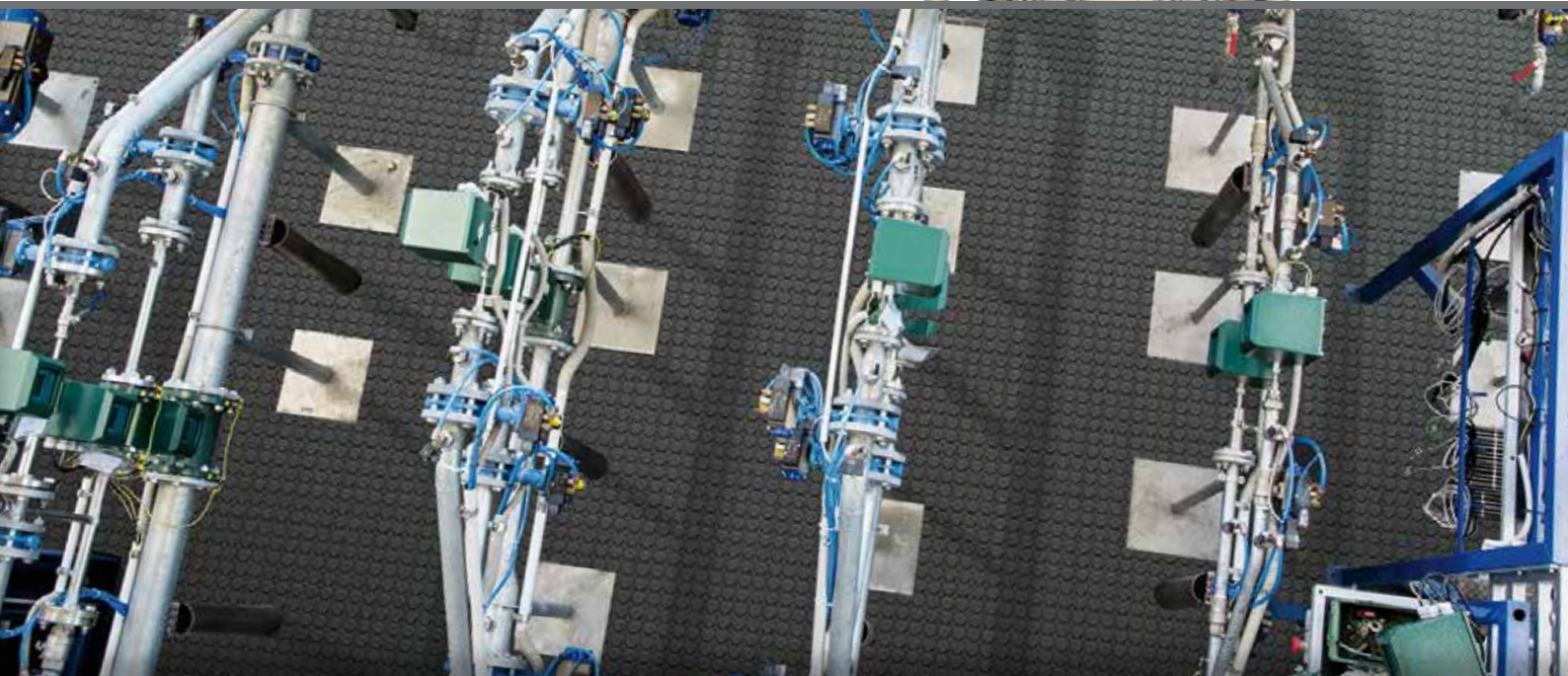


# Accredited Calibration Laboratory Conforming to standard UNI EN ISO/IEC 17025



LAT N° 237  
Signatory of EA, IAF and ILAC Mutual Recognition Agreements



Calibration service for liquid flow meters



## TECHNOLOGY AND EXPERIENCE AT THE SERVICE OF THE CUSTOMER

The calibration laboratory consists of plants and devices for the calibration of measuring instruments for the following physical quantities:

- Volume (totalized)
- Volume flow
- Mass (totalized)
- Mass flow

### 8 CALIBRATION LINES

The system consists of eight lines, each calibration line is designed for the hydraulic connection of a group of nominal diameters as indicated in the following table.

CALIBRATION LINE	NOMINAL DIAMETERS
<b>Line 1</b>	DN3
<b>Line 2</b>	DN6, DN10
<b>Line 3</b>	DN15 to DN25
<b>Line 4</b>	DN32 to DN50
<b>Line 5</b>	DN65 to DN100
<b>Line 6</b>	DN125 to DN300
<b>Line 7</b>	DN300 to DN700
<b>Line 8</b>	DN300 to DN3000

The plant consists of 8 calibration lines running on static weight based, direct comparison with a Master Meter or Master Volume method as shown in the below table.

CALIBRATION LINE	CALIBRATION METHOD		
	GRAVIMETRIC STATIC WEIGHT (VOLUME AND MASS)	DIRECT COMPARISON (MASTER METER) (VOLUME)	VOLUMETRIC PROVING TANKS (VOLUME)
<b>Line 1</b>	●	●	
<b>Line 2</b>	●	●	
<b>Line 3</b>	●	●	
<b>Line 4</b>	●	●	
<b>Line 5</b>	●	●	
<b>Line 6</b>	●	●	
<b>Line 7</b>		●	
<b>Line 8</b>			●

#### Indirect method for static weighing

The system consists of a calibration system using the static weighing method complying with the norm UNI EN 24185:1994 "Measurement of fluid flow in closed conduits - Weighing Method". This standard is specific for calibration of the flow rate (in volume and in mass). The same standard is used as a reference for the calibration of the volume and mass totalized.



Calibration lines 1 to 6 for diameters from DN3 to DN300

#### Direct method for comparison against reference (Master Meter)

The method involves direct comparison between the instrument to be calibrated and one or more instruments used as reference. The system is designed in such a way as to allow the installation of the measuring tube of the instrument used as reference sample and measuring instrument to be calibrated in series. The two instruments are directly connected by means of a hydraulic line made of steel pipes.

The metrological performance of the measurement is ensured by the possible choice of each line and one of three Master Meters of different nominal diameters.

#### Volumetric method for direct comparison with volume reference

The method involves direct comparison between the indication of the instrument to be calibrated and the volume of the reference tank between the initial and final levels determined by the calibration. The reference volumetric flow rate is determined by the ratio between the volume and the emptying time.



The 8 calibration lines use different calibration methods; static weighing, direct comparison with Master Meter or with a sample volume as shown in the table:

	PARAMETER	MINIMUM FLOW	MAXIMUM FLOW
CALIBRATION LINE	V = Volume M= Mass	Volume: dm <sup>3</sup> /s Mass: kg/s	Volume: dm <sup>3</sup> /s Mass: kg/s
<b>Line 1</b>	V,M	0,0036	0,072
<b>Line 2</b>	V,M	0,0065	0,80
<b>Line 3</b>	V,M	0,0065	4,5
<b>Line 4</b>	V,M	0,025	20
<b>Line 5</b>	V,M	0,08	80
<b>Line 6</b>	V,M	0,5	290
<b>Line 7</b>	V	1	480
<b>Line 8</b>	V	7	4000

**The calibration lines from 1 to 6** are equipped with submersed power pumps regulated by an inverter (the pumps are installed in a common tank with a capacity of 600 m<sup>3</sup>), a system of steel pipelines making the hydraulic path, valves, devices for air venting, process connections for the devices under test to be calibrated and an electronic scale with storage tank of adequate measurement volume capacity.

A high-precision flow diverter controls the filling of the weighing tank.

A bypass hydraulically connects the flow diverters of the six calibration lines, allowing optimization of the metrological calibration performance using the most appropriate scale for resolution and accuracy.

**Line 7** consists of a closed loop hydraulic circuit that includes a pumping station and four master meters.

Calibration lines 1 to 7 can perform calibrations utilizing the comparison with Master Meter method. On each line there are several master meters, appropriately sized, so as to guarantee high metrological calibration performances over a wide range of flow rates.

**The calibration line 8** is equipped with a volumetric tank of 550 m<sup>3</sup> capacity, the calibration of the instrument (DUT device under test) foresees the progressive emptying of the tank under controlled conditions.

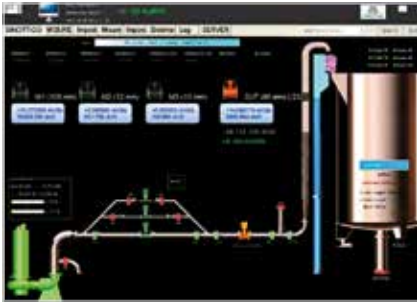


Tanks with electronic balance and empty valves

Calibration line 8 for diameters up to DN3000

## THE SOFTWARE

Calibration processes activities are completely automated and directly interface with system management software that controls all calibration operations.



Synoptic of lines 1 to 6  
for diameters from DN3 to DN300



Synoptic of line 7  
for diameters from DN300 to DN700



Synoptic of line 8  
for diameters up to DN3000

## THE MANAGEMENT

The management of all calibration orders is fully automated and is directly linked with the software system issuing Certificates of Calibration at the end of the tests.



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