

FIELD OF ACTIVITY



Volume measurement



Liquid flow measurement

The Volume Laboratory provides calibrations to the industry, mainly for water meters manufacturers, fuel companies, verification offices, chemical, analytical and pharmaceutical laboratories. There are three separate facilities:

- Small volumes (Glassware and piston operated volumetric equipment);
- Large volumes (Standard test measures and proving tanks);
- Liquid flow (Liquid dosing instruments and flowmeters)

SI UNITS

Derived unit of the International System of Units (SI) of the quantity Volume (V):

cubic meter (m³) defined as: The volume of a cube with 1 metre edge.

Non-SI unit accepted for use with the SI

The litre (L or l) can also be used as a measurement unit and it is equivalent to 0,001 m³ or 1 dm³.

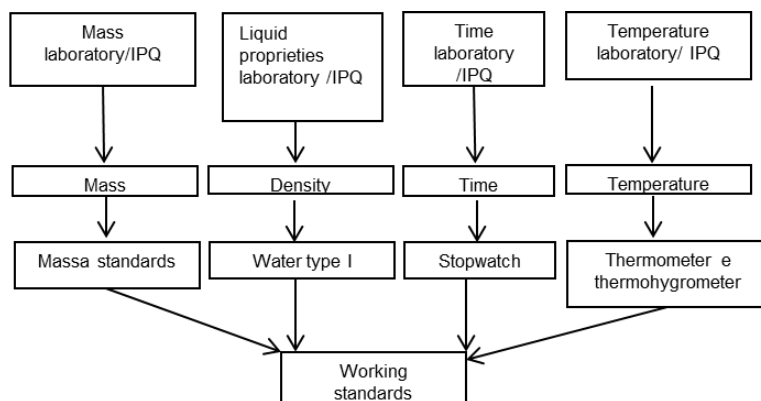
Derived unit of the International System of Units (SI) of the quantity Flow(Q):

cubic meter (m³)/second (s) defined as: the volume of fluid passing through a given area per unit time.











TRACEABILITY

The traceability of the Volume and Flow Laboratory is established to the national mass standards, temperature standards, time standards and density of the used liquid.

Traceability chain of the Volume and Flow Laboratory



Calibration

EQUIPMENT	RANGE	UNCERTAINTY	
Pycnometers	1 mL to 100 mL	0,003 %	
Micropipettes (gravimetric method)	1 µL to 20000 µL	(0,3 - 0,1) %	
Micropipettes (photometric method)	0,1 µL to 1000 µL	(2,7 - 0,4) %	
Dispensers	0,001 mL to 200 mL	0,01 %	
Syringes and Microsyringes	0,001 mL to 200 mL		
Flasks	1 mL to 10000 mL		
Glass burettes	1 mL to 100 mL		
Piston burettes	0,1 mL to 100 mL		
Graduated and volumetric pipettes	1 mL to 200 mL		
Cylinders	1 mL to 2000 mL		
Proving tanks and standard test measures (Gravimetric method)	1 L to 1500 L	0,01 %	
Proving tanks and standard test measures (Volumetric method In Situ)	1 L to 10 000 L	0,02 %	
Proving tanks and standard test measures (Volumetric method)	1 L to 5000 L	0,02 %	
Plain volume measures	1 mL to 1500 mL	0,03 %	
Syringe pumps and peristaltic pumps (gravimetric method)	0,12 mL/h a 2000 mL/h	(2,5 a 0,11)%	
Flow meters and infusion analysers (gravimetric method)	0,12 mL/h a 2000 mL/h	(2,5 a 0,11) %	
Syringe pumps and peristaltic pumps (interferometric method)	0,1 µL/h a 5000 µL/h	2,0%	
Flow meters and infusion analysers (interferometric method)	0,1 µL/h a 5000 µL/h	2,0%	



- Expanded Uncertainty presented in the CMC: BIPM

Methods for the calibration of volume and flow instruments:

Gravimetric Method



Mass comparator with a maximum range of 20 g and mass standards E2

The instrument is weighted empty and dried and then weighted full with the calibration liquid. The difference between the two mass values gives the mass of the contained liquid; usually water, converted then to volume using the formula described in ISO 4787. If we consider the time, flow can also be determined.

Volumetric Method



Volumetric standards from 1 L to 20 L

A constant volume of water previously calibrated by gravimetric method is transferred to the instrument under calibration, according to guide EURAMET cg-21.

In this method the standards are automatic pipettes or automatic volumetric standards of different capacity.

Photometric method



Photometer PCS3

The volume of the micropipette is determined by the variation of the absorbance of the colorimetric solutions used.

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