









## Available Calibration Services on the Liquid Properties Laboratory

### Calibration


MEASURING INSTRUMENTS	MEASURING INTERVAL	EXPANDED UNCERTAINTY* (k=2)
Hydrometers Alcohol meters at 20 °C	500 kg m <sup>-3</sup> - 2 000 kg m <sup>-3</sup> 0 cL L <sup>-1</sup> ethanol - 100 cL L <sup>-1</sup> ethanol	0,1 kg m <sup>-3</sup> [750 ; 1 000] kg m <sup>-3</sup> 0,028 cL L <sup>-1</sup> etanol 
Oscillation-type density meters (also available in situ calibration service)	0 kg m <sup>-3</sup> - 1 700 kg m <sup>-3</sup>	0,01 kg m <sup>-3</sup> - 0,03 kg m <sup>-3</sup>
Capillary viscometers (K) at 20 °C	0,001 mm <sup>2</sup> s <sup>-2</sup> - 30 mm <sup>2</sup> s <sup>-2</sup>	0,22 % 
Rotational viscometers	Under implementation	-
Rheometers s	Under implementation	-
Tensiometers a t 20 °C	18 mN m <sup>-1</sup> - 73 mN m <sup>-1</sup>	0,1 mN m <sup>-1</sup> - 0,5 mN m <sup>-1</sup>

### Determination and Certification of Liquids

QUANTITY	MEASURING INTERVAL	EXPANDED UNCERTAINTY* (k=2)
Density	0 kg m <sup>-3</sup> - 3 000 kg m <sup>-3</sup>	0,01 kg m <sup>-3</sup> - 0,03 kg m <sup>-3</sup>
Kinematic viscosity (ν) at 20 °C (of newtonian liquids)	v <sub>1</sub> : 1,2 mm <sup>2</sup> s <sup>-1</sup> - 36 mm <sup>2</sup> s <sup>-1</sup> v <sub>2</sub> : 65 mm <sup>2</sup> s <sup>-1</sup> - 1 800 mm <sup>2</sup> s <sup>-1</sup> v <sub>3</sub> : 4 000 mm <sup>2</sup> s <sup>-1</sup> - 17 000 mm <sup>2</sup> s <sup>-1</sup>  Soon available: at t 15 °C v <sub>4</sub> : 6 mm <sup>2</sup> s <sup>-1</sup> v <sub>5</sub> : 500 mm <sup>2</sup> s <sup>-1</sup>	U <sub>v1</sub> : 0,45 %  U <sub>v2</sub> : 0,50 %  U <sub>v3</sub> : 0,60 %   Soon available: U <sub>v1</sub> : 0,16 % U <sub>v2</sub> ; U <sub>v3</sub> : 0,46 % U <sub>v4</sub> : 0,16 % U <sub>v5</sub> : 0,29 %
Dynamic viscosity (η) at 20 °C (of newtonian liquids)	η <sub>1</sub> : 0,89 mPa s – 28,0 mPa s η <sub>2</sub> : 60,0 mPa s – 1 700 mPa s η <sub>3</sub> : 3 000 mPa s – 15 000 mPa s	U <sub>η1</sub> : 0,45 %  U <sub>η2</sub> : 0,50 %  U <sub>η3</sub> : 1,0 % 
Surface tension	18 mN m <sup>-1</sup> - 73 mN m <sup>-1</sup>	0,1 mN m <sup>-1</sup> - 0,5 mN m <sup>-1</sup>
Rheological properties	Under consulting	-

## Certified Reference Materials (CRM)

CRM FOR DENSITY	NOMINAL DENSITY VALUE (at 20 °C)	EXPANDED UNCERTAINTY* (k=2)	TIME STABILITY
<b>Water and Aqueous Solutions</b>			
Ethanol (C <sub>2</sub> H <sub>5</sub> OH)	789 kg·m <sup>-3</sup> - 997 kg·m <sup>-3</sup>	0,38 kg·m <sup>-3</sup> - 0,08 kg·m <sup>-3</sup>	1 year
Ultrapure water (H <sub>2</sub> O)	998 kg m <sup>-3</sup>	0,010 kg m <sup>-3</sup>	1 year
Ethanol (C <sub>2</sub> H <sub>5</sub> OH)	984 kg·m <sup>-3</sup> - 978 kg·m <sup>-3</sup> 10 cL L <sup>-1</sup> - 15 cL L <sup>-1</sup>	0,017 kg·m <sup>-3</sup> 0,1 cL L <sup>-1</sup>	1 year
Glucose (C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> )	1 140 kg·m <sup>-3</sup> - 1 170 kg m <sup>-3</sup>	0,2 kg·m <sup>-3</sup> - 0,38 kg·m <sup>-3</sup>	1 year
Sodium Chloride (NaCl)	1 140 kg·m <sup>-3</sup> - 1 170 kg m <sup>-3</sup>	0,030 kg m <sup>-3</sup> 0,10 kg m <sup>-3</sup>	6 months 1 year
Sodium Bromide (NaBr)	1 140 kg·m <sup>-3</sup> - 1 370 kg m <sup>-3</sup>	0,19 kg·m <sup>-3</sup> - 0,72 kg·m <sup>-3</sup>	1 year
<b>Organic solvents (1 component)</b>			
n-Hexane (C <sub>6</sub> H <sub>14</sub> )	660 kg m <sup>-3</sup>	0,045 kg m <sup>-3</sup>	1 year
Isooctane (C <sub>8</sub> H <sub>18</sub> )	692 kg m <sup>-3</sup>	0,048 kg m <sup>-3</sup>	1 year
n-Nonane (C <sub>9</sub> H <sub>20</sub> )	718 kg m <sup>-3</sup>	0,051 kg m <sup>-3</sup>	1 year
n-Decane (C <sub>10</sub> H <sub>22</sub> )	730 kg m <sup>-3</sup>	0,040 kg m <sup>-3</sup>	1 year
n-Undecane (C <sub>10</sub> H <sub>22</sub> )	740 kg m <sup>-3</sup>	0,048 kg m <sup>-3</sup>	1 year
n-Dodecane (C <sub>12</sub> H <sub>26</sub> )	749 kg m <sup>-3</sup>	0,034 kg m <sup>-3</sup>	1 year
Toluene (C <sub>7</sub> H <sub>8</sub> )	867 kg m <sup>-3</sup>	0,033 kg m <sup>-3</sup>	1 year
Dimethyl phthalate (C <sub>10</sub> H <sub>10</sub> O <sub>4</sub> )	1 191 kg m <sup>-3</sup>	0,037 kg m <sup>-3</sup>	1 year
Tetrachloroethylene (C <sub>2</sub> Cl <sub>4</sub> )	1 623 kg m <sup>-3</sup>	0,059 kg m <sup>-3</sup>	1 year
<b>Organic solvents (2 components)</b>			
Mixtures of Isooctane (C <sub>8</sub> H <sub>18</sub> ) and Tetrachloroethylene (C <sub>2</sub> Cl <sub>4</sub> )	692 kg·m <sup>-3</sup> - 1 623 kg m <sup>-3</sup>	0,31 kg·m <sup>-3</sup>	1 year

**Notes:** cL L<sup>-1</sup> ethanol - represents the SI unit for the alcoholic strength of alcoholometers - the scale is commonly represented by % v / v;  - Expanded uncertainty as published in the BIPM key comparison database (KCDB) of the CIPM MRA; \*The expanded uncertainty presented in the tables above refers to the lower possible uncertainty to be obtained with the methods in the reference conditions and with certain metrological characteristics of the measuring instruments to be calibrated or characteristics of homogeneity and stability in case of liquid samples to be tested.