



सी एस आई आर - राष्ट्रीय धातुकर्म प्रयोगशाला
CSIR - NATIONAL METALLURGICAL LABORATORY

(वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद) / (Council of Scientific & Industrial Research)

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Corrigendum 1

Ref : 1. Tender Enquiry No. : NML/PUR/32/37/20 Dated 25-01-2021 for the supply of ELECTRIC ARC FURNACE.
Tender ID : 2021_CSIR_67891_1

Consequent to the Pre- Bid Meeting dated 04-02-2021 with reference to the procurement, Competent Authority has approved to issue the Technical corrigendum by revising complete Chapter 4 as detailed below.


19.02.2021
Controller of Stores & Purchase

Specifications of Electric Arc Furnace

Electric Arc Furnace is required for smelting reduction of titaniferous ores and other similar types of ores. The raw pallet with coke or graphite powder will be fed to furnace, initially approx. 20% to 25% of the total feed product. A molten pool will be made by arcing. Thereafter, the raw materials will be charged through the charging hole at the roof attached with a chute connected with an overhead bunker with vibro feeder. The charging can be controlled by controlling the vibro feeder. After completing the melting, of approx. 100 – 110 kg. of raw material, the temperature to be raised and proper liquefaction will be done to get the settle of Cast Iron at the bottom – expected 20 kg of liquid pig and 60 – 70 kg of TiO₂ rich slag at the top to get accumulated. By tilting the furnace, 1st slag will be collected and then the sedimented metal to be collected. Multiple numbers of such heat will be conducted consecutively in the same campaign depending upon lining life.

A. General Technical Specifications:

1.	Shell details	
a)	Internal volume after lining	100,000 cc
b)	Lining Thickness	220mm (±10mm)
2.	Furnace shell	
a)	Inner Volume:	It has to accommodate 70 kg slag of sp. Gravity 2.5 g/cc and 20 kg metal in its one third portion (100,000 cc after lining)
b)	Shell thickness	10mm±1mm MS plate
c)	Refractory lining thickness	Wall: 220 mm (±10mm) (Brick lining at the back facing with ramble mass of graphite) Bottom: 300 mm brick at the bottom with ramble graphite mass facing
d)	Inner Dia to Depth ratio	Approx. 1:1.2
3.	Roof Refractory lined, 3 holes for electrode, 1 hole for material feeding & 1 no for observation port.	
4.	Transformer rating	150 kVA
5.	Input Voltage	415 V (Fluctuations from +10% to -15%) Frequency: 50Hz (±5%); AC 3 phase
6.	Transformer Secondary Voltage	80 V, 70 V, 60 V & 50 V
7.	Working Temperature	1600-1850°C
8.	Electrode size (graphite)	Length: 1200 mm (±5mm) Diameter: 75mm (±0.5mm)
9.	Number of electrodes	3 Nos
10.	Pitch circle diameter (PCD) of electrode	250 mm adjustable (±25mm)
11.	Electrode movement	Driven by Gear Motor and controlled by VVVF drive with 1 KW rating each per phase
12.	Maximum speed of electrode movement	Raising = 50 mm / sec (Tolerance: ±5mm/sec) Lowering = 25 mm/ sec (Tolerance:±5mm/sec)
13.	Tapping of liquid	Through spout by tilting
14.	Angle of tilting	40° for slag tapping & 70° for draining of entire liquid
15.	Tilting facility	Hydraulically controlled for smooth tilting up to 70° with vertical axis with suitable controls along with suitable compressor capacity

16.	Lining material	60-70% Alumina brick lining followed by graphite for shell and high alumina (castable-A grade) for roof. Sufficient lining material for repair/replacement has to be provided for at least 10 campaigns of minimum 3 heats each
17.	Roof lifting	Roof fixed type but removable by monorail chain pulley arrangement for maintenance and changeover of roof. It has to be supplied with the equipment by vendor.
18.	Electrode arms	MS Fabricated with electrode holding clamp, spring held, pneumatic released with copper busbar and copper insert, suitable 3" diameter electrodes
19.	Electrode arm lifting and lowering mast with lead screw and gear motor, guide roller and insulation and electrode arm fixing arrangement	3 sets
20.	Material feeding to furnace through vibro feeder with storage bunker on structure with feed rate control and discharge chute	1 set [Maximum capacity of vibro feeder=400kg/h] [Storage Bunker capacity= 200-250kg]
21.	Compatible Fume extraction system with Baghouse, ID Fan, Chimney, pulse cleaning valve and associated structure	
22.	Water cooling system for electrode holder	Two nos. of tanks of 1m ³ adjacent to the furnace with suitable pumping mechanism
23.	Control Panel	Step up and step down provision for all parameters (Input-Output V/A, Tap position), kW load, Total kWh and equipped with electrode movement system and overheating safety alarm feature. Display and electronic fittings must be provided from Branded company (Schneider electric/Forbes Marshall/L&T)
24.	Essential accessories	One set of essential tool kit for maintenance; Free lining material as per detailed in Sl. No.16
25.	Civil Modifications at site for installation shall be the responsibility of party	
26.	Selected bidder has to generate engineering drawing and take approval of CSIR-NML	
27.	Warranty: 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier. This is not applicable for LINING MATERIAL as a distinct clause is added in Sl. No.16	
28.	Dedicated training on site as per acceptance criteria	

B. Qualification and acceptance criteria:

Qualification:

- i. Vendors who have demonstrated expertise in manufacturing/supply of ELECTRIC ARC FURNACE/SUBMERGED ARC FURNACE to research laboratories, PSUs or government agencies or private industries, are eligible. Also, vendors should have completed at least 1 successful commissioning of the ELECTRIC ARC FURNACE/SUBMERGED ARC FURNACE (50-1000 kVA rating) in India in last 5 years. Vendors should furnish list of previous supplies along with the relevant purchase order and commissioning document/certificates.

Acceptance:

- i. Vendor should be able to demonstrate successful commissioning of the unit with 100kg mix provided by CSIR-NML. The parameters like temperature, tilt, electrode cooling, electrode movement should be demonstrated in at least two campaigns. Temperature shall be measured using pyrometer available at NML.
- ii. All the design and parameters mentioned above for shell, MOC, electrode design, movement, heating, tilting and tapping shall be matched upon receipt of order and on completion of commissioning.

D. Provisions from NML:

- i. 415 V (Fluctuations from +10% to -15%); Frequency: 50Hz ($\pm 5\%$); AC 3 phase
- ii. Single point water supply for make-up water requirement
- iii. CSIR-NML will provide the required space, which should be indicated by vendor in the technical bid

E. Delivery: 4 months from date of purchase order