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FLUID CONTROL RESEARCH INSTITUTE

AIR FLOW LABORATORY

FCRI has established air flow facilities covering areas related to industrial gases. A full-fledged low pressure calibration facility has been in existence since 1989 operating at near atmospheric pressure with flow rates upto 10000 m^3/h. Various types of flow meters of sizes upto 400 mm are evaluated with measurement uncertainties, which are in par with international institutions.

Primary Air Flow Laboratory (PAFL)

Calibration of flowmeters at low pressure is carried out in Primary Air Flow Laboratory (PAFL) for flow ranges upto $40m^3/h$. As per the norms stipulated by the International Standards Organisation (ISO) for standard atmospheres for conditioning, ambient is maintained at a temperature of $20 \pm 0.5^{O}C$ and at relative humidity of 55 ± 5% through an air conditioning system operated continuously. The conditioned atmosphere of PAFL maintains the metrological qualities of the master flow meters and thereby provides high reliability of calibration and operating performance.

Secondary Air Flow Laboratory (SAFL)

Secondary Air Flow Laboratory has reference flow meters upto a range of 10,000 m3/h. Sixteen numbers of critical flow venturi nozzles having capacities in the range 0.7 m^3/h - $2880m^3/h$, designed as per ISO 9300 serve as reference standards

20 Bar Blow Down Air Test Facility

Compressed air is stored in four Vessels 11 m^3 capacity at a pressure of 20 bar(g). During tests air is discharged (blow down mode) through reference meters and products to be calibrated/tested. This facility is mostly used for testing of Safety relief v alves and flowmeters upto 4" nominal diameters.

Primary Standard Gravimetric System (PSGS)

PSGS enables primary calibration of flow meters using air upto $50m^3/h$, at pressure upto 20 bar(g). The measurement uncertainty is about 0.1%. Using this system, the traceability of calibration of reference meters in CLATF is established

Laboratory	Max. Flow Rate(m^3/h)	Max. Line Size	Uncertainty in Flow Rate (% reading)	Uncertainty volume (% reading)
Air Flow (1bar abs)	10000	400mm	0-40 m^3/hr : ± 0.2% > 40 m^3/hr : ± 0.25%	0 - 0.5 m^3 : ± 0.1%
Closed Loop Air Test Facility (20 bar)	400 50	100mm 50mm	±0.27% ±0.12%	-

Major Calibration & Testing Facilities at FCRI

Laboratory Fluid Flow NABL C 026	Max. Flow Rate m^3/h	Max. Line Size	Uncertainty in Flow Rate (% reading)	Uncertainty in Volume (% reading)
Water Flow	5000 15000	1200 mm 1600 mm	0 - 1800 m^3/hr : ±0.1% 1800 - 5000 m^3/hr : ±0.25% 5000 - 15000 m^3/hr : ±0.5%	0-20 m^3 : ± 0.05%
Air Flow	10000	400 mm	0-40 m^3/hr : ± 0.2% >40 m^3/hr : ± 0.25%	0-05m^3 : ± 0.1%
Closed Loop Air Test Facility (20Bar) * Calibration Loop * Gravimetric Loop	400 50	100 mm 50 mm	± 0.3% ± 0.1%	
Oil Flow	650	200mm	0-100 m^3/hr : ±0.075% 100-650m^3/hr : ± 0.1%	0.9m^3 : ± 0.05%

	Parameters	Range	Accuracy	Parameters	Range	Accuracy
Mechanical Calibration Metrological, Pressure, Noise, Vibration etc. NABL C 056	Length	0.5 to 100 mm 125 to 500 mm	00 Grade 0 Grade	Volume	1-5000 ml 5-50 litrs 50-250 litrs	0.01% 0.02% 0.05%
	Mass	Upto 50 kg.	Class F2	Density	0.6 to 1.6 g/cc	0.0005g/cc
	Prassure	-1 to 7 Bar (air) 1-1200 bar (Oil)	0.025 % rdg. 0.02 % rdg.	Viscosity	1 to 60000 mPa.S / cst	1% reading
	Vacuum	-0.95 bar to 0	0.03 % rdg.	Barometer	0.85 - 1.3 bar	0.02% rdg.
	Angle	0 - 360 deg	2.75 min.	Surface Finish	2.5 m (Ra)	5%
	Torque	0.2 - 60 Nm 60 - 4000 Nm	0.2 % rdg. 0.25 % rdg.	Force	Upto 50 kgf 50 - 1000 kgf	0.14% rdg 0.25% rdg
	Acoustic Pressure	94 dB @ 1 Khz 114 dB @ 1 Khz 124 dB @ 250 Hz	0.3 dB	Acceleration	0.1 to 100m/S^2 (0.01 to 10g)	4% (5 Hz to 5 Khz)
	Sound Power	As per ISO 3744 & 3745		Speed	10,000rpm upto 25,000 rpm	1.20 rpm 3.60 rpm
Electro Technical Calibration NABL C 0254	Voltage	Upto 1000 V AC DC	±0.02% to 4 ppm ±0.02% to 8 ppm	Time	0.1 sec - 1000 sec 1000 sec - 5400 sec	9m sec - 0.9 sec 0.9 sec - 0.1 sec
	Resistance (DC)	1Ω-100 MΩ	±0.02% to 40 ppm	Frequency	Upto 15 MHz	1to 14 ppm
	Current	Upto 100 A AC DC	0.03% to 2.6% 0.01% to 0.04%	CRO Calibration	Sine Wave (Upto 600 MHz) Square Wave DC Voltage, Time Marker	±1x10^{-3}% ±1x10^{-3}% ±0.02% ±1x10^{-3}%
Temperature Calibration NABL C 0255	Temperature	-70° C to + 1000°C	±0.07% to 1.13%	Dust Chamber Water Jet Temp + RH Chamber	IP 65 0-70°C 20 to 95% RH	±0.06°C ±0.5% RH

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