

CSIR- NATIONAL PHYSICAL LABORATORY

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From: Director, CSIR-NPL

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CORRIGENDUM

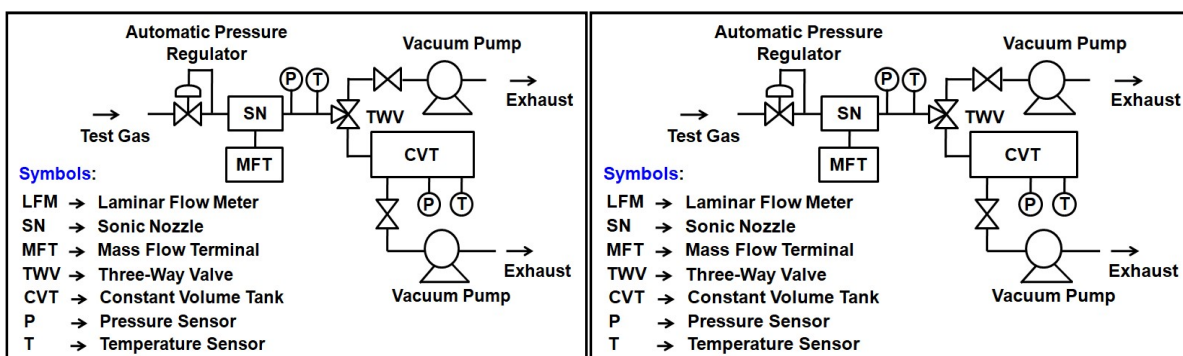
With reference to NPL's Global Tender ID: **2025_CSIR_222621_1**, It was inadvertently old specification was uploaded on the portal, now a corrigendum being uploaded for revised specifications on portal as follows:

DETAIL REVISED TECHNICAL SPECIFICATIONS

Annexure-1

Specifications of PVTt Standard (Primary Gas Flow Standard)

The turnkey PVTt (i.e. Pressure, Volume, Temperature and Time) standard consists of large number of items such as water temperature bath, collection tanks temperature and pressure sensors with indicators, vacuum pumps, vacuum sensors with indicators, sonic nozzles with flow display device, frequency counter/ timer, diverter valves, on/off valves, precision pressure regulators with feedback (also called automatic pressure regulators), pipes and fittings, automation hardware and software etc. Figure 1 shows the schematic diagram of calibration of the laminar flowmeter and sonic nozzle through PVTt Standard respectively.



(a) Laminar Flowmeter calibration

(b) Sonic nozzle calibration

Figure 1. Schematic diagram of calibration of the laminar flowmeter and sonic nozzle through PVTt Standard (Timer, air compressor system and other automation hardware not shown in the diagram)

The detailed specification of the system is given below:

- (1) Flow Range: 1 L/min to 1200 L/min referenced to standard temperature and pressure conditions of 25 °C and 101.325 kPaa respectively.
- (2) There will be two systems. First system will have tank volume of approx. 35 L which will cover the flow from 1 L/min to 100 L/min. Second system will have tank volume of approx. 450 L which will cover the flow range from 30 L/min to 1200 L/min. Expanded Uncertainty: $\pm 0.15\%$ or better in the above flow ranges.
- (3) Supported gas: Air and Nitrogen (The other gases can be also calibrated with increased uncertainty)
- (4) High stability Water Temperature Bath:
 - (a) Size: 2.5 m (L) \times 1 m (W) \times 1 m (H)
 - (b) Material of construction: SS 316L,
 - (c) Thickness of SS Sheet: minimum 2 mm
 - (d) Operating range: (20-30) °C
 - (e) The bath should have temperature uniformity of 100 mK or better and temperature stability of 100 mK or better. The heating and cooling arrangement should be provided for maintaining proper temperature uniformity and stability with 9 nos. of cylinders housed inside. So, all the clamping arrangement should be provided for these cylinders in the water bath.
 - (f) The bath should be covered with Acrylic sheet of minimum 5 mm thickness.
- (5) Collection Tanks:
 - (a) Material of construction: SS 316L with high finish inside
 - (b) Thickness of the each cylinder: minimum 6 mm
 - (c) Size of the cylinder for 35 L Tank: Length: approx. 1.82 m, inner diameter: 16 cm with end circular cap, Qty: 01 no., to be mounted horizontally in the water bath
 - (d) Size of the cylinder for 450 L Tank: Length: approx. 1.82 m, inner diameter: 20 cm with end circular cap, Qty: 08 nos. to be mounted horizontally in the water bath and interconnected
 - (g) End connection for 35 L Tank: KF16 or other leak proof fitting with DN15 pipe line
 - (h) End connection for 450 L Tank: KF25 or other leak proof fitting with DN25 pipe line
- (6) Sonic Nozzles alongwith Flow Display Device
 - (a) 4 Nos. of sonic nozzles to cover flow range from 1 L/min to 50 L/min should be supplied.
 - (b) The flow should be displayed either in flow display instrument or in the computer automation software. For derivation of flow, high accuracy digital thermometers, pressure gauges and associated instrumentation of required accuracies should be used to get flow accuracy of $\pm 0.20\%$ or better. The accuracy is defined as $\leq \text{error} \pm \text{uncertainty}$.

- (c) Operating pressure ranges of the sonic nozzles are 50 kPaa to 600 kPaa.
- (7) Temperature sensors with Display/ Readout:
 14 temperature sensors [4-wire 25.5 ohm PRT type with temperature co-efficient (α) of $0.0039250 \Omega/\Omega/^{\circ}\text{C}$, W(Ga) of ≥ 1.11807 with gold plated spade connectors and inconel sheath] alongwith readout and or temperature scanner should be provided. The length of the sensor cable must be approx. 1.5 m for connection to temperature readout/ scanner. The accuracy of the temperature measurement should be $\pm 0.02^{\circ}\text{C}$ or better.
- (8) Pressure gauges (Quantity: 02 nos):
- (a) Absolute type pressure gauges with maximum range of 130 kPaa or higher.
 Pressure measurement range: 40 kPaa to 130 kPaa or more.
 - (b) Resolution: 1 ppm, user selectable
 - (c) Long-term Stability (1 year): $\pm 0.005\%$ of reading or better
 - (d) Precision: $\pm 0.005\%$ of reading or better
 - (e) Accuracy of pressure gauges: $\pm 0.01\%$ or better at 100 kPaa.
- (9) Vacuum Gauges (Quantity: 2 nos.).
- (a) Thermocouple type or other type vacuum gauges for required application
 - (b) Range: 10 Paa to 100 kPaa
 - (c) Accuracy: $\pm 10.0\%$ or better at 10 Paa.
- (10) Vacuum pumps (alongwith roughing vacuum pump), Quantity: 02 nos. should be supplied. The vacuum pumps which are capable to achieve the vacuum level of 10 Paa without use of roughing vacuum pumps are also acceptable.
- (11) Frequency Counter/ timer (Quantity: 1 no.) for time interval measurement
- (a) Capability to measure Frequency, Period, Ratio, Time Interval, Phase, Voltage, Duty Cycle, Pulse Width, Rise/Fall Time
 - (b) Frequency measurement range: 0.001 Hz to 350 MHz, Time base frequency: 10 MHz
 - (c) No. of Channels: two
 - (d) Time measurement range: upto 1000 s or more, time measurement in positive & negative trigger mode, trigger voltage: upto $\pm 5\text{V DC}$ (1x), $\pm 50\text{V DC}$ (10x),
 common channel mode
 - (e) GPIB/USB/ RS-232 interfaces.
 - (f) Resolution in time and frequency modes: 100 ps or better and 12 digits/s respectively
 - (g) Triggering source: Internal, external and other type if any
 - (h) Ageing rate: ± 0.5 ppm per year or better, high-stability Oven Time Base
 - (i) Calibration uncertainty (for one year): ± 0.5 ppm or better (at 95% confidence level) in frequency mode

- (j) All the accessories (interface cables, signal input output cables, various adaptors (BNC to Banana, BNC to N-type, BNC male to female, etc., Tee), required for proper functioning of the frequency counters must be supplied.
- (12) Precision pressure regulators with feedback (i.e. Automatic Pressure Regulator),
Quantity: 02 nos., for controlling upstream and downstream pressure to maintain the Pressure constant. The position of the pressure regulators may be altered depending upon the conditions.
 - (a) Pressure range: 50 kPaa to 700 kPaa
 - (b) Stability: $\pm 0.05\%$ of the pressure set point or better
 - (c) Accuracy: $\pm 0.1\%$ of the reading or better
- (13) High speed 3-way switching valves, electro-pneumatic type (Quantity: 02 nos.)
 - (a) One 3-way valve with size DN15 or other suitable size, flow rating of approx. 150 L/min@100 kPaa, Switching on time: 10 ms or less, Switching off time: 10 ms or less.
 - (b) One 3-way valve with size DN25 or other suitable size, flow rating approx. 1500 L/min @100 kPaa, Switching on time: 10 ms or less, Switching off time: 10 ms or less.

In place of 3-way switching valve, two nos. of 2-way switching valves can be also used where one valve is kept on and other is kept off. The operation of these valves will be reversed when diverting the flow from bypass line to collection tank.
- (14) Complete automation of the system should be done with development of software. All the hardware & software for automation should be provided. The vendor should mention the application for software development (such as Lab View or other). A latest Desktop (i7 processor or better with minimum 16 GB RAM, 1 TB hard disk and 1 TB SSD) with genuine MS Windows 10 or higher version and other required software should be supplied for automation purpose. Also, one multifunction printer with fax, copy, scan (black & white and colour) and print (black & white) should be supplied. The acquired data should be presented in MS-Excel for further processing.
- (15) One 2 kVA online UPS with 1 hour battery backup should be supplied for the above system.
- (16) Warranty of the complete system for 1 year after satisfactory installation and commissioning.
- (17) The system should work on 220V $\pm 10\%$ and 50 Hz $\pm 5\%$ power supply condition.
- (18) All accessories, valves, adaptors, pipes, tubing etc. required for complete operation of the system should be supplied.
- (19) All the calibration certificates of the equipments (high stability water temperature bath, temperature sensors with readouts, pressure sensors with readout, pressure gauges, vacuum

gauges, sonic nozzles, frequency counter/timer) should be supplied from ISO/IEC 17025 standard accredited laboratories.

(20) On-site Training should be provided for 5 working days to the NPL staffs (3 nos.) for proper operation and maintenance of the system.

(21) The items will be shipped to NPL. The pre-delivery test reports should contain all the calibration certificates of individual items.

(22) After delivery of all the instruments and accessories, the turnkey solution will be integrated by the supplier at NPL. Supplier will be responsible to specify the followings in his/her quotation:

- (a) Timeline of the delivery
- (b) Timeline of integration
- (c) Timeline of testing in NPL
- (d) Timeline of Acceptance Report preparation and commissioning of system

Note:

(1) The high accuracy 12 kg weighing scale of required specification will be provided by NPL for determination of tank volume by volume expansion method.

(2) The laminar flowmeters in the flow range 1 L/min to 50 L/min will be provided by NPL for use as a Device under Test (DUT).

(3) The 3 nos. of sonic nozzles in the flow range 10 L/min to 1200 L/min along with flow display device will be provided by NPL for use as a DUT and also as a flow controlling device.

Criteria for Determining Lowest Quotation: The lowest quotation will be determined by sum of cost of individual items quoted by the party. The lowest quotation will not be determined by the lowest cost of the individual items.

Therefore, following extension in due date of submission & opening of the said tender may be read exactly as follows:

Due date & time of tender submission

For : 26.01.2025 up to 3.00PM (IST)

Read as : 03.02.2025 up to 3.00PM (IST)

Date & Time of Tender Opening

For : 27.01.2025 at 3:00PM (IST)

Read as : .04.02.2025 at 3.00PM (IST)

All other terms & conditions of said tender will remain the same.

Sr. Controller of Stores & Purchase