एफ.सी.आर.आई.

FLUID CONTROL RESEARCH INSTITUTE

WATER FLOW LABORATORY

The Water Flow Laboratory, established in 1989, has been providing technical consultancy, research, training, testing and calibration in flow measurement for our clients across the globe. Activities of water flow laboratory are centered around calibration and testing of flow products including flow meters, valves, pumps and fire fighting equipments with water as medium of flow.

Water Flow laboratory

Static gravimetric method as per ISO 4185 is adopted here for measurement of flow rate. The Water Flow Laboratory has two divisions viz. the 600 mm Water Flow Laboratory and the 100 mm Water Flow Laboratory.

The flow meters are calibrated to the highest accuracy by weighing the quantity of water that passes through the meter during a known time interval. The laboratory is designed to handle a maximum flow rate of 4500 m^3/h and a maximum pressure of 3 bar. Pipes upto 900 mm NB diameter can be accommodated in the system. The test rig has different test line sizes up to 900 mm NB and the laboratory is capable of extending the line size upto 1200 mm. A large underground sump of 370 m^3 capacity is used to store the required water. The test rig is supplied with water at constant head from an over head tank of 50 m^3 capacity and 18 m head. During operation the constant head tank (CHT) is continuously overflowed using different low pressure pumps, which can be selected according to the requirement of the test meter. Weighing tanks of capacities 30 kg, 300 kg, 2000 kg and 20000 kg are made available for the flow measurement. Diverter systems are used to divert the flow to the weighing tank for an accurately measured time period (flying start and stop method). The mass measurement is by high precision electronic balance/load cell. Time is measured using universal counter which is triggered by a photo switch connected to the diverter system. A set of high precision differential pressure transmitters are available for the measurement of differential pressure.

Specifications of the Water Flow Laboratory (NABL)					
Max. Flow Rate (m^3/h)	Max. Size	Measurement Uncertainty			
		In Mass Flow rate	In Volume Flow rate	In Total Volume	In Total mass
4500	900mm	±0.03% (Upto 200 T/h) ±0.05% (200 to 2500 T/h)	±0.05% (Upto 600 m^3/h) ±0.10% (600 to 2500 m^3/h) ±0.15% (2500 to 4500 m^3/h)	±0.05% (Upto 20 m^3)	±0.01% (0 to 2000 kg) ±0.025% (2000 to 20000 kg)

The density of water at flowing condition is measured using an online density meter. Together with measurement of density at the moment of each diversion enables mass readings, after correction for buoyancy, to be converted into volume. The volume is divided by the respective diversion time to obtain accurate measurement of flow rate.

The laboratory has been accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) and certified by GCAS for ISO 9001.

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FCRI

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Special Tests at Water Flow Laboratory

Validation of Flow Nozzle assembly as per ASME PTC-6 2004

In order to conduct the turbine acceptance tests, accurate determination of primary flow is necessary to compute turbine heat rate or steam rate. All known errors must be reduced so that their individual effect is less than 0.05% of the primary flow to be measured.

Experience shows that the coefficient of discharge for a particular flow section cannot be satisfactorily predicted to meet PTC Code uncertainty objectives, and, therefore, it is necessary to calibrate each flow section. At FCRI, calibration can be undertaken with a similar Reynolds number to those in the actual installation. The physical construction of the piping in the calibrating setup can be assembled similar to that in the test setup immediately upstream and downstream of the flow-measuring section. Reynolds number in the range of 4 million can be achieved at our facility.

Many Indian and overseas customers are utilizing FCRI facilities for the calibration of their PTC -6 flow nozzles as part of qualification tests.

Laboratory Proving of Compact Provers

Water draw calibration of Compact Prover, Pycnometry and meter proving can be conducted, as per API MPMS at the laboratory. It is essential to determine the base volume of the Compact Prover. Here the signal from the detector switches are used to start and stop the flow from the prover outlet, which will be collected in a volume vessel or a weigh tank. By determining the density of the collected water, we can establish the base volume. At FCRI we can provide direct traceable volume measurement to the minimum uncertainty level. Base volume certification of Pipe Provers at site is also handled by FCRI.

Fitness for purpose requirements and appropriate verification tests at FCRI

At Fluid Control Research Institute (FCRI) exclusive test facilities for the testing of the valves against BS EN 1074 – "Valves for water supply – Fitness for purpose requirements and appropriate verifications tests" are available. Valves like Gate valves, Butterfly valves, Pressure Relief valves used in the drinking water pipe works are tested against this standard. Many Indian customers are utilizing our facility before exporting their valves to European countries.

Testing of Pressure Relief Devices as per ASME PTC 25 - 2008

The blow down capacity, lift at set pressure, over pressure and reseating pressure can be experimentally determined at the Water Flow facility. The experiment can be conducted at a pressure of 16 bar and at a flow rate of 100 m^3/hr.

The purpose of the testing is to determine the functional and operational characteristics of the pressure relief valves used in high pressure applications. The experiment can be conducted with different internals to attain the required set pressure and flow rate.

International Inter-comparisons

Water Flow Laboratory has conducted inter laboratory comparisons with International laboratories like Delft Hydraulics - Netherlands, National Engineering Laboratory - United Kingdom and proved that the FCRI results are well comparable with International flow measurement systems.