EN

Telephone: +9144 2257 4755

Department of Metallurgical and Materials Engineering

Indian Institute of Technology, Madras

I.I.T. P.O., CHENNAI – 600 036.

Date: 04.06.2019

Ref. No.

MET	2019	3043	SPLX	SABI

Due Date: 25.06.2019

Dear Sir,

1. Quotations are invited **in duplicate** for the fabrication of the following items with accessories, Department of Metallurgical and Materials Engineering, IIT Madras details of which are shown in overleaf.
2. Preparation of Bids: - The Limited tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.
3. The Quotations **duly sealed and superscribed on the envelope** with the reference No. and due date, should be addressed to the undersigned so as to reach her on or before the due date stipulated above.
4. The Quotations should be **valid for ninety days** from the due date and the period of delivery required should also be clearly indicated.
5. If the item is under DGS&D Rate Contract, Rate Contract Number and the price must be mentioned. It may also please be indicated whether the supply can be made direct to us at the Rate Contract price. If so, please send copy of the R. C. (Please note that we are not Direct Demanding Officers).
6. Relevant literature pertaining to the items quoted with full specifications (and drawing, if any) should be sent along with the Quotations, wherever applicable. Samples if called for should be submitted free of charges and collected back at the supplier's expenses.
7. **Local Firms:** Quotations should be for free delivery to this Institute, if Quotations are for Ex-Godown delivery charges should be indicated separately.
8. **Firms Outside Madras:** Quotations should be F.O.B. Madras. If F.O.B. consignor station, freight charges by passenger train / lorry transport must be indicated. If Ex-Godown, packing, forwarding and freight charges must be indicated.
9. The rate of Sales / General Taxes and the percentage of such other taxes legally leviable and intended to be claimed should be distinctly shown along with the price quoted. Where this is not done, no claim for Sales / General Taxes will be admitted at any stage and on any ground whatsoever. **The taxes leviable should take into consideration that we are entitled to have Concessional Sales Tax applicable to non-Government Educational Institutions run with no profit motive for which a concessional. Sales Tax Certificate will be issued at the time of final settlement of the bill.**
10. Goods should be supplied carriage paid and insured.
11. Goods shall not be supplied without an official supply order.
12. **Payment:** Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later.

Yours faithfully,

Sabita Sarkar

Project Co-ordinator,
Department of Metallurgical and Materials Engineering,
Indian Institute of Technology, Madras
CHENNAI – 600 036

Technical Specifications for fabrication of the items & Accessories

Bottom Pouring Furnace: A cylindrical metallic chamber with refractory wall to hold a detachable crucible with internal dimensions of 100 mm diameter and 300 mm depth must be fabricated as shown in Figure 1 for working temperature up to 800 °C. Heating of the furnace must be achieved by heating coils, which are wound, and held in position around the metallic chamber. The chamber and the heating coil must be insulated by lining with suitable refractory materials, in order to maintain the working temperature. A detachable/removal crucible will be placed in the furnace, in which metals are melted. There must be a provision for the temperature measurement inside the furnace. A control system for adjusting the temperature in the furnace, along with a digital unit displaying the temperature must be coupled with the heating arrangement. The lid of the furnace must also be thermally insulated and must have sealing gasket for handling the high gauge pressures of up to 10 bar inside the furnace. An air inlet pipe of 12 mm diameter will be provided at the top of the furnace for introducing the pressurized atmosphere. A pipe of internal diameter 8 mm, along with a flow controlling ball valve will be provided at the bottom of the crucible, through the furnace, for transferring the molten metal into the atomization chamber (refer Figure 2).

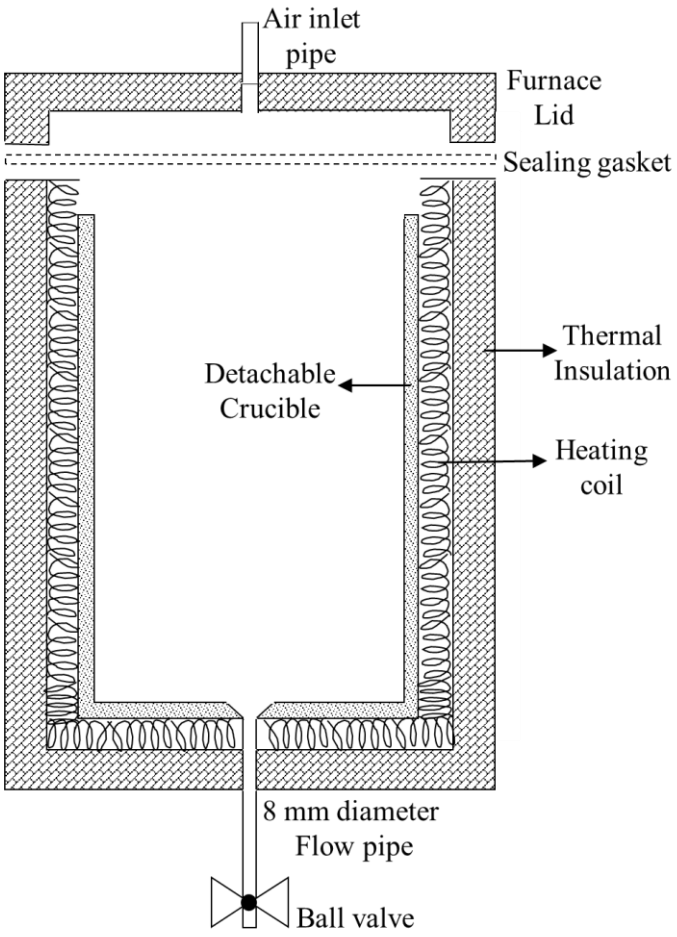


Figure 1. High pressure bottom pouring furnace

Temperature Control:

Temperature should be controlled by a programmable P.I.D. controller. It should have the following units.

1. Micro Processor based programmable P.I.D temperature controller
2. Solid state Thyristor Unit
3. Temperature indicator for getting the temperature inside the crucible
4. Safety fuses
5. Sensors: K-type based thermocouple
6. Switches and indicators

Atomization chamber: This comprises of a stainless-steel plate of 250 mm diameter and about 10 mm thick placed directly below the flow tube at 100 mm (see Figure 2). This steel plate is mechanically linked to a vertical rotating shaft. The mechanical linking is rigid, but semi-permanent, so that the disc can be replaced when necessary. The rotating shaft couples to a motor, with a variable speed from 100 to 1500 RPM and above. A variable frequency drive with control for adjusting the speed of the motor, along with a digital RPM indicator must be provided. The rotating shaft and plate assembly will be contained in a heat resistant cubical housing of 1500 mm length. The housing is made of glass for viewing and taking photographs and will have a hinged glass door on one side for collecting the samples after the experiment. The surface of the rotating stainless-steel disc lies at a height of 1000 mm from the base of the housing.

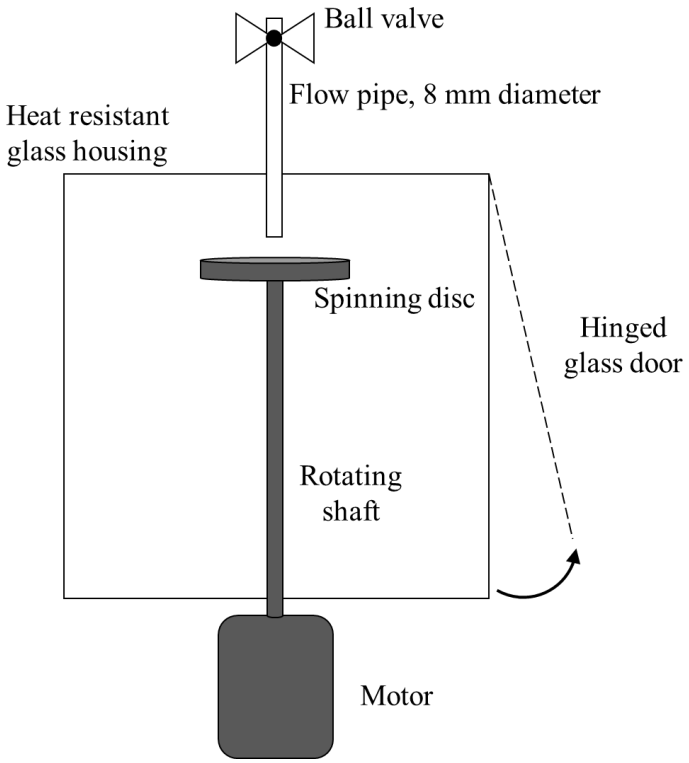


Figure 2. Atomization chamber

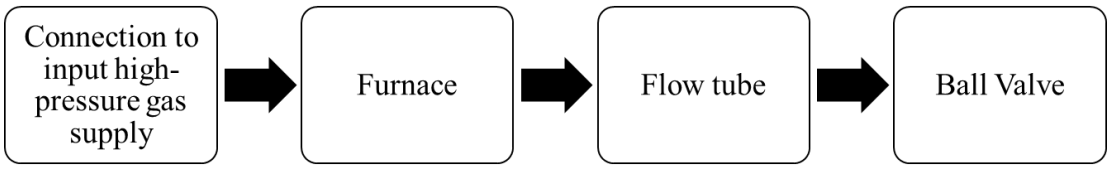
Accessories:
Accessories should include details and pricing information (if applicable) of the following items.

- Crucible with an opening at the bottom, to be placed in the furnace.
- Chilled water circulating unit with control system for feeding of cold water to the flanges of the heat resistant metallic retort.
- Stand to house the furnace and the flow tube at appropriate heights
- Safety fuses, connecting leads, switches, indicators etc.
- Cables to connect the heating system and the control system
- Provision for Flowmeter

Installation & commissioning:

All these units must be connected in two steps, as in figure 3 below under our supervision in the laboratory.

Step1:



Step2:

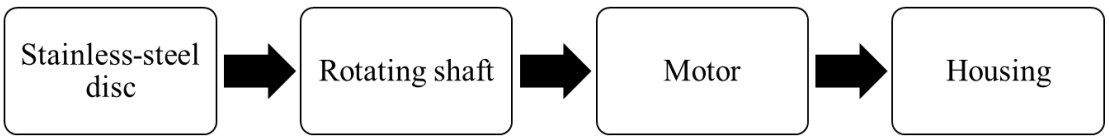


Figure 3. Installation diagram

All these units shall be installed and commissioned at our site by a company specialist and suitable trails shall be undertaken along with the startup training excluding commissioning hours.

In order to get confidence of "after-sale service" of an agent/ supplier, we require that supplier/Indian agent should have had the experience of at least one fabrications of high temperature atomization unit and installations across India in reputed research organizations and CFTI (centrally funded technical institutes) academic institutes (such as IITs or IISc or IISERs or NITs across India) in last 5 years.

- **Performance Guarantee for 1 Year (PBG to be Provided - 10% of the cost)**
- **Warranty Period after the PG period for 2 years should be provided.**

Payment Terms:

1. 40% advance
2. 20% at the Time of Delivery
3. 30 % after successful Installation & Commissioning
4. 10% providing 1 or 2 years of Performance Bank Guarantee from a Schedule Bank

Quotations duly sealed and superscribed on the envelope with reference No. and due date should be address to the Undersigned.

Sabita Sarkar

Project Co-ordinator,
Department of Metallurgical and Materials Engineering,
Indian Institute of Technology, Madras,
Chennai 600036