



CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY (C-MET)

(Scientific Society, Dept. of Information Technology, Govt. of India)

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ANNEXURE-I

TENDER DOCUMENT FOR VACUUM SYSTEMS

SCOPE:

Design, supply, connecting to vacuum retort and commissioning of vacuum pumping system.

Bidder should quote for the vacuum systems specified below. The system should be supplied to M/S. CMET, Cherlapally, Hyderabad and vacuum plumbing should be completed at site connecting vacuum system to vacuum retorts.

Bidder should use AISI 304 grade stainless steel pipes for vacuum plumbing and the offer should clearly give the specification of all components proposed to be used and the cost should include plumbing at site and vacuum testing for satisfactory performance at site. Offer should indicate the leak rate which the bidder can guarantee with his system.

Offer should give separately quotation for spares required for two years of operation.

TECHNICAL SPECIFICATIONS:

1. VACCUM PUMPING SYSTEM FOR REDUCTION RETORT

Drg. No. : BC C-MET-2011/01-1/9

Duty: Vacuum pumps shall be installed in the ground floor level and connected to the reduction retort's evacuation port at approximately +4M level. The retort is loaded with solid hafnium tetra chloride and sealed and then evacuated for de-gassing.

Volume : 500 Liters

Vacuum : 1×10^{-1} mbar

Evacuation time : 30 min.

VACUUM PUMPING SYSTEM:

The system essentially consists of:

- a. High pressure Pirani Vacuum Gauge with digital display having a range from + 0.3 KG/Sq cm to 1 mbar.
- b. SS Plumbing line with interconnecting fittings, vacuum valves, auto safety valve and SS flexible hose etc.

- c. MS painted mounting frame for the system.

Brief specification of the Pumps is given below.

ROOTS BOOSTER PUMP

Make	: Imported
Pumping Speed	: 500 m ³ /hr.
Ultimate Vacuum	: 1 x 10 ⁻³ mbar
Inlet connection	: ISO 100LF
Outlet connection	: ISO 63LF
Motor Power	: 2 H.P/3 Ph/440V/50 Hz/1440 r.p.m.

ROTARY VACUUM PUMP

Make	:	Hind High Vacuum/Edward/Microtorr or ISO 9000/BIS
Nominal Pumping Speed	:	1000 Lit/min.
Ultimate Vacuum with Gas ballast closed:	:	1 x 10 ⁻³ mbar
With Open Gas Ballast	:	2 x 10 ⁻² mbar
Water Vapour Pressure	:	25 mbar
Motor Power	:	1440 rpm/440 V/3 phase/50 Hz and power Not less than 3 HP
Oil Capacity	:	7 Lit (Approximate)
Inlet Flange	:	ISO DN 63LF (approx.)
Exhaust Flange	:	ISO DN 40KF (approx.)

SS PLUMBING LINE

SS Plumbing line is to be fabricated to connect the vacuum pumps with the vacuum port of the retort. A Quarter swung butterfly valve should be used as isolation valve with interconnecting fittings.

A High Pressure Pirani Vacuum gauge with digital display should be provided on the pipeline near the retort for measuring the vacuum level.

The system with pump should be mounted on a neatly painted MS frame.

The system should be designed to connect the retort port at about 4 meters height from ground level.

2. VACUUM PUMPING SYSTEM FOR VACUUM DISTILLATION

Drg. No. BC – CMET – 2011/02-1/8

Retort Size	:	φ600 x 2600 mm
Volume	:	800 Liters
Vacuum	:	1 x 10⁻³ mbar
Evacuation time	:	30 min.

VACUUM PUMPING SYSTEM:

The system essentially consists of:

- a. Mechanical Booster Pump backed by two Rotary Vacuum Pump of Edwards/Varian/Leybold/Ulvac make pumps combination with an effective pumping speed of 400 m³/hr (Two Rotary Vacuum Pumps will be connected in parallel with individual auto safety valve to ensure continues operation even if one of the pump fails).
- b. High pressure Pirani Vacuum Gauge with digital display having range of +0.3 KG/Sq.Cm to 1 x 10⁻³ mbar
- c. SS Plumbing line with interconnecting fittings, Vacuum Valves, auto safety valve and SS flexible hoses etc.
- d. MS painted mounting frame for the system.

Brief specification of the Pumps is given below:

MECHANICAL BOOSTER PUMP

Make	:	Imported
Pumping Speed	:	500 m ³ /hr.
Ultimate Vacuum	:	1 x 10 ⁻³ mbar
Inlet connection	:	ISO 100LF (or nearby size)
Outlet connection	:	ISO 63LF (or nearby size)
Motor Power	:	2 H.P/3 Ph/440V/50 Hz/1440 r.p.m.
Cooling Medium	:	Air

ROTARY VACUUM PUMP

Quantity	: 2 Nos.
Make	: Edwards/ Varian/ Leybold/Ulvac make pumps
Free air displacement	: 80 Cu M/hr.
Ultimate Vacuum	: 1×10^{-3} mbar
Motor Power	: 2.2 KW (approx.)
Inlet flange	: ISO 63LF (approx.)
Exhaust	: ISO 25KF

VACUUM MEASURING GAUGE

Digital High Pressure Pirani Gauge

Measuring Range	: 1×10^{-3} mb to 999 mb. (N2 Equivalent)
Display	: 3 digit 7 segment filament LED Display.
Response time	: 200 m seconds
No. of gauge heads	: Two
Operating temperature & range	: 10 to 85 Degree C.
Power	: 10 W nominal.
Main Supply	: 230 V, 5 Amps, 50 Hz.

SS PLUMBING LINE

SS Plumbing line should be fabricated to connect the vacuum pumps with vacuum port of the retort. A Quarter swung butterfly valve is to be used as isolation valve with interconnecting fittings.

The system with pumps is to be mounted on a neatly painted MS frame.

The system should be designed to connect the retort port at about 4 meters height from ground level.

3. VACUUM PUMPING SYSTEM FOR THE FURNACE PORTION OF VACUUM DISTILLATION

Drg. No. BC – CMET – 2011/02-1/8

Furnace Size : ϕ 1300/ ϕ 600 mm (annular space) x 1500 mm

Volume : 1600 Liters

Vacuum : 100 mbar

Evacuation time : 30 min.

PUMPING SYSTEM:

The Pumping system for this application is also same as in case 1 above.

The system essentially consists of:

- a. High pressure Pirani Vacuum Gauge with digital display having a range from + 0.3 KG/Sq cm to 1 mbar.
- b. Seamless MS Plumbing line with interconnecting fittings, auto safety valve and SS flexible hose etc.
- c. MS painted mounting frame for the system.

Brief specification of the Pumps is given below.

ROTARY VACUUM PUMP

Make	:	Hind High Vacuum
Nominal Pumping Speed	:	1000Lit/min.
Ultimate Vacuum with Gas ballast closed:	:	1×10^{-3} mbar
With Open Gas Ballast	:	2×10^{-2} mbar
Water Vapour Pressure	:	25 mbar
Motor Power	:	1440 rpm/440 V/3 phase/50 Hz and power Not less than 3 HP
Oil Capacity	:	7 Lit (Approximate)
Inlet Flange	:	ISO DN 50KF (approx.)
Exhaust Flange	:	ISO DN 40KF (approx.)

SS PLUMBING LINE

SS Plumbing line is to be fabricated to connect the vacuum pumps with the vacuum port of the retort. A Quarter swung butterfly valve should be used as isolation valve with interconnecting fittings.

A High Pressure Pirani Vacuum gauge with digital display should be provided on the pipeline near the retort for measuring the vacuum level.

The system with pump should be mounted on a neatly painted MS frame.

The system should be designed to connect the retort port at about 4 meters height from ground level.

As only rough vacuum is required in the furnace side, bidder should give offers for

- i) The system No. 3 specified as above and
- ii) The system No. 3 with only mechanical pump of the capacity as specified above.

Notes:

1. Specification of the connecting flange to the retort will be provided at the time of erection for all the three systems.
2. Bidder should give a line diagram giving the details of all the components being offered for each system.
3. Bidder should give warranty for a period of one year from the date of commissioning **OR** fifteen (15) months from the date of supply.