



BHARAT HEAVY ELECTRICAL LIMITED
CENTRAL FOUNDRY FORGE PLANT
STEEL MELTING SHOP






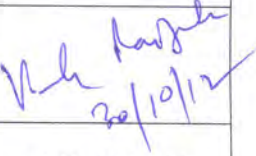
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TECHNICAL SPECIFICATION
FOR
CONVERSION OF "70T VAD-1 UNIT"
INTO
"70T LRF CUM VACUUM DEGASING UNIT"

PREPARED BY		CHECKED BY			APPROVED BY
					 20/10/12
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Clause No	Description	Vendor's Acceptance /Remarks
1.0	GENERAL DESCRIPTION:	
1.1	This specification covers the Conversion & Relocation of existing 70T VAD-1 UNIT” into “70T LRF CUM VACUUM DEGASSING UNIT & Erecting Commissioning of Converted Unit in Pit Side of Steel Melting Shop.	
2.0	TECHNICAL PARAMETERS	
2.1	TECHNICAL PARAMETER OF EXISTING 70T VAD -1 UNIT.	
2.1.1	Nominal Heat size: 30 to 70 MT.	
2.1.2	Rate of Temperature Rise (Heating Rate): 3-5°C / minute (now not in Operation)	
2.1.3	Electrode Diameter: 355 mm (14”).	
2.1.4	Electrode control system: Thyristor Control (not in stock)	
2.1.5	Ladle Transfer: Inside the vacuum tank placed on Transfer Trolley from Pit Side to VAD-1.	
2.1.6	Roofs: Two (Water cooled)	
2.1.7	Roof Movements (Raising, Lowering): Hydraulic with lifting cylinder	
2.1.8	Transformer capacity: 9/11 MVA, 11 KV (not in stock)	
2.1.9	Circuit Breaker : Vacuum Circuit Breaker, 11 KV, 1250 A (not in stock)	
2.2.0	TECHNICAL PARAMETERS REQUIRED FOR CONVERTED 70T LRF CUM VACUUM DEGASSING UNIT	
2.2.1	Heat size: 30 to 70 MT.	
2.2.2	Rate of Temperature Rise (Heating Rate): Minimum 5°C / minute.	
2.2.3	Electrode Diameter: 355 mm (14”).	
2.2.4	Electrode control system: Oil (non-inflammable) Hydraulic Electrode Regulation System with PLC.	
2.2.5	The Position of the LRF and Vacuum Degassing (VD) Operation: The LRF and VD shall be at a same fixed station.	
2.2.6	Ladle Transfer to LRF: Liquid Metal Ladle to be carried by EOT Crane to the Fixed Station.	
2.2.7	Number of Roofs: Two, one for LRF and another for Vacuum Degassing. Both the roof is to be operated from single control room.	
2.2.8	Roof Movements (Raising, Lowering and Slewing): Hydraulic System. Note: For horizontal movement of VD Roof on Rail, if required, suitable drive mechanism and structure system is to be provided.	
2.2.9	Camera on the VD Roof for continuous observing the liquid metal on the monitor during VD Operation. Monitor of the Camera shall be at the Control Room.	
2.2.10	Alloy feeding Unit: 1 MT Capacity The alloys will be weighed separately and put into the bucket manually or with EOT crane depending on the quantity of the alloy to be added.	
2.2.11	Argon purging system in LRF and in Vacuum Degassing unit: Argon flow rate 20-120 Lt/min at pressure from 2- 6 kg/cm ² depending on the type of operation is being done.	
2.2.12	Vacuum during degassing: ≤ 0.70 Torr. (It is in the scope of CFFP-BHEL)	
2.2.13	Transformer capacity: 12/14.4 MVA, 11 KV/120V-325V, with OLTC (17Taps).	
2.2.14	Circuit Breaker : Vacuum Circuit Breaker, 11 KV, 1250 A.	



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3.0	VENDOR'S QUALIFICATION CRITERIA	
3.1	Only those vendors should quote who are "Original Equipment Manufacturer (OEM)" of ELECTRIC ARC FURNACE or LADLE FURNACES and have supplied & commissioned at least one Electric Arc Furnace or Ladle Furnace of same or higher size/capacity in the past ten years (on the date of opening of Tender) and referred Furnace is presently working satisfactorily for more than one year after commissioning (on date of opening tender).	
3.2	Average Annual financial turnover during the last 3 years, ending 31st March 2012 should be at least equal the offered value against the tender of this specification – Vendor must confirm. (Audited Balance sheet / P&L statements of last 3 years to be enclosed)	
3.3.0	Following information / documents should be submitted by the vendor about referred Electric Arc Furnace or Ladle Furnace has been supplied. This is required for all vendors for qualification of the offer.	
3.3.1	List of Customers with Equipments Capacity, Month & Year of commissioning.	
3.3.2	Un-priced Copy of Purchase orders of the Electric Arc Furnace or Ladle Furnace	
3.3.3	Name, Designation, Phone, FAX no. and e-mail address of the contact person of the customer.	
3.3.4	Performance certificate from the customer/company regarding satisfactory performance of Electric Arc Furnace or Ladle Furnace supplied to them (Original Certificate or Through E-mail directly from the customer). The original performance certificate may be returned after verification by BHEL, if required.	
3.4	BHEL reserves the right to verify information submitted by vendor including visit to the Customer's works and witnessing the operation of the Furnace. Vendor has to facilitate the same.	
4.0	SITE VISIT AT BHEL	
4.1	The Vendors who can qualify as per Qualification criteria may visit the site to get a first hand appraisal of the existing unit, about the location, application and layout of the converted unit. The Vendor must be very clear about the site conditions, the status of the usable equipments/components and scope of supply before submitting the tender. Any presumption by the bidder shall not be entertained at a later stage. It shall be supplier's duty to satisfy himself about the site conditions and status of usable equipments/components before hand, to avoid any difficulty during installation & commissioning of the equipment.	
5.0	SCOPE OF SUPPLY	
5.1	Designing, Engineering, Manufacture, Supply of Components-Equipments-tools-Spares, Retrofitting, Overhauling of usable components & equipments of Existing "70T VAD-1 Unit" for Conversion & Relocation of existing 70T VAD-1 UNIT" into "70T LRF CUM VACUUM DEGASSING (VD) UNIT & Erecting Commissioning of Converted Unit". The 70T LRF unit shall be robust & reliable. It should operate trouble free in presence of dust and high temperature of surroundings.	



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5.2	<p>The design of 70T LRF CUM VACUUM DEGASSING (VD) UNIT shall be as follows:</p> <ul style="list-style-type: none">a) The LRF and VD shall be operated at single fixed station.b) The Ladle/Vacuum tank shall be fixed at a place below the ground level.c) The top of the Ladle/Vacuum Tank shall be approximately 1 meter above the ground level.d) Liquid Metal Ladle shall be transferred inside the Ladle/Vacuum Tank by EOT Crane.e) Single Control Room for LRF and VD Operationf) The control room shall be designed as sound proof room.g) The Control Room, temperature measurement and collection of metal sample, addition of alloys etc shall be done from the ground level.h) The existing Ladle/Vacuum Tank has to be modified / rectified for above mentioned arrangement by the supplier.i) The movements of Roofs of LRF and VD should be designed to satisfy the above mentioned arrangement.j) Suitable Camera on the VD Roof for continuous observing the liquid metal on the monitor during VD Operation. Monitor of the Camera shall be at the Control Room.	
5.3	Argon purging system with Argon Manifold to maintain the argon flow rate 20-120 Lt/min at pressure from 2- 6 kg/cm ² depending on the type of operation is being done.	
5.4	Alloy feeding system with one bunker up to 1 MT through charging bucket. The alloys will be weighed separately and put into the bucket manually or with EOT crane depending on the quantity of the alloy to be added.	
5.5	Wire feeding System is not required. But provision for adding wire feeding system shall be kept in the design.	
5.6	Complete Ducting system for fume extraction from 70T LRF to existing Fume Extraction system.	
5.7	<p>Dismantling of existing Components/Parts of Existing "70T VAD-1 Unit" for modification, overhauling etc.</p> <p>Note: Mutually agreed amount of Bank Guarantee will be required for taking any component/Parts of existing "70T VAD-1 Unit" outside BHEL site for Modification / Rectification / Overhauling etc.</p>	
5.8	Modification, if necessary, of existing usable components as given in Clause-8.0 to 8.13	
5.9	Supply of New Components as per Clause 9.0 & 9.14.	
5.10	All steel structural works will be in the scope of supplier.	
5.10	Civil Design and preparation of Civil Drawings (Civil Foundation work and construction of rooms as per drawing are in the scope of BHEL)	
5.11	Supply of Spares and Tools as per Annexure-A	



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5.12	Providing complete list of spares and Tools for successful running of "70T LRF cum Vacuum Degassing Unit". The specification/ type/ model of the spares, and name & address of the each spare supplier shall also be furnished.	
5.13	All bought out items shall be reputed make. Note: a) Hydraulic System should be Vicker's, Rexroth and Parker make. b) All Motor should be Siemens, L&T, ABB and Crompton & Greaves	
6.0	PERFORMANCE GUARANTEE / WARRANTY:	
6.1	The Performance of the "70T LRF cum Vacuum Degassing Unit" as per Technical Parameter as mentioned in Clause-2.2.0 to 2.2.14 shall be guaranteed for a minimum period of 12 months from the date of acceptance after successful commissioning of the "70T LRF cum Vacuum Degassing Unit" at CFFP-BHEL Works.	
7.0	DRAWINGS-DOCUMENTS-MANUALS	
7.1.0	The following Drawings/Documents are to be submitted along with the Technical Offer:	
7.1.1	The vendor shall furnish full technical information of the equipment along with general Arrangement drawings, flow diagrams, list of spares and tools.	
7.1.2	Drawings of Roof including roof movement mechanism	
7.1.3	List of Bought Out Items (BOI) with their make Note: BHEL's confirmation on make of BOI is required	
7.1.4	Erection & Commissioning charges, duration, terms & conditions should be furnished in detail separately by vendor along with offer.	
7.2.0	The following Drawings/Documents are to be submitted after placement of Purchase Order prior to manufacture of the "70T LRF cum Vacuum Degassing Unit" for approval by CFFP-BHEL:	
7.2.1	The Detailed drawings of Civil Foundation and Civil Construction of Transformer Room, Control Room etc. Note: a. Civil Construction shall be done by BHEL. b. Electricals are to be done by Vendor	
7.2.2	Civil Foundation Drawings for other equipments, if required	
7.2.4	Roof Drawings including roof movement mechanism.	
7.2.5	Electrical Schematic Diagrams, Wiring Diagrams, Junction Box Layouts, Connector Diagrams and Cable Layouts.	
7.2.6	Detailed assembly drawings of all units of "70T LRF cum Vacuum Degassing Unit" showing component/part name & their description.	
7.2.7	Complete list of parts/items(Bill of materials) used in "70T LRF cum Vacuum Degassing Unit"	
7.2.8	Details such as make, model No., and rating of Major bought out items.	
7.2.9	Complete list of equipment detailing individual items with ratings, capacity, service etc.	
7.2.10	Submission of Schedule of Erection and Commissioning and Detailed requirement from BHEL for Erection and Commissioning	



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7.3.0	The following Drawings, Documents and Manuals are to be Provided along with the supply of materials of "70T LRF cum Vacuum Degassing Unit"	
7.3.1	Copy All approved drawings and documents as per Clause 7.2.0 to 7.2.10	
7.3.2	Manufacturing drawings of all parts and items manufactured by the supplier.	
7.3.3	Instruction for operation and maintenance of the equipment and controls including lubrication charts & Hydraulic Control Circuit diagram.	
7.4.0	The following Documents/Certificates are to be Provided after Erection and Commissioning of "70T LRF cum Vacuum Degassing Unit".	
7.4.1	Operation and Maintenance Manual	
7.4.2	Programming Manual for Electrode Regulations	
7.4.3	Erection and Commissioning Manuals	
7.4.4	Catalogues, Operation & Maintenance Manuals of all bought out items including drawings, wherever applicable.	
7.4.5	Guarantee/Warranty Certificate of "70T LRF cum Vacuum Degassing Unit".	
7.4.6	Test and guarantee/Warranty certificates for all Major Mechanical and Electrical equipment.	
7.5	All hard copies of Drawings/Documents/Manuals/Certificates as per Clause 7.2.0 to 7.4.6 shall be hard-bound in high quality leather folders, encased in decent individual boxes – in 5 Sets	
7.6	DVD/CD Containing all Drawings/Documents/Manuals/Certificates as per Clause 7.2.0 to 7.4.6 – in 5 Sets	
8.0	EXISTING USABLE/NEW COMPONENTS/UNITS TO BE PROVIDED BY BHEL	
8.1	Transformer: 12/14.4 MVA, 11 KV / 120V - 325V, with OLTC (17 Taps).– (New Transformer).	
8.2	Vacuum Degassing Tank. (1 number): Existing	
8.3	Different sizes of Ladle suitable for 30 MT to 70 MT heat as per Annexure-B and C	
8.4	Vacuum Circuit Breaker: New.	
8.5	Complete arm assembly (3 numbers): Existing	
8.6	Control Panel: Existing	
8.7	Water cooled roof 1 number for LRF and 1 number for VD unit: Existing, but modification for LRF Roof is required.	
8.8	Roof lifting mechanism. (1 number):	
8.9	Electrode lifting column & back structure with base: Existing	
8.10	Fume Extraction system: Existing but Connection from LRF to FES shall be done by supplier.	



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8.11	HT cables from distribution to VCB/Transformer: New.	
8.12	Erection & Commissioning of Vacuum Degassing Unit at the location of 70T LRF.	
8.13	Note: a) Wherever Modification/Rectification is required of the above components, it has to be carried out by the supplier. b) If any of the above existing component/units is beyond modification / rectification, then supplier has to provide a new component/unit to replace those component/units.	
9.0	NEW COMPONENTS TO BE SUPPLIED BY VEDOR	
9.1	LT delta bus bars along with water cooled cables & LT CT's : New (Supplier)	
9.2	LT power cables and Control cables.	
9.3	Argon purging system along with Argon Gas manifold.	
9.4	Suitable Camera on the VD Roof for continuous observing the liquid metal on monitor during VD Operation. Monitor of the Camera shall be at the Control Room.	
9.5	Alloy Feeding System with one bunker up to 1 MT.	
9.6	Motor Control Centre (MCC) panel	
9.7	Digital Temperature Recording System with accuracy $\pm 5^{\circ}\text{C}$. Note: The Thermo tips in use at BHEL,CFFP is Pt/Pt-RH10% Mark III and Response time less than 3 seconds. The system should be compatible with this Thermo tip:	
9.8	M.S. pipes, valves, manifold, water & air hoses.	
9.9	All the foundation bolts, plates, Rails and embedded parts for Civil Foundation and Erection & Commissioning	
9.10	Hydraulic power Pack unit for roof lifting and electrode regulation	
9.11	Electrode Regulation Panel	
9.12	Centre Delta Ring, Existing Roof for LRF has to be modified for placement of detachable Centre Delta Ring.	
9.13	Ducting for fume extraction shall be connected from 70T LRF to existing Fume Extraction system.	
9.14	Note: Any other necessary components/equipments/materials etc required for Conversion & Relocation of existing "70T VAD-1 UNIT" into "70T LRF CUM VACUUM DEGASSING UNIT" & Erecting Commissioning of Converted Unit" but are not mentioned in this specification are to be provided by the vendor.	
10.0	UTILITIES / SERVICE TO BE PROVIDED BY BHEL	
10.1	Supply of Electric Power up to an Appropriate Point. High Tension : 11KV, 3 Phase, 50 Hz Low Tension: 415V, 3 Phase, 50 Hz	
10.2	Water Supply (Pressure 2-3 Kg/cm ²) up to an Appropriate Point for LRF.	



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10.3	Compressed air: 4 Nm ³ /h at 4 to 6 kg/cm ² , dry, intermittent requirement	
10.4	Argon Gas in Cylinder.	
10.5	Vacuum Degassing Unit, necessary Ejectors with Nozzles and Condenser.	
10.6	All Civil construction including of New Foundation Base, Civil Construction of Transformer Room, and Control Room etc. will be done by BHEL. But all the Civil Drawings, materials like foundation bolts, plates, Rails and embedded parts etc. are to be provided by the supplier before the start of civil work.	
11.0	PRE DISPATCH INSPECTION OF EQUIPMENTS:	
11.1	All items including Test Certificates shall be verified by BHEL for clearance of before dispatch.	
12.0	ERECTION AND COMMISSIONING	
12.1	All Tools & Tacckles required for commissioning of the Furnace within stipulated time, shall be brought by the supplier on returnable basis (necessary entries should be done at gate while entering.).	
12.2	Supplier shall take full responsibility for carrying out the erection, testing and Commissioning of Furnace, its control system & all types of other supplied equipment. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. The available crane capacity at the proposed location of the Furnace in Pit Side 130T and in Furnace Bay 50Ton. The Supplier will ensure to make requisite arrangement for lifting of heavier consignment/ items/assembly of the machine not getting covered by this capacity.	
13.0	ACCEPTANCE CRITERIA FOR SUCCESSFUL COMMISSIONING	
13.1	After erection and testing, the "70T LRF CUM VACUUM DEGASSING UNIT" should successfully operate for 30 heats without any breakdown. If any breakdown occurs during any heat, that heat shall not be counted.	
14.0	TRAINING	
14.1	Training is to be given to Furnace operators on operation of Furnace, Electrode Regulation, Programming, and to Maintenance Staff on maintenance of each equipment & accessories etc by the supplier's experts / engineers at BHEL works.	



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ANNEXURE-A

LIST OF MANDATORY SPARES FOR TWO YEARS OF TROUBLE FREE OPERATION

Note: In Two Part Bid, Price is not a part of Technical Offer

(Do not put any price on Technical offer)

NOTE:

1. Following mandatory spares and Tools shall be supplied along with the "70T LRF CUM VACUUM DEGASING UNIT".
2. Set means one no. quantity of each spare item of each type in one assembly.

S.No	Item Description	Unit	Quantity	Unit Price	Total Price
A	Spares:				
1.	Centre Delta Ring	NO	2		
2.	Electrode Clamping Cylinder	SET	2		
3.	Copper Insert Assembly	NO	2		
4.	Phase Control Switch	NO	6		
5.	Master Control Switch	NO	2		
6.	Indicating Lamp	NO	20		
7.	Push Button	NO	10		
8.	Electrode Arm Insulations	SET	2		
9.	Current adjusting Rheostat	NO	3		
10.	Set of Electronic Card for Electrode Regulation	SET	1		
11.	Set of Valves for water flow	SET	1		
12.	Set of Water and Air Hoses	SET	1		
13.	LT Current Transformer	NO	2		
14.	Hydraulic Pump-Motor set of Electrode Regulation	No	1		
15.	Each type of Hydraulic Control Valves of Electrode Regulation	Set	1		
16.	Hydraulic Oil	Lt	1000		
B	Tools:				
1.	Electrode Tightening Wrench	NO	1		
				TOTAL	



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ANNEXURE-B

DRAWING OF 70T LADLE

