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Trombay  
Mumbai- 400 085

**Government of India  
Bhabha Atomic Research Centre  
Radiological Physics and Advisory Division**

Ref: BARC/RPAD/MJ/ 426 /2022

March 17, 2022

**Invitation of Tender**

**Design, fabrication and supply of Mask/filter testing apparatus**

Two-bid quotations are invited for design, fabrication and supply of Mask/filter testing apparatus as per attached specifications.

Your two-bid quotation (separate sealed covers for 'technical bid' and 'commercial bid') in a sealed cover super scribed with "Two-bid quotation for design, fabrication and supply of Mask/filter testing apparatus" addressed to:


**Dr. Manish Joshi**  
1-194-H, Mod Labs, RP&AD  
BARC Trombay  
Mumbai - 400 085

should reach before March 31<sup>st</sup> 2022 (up to 1400 hrs.).

**PAN and GST No. of the party, in the quotation are mandatory. Quotation should be sent through registered post/ speed post of Indian Postal Service.**

**Starting date of tender: March 18<sup>th</sup> 2022**

**Last date of receiving tender: March 31<sup>st</sup> 2022 (up to 1400 hrs.)**

  
(B. K. Sapra)

डॉ. बी.के. सप्रा / Dr. B.K. Sapra  
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Head, Radiological Physics and Advisory Division  
भारत सरकार / Government of India  
भाभा परमाणु अनुसंधान केंद्र / Bhabha Atomic Research Centre  
सी. टी. एवं सी. आर. एस. भवन / CT & CRS Bldg.,  
अणुविद्युत नगर, मुंबई / Anushaktinagar, Mumbai - 400 094.

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## Specifications for the MASK/FILTER TESTING APPARATUS

### **General:**

'Mask/filter testing apparatus' works on the principle of detecting the change in particle mass concentration upstream and downstream of filter media or the full mask. A standard aerosol atomizer is used as the source of controlled stream of test aerosols (NaCl etc.). Generated particles can be mixed in a mixing manifold carrying compressed air through an air filtration unit. Filter holder cups can hold the 'test material' and the attenuation in the mass concentration upstream and downstream of test material can be estimated by aerosol photometer. A differential pressure gauge is used to estimate the pressure difference across the media. The unit should be fabricated to couple a mannequin to the existing aerosol flow stream (generation and detection) providing provisions to test the effectiveness of full mask in face fix or sealed fixture. The device requires pressure regulators, selection switches, flow meters, purging switch, flow control valve and vacuum pump for its operation. It requires an external compressor supplying air to the manifold which is cleaned by an air filtration unit and used subsequently in different segments. 'Mask testing apparatus' can work at variable flow rates including  $28.3 \text{ Lmin}^{-1}$  (ASTM criterion) and  $80 \text{ Lmin}^{-1}$  (NIOSH criterion). Operational parameters during the setting and testing phase can be displayed on a LCD screen. A software needs to be used for running the device encompassing the on screen visual and control, testing, data storage and analysis. No external computer is intended for running the device and the data should be transmitted via a USB for external storage.

Following are the components of this unit:

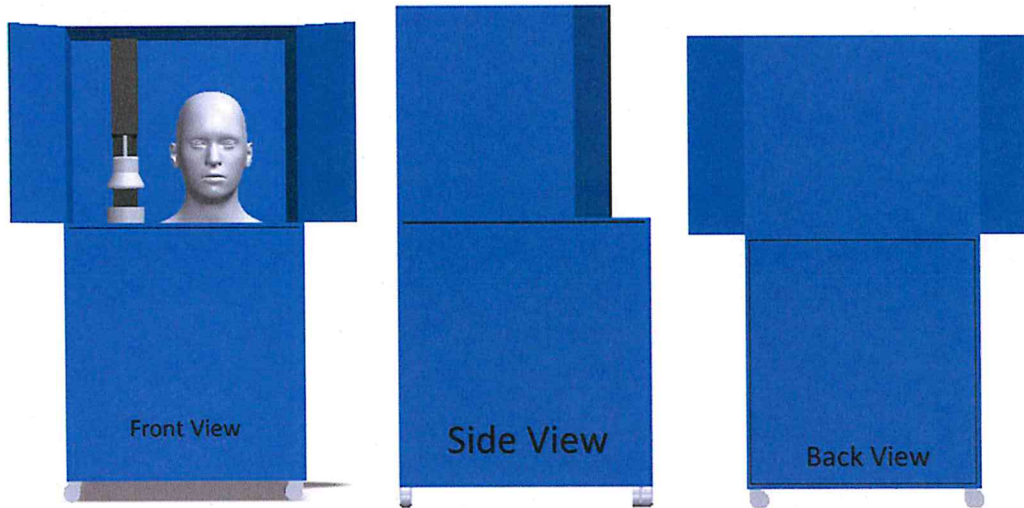
1. Air regulators	3 No.
2. Air filters	2 No.
3. Pneumatic cylinder	1.No.
4. Flow regulator	1 No.
5. Rotameter	2 No.
6. Flow meter	1 No.
7. Air heater	1 No.
8. Filter holder assembly	1 No.
9. Mixing chamber	1 No.
10. PLCs	2 No.
11. Air ionizer	1 No.
12. Mannequin head	1 No.
13. Vacuum pump	1 No.
14. Enclosure	1 No.
15. HMI display	1 No.
16. Differential pressure sensor	1 No.
17. Pneumatic connectors	As per requirement
18. Tubing (6, 8, 10, 12 mm)	As per requirement
19. Electrical panels, buttons	As per requirement

Specifications for the main parts of 'mask testing apparatus' are as follows:

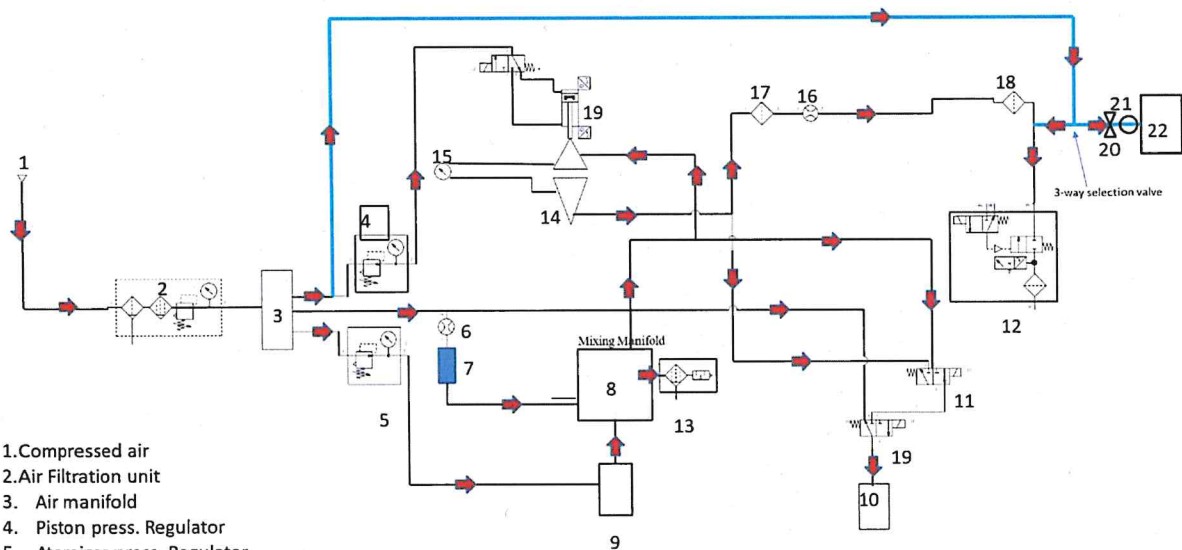
S.no.	Items	Make	Specifications
1.	Air regulator	SMC Pneumatics India Pvt. Ltd	0-150 psi
2.	Air filter	SMC Pneumatics India Pvt. Ltd	99.99% Efficiency at 0.3 micron
3.	Pneumatic cylinder	SMC Pneumatics India Pvt. Ltd	150 mm stroke length single acting
4.	Flow regulator	SMC Pneumatics India Pvt. Ltd	0-100 Lmin <sup>-1</sup>
5.	Rotameter	CVG Technocraft	0-150 Lmin <sup>-1</sup>
6.	Flow meter	SMC Pneumatics India Pvt. Ltd	2-200 Lmin <sup>-1</sup>
7.	Air heater	Standard	Heat up to 120 °C
8.	HMI display	Standard	> 8 inch
9.	Vacuum pump	GAST	> 5 CFM free flow
10.	Air ionizer	SMC Pneumatics India Pvt. Ltd	Operable up to 100 Lmin <sup>-1</sup>
11.	Differential pressure sensor	SMC Pneumatics India Pvt. Ltd	0-2000 Pa
12.	Quick connect coupling	Festo / Sealexcel	Quick connect coupling of Festo / Sealexcel should be used.
13.	Mannequin head	Standard	Standard Indian Male
14.	Enclosure	Self-fabricated	Optimized enclosure size without hampering the accessibility for maintenance.
15.	Software	Customized	Customized software to control all the pneumatics and integrate them with atomizer and photometer.
16.	Output data	Customized	Output of integrated system should be in terms of efficiency and differential pressure reading of Masks
17.	Mask Holder	Customized	Suitable mask holders to be provided along with instrument to mount all types of mask in the machine.
18.	Compatibility	-	Integrated setup should be compatible to standard aerosol generators and aerosol measuring instruments.
19.	Warranty- Minimum period of 1 year from the date of supply		
20.	Software- Please provide preliminary algorithm/scheme for control and output		
21.	The company should have minimum 1 year experience in supplying and providing 'commissioning and after sales support' for similar instruments with government organizations.		
22.	Conformation to the above specifications should be provided as per the above format. Any deviation with respect to the asked specifications should be clearly mentioned.		

**Accessories:** Tubing (6,8,10,12 mm): 5 m each, Push buttons (10 no.), Pneumatic connectors (10 no.)

The artistic view of the device is as follows:



The flow diagram for the device is shown below:



- 1. Compressed air
- 2. Air Filtration unit
- 3. Air manifold
- 4. Piston press. Regulator
- 5. Atomizer press. Regulator
- 6. Makeup air flow meter
- 7. Ionizer (corona based)
- 8. Mixing Manifold Atomizer
- 9. Aerosol generator
- 10. Particle Photometer
- 11. Aerosol selection switch
- 12. Vacuum Pump
- 13. Exhaust
- 14. Filter holder cups
- 15. Differential Pressure gauge
- 16. Flow meter

- 17. Flow control valve
- 18. Air Filter
- 19. Purging Switch
- 20. Flow controller
- 21. Flow meter
- 22. Mannequin Head