

Detailed technical specifications for  
**Special-purpose customized overhead heat treatment furnace**

**I. DESCRIPTION OF REQUIREMENT**

CSIR NML plans to fabricate a “Special purpose customized overhead heat treatment furnace setup” for component (specifically flame tube) heat treatment. **The said furnace, as per CSIR-NML technical specifications, needs to be fabricated, assembled, installed and commissioned at INS Eksila, Mulagada Area, Vishakhapatnam-530012 by the vendor.** The proposed furnace (*as provided in the drawing Annexure-II*) is meant for heat-treating flame tube component (*as per drawing in Annexure - III*).

Detailed technical specifications for each part of the “**Special purpose customized overhead heat treatment furnace**” are as below:

**1. Overhead multi-zone cylindrical resistance heating furnace:**

- 1.1. Provision for multi-zone in the furnace (cylindrical type resistance heating furnace).
- 1.2. Maximum operating temperature: **1100-1150 °C** for continuous operation for **14 hours or above**.
- 1.3. Furnace heating core/zone size: **550-600 mm diameter X 1450-1500 mm length** should be divided into **03 temperature zones** along length/height (top zone, middle zone and bottom zone).
- 1.4. The furnace should be inverted face-down type fixed firmly to a suitable rigid column structure at a height of approximately 1500 mm.
- 1.5. The furnace should be capable of attaining a maximum temperature of 1150 °C with heating rates in the range of **5 - 20 °C/minute**, i.e. within approximately **1- 4 hours**.
- 1.6. The heating element of the furnace should be **Kanthal A1 or better**, so as to ensure stable long life and withstand thermal shock.
- 1.7. The furnace should be equipped with thyristor controller with manual / automatic control of heating rates through suitable **PID programming controller** for 03 independent heating zones of the furnace. If in any case, one of the heating zone controller fails during operation, then other two controllers or furnace should shut off automatically to avoid non-uniform heating and damage to the component.
- 1.8. The furnace should be equipped with **K-type** Thermocouple of suitable diameter approximately 10-14 mm at positions shown in **the drawing (Annexure-II)**.
- 1.9. Outside skin temperature of furnace body should not exceed **50 °C**, when operating continuously at maximum temperature for **14 hrs**.
- 1.10. The permissible temperature should be maintained **within ±5 °C**.
- 1.11. Provision for an **emergency stop** in case of temperature overshoot or any other fault during operation or in the event of primary control failure.



- 1.12. The exteriors should be **perforated metallic SS-316 grade steel or better**.
- 1.13. There should be a provision for separate lid hinged at the bottom face of the furnace (*Annexure-II, item no. 16*) for optimal covering at the end of the sample heat treatment and during idle time.
- 1.14. There should be stable long lasting heating elements with easy installation for maintenance and replacement.

## 2. Charging/loading Lid Mechanism:

- 2.1. The **charging lid/platform** should be designed to raise the component (Flame Tube) having approximate weight of 40-50 kg into the furnace. The component would be placed precisely at the centre of the lid/platform, such that the flame tube component when raised into the furnace doesn't touch the furnace element and refractory.
- 2.2. The **charging lid/platform** should be capable of moving in vertical linear mechanized guideways through a suitable manually operated rope pulley mechanism as shown in the drawing (*Annexure-II*)
- 2.3. The charging **lid/platform** should have an appropriate groove for positioning the job i.e. flame tube and support its weight 40-50 Kg.
- 2.4. The flame tube should be easily loaded and unloaded at room temperature to/from the charging **lid/platform**.
- 2.5. The charging lid should have a refractory lining of sufficient height, such that the flame tube is suitably placed at the heating zone of the furnace and no heat loss is experienced near the lid.

## 3. Lifting mechanism

- 3.1. The lifting mechanism should be manually operable with high mechanical advantage for ease of lifting. The effort at the handle should be less than 2 Kg.
- 3.2. A suitable grade of steel wire rope should be used to ensure safe and sustained lifting of approximate weight of 100 kg (weight of Flame tube + Charging platform).
- 3.3. The handle rotation (clockwise and counter-clockwise) should be so designed that there should be a provision of two-way motion (up and down) of the lid and equipped with unidirectional motion of safety at any position of the **lid/platform**.
- 3.4. There should be an alternate braking mechanism of the **lid/platform** in the event of wire rope failure by chance (*Annexure - II, item no. 13*).
- 3.5. There should be an auto-locking mechanism at the end of the complete engagement of the charging lid/platform to the furnace face.
- 3.6. The lifting mechanism should be suitable so as to retract the component from the furnace in hot conditions partly and lock it at a specified height (*Annexure – II, item no. 13*)

## 4. Structural column with fence

- 4.1. There should be a rigid structural steel column, MOC: double steel box section 100-120 mm approximately should be fastened and grouted.
- 4.2. A metallic fence structure up to height of approximately 1.0 meter should be there along three sides of the structure.



4.3. Utmost care should be taken in fabrication, painting and final assembly work for the aesthetically appealing look of the complete setup.

## 5. Control panel

5.1. A suitable control panel with a user-friendly interface with PID controller for the complete operation and Data acquisition for above mentioned item 1.

5.2. Programmable precision type like PID controller with HMI provision for designing minimum 15 segments of heat treatment schedules should be present. Each segment may be defined as a combination of temperature ramping rate + target temperature + dwell time at a fixed temperature. The maximum ramping rate in each segment will be limited by the aforementioned maximum achievable heating rate.

5.3. All temperatures should be displayed in real-time on HMI display. Dual display of set temperature and actual temperature is mandatory. Any other controllers/ devices/fittings required for smooth functioning of the furnace for long hours (10-15 hours) may be provided. Any other controllers/ devices/fittings required for the smooth functioning of the furnace for long hours (10-15 hours) may be provided.

5.4. Suitable communication port (preferably USB 2.0, 3.0 or higher) to record the furnace data (HMI) in Excel/CSV compatible format.

5.5. Suitable data loggers for acquiring and recording/storing time-temperature profiles from the three aforementioned thermocouples. The sampling rate should be **min 5-10 Hz**.

5.6. There should be provision for an emergency auto-tripping of the power supply during any sudden/unforeseen event in the furnace.

5.7. The control panel should be equipped with a Voltmeter, Ammeter, power and energy meter, HMI (good quality preferably made in India) for real-time display of the heating cycle.

## 6. Installation, commissioning and warranty

6.1 The delivery period is maximum **10 weeks at INS Eksila works**, Vishakhapatnam-530012.

6.2 The said furnace, as per CSIR-NML technical specifications, needs to be fabricated, assembled, installed and commissioned at INS Eksila, Mulagada Area, Vishakhapatnam-530012 by the vendor.

6.3 **01 year of comprehensive warranty** (inclusive of necessary spares, replaceable base refractory, heating element, fuses and other accessories etc.) to be provided from the date of installation and commissioning at INS Eksila works

6.4 Pre-dispatch inspection/trials will be conducted by CSIR-NML at the supplier's premises.

6.5 A detailed technical drawing for installation and commissioning of the above furnace setup should be supplied with the technical bid for CSIR-NML's endorsement.

6.6 Pre-Installation requirements at site should be communicated to CSIR-NML within 15 days after receiving Purchase order / MoU.

6.7 The installed system should be ready for operation (only power and adequate space will be provided at the installation-commissioning site at INS Eksila).

6.8 Trials for proofing the fabricated furnace will be carried out by the vendor at site in presence of CSIR-NML and INS-Eksila personnel.



## **II. GENERAL TERMS & CONDITIONS**

- i. The job will be taken up on a turnkey basis. Intellectual Property Rights (IPR) will be retained with CSIR-NML.
- ii. The party should have prior **experience of more than 5 years** in developing such equipment.
- iii. The system should be complete in all respects with all associated electrical, controls etc.
- iv. All the components of the experimental set-up are to be designed for continuous operation.
- v. The system should have proper shielding for the elimination of all electronic noises and mechanical vibrations affecting instrument performance.
- vi. Operation and maintenance training for INS Eksila personnel and NML personnel to be provided by the supplier.
- vii. Proper care is to be taken for the ease of operation and maintainability.
- viii. Detailed specifications of various machinery / instruments involved supported by technical brochures/datasheets in English. The Bidder shall provide the complete technical information (without any IP related material) with specific OEM name, Model Number etc.

## **III. SUPPLIERS SCOPE**

The supplier has to execute the job on turnkey basis. The scopes include the supply, installation and commissioning with reliability of total system based on conceptual design and know-how provided by NML. The supplier should stand responsible for proper functioning of the system supplied.

## **IV. ITEMS UNDER NML'S SCOPE OF SUPPLY:**

Conceptual design of the special-purpose customized overhead heat treatment furnace setup

## **V. MODUS OPERANDI**

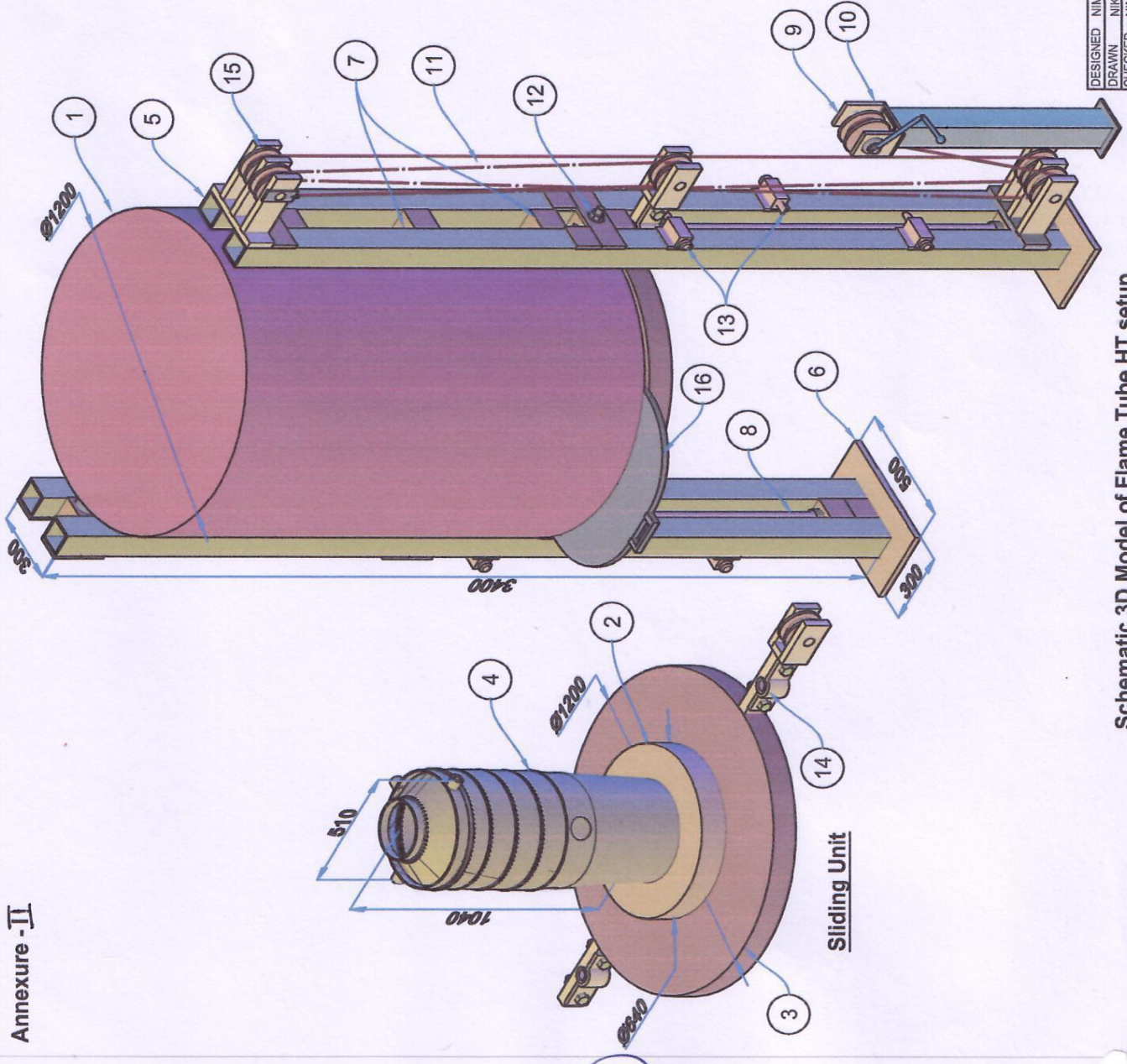
- i. The party may visit NML for technical discussions if needed.
- ii. The delivery and installation will be at INS Eksila works in Visakhapatnam at the cost of the supplier.
- iii. CSIR-NML will have the right to accept any part of the quotation or rejecting totally without assigning any reason.

## **VI. Eligibility Criteria**

Bidders should have 5 years of experience in customized furnace fabrication and should have executed at least one single order of value not less than 10 (Ten) Lakhs.



Annexure -II



*Praveen*  
27/9/24

All dimensions are in mm

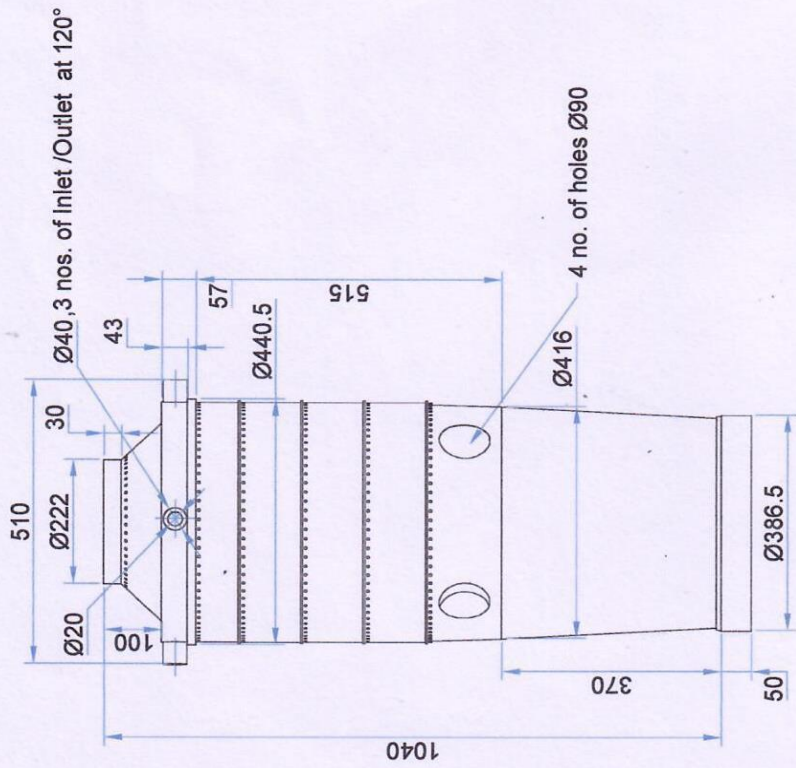
Sl.no.	Part name	Qty.
1.	Furnace: as per job(1780 lth)	1
2.	Refractory LID: (Ø600x100thk)	1
3.	Circular Base plate(Ø1100)	1
4.	Fume tube :Ø455x1040 Lth	1
5.	Sq. Column(100x100)mm	4
6.	Column Base plate(300x500)	2
7.	Sq. block (100x100)mm	16
8.	Round guide rail Ø40	2
9.	3 Pulley System	1
10.	Support column	1
11.	Steel Rope	
12.	Furnace holding support	4
13.	Latch lock	6
14.	C-Clamp	2
15.	Pulley holding support	3
16.	Furnace Lid	1

CSIR-NATIONAL METALLURGICAL LABORATORY JAMSHEDPUR	
ENGINEERING DIVISION	
TITLE	
3D Model of Flame Tube HT setup	
FOR - MTE	
MECH. LEAD/SCALE	DRAWING NO.
1:20	NML/ENG/MTE/FP/SK-01
REV.	4

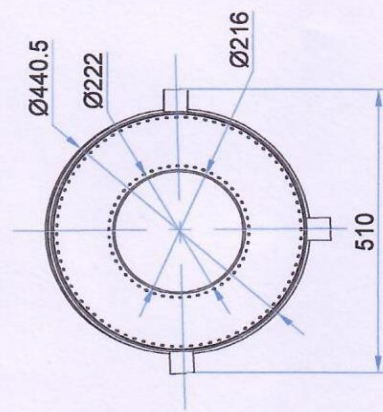
DESIGNED	NIMAI H.
DRAWN	NIKITA
CHECKED	NIMAI H.
APPROVED	Y.USHA
DATE	25-09-2024

Schematic 3D Model of Flame Tube HT setup





Front view



Top view  
Flame Tube

All dimensions are in mm

CSIR-NATIONAL METALLURGICAL LABORATORY JAMSHEDPUR	
ENGINEERING DIVISION	
TITLE	Flame Tube
FOR - MTE	
MECH. LEAD/SCALE	DRAWING NO.
1:10	NML/ENG/MTE/FP/SK-02
REV.	0

DESIGNED	NIMAIH.
DRAWN	NIKITA
CHECKED	NIMAIH.
APPROVED	Y.USHA
DATE	25-09-2024

## Terms & Conditions

1. **Scope of Supply:** Supply, installation, Commissioning, Testing and Demonstration of Goods as per specifications.
2. **Qualification Requirement:** Please refer to the technical specifications of the bid document.
3. **Delivery Period:** Delivery should be completed in full within a period of **10 weeks** from the date of purchase order. Liquidated Damage clause will be imposed in the event of non-completion of delivery within the stipulated time.
4. **Liquidated Damage clause:** The penalty shall be 0.5% per week or part of a week towards late delivery and installation, commissioning, training etc. including all contractual obligations beyond contractual deadline. The maximum amount of penalty shall be 10%.
5. **Delivery Site: INS Eksila, Mulagada Area, Vishakhapatnam- 530012**
6. There can be only one bid from the following:
  - a. The original manufacturer directly or through one authorized dealer on his behalf; and
  - b. Authorized dealer on behalf of only one manufacturer.
7. **Installation, commissioning and Training:** To be installed and commissioned at site by the supplier within twenty-one (21) days from the delivery of goods. The inspection of the material shall be done within 30 days after installation of the goods. The said furnace, as per CSIR-NML technical specifications, needs to be **fabricated assembled, installed and commissioned at INS Eksila, Mulagada Area, Vishakhapatnam – 530012**. Training to be provided by supplier for 4 nos. of persons.
8. **Warranty: One (01) year comprehensive warranty** from the date of successful installation and commissioning.
9. ~~AMC: Vendor must quote consecutive three (3) years non-comprehensive AMC rate (minimum 01 preventive + 1 breakdown) for equipment after warranty. AMC charges shall be taken into consideration for deciding L1/evaluation of bids. How ever AMC charges should be quoted separately.~~
10. **OEM Certificate (*applicable for manufacturer only*):** In case the Bidder is the OEM, a declaration to this effect must be attached along with the offer. This certificate with valid date must contain Name, Designation, Email Address and Mobile Phone Number of the authorized signatory along with the address of the office.
11. **MAF Certificate (*applicable for dealer only*) :** In case the Bidder is offering products on behalf of the OEM, a proper Manufacturer's Authorization Certificate (MAF) with valid date must be attached with the quotation and it should contain Name, Designation, Email Address and Mobile Phone Number of the authorized signatory along with the address of the office.
12. **Taxes, Duties etc.:** The buyer should indicate full GST rates.
13. **Make In India:** Preference will be given to offer/s for Class-I MII product. The Bidder must furnish a declaration/Certificate to this effect along with the bid mentioning about the percentage of Local Input of the offered product and the detailed address of the place (manufacturing unit) where the input is being added. The Declaration/Certificate should have full name and designation of the signatory along with his/her email ID, direct phone number, office address.

As per Govt. of India procurement policies the eligibility of the suppliers for this bidding is restricted to Class I and Class II local suppliers as per Department for Promotion of Industry and Internal Trade, Govt. of India, vide OM No. P-45021/2/2017-PP (BE-II) dated 04 June 2020 and OM No. P-45021/2/2017-PP (BE-II) dated 16 September 2020.

14. **MSE:** Preference will be given to MSEs. The bidder must submit valid documents for claiming them as eligible MSEs for the particular bid/item.
15. **Other certificate/s :**
16. **Certificate reg. Land Border Sharing is compulsory.** Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. While participating in bid, Bidder has to undertake compliance of this and any

false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws.

17. **EMD:** The bidder has to submit an EMD along with the bid for amount mentioned in EMD details. EMD should be provided on the name of Director, CSIR-NML, Jamshedpur.
18. **Payment Terms:** ~~Hundred percent (100%) of the Contract Price of Goods received shall be paid within thirty (30) days of receipt of Goods and successful installation & commissioning upon submission of claim supported by the acceptance certificate issued by the Purchaser along with the Performance security.~~

OR

70% against delivery of goods, inspection and acceptance by the user and 30% after successful installation and commissioning and submission of Performance Security if any.

19. **Performance Security:** The vendor has to submit a Performance Security equivalent to 3 (three) per cent of the purchase order value before release of payment. The performance security should remain valid for a period of warranty plus sixty (60) days from the date of successful installation and commission of the supplied equipment.
20. **Bid Securing declaration:** Submission of Bid Securing Declaration is compulsory.
21. **The place of jurisdiction is Jamshedpur, Jharkhand, India.**
22. **Catalogue/Leaflet/Brochure:** Bidder must submit Catalogue / Leaflet / Brochure to justify the specification/feature of their offered equipment.
23. The bidder should ONLY attach the requisite documents, asked for. The Bidder should not attach "**IRRELEVANT DOCUMENTS**" or "**DOCUMENTS WHICH HAVE NOT BEEN ASKED FOR**".
24. In the event of non-compliance of any of the aforesaid guidelines, the offer of the bidder may be treated as non-responsive.



**Bidder Information Form**

(a) *The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted. This should be done of the letter head of the firm]*

Date: *[insert date (as day, month and year) of Bid Submission]*

Tender No.: *[insert number from Invitation for bids]*

01.	Bidder's Legal Name <i>[insert Bidder's legal name]</i>
02.	In case of JV, legal name of each party: <i>[insert legal name of each party in JV]</i>
03.	Bidder's actual or intended Country of Registration: <i>[insert actual or intended Country of Registration]</i>
04.	Bidder's Year of Registration: <i>[insert Bidder's year of registration]</i>
05.	Bidder's Legal Address in Country of Registration: <i>[insert Bidder's legal address in country of registration]</i>
06.	Bidder's Authorized Representative Information Name: <i>[insert Authorized Representative's name]</i> Address: <i>[insert Authorized Representative's Address]</i> Telephone/Fax numbers: <i>[insert Authorized Representative's telephone/fax numbers]</i> Email Address: <i>[insert Authorized Representative's email address]</i>
07.	Attached are copies of original documents of: <i>[check the box(es) of the attached original documents]</i> Articles of Incorporation or Registration of firm named in <b>1</b> , above.

Signature of Bidder \_\_\_\_\_

Name \_\_\_\_\_

Business Address \_\_\_\_\_

MANUFACTURERS' AUTHORIZATION FORM

***[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer and be enclosed with the technical bid.]***

Date: *[insert date (as day, month and year) of Bid Submission]*

Tender No.: *[insert number from Invitation for Bids]*

To: *[insert complete name and address of Purchaser]*

WHEREAS

We *[insert complete name of Manufacturer]*, who are official manufacturers of *[insert type of goods manufactured]*, having factories at *[insert full address of Manufacturer's factories]*, do hereby authorize *[insert complete name of Bidder]* to submit a bid the purpose of which is to provide the following Goods, manufactured by us *[insert name and or brief description of the Goods]*, and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 2.21 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer]*

Title: *[insert title]*

Duly authorized to sign this Authorization on behalf of: *[insert complete name of Bidder]*

Dated on \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_ *[insert date of signing]*



**[To be submitted by the bidding/participating firm in their letter Head]**

With reference to NML tender Enquiry bearing No. .... dated  
it is certified that:

We have read clause regarding restriction on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; We certify that the bidder is not from such a country or, if from a such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the competent Authority. A valid certificate issued by the Competent Authority has been attached with the bid. I hereby certify that this bidder fulfill all requirements in this regard and is eligible to be considered. (As per requirements under P-45021/112/2020-PP(BE-II)(E-43780) dated 24.08.2020 of Ministry of Commerce and Industry, Department for Promotion of Industry and Internal Trade and any amendments thereon.)

For and on behalf of M/s.....

[Seal of the firm]

Place:-

.....

Date:-

.....

Bid-Securing Declaration Form

To (insert complete name and address of the purchaser) I/We. The undersigned, declare that:

Date: Bid No. \_\_\_\_\_

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

- (a) have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
- (b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or reuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown) in the capacity of (insert legal capacity of person signing the Bid Securing Declaration).

Name: (insert complete name of person signing he Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of : (insert complete name of Bidder) Dated on \_\_\_\_\_day of \_\_\_(insert date of signing)

Corporate Seal (where appropriate)

(Note: In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid)



## Annexure–VIII

### Format for declaration by the Bidder for Code of Integrity & conflict of interest

(On the Letter Head of the Bidder)

Ref. No: \_\_\_\_\_

Date \_\_\_\_\_

To,

\_\_\_\_\_

\_\_\_\_\_  
(Name & address of the Purchaser)

Sir,

With reference to your Tender No. \_\_\_\_\_ dated \_\_\_\_\_ I/We hereby declare that we shall abide by the Code of Integrity for Public Procurement as mentioned under Para 1.3.0 of ITB of your Tender document and have no conflict of interest.

The details of any previous transgressions of the code of integrity with any entity in any country during the last three years or of being debarred by any other Procuring Entity are as under:

a

b

c

We undertake that we shall be liable for any punitive action in case of transgression/ contravention of this code.

Thanking you,

Yours sincerely,

Signature

(Name of the Authorized Signatory)

Company Seal

**PERFORMANCE SECURITY FORM**

MODEL BANK GUARANTEE FORMAT FOR PERFORMANCE SECURITY

To,

.....

WHEREAS ..... (name and address of the supplier) (hereinafter called "the supplier")

has undertaken, in pursuance of contract No. .... dated ..... to supply

(description of goods and services) (herein after called "the contract").

AND WHEREAS it has been stipulated by you in the said contract that the supplier shall furnish you with a bank guarantee by a scheduled commercial bank recognized by you for the sum specified therein as security for compliance with its obligations in accordance with the contract;

AND WHEREAS we have agreed to give the supplier such a bank guarantee;

NOW THEREFORE we hereby affirm that we are guarantors and responsible to you, on behalf of the supplier, up to a total of ..... (amount of the guarantee in words and figures), and

we undertake to pay you, upon your first written demand declaring the supplier to be in default under the contract and without cavil or argument, any sum or sums within the limits of (amount of guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the supplier before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract to be performed there under or of any of the contract documents which may be made between you and the supplier shall in any way release us from any liability under this guarantee and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until the ..... day of ....., 20.....

(Signature of the authorized officer of the Bank)

.....

Name and designation of the officer

.....

Seal, Name & Address of the Issuing Branch of the Bank

**Note: Whenever, the bidder chooses to submit the Performance Security in the form of Bank Guarantee, then he should advise the banker issuing the Bank Guarantee to immediately send by Registered Post (A.D.) an unstamped duplicate copy of the Guarantee directly to the Purchaser with a covering letter to compare with the original BG for the correctness, genuineness, etc.**