Flowrate	1 m^3/h to 600 m^3/h								
						Maximum pressure	6 bar								
						Pipe size	DN 20 - 400								
Volume	Flowmeters	e.g. turbine, ultrasonic, positive-displacement meters	5	5000	l	Liquid	white spirit (density = 770 kg/m^3, viscosity = 0.77 mPa s)	0.05	%	2	95%	Yes		DE28	Approved on 03 January 2007
						Temperature	ambient								
						Flowrate	0.6 m^3/h to 250 m^3/h								
						Maximum pressure	3.5 bar								
						Pipe size	DN 25 - 150								
Volume (liquid)	Glassware	Pipettes	1	100	l/h	Temperature	room temperature	0.004	%	2	95%	Yes	Water contents	DE30	Approved on 03 January 2007

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Liquid flowing quantity, volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	50	50	l	Liquid	water	0.4	%	2	95%	Yes		DE9	Approved on 03 January 2007
						Temperature	80 °C to 180 °C								
						Pipe size	DN 40 - 150, PN 25								
Liquid flowing quantity, volume	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	5	250	l	Liquid	glycol-water solutions	0.5	%	2	95%	Yes		DE13	Approved on 03 January 2007
						Temperature	-15 °C to 80 °C								
						Pipe size	DN 10 - 32								
Liquid flowing quantity, mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	5	250	kg	Liquid	glycol-water solutions	0.3	%	2	95%	Yes		DE14	Approved on 03 January 2007
						Temperature	-15 °C to 80 °C								
						Pipe size	DN 10 - 32								
Mass	Flowmeters	e.g. Coriolis-type flowmeters	30	30000	kg	Liquid	water	0.02	%	2	95%	Yes		DE24	Approved on 03 January 2007
						Temperature	ambient								
						Maximum pressure	6 bar								
						Pipe size	DN 20 - 400								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Mass	Flowmeters	e.g. Coriolis-type flowmeters	50	900	kg	Liquid	white spirit (density = 770 kg/m^3, viscosity = 0.77 mPa s)	0.05	%	2	95%	Yes		DE29	Approved on 03 January 2007
						Temperature	ambient								
						Flowrate	0.2 m^3/h to 60 m^3/h								
						Maximum pressure	3.5 bar								
						Pipe size	DN 25 - 80								
Liquid flowing quantity, mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	50	2800	kg	Liquid	water	0.2	%	2	95%	Yes		DE2	Approved on 03 January 2007
						Temperature	20 °C to 80 °C								
						Pipe size	DN 50 - 200								
Liquid flowing quantity, mass	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	50	50	kg	Liquid	water	0.4	%	2	95%	Yes		DE10	Approved on 03 January 2007
						Temperature	80 °C to 180 °C								
						Pipe size	DN 40 - 150, PN 25								
Gas flow speed	Laser Doppler Velocimeter (LDV)	LDV	0.1	15	m/s	Particle speed on surface (rotating glas wheel)	Fringe calibration	0.1	%	2	95%	Yes	Back scattering mode	DE39	Approved on 03 January 2007
Gas flow speed	Air speed anemometers	Prandtl tubes, fan type anemometer, hot film anemometer	0.2	60	m/s	Temperature	ambient	0.01 to 0.05	m/s	2	95%	No	Flow in open wind tunnel	DE40	Approved on 03 January 2007
						Pressure	ambient								
						Diameter	< 60 mm								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**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?**	**Comments**	**NMI Service Identifier**	**Approval Date**
Gas flow speed	Air speed anemometers	Prandtl tubes, fan type anemometer < 25mm	0.5	60	m/s	Temperature	ambient	0.5	%	2	95%	Yes	Pipe flow	DE41	Approved on 03 January 2007
						Pressure	ambient								
						Diameter	< 40 mm								
Volume of heat conveying flowing liquid (for thermal energy measurements)	Any flow measurement instrument or flow device	Pulsed, electrical, digital and optical outputs, various methods	no range given	no range given		Liquid	water, glycol-water-solutions	0.2 to 0.5	%	2	95%	Yes	The uncertainty depends on measuring conditions.	DE17	Approved on 03 January 2007
						Pipe size	DN 10 - 200, up to PN 25								
Thermal energy (as a function of liquid flowrate volume and temperature difference)	Any type of calculator	Pulsed, electrical, digital and optical outputs, various methods	3	200	K	Liquid	water, glycol-water-solutions	< 0.2	%	2	95%	Yes		DE18	Approved on 03 January 2007
						Power	20 W to 10 MW								
Temperature difference (for thermal energy measurements)	Any type of temperature sensor pairs	Electrical, digital output, various methods	3	200	K	Liquid	water, glycol-water-solutions	< 0.02	K	2	95%	No		DE19	Approved on 03 January 2007
						Temperature	-15 °C to 200 °C								
Thermal energy	Any type of heat meter	Pulsed, electrical, digital and optical output, various methods	20	10E+06	W	Liquid	water, glycol-water-solutions	< 1.0	%	2	95%	Yes		DE20	Approved on 03 January 2007
						Temperature	-15 °C to 200 °C								
						Pipe size	DN 10 - 200, up to PN 25								