



CSIR-NML

सीएसआईआर - राष्ट्रीय धातुकर्म प्रयोगशाला

(सीएसआईआर की एक संघटक प्रयोगशाला, विज्ञान एवं प्रौद्योगिकी मंत्रालय)
भारत सरकार, बर्माईंस, जमशेदपुर - 831007, झारखंड (भारत)

CSIR-National Metallurgical Laboratory

(A Constituent Laboratory of CSIR, Ministry of Science & Technology)
Govt. of India, Burmamines, Jamshedpur - 831 007, Jharkhand (India)

PURCHASE ORDER

To, THERELEK ENGINEERS PRIVATE LIMITED, 70-71, III Phase, Peenya Industrial Area, Bengaluru – 560 058, Karnataka, India Email – info@therelek.com GST – 29AAACT5414A1ZR	P.O. No.	PUR/219/KK/DB/EQM/2025-26 (RE)
	Date	25-09-2026
	Subject	Award of Contract
	Ref.:-	1. GEM Bid No. GEM/2026/B/7592663 2. Quotation Ref. No. TEPL/NML/VDCFM/26-27/01 Dt: 27.06.2026 [vide Bid Form-Annexure-XVII(ii)] 3. Clarification reply Letter No: TEPL263/NML/CLE01/26-27/1176 dt. 05-08-26 4. Cost offered after Price Negotiation Meeting vide Letter No. TEPL263/NML/NG/Price/26-27/369 dt. 02.09.26.

Dear Sir,

I am directed to inform you that after evaluating the bid documents submitted by you as referred above, The Director, CSIR-NML, Jamshedpur has been pleased to inform you that you have been selected as the successful bidder for the **SUPPLY, INSTALLATION, COMMISSIONING ETC. OF DESIGN AND FABRICATION OF CONTINUOUS VACUUM DISTILLATION AND CASTING FACILITY OF MAGNESIUM.**

The total purchase price including cost of the equipment [covering Three (03) Years onsite Comprehensive Warranty] and Non-Comprehensive AMC period for Two (02) Years shall be ₹ **1,65,00,000.00**, as indicated in your revised and final financial offer submitted on the GeM Portal after Price Negotiation indicated through Letter No. TEPL263/NML/NG/Price/26-27/369 dt. 02.09.26, in accordance with the procedures intimated in the relevant bid documents.

Accordingly, you are requested to kindly arrange for execution of the Contract for **DESIGN AND FABRICATION OF CONTINUOUS VACUUM DISTILLATION AND CASTING FACILITY OF MAGNESIUM** within the delivery period. Please apply for refund of EMD if deposited by you with proper documentary evidence.

COST OF EQUIPMENT

Sl. No.	Description	Quantity	Total Price/ INR
1.	Basic Price of Design and Fabrication of Continuous Vacuum Distillation and Casting Facility of Magnesium (Technical Specifications are attached at Annexure-A)	One (01) Unit	1,31,91,557.40
2.	GST on Basic Price	@ 18%	23,74,480.33
Total cost on FOR CSIR-NML basis after Price Negotiation meeting vide bidder's email dt: 02.09.2026 including charges towards Packing, Forwarding, Installation & Commissioning			Rs. 1,55,66,037.73

CHARGES OF NON-COMPREHENSIVE

ANNUAL MAINTENANCE CONTRACT FOR 2 YEARS

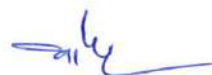
Sl. No.	Description	Total Price/ INR
1.	Basic charges towards Non-Comprehensive AMC for 1 st Year covering Two (02) nos. of Preventive Maintenance (PM) and Two (02) nos. of Failure/Breakdown Maintenance	3,95,746.72
2.	Basic charges towards Non-Comprehensive AMC for 2 nd Year covering Two (02) nos. of Preventive Maintenance (PM) and Two (02) nos. of Failure/Breakdown Maintenance	3,95,746.72
3.	GST @ 18% on Basic charges towards Non-Comprehensive AMC for 1 st Year	71,234.41
4.	GST @ 18% on Basic charges towards Non-Comprehensive AMC for 2 nd Year	71,234.41
Total charges of Non-Comprehensive Annual Maintenance Contract for Two (02) Years [covering Two (02) nos. of Preventive Maintenance + Two (02) nos. of failure/Breakdown Maintenance per AMC Year].		9,33,962.26

TOTAL CONTRACT VALUE

Sl. No.	Description	Quantity	Total Price/ INR
1.	Total cost on FOR CSIR-NML basis after Price Negotiation meeting vide bidder's email dt: 02.09.2026 including charges towards Packing, forwarding, Installation & Commissioning	One (01) Unit	1,55,66,037.73
2.	Total Non-Comprehensive AMC Charges for Two (02) Years including GST covering 2 nos. of Preventive Maintenance + Two (02) nos. of Breakdown Visit when required per Year.	2 Years	9,33,962.26
TOTAL CONTRACT VALUE* * On-site Comprehensive Warranty for Three (03) years from the date of completion of successful installation & commissioning and completion of all contractual obligation to the entire satisfaction of buyer. All consumable and non-consumable items/components should be covered under warranty without any exclusion whatsoever.			1,64,99,999.99
TOTAL CONTRACT VALUE [Rounded off]			1,65,00,000.00

This Contract/Purchase Order shall be governed by:-

- (1) General Conditions of Contract and Special Conditions of Contract as detailed in the BID NO. GEM/2026/B/7592663 floated on GEM Portal and
- (2) Special Conditions of Contract enclosed with this Purchase Order.



The Technical Specifications and other allied features of the ordered goods shall strictly conform to those specified in the aforesaid CSIR-NML Tender Document and complied by the Bidder / Supplier in their Quotation submitted on GeM Portal and all communications exchanged between CSIR-NML and the Bidder / Supplier.

The Order Acknowledgement must be submitted immediately and in any case, **within 07 days** from the date of placement of this Purchase Order. **The Order Acknowledgement shall be made on letterhead of the firm mentioning detailed technical specifications as per the Purchase Order and shall also contains declaration towards acceptance of all the terms & conditions of the Purchase Order.**



Stores & Purchase Officer

For & on behalf of the Council of Scientific & Industrial Research

Enclo:

1. Technical Specifications (Annexure-A, Page No. 12 to 32)

Explanations

The following words and expressions used in this Award of Contract shall have the meanings hereby assigned to them:

Purchaser	Means CSIR-NATIONAL METALLURGICAL LABORATORY, BURMA MINES, JAMSHEDPUR, JHARKHAND - 831007
Manufacturer/Supplier	Means Therelek Engineers Private Limited, Bengaluru
Indian Agent	Means Therelek Engineers Private Limited, Bengaluru

1.	Delivery Term	FOR CSIR-NML Jamshedpur (Door delivery at LSTF, Magnesium Plant, Nildih Campus, CSIR-NML, Jamshedpur)
2.	Purchase Order Value / Contract Price	₹ 1,65,00,000.00 (INR ONE CRORE SIXTY FIVE LAKHS ONLY)
3.	Transportation / Dispatch	The ordered goods shall be delivered by Supplier at LSTF, Magnesium Plant, Nildih Campus, CSIR-NML, Jamshedpur and duly insured by Supplier from your warehouse to final destination basis covering all the risks including SRCC and unloading at destination site.
4.	Payment	<u>Payment shall be made in currency of the Contract in the following manner:</u> Hundred percent (100%) of the Contract Price of Goods received excluding AMC Charges shall be paid within thirty (30) days of successful installation, commissioning, training and all incidental / related services of the items and acceptance certificate issued by user and submission of Performance Security within 21 days of receipt of the notification of award/ PO. <u>Payment terms of AMC for Two (02) Years (Non-Comprehensive):-</u> AMC Charges shall be paid on Yearly basis through RTGS within 30 days after completion of each AMC year subject to satisfactory service certificate given by the concerned user and against submission of bills.
5.	Delivery, Installation, Commissioning and Testing	SIX (06) MONTHS from date of issue of Purchase Order. Denial Clause (over and above levy of Liquidated Damage): any increase in statutory duties and / or upward rise in prices due to the PVC (Price Variation Clause) clause and / or any adverse fluctuation in foreign exchange are to be borne by the seller during the extended delivery period, while the purchaser reserves the right to get any benefit of a downward revisions in statutory duties, PVC and foreign exchange rate.

6.	Performance Security	The Supplier shall furnish Performance Security for 3% of the contract price excluding AMC Charges, i.e. ₹ 4,66,981.00 within 21 days of receipt of the notification of award/PO. The Performance security shall be in one of the following forms: (a) A Bank guarantee or stand-by Letter of Credit issued by a Nationalized/Scheduled bank located in India or a bank located abroad in the form provided in the bidding documents. OR (b) A Banker's cheque or Account Payee demand draft in favour of the purchaser. The performance security will be discharged by the Purchaser and returned to the Supplier not later than 60 days following the date of completion of the Supplier's performance obligations, including any warranty obligations, unless specified otherwise in SCC, without levy of any interest. In the event of any contract amendment, the supplier shall, within 21 days of receipt of such amendment, furnish the amendment to the performance security, rendering the same valid for the duration of the contract, as amended for further period of 60 days thereafter. The order confirmation must be received within 7 days. However, the Purchaser has the powers to extend the time frame for submission of order confirmation and submission of Performance Security (PS). Even after extension of time, if the order confirmation /PS are not received, the contract shall be cancelled provided that the purchaser, on being satisfied that it is not a case of cartelization and the integrity of the procurement process has been maintained, may, for cogent reasons, offer the next successful bidder an opportunity to match the financial bid of the first successful bidder, and if the offer is accepted, award the contract to the next successful bidder at the price bid of the first successful bidder. 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.
7.	Country of Origin	INDIA
	Port of Shipment	By Road.
8.	Road Permit / eWaybill	Will not be provided.
9.	Scope of Work	Design, Fabrication, Supply, Installation, Commissioning, Testing and Training.



10.	Pre-Dispatch Inspection (PDI)	a) Vendor should submit Layout drawings within 20 days from the issue of P.O. before taking up the fabrication/assembly work. b) The submitted drawings should be approved by CSIR-NML and shall be used for all fabrication / assembly work. c) Pre-Dispatch Inspection will be done by CSIR-NML at Supplier's site. Prior notice of 7 working days shall be given by Supplier for PDI. d) The Vendor should intimate minimum one week in advance for the inspection call. e) PDI will also be a part of the acceptance criteria mentioned. If any discrepancy or deviation is identified with respect to above mentioned Technical Specifications and approved Drawings during PDI, the bidder has to take up corrective actions upto the satisfaction of the tenderer, followed by re-inspection by CSIR-NML. All necessary PDI should be completed by the delivery time mentioned. Non –compliance during PDI may lead to cancellation of the order. f) The cost of travel, hospitality for the PDI will be borne by NML, Jamshedpur. However, all costs related to demonstration of equipment will have to be borne by the supplier.
11.	Design Vetting Conditions and Submission of Final Approved Drawings	GAD and component A, B, C designs are required to be vetted by CSIR NML before fabrications. In case of any doubt while detailed engineering designs, CSIR NML shall be asked for clarifications to avoid any errors. Vetting of all mechanical, electrical and single line diagrams, control panel designs shall be done by CSIR NML before start of actual fabrication.
12.	ICT (Onsite) (Installation, Commissioning And Testing)	Installation, Commissioning and Testing will be the sole responsibility of the Supplier. Installation, Commissioning and Testing will have to be done by the supplier. The Supplier will complete the Installation & Commissioning including Training and acceptance test at site within SIX (06) MONTHS from the date of issuance of Purchase Order. Installation, commissioning, heating, vacuum and temperature parameter tests, and training of the equipment with operation shall be provided by vendor to NML personnel. Supplier must submit copy of Installation Certificate on their letterhead duly signed & stamped by both the firm's engineer and user of CSIR-NML indicating specific start date and completion date of Installation. The firm must also submit Acceptance Certificate Form (Attached) on completion of commissioning of the items.
13.	Warranty	Three (03) Years on-site Comprehensive Warranty from the date of completion of successful installation & commissioning and completion of all contractual obligation to the entire satisfaction of buyer. All consumable and non-consumable items/components should be covered under warranty without any exclusion whatsoever.

14.	AMC	Consecutive Two (02) years Non-comprehensive AMC [minimum Two (02) preventive + Two (02) failure / breakdown visit annually] for equipment to be started immediately after expiry of warranty period of Three (03) Years. The services towards Preventive Maintenance will be carried out in equal spaced interval during each AMC Year and Breakdown Maintenance visits will be carried out as and when required during each AMC Year. In the event of any breakdown, the Supplier shall attend to the complaint notice and depute its service personnel within five (05) working days from the date of notification by the Purchaser.
15.	Pre-installation visit	Supplier's engineer will make the inspection for site readiness prior to shipment/ dispatch to expedite the installation.
16.	Training	It should be imparted to Ten (10) persons for Five (05) days to the purchaser at purchaser's premises. It should be completed as per schedule mentioned under installation and commissioning.
17.	Acceptance Criteria	- Inspection of all dimensional details as PO, Compliance Documents (including drawings and BOM) submitted by bidder during tendering and final approved drawings. - Installation, commissioning and testing of equipment with all utilities, alongwith performances of individual subunits till the specified limit of all operational parameters. - Atleast 02 nos. hot trials will be conducted in presence of vendor's representatives after commissioning of item. - Successful ICT by CSIR NML team/s will lead to acceptance of system supplied. On successful completion of acceptability test, receipt of deliverables, etc. and after the Buyer is satisfied with the working of the complete system, the acceptance certificate signed by the supplier and the representative of the buyer will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the equipment.
18.	LD Clause	The penalty shall be zero point five percent (0.5%) per week or part of a week; maximum amount of penalty shall be ten (10%). It will be applicable for delay in delivery / shipment, installation, testing, commissioning and completion of all contractual obligations beyond deadlines as mentioned above.
19.	Certificate for effecting payment	Supplier will submit the installation and acceptance certificate indicating the completion of Installation, Commissioning & Training as well as duly signed by the user of CSIR-NML alongwith Invoice for effecting the payment.

NON-DISCLOSURE AGREEMENT (NDA)

The supplier must abide with the confidentiality and non-disclosure of any information pertaining to this Purchase Order / item under this Project.

The designs and details is strictly confidential and shall not be shared to anyone without permission of CSIR NML, Jamshedpur. An NDA for design and specs shall be provided by M/s. Therelek Engineers Private Limited, Bengaluru to NML before actual fabrication. Final equipment and its designs will be property of CSIR NML and hence vendor will be abiding with non-disclosure terms of CSIR National Metallurgical Laboratory (NML). All designs (mechanical/electrical/ electronic) and integrated pilot plant will be intellectual property of CSIR NML and permissions must be sought before disclosing information to parties other than CSIR NML Jamshedpur.

All designs and drawings originating from this tender shall be copyright and IP of CSIR-NML.



BIDDER MUST NEED TO PROVIDE A DECLARATION CERTIFICATE ON COMPANY LETTERHEAD FOR MAINTAINING CONFIDENTIALITY AND ACCEPTANCE OF NON-DISCLOSURE AGREEMENT DULY SIGNED & SEALED BY AUTHORIZED SIGNATORY.



Stores & Purchase Officer
For & on behalf of the Council of Scientific & Industrial Research

SPECIAL CONDITIONS OF CONTRACT (SCC)

The following Special Conditions of Contract (SCC) shall supplement and / or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

SCC 1.	The Purchaser is: Director, CSIR-NATIONAL METALLURGICAL LABORATORY, BURMA MINES, JAMSHEDPUR, JHARKHAND - 831007
SCC 2.	The Supplier is: M/s. Therelek Engineers Private Limited, Bengaluru
SCC 3.	Final Destination: LSTF, Magnesium Plant, Nildih Campus, CSIR-NML, Jamshedpur
SCC 4.	Order Acknowledgement/Confirmation: The Order Acknowledgement must be submitted immediately and in any case, within 07 days from the date of placement of this Purchase Order. The Order Acknowledgement shall be made on letterhead of the firm mentioning detailed technical specifications as per Quotation and shall also contains declaration towards acceptance of all the terms & conditions of the Purchase Order.
SCC 5.	Performance Security: The Supplier shall furnish Performance Security for 3% of the contract price excluding AMC Charges , i.e. ₹ 4,66,981.00 within 21 days of receipt of the notification of award/PO.
SCC 6.	Delivery / Shipment : <u>SIX (06) MONTHS</u> from date of issue of Purchase Order. Denial Clause (over and above levy of Liquidated Damage): any increase in statutory duties and / or upward rise in prices due to the PVC (Price Variation Clause) clause and / or any adverse fluctuation in foreign exchange are to be borne by the seller during the extended delivery period, while the purchaser reserves the right to get any benefit of a downward revisions in statutory duties, PVC and foreign exchange rate. Except as provided under the Force Majeure clause, a delay by the Supplier in the performance of its delivery obligations shall render the Supplier liable to the imposition of penalty pursuant to Penalty Clause unless an extension of time is agreed upon pursuant to above clause without the application of penalty clause.
SCC 7.	Part supply will not be accepted.
SCC 8.	The country of origin of the Goods is INDIA The port of shipment of the Goods is By Road.
SCC 9.	The mode of shipment / dispatch: By Road.
SCC 10.	Pre-installation visit Supplier's engineer will make the inspection for site readiness prior to shipment / dispatch to expedite the installation. Installation & Commissioning: Installation, Commissioning and Testing will be the sole responsibility of the Supplier. Installation, Commissioning and Testing will have to be done by the supplier. The Supplier will complete the Installation & Commissioning including Training and acceptance test at site within SIX (06) MONTHS from the date of issuance of Purchase Order. Installation, commissioning, heating, vacuum and temperature parameter tests, and training of the equipment with operation shall be provided by vendor to NML personnel. Firm must submit copy of Installation Certificate on Supplier's letterhead duly signed & stamped by both the firm's engineer and user of CSIR-NML indicating specific start date and completion date of Installation. The firm must also submit Acceptance Certificate Form (Attached) on completion of commissioning of the items.



	Delay beyond the prescribed period in completion of contractual obligations will attract the imposition of Liquidated Damage Clause as mentioned in this tender document.
SCC 11.	Training: It should be imparted for Ten (10) persons for Five (05) days to the purchaser at purchaser's premises. It should be completed as per schedule mentioned under installation and commissioning.
SCC 12.	Acceptance Criteria : - Inspection of all dimensional details as PO, Compliance Documents (including drawings and BOM) submitted by bidder during tendering and final approved drawings. - Installation, commissioning and testing of equipment with all utilities, alongwith performances of individual subunits till the specified limit of all operational parameters. - Atleast Two (02) nos. hot trials will be conducted in presence of vendor's representatives after commissioning of item. - Successful ICT by CSIR NML team/s will lead to acceptance of system supplied. On successful completion of acceptability test, receipt of deliverables, etc. and after the Buyer is satisfied with the working of the complete system, the acceptance certificate signed by the supplier and the representative of the buyer will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the equipment.
SCC 13.	Pre-Dispatch Inspection and Acceptance Tests:- The Inspection tests prior to shipment of goods and at final acceptance at buyer's site. - Vendor should submit Layout drawings within 20 days from the issue of P.O. before taking up the fabrication/assembly work. - The submitted drawings should be approved by CSIR-NML and shall be used for all fabrication / assembly work. - Pre-Dispatch Inspection will be done by CSIR-NML at Supplier's site. Prior notice of 7 working days shall be given by Supplier for PDI. - The Vendor should intimate minimum one week in advance for the inspection call. - PDI will also be a part of the acceptance criteria mentioned. If any discrepancy or deviation is identified with respect to above mentioned Technical Specifications and approved Drawings during PDI, the bidder has to take up corrective actions upto the satisfaction of the tenderer, followed by re-inspection by CSIR-NML. All necessary PDI should be completed by the delivery time mentioned. Non –compliance during PDI may lead to cancellation of the order. - The cost of travel, hospitality for the PDI will be borne by NML, Jamshedpur. However, all costs related to demonstration of equipment will have to be borne by the supplier. After the goods are manufactured and assembled, inspection and testing of the goods shall be carried out at the Supplier's plant by the Supplier prior to shipment to check whether the goods are in conformity with the technical specifications. Manufacturers Test Certificate with data sheet shall be issued to the effect and submit alongwith delivery documents. The acceptance test will be conducted by the Purchaser, their consultant or other such person nominated by the Purchaser at its option after the equipment is installed at Purchaser's site in the presence of supplier's representatives. The acceptance will involve trouble free operation. There shall not be any additional charges for carrying out acceptance test. No malfunction, partial or complete failure of any part of the equipment is expected to occur. The Supplier shall maintain necessary log in respect of the result of the test to establish to the entire satisfaction of the Purchaser, the successful completion of the test specified. In the event of the ordered item failing to pass the acceptance test, a period not exceeding two weeks will be given to rectify the defects and clear the acceptance test, failing which, the Purchaser reserve the right to get the equipment replaced by the Supplier at no extra cost to the Purchaser. Successful conduct and conclusion of the acceptance test for the installed goods and equipment shall also be the responsibility and at the cost of the Supplier.

	Before the goods and equipment are taken over by the Purchaser, the Supplier shall supply operation and maintenance Manuals together with Drawings of the goods and equipment built. These shall be in such details as will enable the Purchase to operate, maintain, adjust and repair all parts of the works as stated in the specifications. The Manuals and Drawings shall be in the ruling language (English) and in such form and numbers as stated in the Contract. Unless and otherwise agreed, the goods and equipment shall not be considered to be completed for the purposes of taking over until such Manuals and Drawing have been supplied to the Purchaser. On successful completion of acceptability test, receipt of deliverables, etc. and after the Purchaser is satisfied with the working of the equipment, the acceptance certificate signed by the Supplier and the representative of the Purchaser will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the equipment.
SCC 14.	Packing: The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit.
SCC 15.	Shipping and other Documents : <u>For goods manufactured within India</u> Within 24 hours of dispatch, the supplier shall notify the purchaser the complete details of dispatch and also supply following documents by registered post / speed post and copies thereof by Email. (a) Two copies of Supplier's Invoice indicating, <i>inter-alia</i> description and specification of the goods, quantity, unit price, total value, HSN Code, Gross & Net Weight, Volume of goods; (b) Packing list; (c) Insurance certificate, if required under the contract; (d) Manufacturer's warranty certificate and in-house inspection certificate; (e) Any other document(s) as and when required in terms of the contract.
SCC 16.	Mode of dispatch: In case of supplies from within India, the mode of transportation shall be by Road. In case of supplies from abroad, the mode of transportation shall be by Sea.
SCC 17.	Insurance: The Insurance in respect of goods to cover all risks including SRCC and unloading at destination site shall be borne by Supplier at its own costs.
SCC 18.	Warranty: THREE (03) Years on-site Comprehensive Warranty from the date of completion of successful installation & commissioning and completion of all contractual obligation to the entire satisfaction of buyer. All consumable and non-consumable items/components should be covered under warranty without any exclusion whatsoever.
SCC 19.	Payment: <u>Payment shall be made in currency of the Contract in the following manner:</u> Hundred percent (100%) of the Contract Price of Goods received excluding AMC Charges shall be paid within thirty (30) days of successful installation, commissioning, training and all incidental / related services of the items and acceptance certificate issued by user and submission of Performance Security within 21 days of receipt of the notification of award / PO. <u>Payment terms of AMC for Two (02) Years (Non-Comprehensive):-</u> AMC Charges shall be paid on Yearly basis through RTGS within 30 days after completion of each AMC year subject to satisfactory service certificate given by the concerned user and against submission of bills.

SCC 20.	Liquidated Damages : The penalty shall be zero point five percent (0.5%) per week or part of a week; maximum amount of penalty shall be ten percent (10%). It will be applicable for delay in delivery / shipment, installation, testing, commissioning and completion of all contractual obligations beyond deadlines as mentioned above.
---------	---

NON-DISCLOSURE AGREEMENT (NDA)

The supplier must abide with the confidentiality and non-disclosure of any information pertaining to this Purchase Order / item under this Project.

The designs and details is strictly confidential and shall not be shared to anyone without permission of CSIR NML, Jamshedpur. An NDA for design and specs shall be provided by M/s. Therelek Engineers Private Limited, Bengaluru to NML before actual fabrication. Final equipment and its designs will be property of CSIR NML and hence vendor will be abiding with non-disclosure terms of CSIR National Metallurgical Laboratory (NML). All designs (mechanical/electrical/ electronic) and integrated pilot plant will be intellectual property of CSIR NML and permissions must be sought before disclosing information to parties other than CSIR NML Jamshedpur.

All designs and drawings originating from this tender shall be copyright and IP of CSIR-NML.

BIDDER MUST NEED TO PROVIDE A DECLARATION CERTIFICATE ON COMPANY LETTERHEAD FOR MAINTAINING CONFIDENTIALITY AND ACCEPTANCE OF NON-DISCLOSURE AGREEMENT DULY SIGNED & SEALED BY AUTHORIZED SIGNATORY.



25/09/26

Stores & Purchase Officer

For & on behalf of the Council of Scientific & Industrial Research

Annexure-A

TECHNICAL SPECIFICATION OF **DESIGN AND FABRICATION OF CONTINUOUS VACUUM-DISTILLATION AND** **CASTING FACILITY OF MAGNESIUM:**

End Use: To be used for Vacuum Distillation refining, recycling and casting of Magnesium in CSPS-Mg Pilot Plant under Project.

Scope of Supply and incidental works:

Item: Design and Fabrication of 'Continuous Vacuum Distillation and Casting' Facility of Magnesium

Technical Specification of Continuous Vacuum Distillation & casting system for Mg pilot plant

Continuous Mg distillation system is a customized fabricated equipment for Magnesium metal distillation under vacuum and/or inert atmosphere. This system will be used for refining magnesium metal and recycling Mg alloys to recover Mg metal in high pure form. It will be a 10 kg/hr integrated pilot scale Mg distillation facility consisting of following parts:

- A. **Continuous charging Vacuum distillation Unit** (Vacuum charging, melting and boiling, transporting at minimum capacity 10kg/hr)
- B. **Electrically heated-condenser-collector** with 130-140 kg or higher Liquid magnesium collection
- C. **Electrically heated-Vacuum Casting Unit** for casting at least 120 kg liquid magnesium
- D. **Integrated Vacuum system** with ports and controls for maintaining vacuum of all components (A,B,C)
- E. **Control system:** PLC, HMI/SCADA equipped Automatic and on board switch controls for manual and automatic mode of operations of heating and vacuum control

Reference schematics, drawings and dimensions are provided for detailed design/GAD development.

The technical specifications of various parts are as follows:

Sr. No	Technical Specification/descriptions
A.	Continuous charging Vacuum distillation Unit
A1.	Vacuum Charge Bin
1	Annexure A2/2 is to be referred for Schematic and operational flow for Vacuum charge bin. Charge bin must be provided on the top of the melting chamber isolated through a vacuum tight and manual slide gate valves with radiation protector towards the melting zone and feed resting plate valve towards the charging zone so as to charge feed material into retort without breaking vacuum of retort-system.
2	Vacuum Charge Bin provided at top of retort-furnace chamber, should be able to accommodate at least 10 Kg Mg (10-15 mm lumps) at a time with at least 20% empty volume. Internal bin dimensions should be atleast of 100 mm radius and 400 mm height.
3	Vacuum Charge Bin should have top-hinged lid, vacuum chamber, material resting plate (mild steel/SS), Valve with opening closing mechanism and water cooled- flange at bottom to fit it on Retort (ref drawings). Dummy ports and plugs should be provided for gas feeding.

4	Ports like connector, inlet ports to feed Argon gas in the crucible, thermocouple input points must be provided in the charge bin. Viton O-rings should be used for all O-ring arrangements.
5	Resting plate clear diameter 200 mm, isolation valve opening at least 220 mm, heat shield plate diameter should be atleast 200 mm. There should not be any hindrance to stop fall of Mg lumps to below transfer line (ID-200 mm atleast).
6	Charge bin should be given with a line (PU fitting/ KF 10 flange) and suitable manual valve to connect it with vacuum system
7	There must be a provision to vent the charge bin by flushing Argon (or other inert gas) so as to break the vacuum as per need, without disturbing the vacuum of the system beneath the feed resting plate.
A2.	<i>Vacuum Retort 22H centrifugal casted steel or equivalent grade for minimum 1100 °C working</i>
1	Annexure A2/1 and A2/2 is to be referred for vacuum retort and fitted accessories/utilities.
2	Vacuum retort of 10-12 mm thickness with water cooled collar and reinforced with atleast 04 circumferential strips (same grade material), should be provided, which shall be fitted within split furnace assembly. Internal Diameter of retort should be 310 mm $\pm$ 05mm.
3	Retort should be at least 1150 mm or higher height, suitable to hold graphite-melting and vaporization crucibles with sockets as shown in schematics.
4	Material of Construction (MoC) of Retort should be 22H or super 22H or HRCS or any other equivalent grade capable of sustaining temperature level upto 1150 °C along with vacuum upto 0.001 mbar without any dimensional deformity/damage during operations.
5	A water cooled flange-lid arrangement for separating the 'vacuum charge bin' from the retort should be provided at top of the retort. (retort and retort lid) Top flange shall be at least 600 mm diameter and both shall be water cooled and adequate O-ring arrangements to achieve desired vacuum during operations.
6	The retort shall have provisional ports like connector, Gas inlet ports to feed Argon gas in the crucible, thermocouple input provision etc.
7	Annexure A2/1 shall be referred for drawing details of assemblies.
A3.	<i>Furnace arrangements (split furnaces) with heated connectors</i>
1	Annexure A-2 is to be referred for drawings of Furnace, retorts and all accessories.
2	Resistance Heating furnace system should be constructed with 2-zone heating arrangement, with top zone designed for a maximum temperature of 1000 °C (in 3-3.5 hrs with load) and bottom zone designed for maximum operating temperature of 1200°C (3.5 to 4 hrs with load).
3	Provision of heating should be made by means of external mounted SiC or equivalent heaters of reputed make viz. KANTHAL/SILICARB to maintain furnace temperatures specified for the two zones. It must be ensured that the temperature inside retort and within the uniform heating zone is homogeneously maintained at the set value. Temperature measured at the bottom of the vaporization zone crucible through suitable thermocouples should be considered for attainment of set value. Calculation of heat load must be done for melting and boiling of at least 15 kg Magnesium metal, such that at-least 10-12 kg/hr melting and boiling rates respectively for Mg metal feed is achieved. All heating system should be able to work for at least 20 hours operation in continuation. - Heat load Calculation should be done and shall be provided with technical bid and will be basis for technical qualification.
4	There would be 60-80 mm refractory gap between top and bottom furnaces.
5	Heating and metal vaporization facilities (furnace) is to be equipped with all utilities like Temperature controller and suitable control mechanism with thermocouples, etc.
6	High efficiency ceramic blanket insulation should be provided around the retort The insulation thickness should be such that the adjacent connector should be of minimum length (refer drawing and schematics) with overall minimum heat loss and space should be available for connecting flanges of connector to condenser assembly.

7	Suitable two (02) nos. of K type duplex thermocouples should be provided to measure, control, and monitor temperature in melting and boiling chambers, individually. Calibration certificates of the thermocouples must be provided. Communication Cables should be of adequate length and mounted in trays with nomenclature and ferrules as per standards.
8	Stainless Steel (SS) chamber should be provided to encase the melting and boiling furnaces and the retort and crucible assembly housed within. Bottom of the chamber should be welded with flat plate. Maximum surface/skin temperature of the overall equipment should not be more than 40°C.
9	The vacuum furnace-chamber assembly shall be mounted on powder coated MS structure with hydraulic arrangement for height adjustments in the range of 100-200 mm.
10	Chamber should have provision to feed argon/thermocouples/power cables/sensor-communication lines and should be capable of holding 10 ⁻³ mbar vacuum during operations/hot conditions. An independent vacuum measurement with display through Pirani gauge should be provided.
11	Both furnaces and their peripheral utilities should be equipped with independent controls with PID controllers.
12	Energy meter should be provided to measure the total energy consumption for operations. Reputed make Data loggers (with minimum frequency of 2Hz) with adequate memory provisions for recording temperatures of both thermocouples should be provided. In datalogger dummy ports shall be leftover for future needs. Software for datalogger shall be supplied in original and it should be connected with a PC/laptop for through adequate ports and connections
13	Electrical connections and other fabrications should be as per industry standard and as per standard safety protocols. Safety check points/interlocks should be provided wherever required.
14	Controllers from Schneider ®/ Eurotherm®/ Siemens/ Honeywell/ and Delta/ Rockwell/ ABB/ OMRON make shall be used for controls, and ammeters/voltmeters should be provided for all heating controls.
15	Switches of individual furnaces should be provided with lights as per industry standard and safety coding.
16	Adequate cooling for ports/O-rings should be provisioned in the system, wherever required for smooth and safe operations. KF 10 flanges with clamps/O-rings assembly should be provided with water cooled ports to fit Pirani Gauges/PU fittings etc.
17	Annexure A2 shall be referred for connector design/drawings and details
18	Connector of atleast 150 mm ID, 8-10 mm thickness should be provided as shown in schematics to ensure that the vapour transfer lines are not choked due to local condensation. It should be welded suitably, to hold vacuum 0.001 mbar at 1100-1200°C atleast 20 hrs of operation in continuation.
19	Length of the connector should be kept within 500 mm. Enough space around connector should be provided for ease of fittings of cooling lines, flanges and sensors.
20	Water cooling of the flange (that will be attached with the connector) should be provided along with suitable O-rings. The flanges should be of ID- ~150 mm and OD ~450 mm. Water cooling channel should be designed in such a way that only O-rings are protected from damage due to high temperature. Water cooling is for safety of O-rings and internal connector line should not have temperature drop less than 700°C due to the flange cooling.
21	Provision of external heating should be provided to consistently maintain the temperature of the connector in the range of 1050-1150 °C.
22	Separate temperature measurement (with suitable-K type duplex thermocouples) control unit should be provided for connector heating. Temperature measurement at atleast two equidistant points should be deployed for connector.
23	All fittings/welding/connections should be vacuum tight. Connector should be able to hold vacuum 0.001 mbar under heating. End Flange will be equipped with water cooling and as per specified design shown in Annexure A2.

A4.	Graphite Crucible Assembly for melting-boiling-connector section(refer annexure A3)
1	Two (02) Nos of graphite crucibles should be provided inside the retort, one for melting and the other for vaporization furnaces. The crucibles must have sockets to facilitate vacuum tight connections between the top and bottom furnace crucibles, the top charge bin feed line and top crucible, and connector tubes and bottom furnace crucible. Volume of melting crucible should be ≥ 16 liters and volume of vaporization crucible should be ≥ 18 liters. Vaporization crucible shall be able to hold atleast 18 liters of liquid magnesium at any point of experiment.
2	Wall thickness of crucible should be in the range of 10-15 mm. Base thickness of both crucibles should be at least 10-15 mm.
3	Top melting crucible should have a minimum 40 mm hole at bottom to let the molten feed pour into the bottom of vaporization crucible.
4	Bottom vaporization crucible should have a minimum 130 mm opening on curved surface, as per drawings A2-A4 (dimensional details)
5	There should be a top lid socket in the melting crucible to connect the charging line with the melting crucible.
6	The graphite tube fitted to melting crucible should be of push fit type and no leakage should be there. For connecting the graphite tubes suitable sockets should be designed.
7	Please refer annexure A2-A4 for drawings of crucible assembly
B	Vacuum based thermal condenser with ~140 kg capacity liquid magnesium collection unit (upto 1000 °C)
1	A Condenser of SS 430 with split type furnaces suitable to raise and maintain temperature to 900-1000 °C is to be provided as per schematic and drawings shown in Annexure B (B1-B3). Separate furnaces for zone 1 and 2 should be provided with independent controls. Tolerances for all the dimensions is ± 5 mm.
2	The condenser should be equipped with suitable water cooled flanges to connect it to connector and bottom collecting crucible. A minimum 150 mm ID externally heated condenser feedthrough tube should be welded to lateral part of condenser to collect the vapours coming through the connector from the vaporizing chamber of unit A. The water cooled flange of this feedthrough should be fitted to flange of connector. Refer annexure B1.
3	Condenser-1 and condenser 2 should be externally heated through independent control units working on feedback from separate K-type thermocouples. Both furnaces should be able to raise and maintain temperature upto 1000 °C by 2 hrs. it should be designed for continuous operations till 20 hrs atleast.
4	High grade –insulation materials and refractories should be used in split furnaces to maintain the outer skin temperature not greater than 40°C..
5	At top and bottom of condenser chamber, adequate water cooled flanges should be there as shown in schematic to connect it with bottom collector.
6	At top of the condenser, a hemispherical lid should be provided with a KF port 25/40 mm to connect it with vacuum as per process requirements. The port should have a manual valve to open and close the line. Three cylindrical baffles (MoC. SS 310/430/cast iron) and sleeves should be provided to be fitted inside condenser. OD of baffles should be atleast 260 mm and height should be atleast 250 mm.
7	At bottom of condenser, there should be an externally heated collector chamber with a capacity to hold 140 kg liquid Magnesium. For dimensions, refer Annexure B2. The external furnace should be able to raise and maintain temperature upto 1000 °C to hold 140 kg Mg in liquid state. SS430/310 should be used for vessel construction and inside wetting parts should be of high purity graphite.
8	There should be KF 25 fitted vacuum port and view point on top lid of the collecting vessel.
9	At bottom of the collecting crucible-vessel assembly, a tapping line of 50-80 mm is to be provided with a suitable isolation valve. The tapping line should be fitted with graphite tube (ID 50 mm) and assembly should be heated externally to keep magnesium in liquid phase/flowable. Suitable water cooled- O-ring

	fitted flange shall be given at the end of tapping line to connecting with casting assembly. Dummy lid shall also be provided. Annexure B, B1, B2, B3 shall be followed for design, fabrication and assembly.
10.	Collecting crucible should be equipped with suitable sensor to measure height of liquid collected in bottom collecting crucible. . Temperature and vacuum data shall be displayed continuously as well as recorded in data logger provided on control system.
C.	120-140 Kg vacuum casting unit with cast iron moulds and heating upto 800-900 °C
1	An assembly fitted with tiltable ladle, cast iron (CI) mold assembly to cast atleast 120 kg magnesium is to be provided as per schematics shown annexure C. Suitable transfer line of seamless alloy tube with external heating should be provided with an isolation valve/gate to transfer hot metal from crucible to tundish. Provision should be made to maintain the whole transfer line at temperature in the range of 800-900°C. Isolation valve should withstand hot liquid metal and high temperature (800-900°C). Temperature of transfer line should be measured, displayed and recorded.
2	The casting chamber is a two part vacuum-chamber placed on rolls and split type mechanism. Inside walls should have Alloy based or suitable heaters mounted on refractories to pre-heat the moulds before casting. Provision should be made to raise the temperature inside the vacuum chamber (housing the casting unit) to a level in the range of 800 – 900°C. Suitable-O-ring, vacuum tight O-rings based- lockings is to be provided for vacuum tightness while operations. Vacuum level upto 0.001 mbar should be ensured for operational requirement. Leak test should be done to 0.00005 mbar level in cold conditions.
3	Minimum dimensions of cast iron tundish should be as follows: diameter 300/200 mm and height atleast 400 mm. About 6-12 nos of cast iron moulds are to be provided and fitted as per schematics shown. Dimensions are mentioned in annexure C schematic. However, vendors may propose number of cavities (at least 06 nos.). In any case total casting capacity should be atleast 120 kg magnesium metal. Provision for external water cooling (copper tube based) of moulds should be made to cool the ingots/mold and assembly after casting to ambient temperature within 4 hrs. Attached drawings and guidelines shall be referred for design moulds and casting assembly.
4	For casting operations, the tundish should be fitted in one part of the chamber. The transfer -T-line made up of cast iron fitted with 6-12 moulds (each mold in two parts), will be placed in front of tundish. Once all parts are fitted and checked the door or the other movable part will be brought to first part to close the chamber. Whole assembly will be moved and fitted with the flange of tapping line coming from collecting vessel. Vacuum will be done to desired level and mold shall be heated to 800-900 °C by using heaters mounted inside. If parameters i.e. vacuum, temperature and casting assembly fittings are in line, the isolation valve of tapping line will be opened. Liquid magnesium will flow to tundish through externally heated transfer line under gravity. Once tundish is filled, it should be tilted with handle and liquid magnesium will flow to fill the moulds one by one gradually through T-Line. There should be a view port to see the inside flow of magnesium to molds. The glass port should be protected with a covering lid and argon flow arrangements. Temperature of chamber and molds shall be measured monitored, displayed and recorded continuously.
5	Thermal sensors, temperature measurement system shall be equipped in the casting moulds, cast-assemblies to measure and maintain temperature of liquid metal and moulds during operation. The data of vacuum, temperature shall be logged in in into a reputed make data logger with option to retrieve data in pendrives/laptop/PC/ Control system mounted HMI screens.. PIDs shall be provided of Schneider ®/ Eurotherm®/ Siemens/ Honeywell/ and Delta/ Rockwell/ ABB/ OMRON makes. All thermocouples shall be celebrated.
D	Vacuum system for distillation-condensation and casting requirements (up to 0.001 mbar)

1	Integrated Vacuum system with ports and controls for maintaining vacuum of all sub units/components (A,B,C) should be provided. At least 3 independent rotary pumps (if require in combination of root pumps) for vacuum upto 0.001 mbar shall be given to control vacuum of part A, B, C independently. Adequate vacuum gauges with displays, pressure transmitters shall be equipped in vacuum system. Piping as per requirement shall be provided with structural support wherever required. All vacuum control shall be done through motorized throttle valve arrangements and feedback control. HMI/SCADA and on-board manual controls shall be given with the system. All vacuum fittings shall be on industrial standards.
2	Vacuum line diagrams with all controls, sensors shall be provided with adequate labeling with GAD/Final engineering drawing. Control of all throttle valves shall be PLC Based feedback controlled and suitable PTC/Pirani sensors shall be used.
3	All assembly shall be tested for leak and certificates shall be provided with equipment. In cold condition, leak test shall be done upto 5×10^{-5} mbar (0.00005 mbar). All units shall be displayed shown in mbar. Reputed make Pressure transmitters (0-1014 mbar) shall be able to resolve at least 1 mbar. Calibration certificates for all pressure transmitters, gauges and thermocouples shall be provided. Two Rotary pumps of capacity equivalent to pumps connected in part A, B, C of the system shall be provided as stand by pump. Dummy ports and plugs shall be provided in vacuum lines for leak tests and additional connections/fittings.
4	Suitable manual valves shall be provided in all vacuum lines. For vacuum controls PLC based-feedback controlled throttle valves shall be used. Separate HMI (set point control) as well as manual controls shall be provided for vacuum controls in feed charge bin, melting-boiling-condensation-collection chamber, and casting assembly.
E	Integrated Control system with data display and acquisition:
1	PLC, HMI and on board switch controls for manual and automatic operations of heating and vacuum control, with standard pressure, thermocouples and sensors with display shall be provided for controls (manual/automatic modes).
2	All controls on a single panel to be placed about 20 m away from system shall be provided. Cabling should be done accordingly. HMI with PLC/SCADA should be used with data loggers (reputed make, channel as per requirements) to record vacuum, temperature of all parts during operations. All cables should be numbered and electrical drawings/circuit diagrams shall be made accordingly. Adequate cable tray with labels shall be provided.
3	All furnaces shall be independently controlled and monitored in both automatic and manual modes. In case of any errors in automatic mode, user shall be able to operate the equipment manually.
4	Equipment shall be mounted on suitable coated MS structure with ladders (conformed to industrial safety standards). All safety aspects i.e. Ladder, platforms, working spaces, electrical safety, interlocking of operations etc. shall be considered in final assembly. For reference, assembly, top view and Isometric view is being shown in annexed drawings.
5	Suitable capacity manual Chain pulley and hoists with structures shall be provided for handling the furnaces, retorts in part A, B, C of system.
F.	Scope of CSIR NML
1	Space under shed : 10 m (L) X 4-5 m (W) x 8-10 m (H) with leveled flooring.
2	Argon gas cylinders by NML, but Regulators, piping and valve shall be provided by supplier
3	Electrical power (single point) as per final approved drawings (FAD). All cables shall be provided by supplier.
4	Cooling water @ambient temperature and normal tap pressure at single source would be provided by CSIR NML. Cooling water has to be tapped through pipelines from nearby water sump (@15-20 m distance)
G.	Scope of supplier (technical)
1	Compressor with all utilities as per requirement for operation in distillation-casting plant (equipment) shall be provided by supplier. Any civil requirement of site (on RCC floor) shall be fall in vendor scope. As per

	installation commissioning requirements vendor will have to arrange for grouting, civil foundations, electric and water lines to equipment from provided points nearby (within 15 meters).
2	Initial primary drawings is essentially required and shall be provided with technical offer without fail. It shall be used for technical comparison and non-submission of initial drawings (based on tendered drawings) shall subject to technical disqualification/rejection of bid in evaluation stage. Primary list of BOQ/BOM shall be included with make of electronic components used in offer. Based on understanding of specifications, a detailed process flowsheet or operational flowsheet must also be provided by the bidder Verbatim copy or reproduction of tendered drawings under suppliers letterhead will not be considered as bidder's original drawing and therefore will not be considered for technical comparison. GAD and component A, B, C designs are required to be vetted by CSIR NML before fabrications. In case of any doubt while detailed engineering designs, CSIR NML shall be asked for clarifications to avoid any errors.
3	Equipment with parts and accessories as per technical specification and designs vetted by CSIR NML Jamshedpur. Bought out items shall be of industrial standards. PIDs shall be provided of Schneider ®/ Eurotherm®/ Siemens/ Honeywell/ and Delta/ Rockwell/ ABB/ OMRON makes. All thermocouples shall be celebrated. Vacuum Pumps of HHV, Edward make or equivalent heavy duty and certified to BIS/ International standard shall only be provided. Hose pipe, vacuum lines, sensors shall be or reputed industrial makes to withstand continuous operations of 60 hrs atleast without fail.
4	Vetting of all mechanical, electrical and single line diagrams, control panel designs shall be done by CSIR NML before start of actual fabrication.
5	Spare O-rings-5 Set, calibrated Pirani gauge with cable (0.001 mbar) (05 nos.), digital pressure transmitters (05 nos. with cables/plugs and fittings), all electrical and electronic cables/Thermocouples/trays/electronic fittings required for installation and one set wrench/LN keys and KF 25 to KF 10 reducers 05 sets.
6	Installation, commissioning, heating, vacuum and temperature parameter tests, and training of the equipment with operation shall be provided by vendor to NML personnel. 02 nos. hot trials (without feed charge) will be taken for acceptance.
7	Operation manual (3 hard copies and soft copy in adequate storage)
8	Safety and maintenance manual (3 hard copies and soft copy in adequate storage). Electrical Safety protocols shall be used in equipment as per norms. Interlocks wherever required in control system, shall be provided for safe operations.
9	Leak test certificates, material (construction) certificates and calibration certificates for thermocouples, pressure transmitters and Pirani gauge shall be provided.
10	Single line diagram, CAD drawings (soft and hard copy), Detailed engineering drawings (3 hard copies and soft copy in adequate storage)
11	Operation manual by OEMs of controllers and other accessories (soft and hard copies) shall be provided
12	Space requirements along with any specific requirements shall be provided with drawings for approval before fabrication.
13	Suitable-Structure and charging stand/platform shall be provided with system.
14	Technical details of all materials used shall be provided in 02 sets of equipment manual along with softcopy.
15	05 nos. of K type thermocouples (duplex) as spare. 05 pressure transmitters with cables and displays, 02 Pirani sensors with display, additional dummy ports with lids and KF flanges, 03 set of SS Below of 2 m length with KF 40 Fittings shall be provided as spares.
16	Spare-consumables graphite crucibles: 02 nos. of melting and 02 nos. of vaporization crucible shall be provided with equipment. 02 set of Spare Graphite tubes, blocks shall be provided as used in final fabrication.
17	For dimensional details, attached drawings shall be referred, in case of any doubt clarification must be sought before actual fabrication. Referring the specifications and schematics, for all dimensions, temperature and vacuum levels $\pm 5\%$ tolerances may be considered, if specific range is not provided or values are not explicitly mentioned.

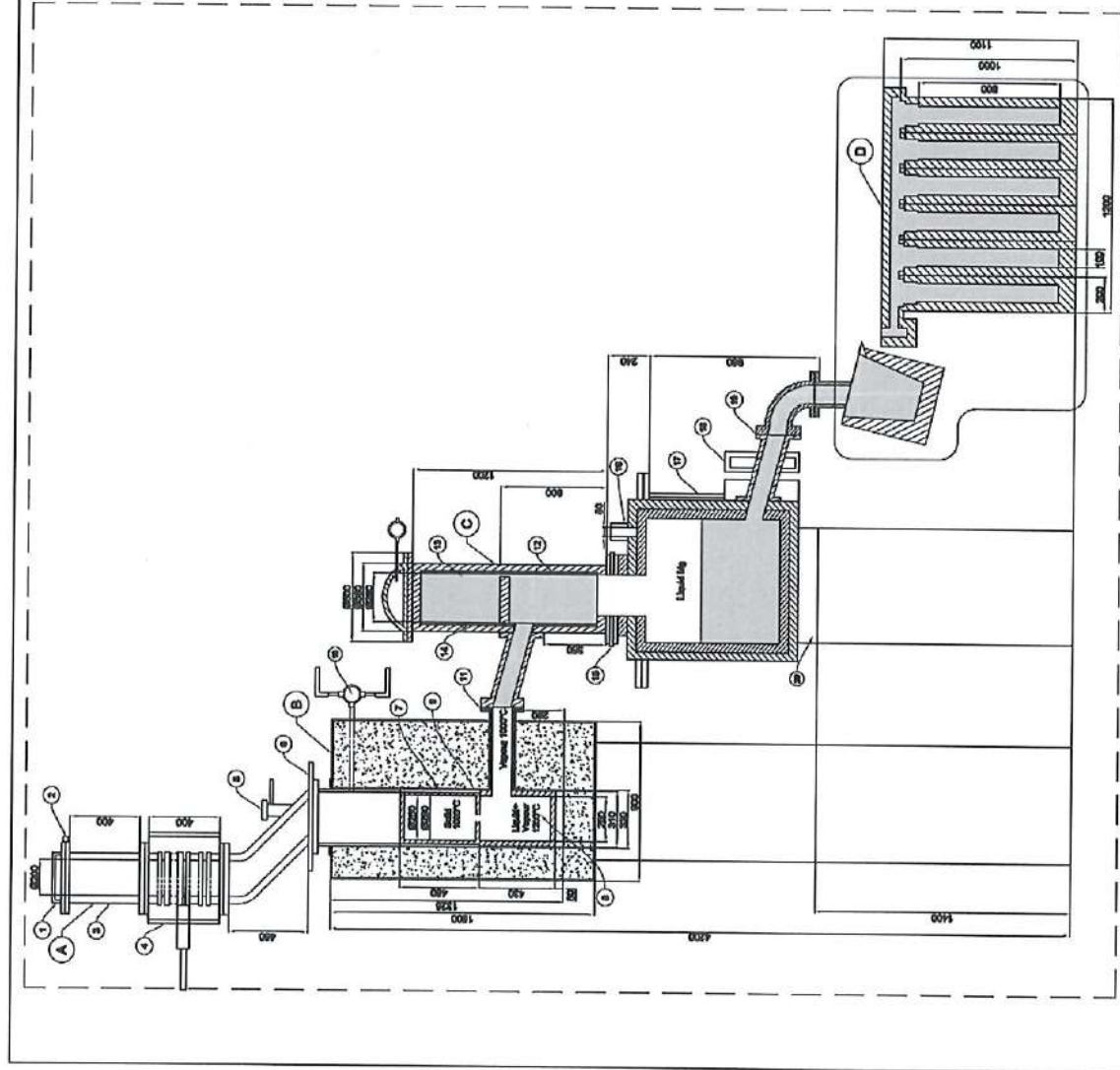
18	Onsite comprehensive Warranty of minimum 36 months (Thirty Six Months) from successful installation and commissioning shall be provided for equipment. OEM warranty certificates and list of all bought out items with specs shall be supplied along with item. For bought out electronic items i.e. PIDs, displays, control system parts, vacuum pumps beyond warranty of OEM, repairing for mechanical and electrical failures shall be covered by supplier for total period of 36 months. All consumable and non-consumable items/components should be covered under warranty without any exclusion whatsoever.
19	Onsite Pre-dispatch inspection (PDI) of equipment with hot trial before delivery by CSIR NML/Indenter. Equipment shall be shipped to "CSIR NML, Jamshedpur only after successful/satisfactory inspection against tendered specifications.
20	The tendered design and details is strictly confidential and shall not be shared to anyone without permission of CSIR NML, Jamshedpur. All designs further developed for NML shall be in IP and copyright of CSIR NML. All participating vendors will abide NDA. Selected vendor shall provide an NDA for design and specifications to NML before actual fabrications. Final equipment and its designs will be property of CSIR NML and hence vendor will be abiding with non-disclosure terms of CSIR National Metallurgical Laboratory (NML), Jamshedpur.
21	Acceptance criteria: - Inspection of all dimensional details as PO and final approved drawings. - Installation, commissioning and testing of equipment with all utilities, alongwith performances of individual subunits till the specified limit of all operational parameters. - Atleast 02 nos. hot trials will be conducted in presence of vendor's representatives after commissioning of item. Successful ICT by CSIR NML team/s will lead to acceptance of system supplied.



Guidelines for Fabrication of Ni-Cr alloy steel –special Vacuum Retorts:

Code for construction for Retort	ASME Section VIII – Division-1
Materials shall conform to ASTM/ASME specification	Mill test certificates(MTC) shall be furnished during inspection. Composition tests shall be provided.
Welding of joints specifications	Suitable welding technology and procedures shall be used for defect free sound welds of all joints, for which test certificates are also mandatory to submit with item.
Inspections (tube, water condenser, welding, flanges)	Inspection of all welds shall be carried out in accordance with ASME Sec. VIII Division-1. Liquid penetrant Inspection • Each weld pass of the butt joints of retort is subject to DP testing and each weld pass other than butt weld joints in pressure boundary area of the retort. • Root and final pass of structural welding for non-pressure boundary area. Radiography Complete retort alongwith welding shall be subject to 100% Radiography. Gamma ray/X-ray radiography may be used as per the conditions mentioned below a) Sensitivity of 2% shall be ensured b) Coverage of 10% overlap to be ensured on either side of weldment Acceptance level shall be as per ASME Section –V and also mutually agreed by manufacturer and purchaser. All test certificates, including leak tests applied for qualification shall be provided in soft and hard copy with item. As per technical specifications listed, vacuum specified shall be tested under cold and hot conditions for acceptance





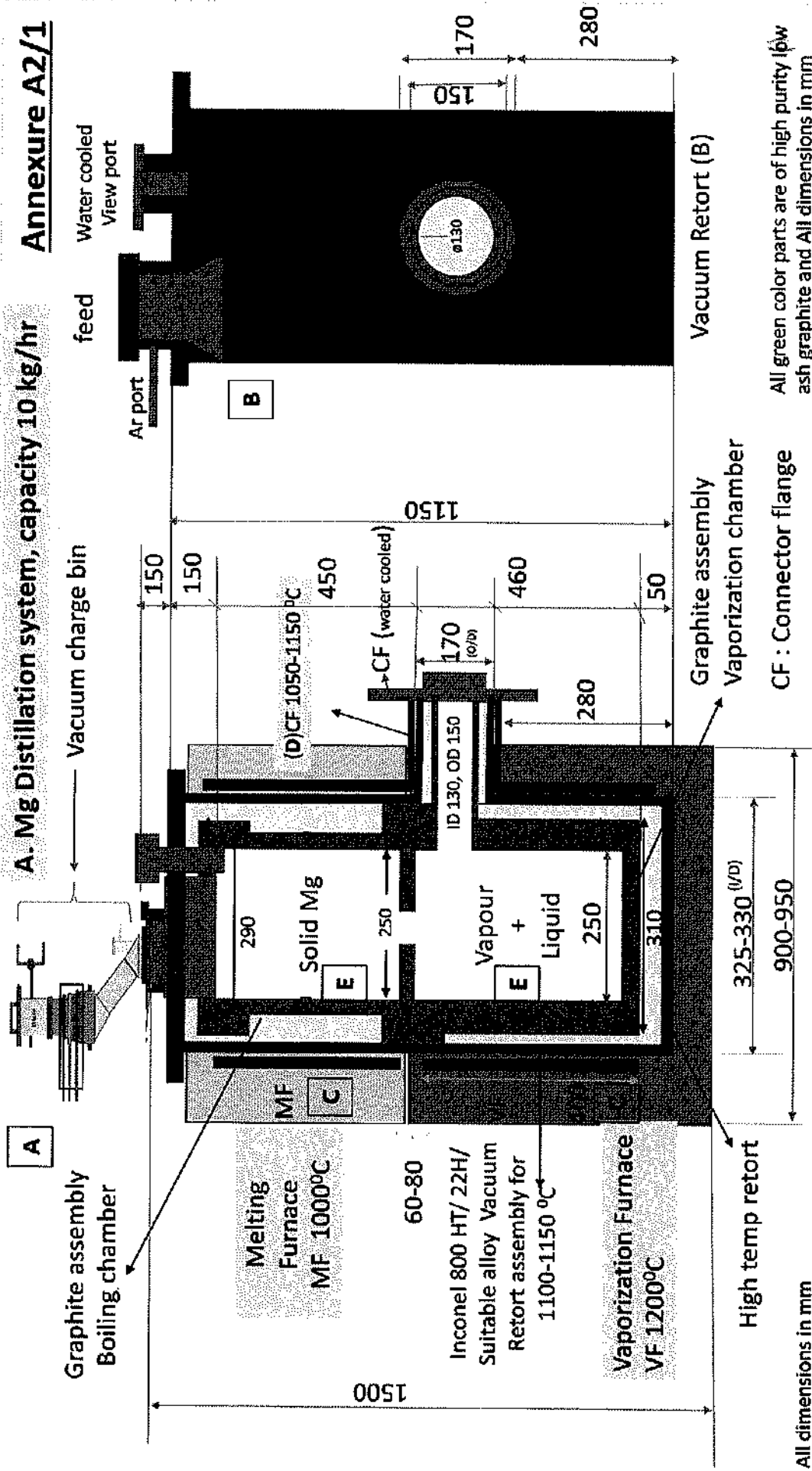
D	Mg Vacuum Casting Unit 120kg/hr
20	Jack to adjust height
19	Connector Flange3
18	Isolation Valve Chamber
17	Silica Gels
16	Dummy to dust filter with lid and orings
15	Alloy Gate Valve
14	Condenser Spill Furnace
13	Condensor2
12	Condensor1
C	Condensor-Melt Crucible Assembly
11	Connector Flange2
10	Two Way Vacuum Valve
9	Vacuum Retort Assy
8	Graphite Assy Vaporisation Chamber
7	Graphite Assy Boiling Chamber
6	Mg Distillation System, Capacity 10kg/hr
5	Connector Flange1
4	Valve case for Feed reading Platform, Slide Gate valve, Radiation Protection Shield
3	Charge Bin
2	Hinge
1	Top Lid with O ring glass view
A	Vacuum Charge Bin
S	No Parts Name

☐ Integrated Vacuum Distillation and Casting Unit

CSIR-NATIONAL METALLURGICAL LABORATORY			
ENGINEERING DIVISION			
JAMSHEDPUR			
DRAWN BY: JAMSHEDPUR			
CHECKED BY: JAMSHEDPUR			
APPROVED BY: JAMSHEDPUR			
DATE: 27/07/2023			
PROJECT NO: 2023-01			
DRAWING NO: 2023-01			
TITLE: LAYOUT FOR RETORT VACUUM REDUCTION UNIT			
SCALE: 1:1			
SHEET NO: 1			
TOTAL SHEETS: 1			
REV: 01			

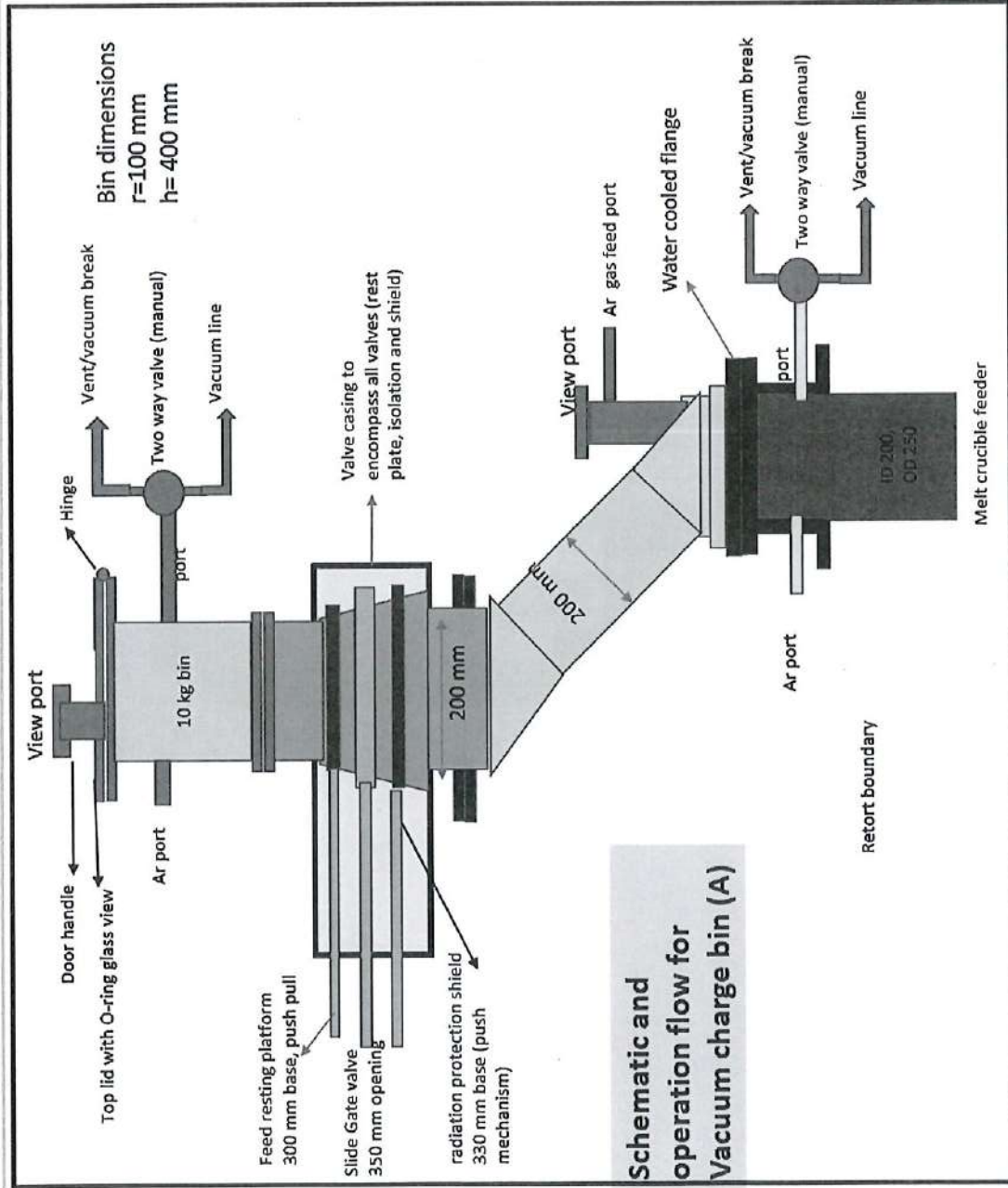
Annexure A2/1

A. Mg Distillation system, capacity 10 kg/hr



All green color parts are of high purity low ash graphite and All dimensions in mm

Annexure A2/2



All dimensions in mm

B. Condenser-Melt crucible assembly



Liquid Mg bath (120-140 kg Mg) and casting under vacuum

	specification
Condenser ID	310 mm ± 5 mm
Condenser OD	322 mm ± 5 mm
Condenser 1 and 2 height	600+600 mm
Condenser split furnace OD	500 mm ± 10 mm
Condenser- graphite wetting parts lining	OD 310/ID 295, ht. 600 mm
Condenser top insulation /skin temp	100 mm /40 °C
Collection Retort ID	400-420 mm
Collection Retort OD	560-600 mm
Collection Retort depth	1100 mm ± 20 mm
Bottom Thickness	20-25 mm
Graphite crucible	
OD	390 mm ± 5 mm
ID	360 mm ± 5 mm
Depth	1000 mm ± 5 mm
Bottom thickness	40 mm ± 5 mm
Lid OD/ID	as per retort
Lining inside lid	Graphite (low ash)
TL (transfer/tapping line)	ID 50-80 mm

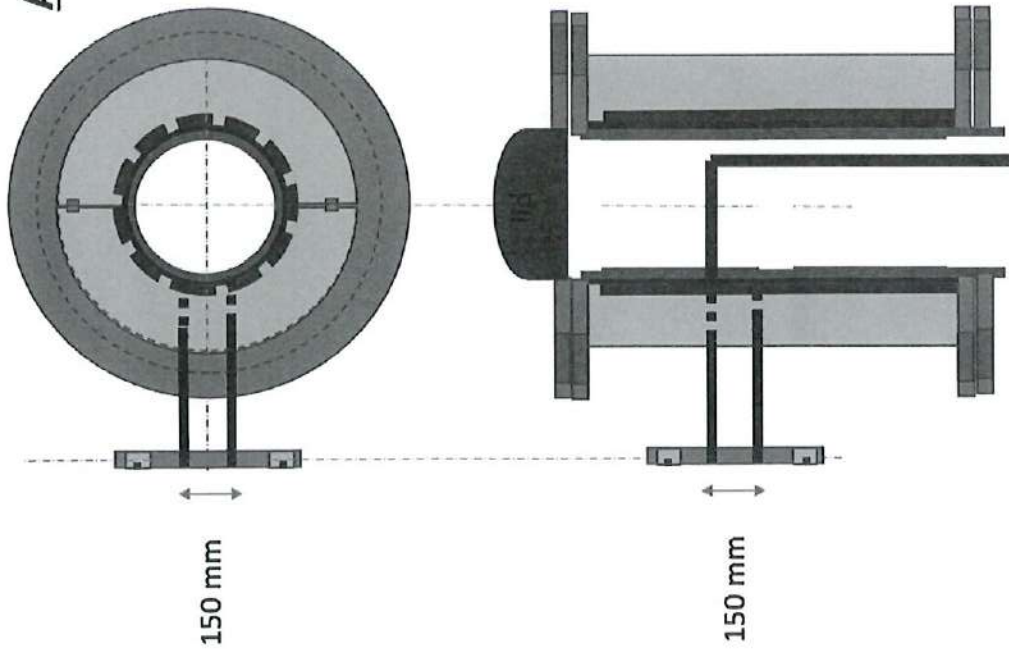
Annexure B1

B1 THERMAL CONDENSER (10 kg/hr)

Condenser ID	310 mm
Condenser OD	322 mm ± 5 mm
Condenser 1 height	600 mm ± 5 mm
Condenser 2 height	600 mm ± 5 mm
Condenser split furnace OD for both condenser 1&2 furnaces	500-600 mm
Condenser- graphite wetting parts lining	OD 310/ID 295, ht. 600 mm ± 5 mm
Condenser top lid insulation	150 mm ± 5 mm
Skin temperature	40-60 °C

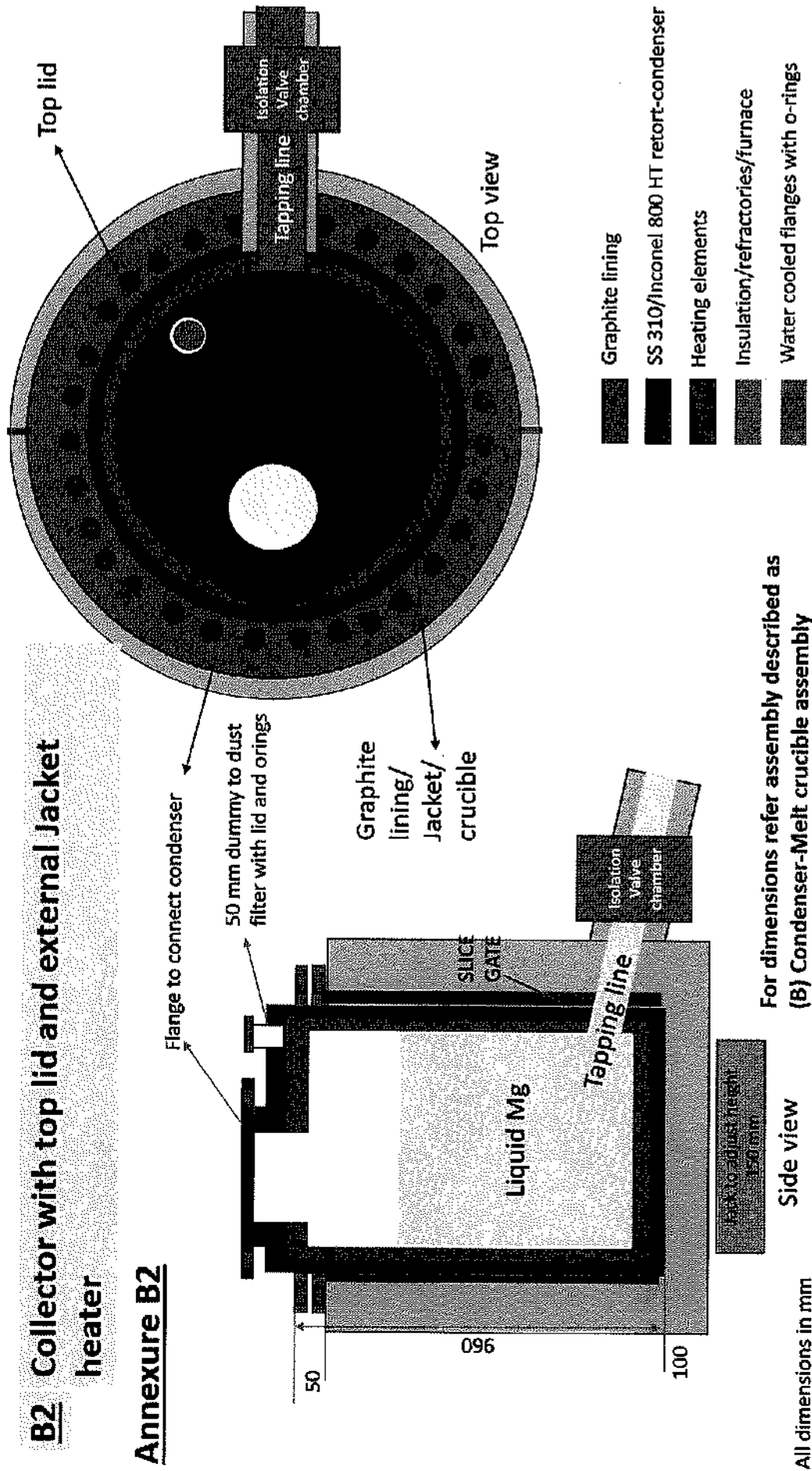
- Graphite lining
- SS 310/Inconel 800 HT retort-condenser
- Heating elements
- Insulation/refractories/furnace
- Water cooled flanges with o-rings

All dimensions in mm



B2 Collector with top lid and external Jacket heater

Annexure B2

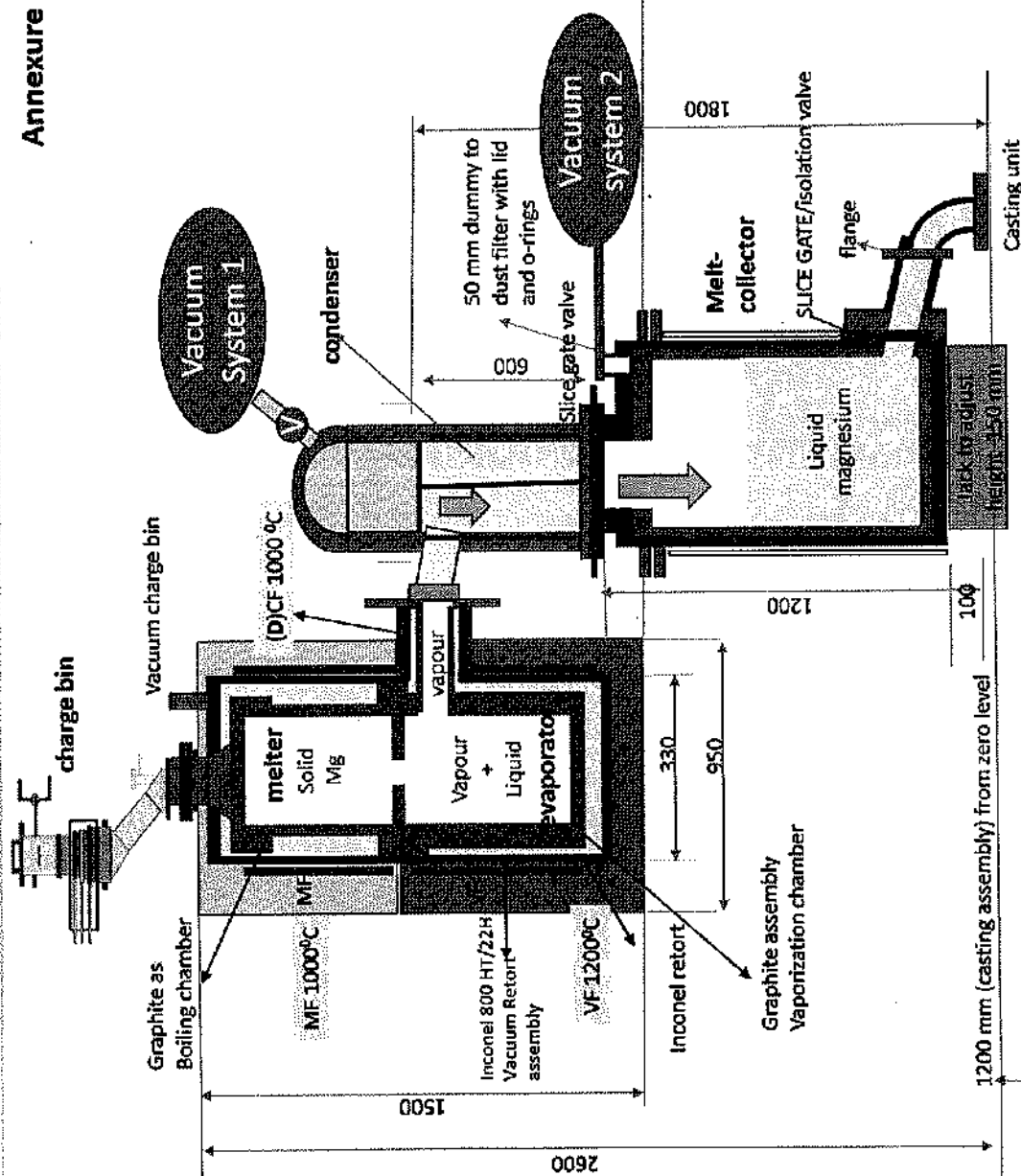


Annexure B3

Assembly of part A and B

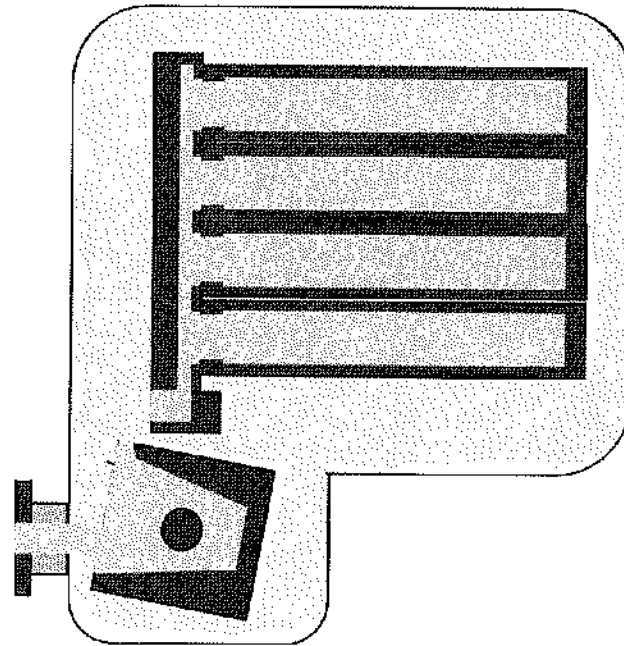
- Integration of Distillation-Condensation and Collection chambers.
- Adequate working space and platforms shall be fabricated around all chambers.
- Furnaces will be split type and space to open and close the furnaces.
- There should be provision for perpendicular/vertical movement of retorts/ condenser- tubes, material flow conduits and casting assembly.
- All ports and flange shall be water cooled and suitable O-rings shall be used in vacuum fittings

All dimensions in mm

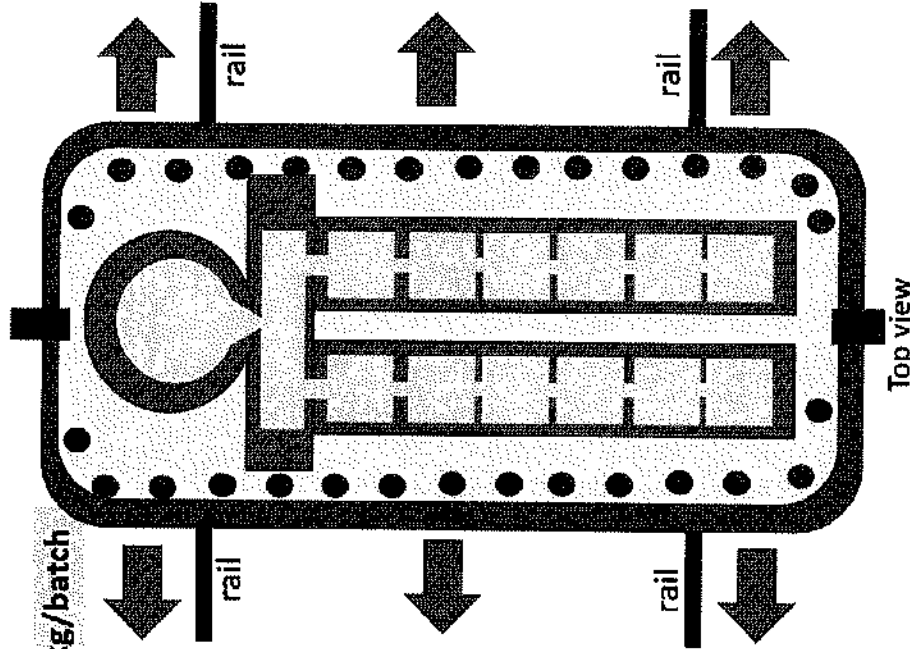


Annexure-C

C. Mg vacuum Casting unit, capacity 130-140 kg/batch



Side view



Top view

All dimensions in mm

*size of chamber and molds should be kept to minimum space/energy requirements

Tundish

30/20 cm Dia x 40-45 cm height

6-12 nos of Cast Iron molds fitted to a dual line T-channel

Internal mold cavity Volume (single)
10-15 X 10-15 X 80-100 cm³

Mold external (single)
20-30 X 20-30 X 100-150 cm³

Mold heating and control provision to 650 °C, with metallic wire-heating elements mounted inside ceramic layers vacuum chamber

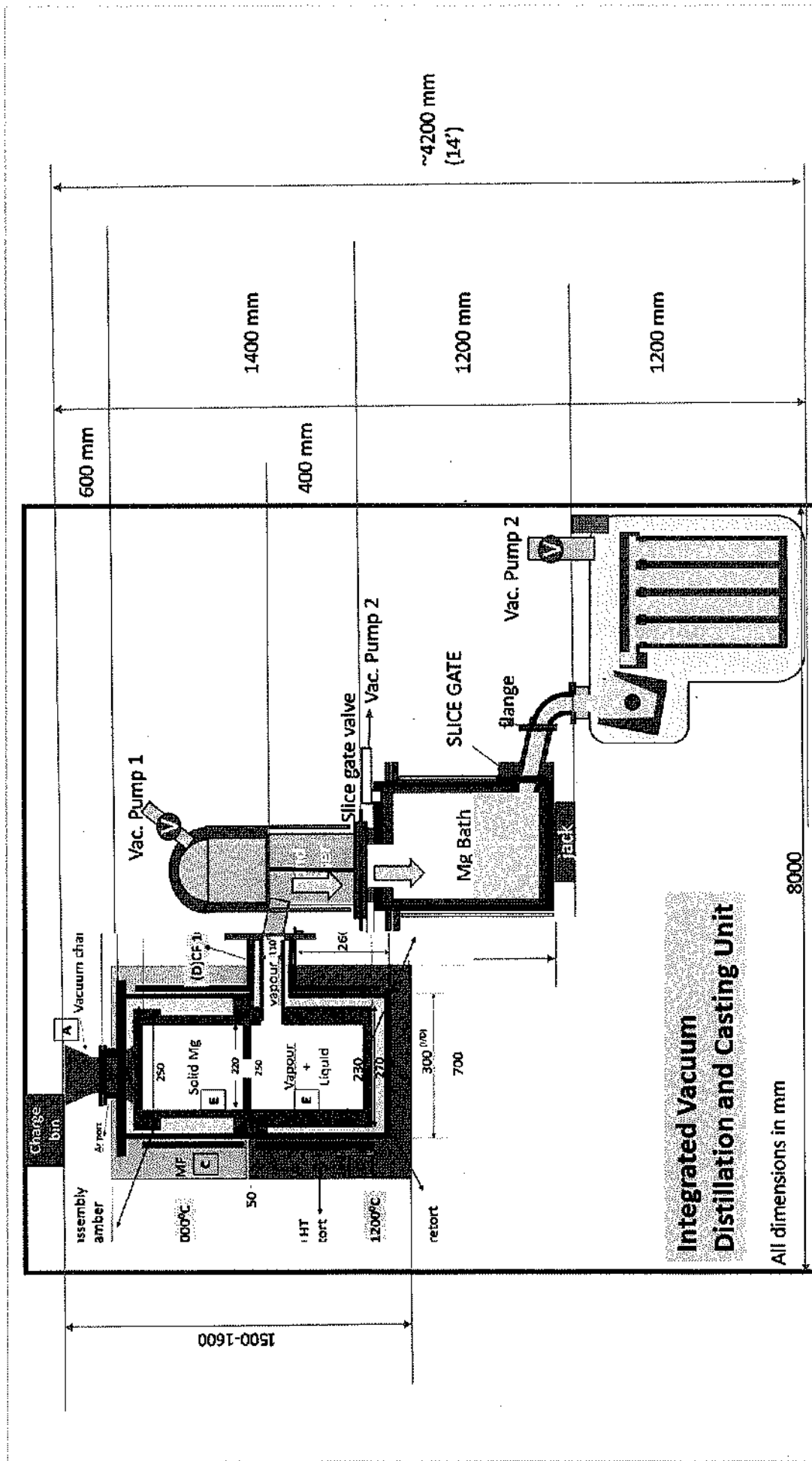
*Vacuum chamber

600 mm x 1800 mm x 1050 mm +

tundish chamber:

600 mm X 600 mm X 600 mm

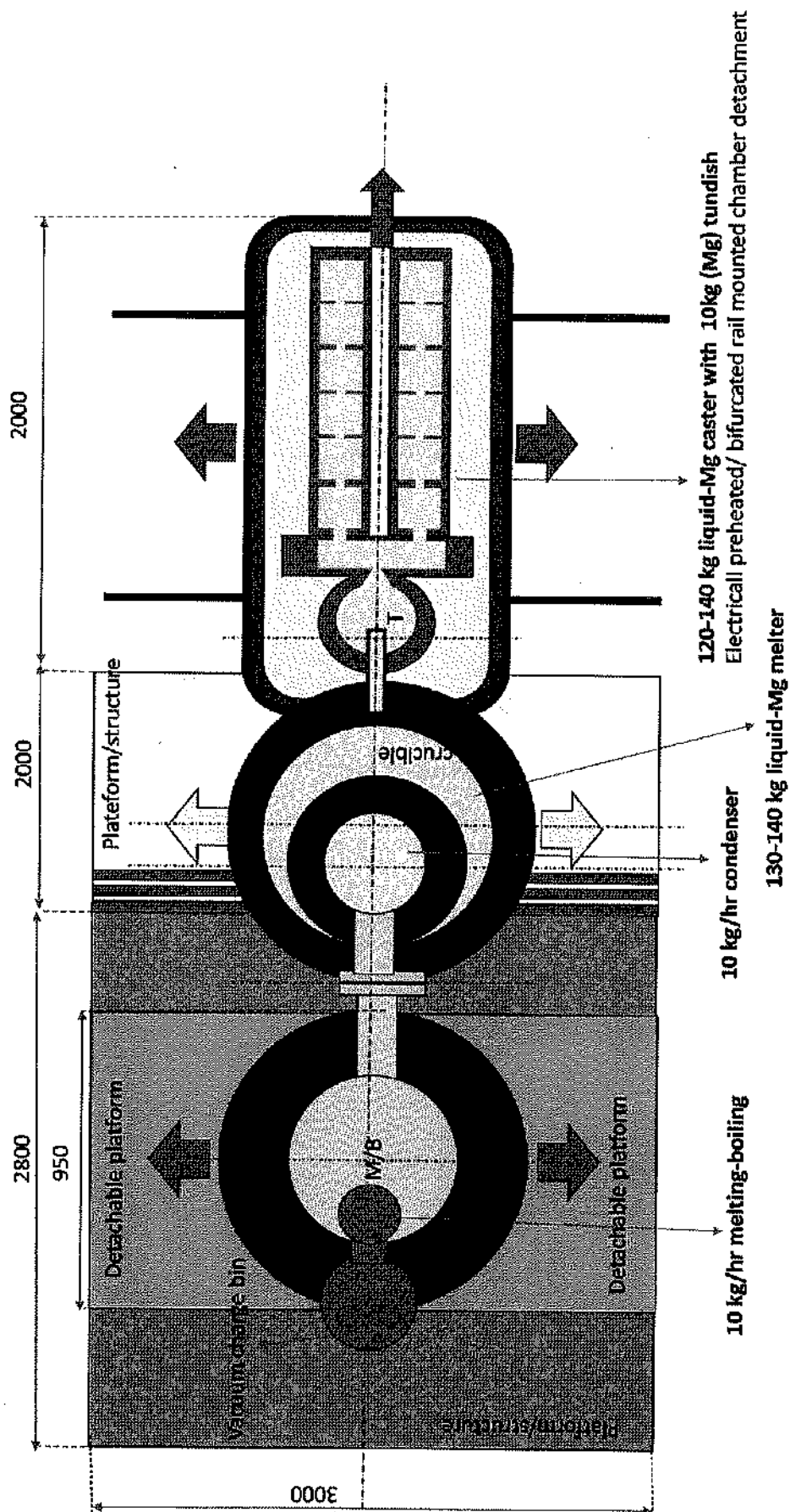
Chamber inside heating should be upto 800-900 °C, to be fabricated as Split chambers mounted on rails to host the tundish and casting assembly. Inside furnace with suitable refractory , skin temp should be < 60°C



Integrated Vacuum Distillation and Casting Unit

All dimensions in mm

Integrated Vacuum Distillation and Casting Unit-top view

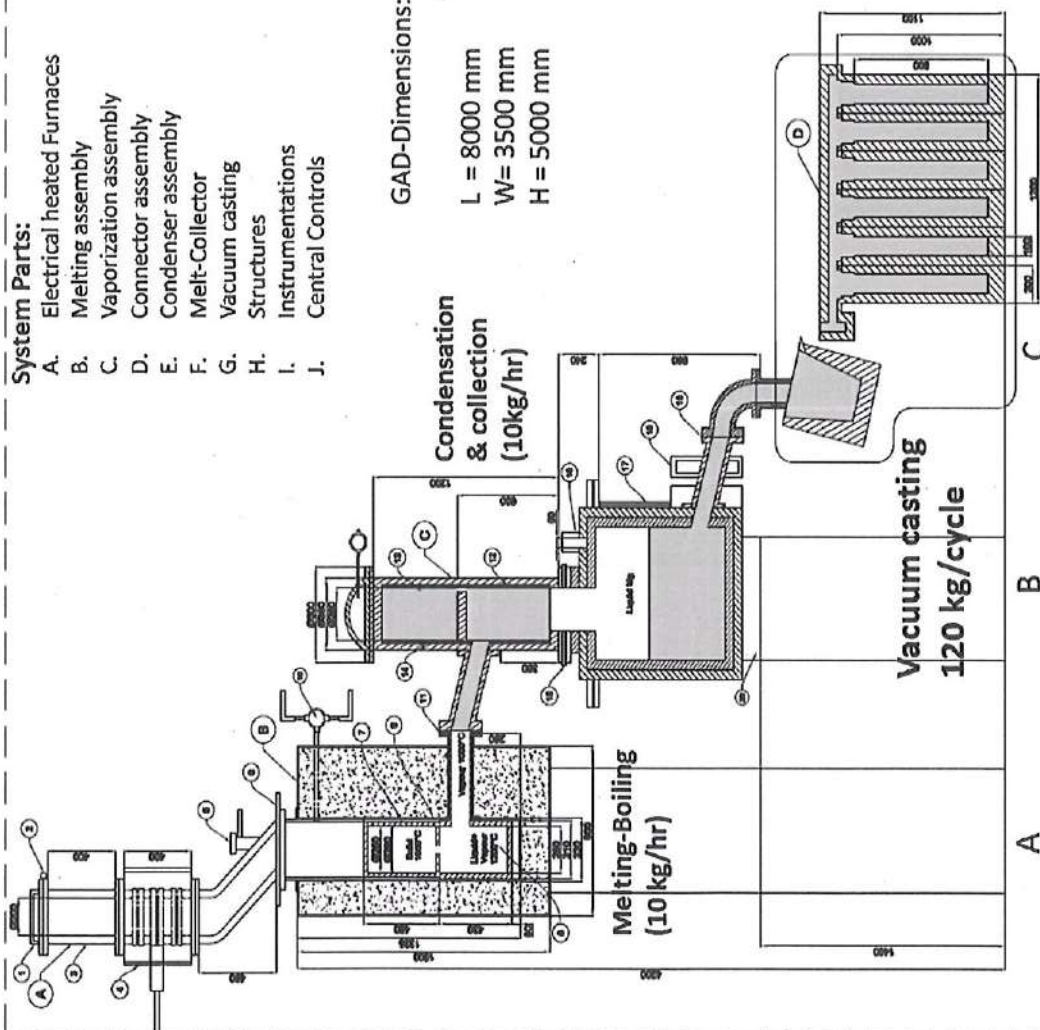


All dimensions in mm

- System Parts:**
- A. Electrical heated Furnaces
 - B. Melting assembly
 - C. Vaporization assembly
 - D. Connector assembly
 - E. Condenser assembly
 - F. Melt-Collector
 - G. Vacuum casting
 - H. Structures
 - I. Instrumentations
 - J. Central Controls

GAD-Dimensions:

L = 8000 mm
W = 3500 mm
H = 5000 mm



D	Mg Vacuum Casting Unit 120kg/hr
20	Jack to adjust height
19	Connector Flange3
18	Isolation Valve Chamber
17	Silica Gate
16	Dummy to dust filler with lid and orings
15	Alloy Gate Valve
14	Condenser Spill Furnace
13	Condensor2
12	Condensor1
C	Condensor-Melt Crucible Assembly
11	Connector Flange2
10	Two Way Vacuum Valve
9	Vacuum Return Assy.
8	Graphite Alloy Vaporisation Chamber
7	Graphite Alloy Boiling Chamber
B	Mg Distillation System, Capacity 10kg/hr
6	Connector Flange1
5	View Port
4	Valve case for Feed reading Platform, Slide
3	Gate valve, Radiation Protection Shield
2	Charge Bin
1	Hinge
A	Top Lid with O ring glass view
SI	No Parts Name

[] -Integrated Vacuum Distillation and Casting Unit

All dimensions in mm

**Tentative Design of 10 kg/hr continuous
Vacuum Distillation and casting facility
(120 kg casting capacity)**

CEIR-NATIONAL METALLURGICAL LABORATORY	ENGINEERING DIVISION
WILSON JAMES	DESIGNER
UNIT FOR RETORT VACUUM REDUCTION UNIT	DESIGNER
PROJECT NO. 10000000000000000000	DATE 10/10/2000
REVISION NO. 001	BY: 10000000000000000000
DATE 10/10/2000	BY: 10000000000000000000

ACCEPTANCE CERTIFICATE FORM

No. _____

Dated: _____

M/s. _____

Sub: Certificate of commissioning of _____

01. This is to certify that the equipment as detailed below has/have been received in good condition along with all the standard and special accessories (subject to remarks in Para 2). The same has been installed and commissioned.

- (a) Contract No. _____ Date _____
- (b) Description of the equipment _____
- (c) Name of the consignee _____
- (d) Scheduled date of delivery of the consignment to the Lab./Instts. _____
- (e) Actual date of receipt of consignment by the Lab./Instts. _____
- (f) Scheduled date for completion of installation/commissioning _____
- (g) Training Starting Date _____
- (h) Training Completion Date _____
- (i) Names of People Trained _____
- (j) Actual date of completion of installation/commissioning _____
- (k) Penalty for late delivery (at Lab./Instts. level) ₹ _____
- (l) Penalty for late installation (at Lab./Instts. level ₹ _____

Details of accessories/items not yet supplied and recoveries to be made on that account:

Sl. No.	Description	Amount to be recovered

02. The acceptance test has been done to our entire satisfaction. The supplier has fulfilled his contractual obligations satisfactorily

or

The supplier has failed to fulfil his contractual obligations with regard to the following:

(a)



(b)

(c)

(d)

The amount of recovery on account of failure of the supplier to meet his contractual obligations is as indicated at Sr. No. 3.

For Supplier

For Purchaser

Signature

Signature.....

Name

Name.....

Designation

Designation.....

Name of the firm.....

Name of the Lab/Instt.....

Date

Date.....



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. datedto 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.

