

Fluid Control Research Institute

A premier Institute for testing & calibration of flow products

The necessity of an R&D / engineering assistance for flow products industry testing & calibration facility for the performance evaluation of the control valves, flow devices led to the idea of having a Fluids Engineering dedicated facility.

Fluid Control Research Institute (FCRI) was established by the Govt. of India during 1984 with the technical and financial assistance of the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) as the executing agency and M/s. Instrumentation Ltd. as the implementing agency on behalf of Ministry of Industry.

The Water Flow Laboratory of FCRI started operating by the end of 1988. The institute was inaugurated on 18th April, 1989 by the then Honourable President of India, Shri. R. Venkitaraman.

The institute is the first of its kind in South East Asia and is on par with similar establishments in the developed countries.

The Institute has now completed its 21 years of dedicated service to the nation. During these eventful years the institute has endeavoured to be a

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Shri S. Saseendran. Commodore (Retd.) has taken over as Director, FCRI w.e.f. April 11, 2005 after the super annuation of Shri M.S. Konnur.

He served the Indian Navy for almost 30 years. His last appointment being Add. Director, Defence Machinery Design Establishment, Hyderabad.

center of excellence for long term R&D requirements of public/private sectors of industry and a major quality assessment and calibration facility. FCRI has been approved by several National organizations for flow product evaluation and acts as a National Certifying Authority.

Major Activities

- Providing design and development assistance to Flow Products industry
- Testing and calibration of flow products as per API, AGA standards.
- Execution of projects sponsored by private, public and Government agencies. (More than 50 completed)
- Quality and reliability assessment of flow products.
- Standardisation and "Model Approval" evaluation of flow elements as per OIML R-117 (legal metrology) standards

- Calibration of metrological instruments.
- Noise, structural and vibration studies.
- Technical documentation and information dissemination.
- Training programs and course for industrial personnel from India and abroad.

- Multi-client consortium projects.
- Software Development & CFD Activities.

Major Facilities

Water Flow Laboratory (WFL)

The Water Flow Laboratory has test rigs for the precise calibration of flowmeters, testing of valves, pipe fittings and other flow products. The whole system is designed to handle a maximum flowrate of 5000m³/h. Pipeline size upto 600mm with a sump of capacity 370m³ is used. Every measurement in this system is traceable to the NPL standards of length, mass time and temperature.

Air Flow Laboratory (AFL)

Primary Air Flow Laboratory

The medium of test is air at controlled temperature and Relative humidity. The PAFL houses the primary flowmetering devices like Bell Prover, Soap Film Burette and the piston prover (Automatic primary calibration setup).

Secondary Air Flow Laboratory

The Secondary Air Flow Laboratory provides reference secondary

standard meters flow standards against which flowmeters / flow products can be calibrated and tested. Purpose built test lines are available up to 400mm dia., which can be interchanged using adapter pipe pieces. The maximum flow rate is 10,000 m³/h. The reference standards are Critical Flow Venturi Nozzles (Sonic Nozzles). The SAFL is also equipped with a Wind Tunnel Facility, which can be used for flow visualisation studies and calibration of velocity probes.

20 Bar Closed Loop air Test Facility (CLATF)

FCRI has recently commissioned the 20 bar closed loop air test facility. Using this it is possible to test/calibrate, flowmeters and other flow products upto 100mm size, maintaining required constant pressure and temperature without interruption. This facility for high pressure testing in air medium is the first of its kind in India.

High Pressure air Test Facility (HPATF)

This facility is for testing of safety relief valve and other high pressure devices (upto 20 bar) as per relevant standards. This facility has been approved by the Chief Controller of Explosives (CCE), Nagpur.

Oil Flow Laboratory (OFL)

OFL employs gravimetric method of calibration of flow meters using a fluid very similar to Aviation Turbine Fuel (ATF)

oil. The system can handle upto a maximum flow rate of 650m³/h. The lab also houses a Multi viscous test facility.

Physical Standards Laboratory (PSL)

This laboratory provides calibration services in the field of dimensional metrology, pressure metrology, mass, volume, density, viscosity, humidity and material testing. Master equipment available are all traceable to National Physical Laboratory at New Delhi. Calibration activities carried out with established procedures in conformance with BIS/ISO/OIML specifications.

Electronics and Instrumentation Laboratory & Environmental Test Facility (EIL)

EIL does calibration and testing of electrical and electronic Equipment/instruments ranging from Precision Digital Multimeters, Universal Counters, Timers, Electronic Indicators, Multifunction calibrators, LCR meters, other types of T&M Instruments, Temperature measuring instruments etc.

Environmental Test Facility caters to the needs for testing of temperature/humidity, HVAC equipment, electrical/

electronic measuring/ indicating instruments, electrical switchgear/ control gear enclosures, RF/wireless – communication and home audio visual equipment, new products developed for space/ aerospace and military applications etc.

Static Temperature tests as per IEC 68-2-1, IEC 68-2-2, IEC 68-31, etc.

Dry heat test as per IEC 68-2-2,

Damp heat tests (steady-state & cyclic, condensing, etc.) as per IEC 68-2-30, IEC 68-2-3, IEC 68-2-56, etc.

Composite temperature/ humidity cyclic tests.

Change of Temperature tests.

Ingress Protection tests including Water spray and Water jet, Dust Spray test.

Electrostatic Discharge test and Electrical Burst Test.

Tests under control conditions for temperature, humidity, Pressure/ Vacuum, Electrical Power, simulated signal inputs etc.

Noise & Vibration Laboratory/ Hemi Anechoic Chamber and Mechanical Testing Facility

Noise & Vibrating laboratory is well equipped to conduct noise & vibration

measurements/ calibration. The laboratory caters to Calibration of RPM indicators, tachometers, vibration pick ups, sound level meters, Accelerometers, Measurement of Valve noise, Torque Machine vibration monitoring, Impact testing of specimens as per ASTM E 23, Stress Analysis of Valve Body, Fatigue Testing of Engine Valves and Seismic Testing.

This laboratory also has a Hemi Anechoic Chamber in accordance with ISO standards for testing of all kinds of equipment for their noise evaluation and performance.

Softwares Developed at FCRI

- FMSEL (Flow meter selection and sizing as per ISO/AGA/BS standards.)
- Water hammer analysis package.
- NWTON (Hydraulic design of water distribution networks)
- AUTOVALV (Selection and sizing of control valve)
- AGROPUMP (Agricultural pump selection)
- UNICON (Unit conversion)
- VAP (Valve analysis program)
- CALLINE (Best-fit estimation and uncertainty calculation)
- SAFEVALV (Selection and sizing of safety relief valve)
 - SMART / FLOWTECH (custody transfer properties, Flow rate, Orifice bore calculation for natural gas flow as per AGA standards)

FCRI is Accredited by the Following national & International Establishments.

- NABL accreditation in the field of Fluid Flow Measurements (Calibration & Testing) and Mechanical Measurements.
- Bureau of Indian Standards (BIS), has recognised FCRI for testing samples of products under BIS Certification mark scheme.
- DST & DSIR has recognised FCRI as an R&D Institute for Flow Measurements
- Dept. of Weights & Measures, Ministry of Civil Supplies has accredited for “Model Approval” of flowmeters/ devices for Hydrocarbon industry for Oil & Gas custody transfer as per OIML Standards
- Chief Controller of Explosives, Nagpur has approved FCRI for testing safety relief valves.
- Under Writers Laboratory, USA has approved FCRI for testing fire fighting equipments & Products safety certification.
- ITEC & Dept. of Economic Affairs (Colombo Plan) have authorised FCRI for conducting technical training programmes for foreign nationals
- Central Pollution Control Board – Approval for certification of Petrol and Kerosene generator sets for implementation of noise limits.

Some Major Customers

ONGC
GAIL
IPCL
BPCL
HPCL
Reliance Petroleum
Kochi Refineries
Chennai Refinery
Essar Oil

Fouress Engg.
 Fisher Rosemount
 KSB Pumps
 ABB Birla
 Mil Conrols
 Krohne Marshall
 FMC Sanmar Ltd.
 Instrumentation Ltd.
 Liquid Controls
 Endress + Hauser
 HOCL
 HNL
 BARC
 IGCAR
 TCE
 EIL
 NPC
 NTPC
 BHEL
 Essar Power
 BWSSB
 BMC
 Delhi Jal Board
 NHPC
 INDALCO
 NALCO
 BALCO
 SAIL
 HAL
 Indian Airlines
 VRDE
 Air India
 Indian Air Force
 Maruti Udyog
 Ashok Leyland
 Hindustan Motors
 Pricol
 ISRO
 Cochin Shipyard

**Major R & D Activities /
 Projects / Assignments
 Undertaken by FCRI**

- Development of Cone Flow Meter.

- Development of Thermal Mass Meter.
- Development of Five Hole Probe.
- Sump Model Projects.
- Testing of water meters.
- Flow Distribution Studies in Grid Plate Assembly.
- Model approval of flow meters.
- Testing of Fire Fighting Equipments for Underwriters Laboratories inc., USA.
- Model Study for performance evaluation of Heat exchanger of PFBR and optimisation of its performance using air as test fluid.
- Model study for optimisation of moderator flow in a pressurised heavy water reactor using water as test fluid.
- Model Study for performance evaluation of Grid Plate Assembly of PFBR heat exchangers.
- Pressure Pulsation / endurance test of heat exchangers used in Transport systems.
- Design of Jet Pumps.
- Level Control Loop installed for Training purposes at NPCIL, Kaiga
- Acoustic Evaluation of Valve Series.
- Flow Measurement in Gas Turbine Test Loop at Site.

Training Programmes

- National
- Flow Metering Computation & Automation.
- Industrial Flow Measurement Techniques
- Pressure Temperature And Level Measurement In Process Industry.
- Industrial/ natural Gas Flow Measurement as per AGA/API

- Metrological Calibration For Industrial Requirements as per ISO /API
- Metrological Calibration for Industrial Requirements as per ISO 9000
- Oil & Gas Flow Measurement For Custody Transfer as per API/OIML
- Metro/Urban water Distribution Engg.
- Recent Trends In Valves & Actuators.
- Management of Traceability/ Standards for ISO 9000 Quality Norms.
- High Pressure Testing of Flow Products & Noise Evaluation Methods.

Customised Training Programmes

Specific training programmes for organisations/ industries on the above & related fields can be conducted at Site/ FCRI. Similar training programmes have already been conducted for ONGC, GAIL, IPCL, Bongaigaon Refinery, ISPAT, Tamilandu Pollution Control Board, Municipal Water Corporation, Nagpur, Binani Zinc, Malayala Manorama.