TECHNICAL SPECIFICATION
FOR
CONVERSION OF "10T EAF UNIT"
INTO
"30T LRF UNIT"

PREPARED BY		CHECKED BY			APPROVED BY
					30/10/12
Arjun Singh Sr. Engineer (M&S)	Sunil Kumar Manager (SMS)	Brijesh Kr. Bedi Sr. Manager (SMS)	V. K. Chadha Sr. Manager (M&S-SMS)	P. K. Roy DGM (SMS)	V. K. Raizada AGM (SMS)

Clause No	Description	Vendor's Acceptance /Remarks
1.0	**GENERAL DESCRIPTION:**	
1.1	This Technical specification covers the conversion of Existing "10 Ton Electric Arc Furnace (EAF) of GEC make, model 11" into "30 Ton Ladle Refining Furnace (LRF)" & Erecting Commissioning of Converted Unit in Furnace Side of Steel Melting Shop	
2.0	**TECHNICAL PARAMETERS REQUIRED FOR CONVERTED LRF**	
2.1	Nominal Heat size (Liquid Metal) in LRF : 25-32T	
2.2	Rate of Temperature Rise in LRF : Minimum 3-5ºC / minute.	
2.3	Electrode diameter : 300 mm (12")	
2.4	Electrode control system : Thyristor Control	
2.5	Roof lifting System : Hydraulic	
2.6	Type of Roof Construction : Water cooled tubular connected with FES system	
2.7	Argon purging system: Argon flow rate 20-120 Lt/min at pressure from 2- 6 kg/cm^2 depending on the type of operation is being done.	
2.8	Ladle Transfer to LRF : Through Ladle Transfer Trolley	
2.9	Transformer capacity: 5/6 MVA , 11 KV,LT 95V-250V with OLTC (17 Taps).	
2.10	Circuit Breaker : Vacuum Circuit Breaker, 11 KV, 800 A.	
3.0	**VENDOR'S QUALIFICATION CRITERIA**	
3.1	Only those vendors should quote who are "Original Equipment Manufacturer (OEM)" of ARC / LADLE FURNACES and have supplied & commissioned at least one Arc Furnace or Ladle Furnace of 30T 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 the companies where referred Arc/Ladle Furnace have 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 Arc / 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 Arc / 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.	

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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 the 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 existing usable components & equipments of "Existing 10T EAF" for Conversion of 10T EAF into 30T LRF & Erecting Commissioning of Converted Unit". The 30T LRF unit shall be robust & reliable. It should operate trouble free in presence of dust and high temperature of surroundings.	
5.2	The design of 30T LRF shall be as follows: a) The Liquid Metal Ladle shall be transferred from Liquid Metal Handling Bay (Pit Side) to LRF station through Transfer Trolley. b) The LRF Station shall be at Furnace Side. c) During Refining operation, Liquid Metal Ladle will be on the Transfer Trolley. d) The top the Ladle shall be at level of the Furnace Platform. e) The height of Furnace Platform is approximately 5 meter above the ground level. f) Necessary modification/fabrication on existing Transfer Trolley is to be done by the supplier for the above mentioned arrangements and for Full Safety, Firm Sitting and Smooth Transfer of the Ladle filled with 25-32 Ton Liquid Metal from Liquid Metal Handling Bay to LRF Station and again return to same Bay for Teeming.	
5.3	Dismantling of existing Components/Parts of 10T EAF for modification, overhauling etc. **Note:** **Mutually agreed amount of Bank Guarantee will be required for taking any component/Parts of existing "10T EAF Unit" outside BHEL site for Modification / Rectification / Overhauling etc.**	
5.4	Modification, if necessary, of existing usable components as given in Clause-8.0 to 8.11	
5.5	If any existing component/equipment is beyond modification/rectification, then supplier has to provide that component/equipment.	
5.6	Any components/equipments/materials etc. which are not mentioned in this specification but required for Conversion of existing "10T EAF UNIT" into "30T LRF UNIT" & Erecting Commissioning of Converted Unit" are to be provided by the supplier.	

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5.7	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.	
5.8	Ducting for fume extraction shall be connected from 30T LRF to existing Fume Extraction system.	
5.9	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) **Note:** The existing Control Room shall be modified as sound proof room.	
5.11	Supply of New Components as per Clause 9.0 & 9.10	
5.12	Supply of Spares and Tools as per Annexure-A	
5.13	Providing complete list of spares and Tools for successful running of LRF. The specification/ type/ model of the spares, and name & address of the each spare supplier shall also be furnished.	
5.14	All bought out items shall be reputed make.	
6.0	**PERFORMANCE GUARANTEE / WARRANTY:**	
6.1	The Performance of the 30T LRF as per Technical Parameter as mentioned in Clause-2.0 to 2.10 shall be guaranteed for a minimum period of 12 months from the date of acceptance after successful commissioning of the 30T LRF 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	List of Bought Out Items (BOI) with their make **Note:** BHEL's confirmation on make of BOI is required	
7.1.3	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 Ladle Furnace for approval by CFFP-BHEL:**	
7.2.1	The Detailed Civil Foundation Drawing for movement of Transfer Trolley from Liquid Metal Handling Bay to 30T LRF, as per existing rail section. **Note:** a. Civil Construction shall be done by BHEL. b. Electricals are to be done by Supplier	
7.2.2	Civil Foundation Drawings for other equipments, if required	
7.2.3	The Drawing cable movement of Transfer Trolley for transfer of 30T Ladle	
7.2.4	Roof Drawings	

Clause No	Description	Vendor's Acceptance /Remarks
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 LRF showing component/part name & their description.	
7.2.7	Complete list of parts/items(Bill of materials) used in LRF	
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	
7.3.0	**The following Drawings, Documents and Manuals are to be Provided along with the supply of materials of 30T LRF**	
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.	
7.4.0	**The following Certificates are to be Provided after Erection and Commissioning of 30T LRF.**	
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 Certificates of 30T LRF	
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 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 7.2.0 to 7.4.6 – in 5 Sets**	
8.0	**EXISTING USABLE COMPONENTS/UNITS TO BE PROVIDED BY BHEL**	
8.1	Transformer 5/6 MVA , 11 KV,LT 95V-250V with OLTC (17 Taps), with LT bus bars.	
8.2	Vacuum circuit breaker 800A.	
8.3	Water Cooled Cables.	
8.4	Roof lifting arrangement with gantry arms and cylinders.	
8.5	Electrode arm with clamp assembly.	
8.6	Winch Unit with rope and pulleys arrangement.	
8.7	Back structure column.	
8.8	30T Ladle as per Annexure-B	

Clause No	Description	Vendor's Acceptance /Remarks
8.9	Transfer Trolley for Ladle Transfer (Necessary modification/fabrication on existing Transfer Trolley is to be done by the supplier for Full Safety, Firm Sitting and Smooth Transfer of the Ladle filled with 25-32 Ton Liquid Metal from Liquid Metal Handling Bay (Pit Side) to LRF Station and again return to same Bay for Teeming. During Refining operation, Liquid Metal Ladle will be on the Transfer Trolley as per existing rail section.	
8.10	Fume Extraction System (FES)	
8.11	**Note:** 1) Wherever Modification/Rectification is required of the above components, it has to be carried out by the supplier. 2) 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	One Set Water Cooled Roof with changeable centre delta ring. **Note:** The Water Cooled Roof shall be suitable for existing 30T Ladle, Roof Lifting Arrangements, Existing electrode Clamp System, and Fume Extraction System.	
9.2.0	Thyristor system for Electrode Regulation.	
9.2.1	The Thyristor system should be as far as possible interchangeable with existing system working at 30T EAF & 70T VAD-2 unit for easy maintenance of spare management.	
9.2.2	The Thyristor System of Existing 30T EAF & 70T VAD-2 unit is suitable for Output power 3x4.5 HP and having Converter Module 40A, Drg No.: A2-05044 and Amature Voltage Control Module 650-20x-1246 Drag. No.: A3-05032. Copy of the Drawing No. A2-05044 and A3-05032 is enclosed)	
9.3	Operator's Control panel	
9.4	Motor Control Centre (MCC)	
9.5	Digital Temperature Recording System with accuracy ± 5°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.	
9.6	Argon purging system along with Argon Gas manifold.	
9.7	LT power cables and Control cables.	
9.8	M.S. pipes, valves, manifold, water & air hoses.	
9.9	All the foundation bolts, plates, Rails as per existing rail section and embedded parts for Civil Foundation and Erection & Commissioning	

Clause No	Description	Vendor's Acceptance /Remarks
9.10	**Note:** Any other necessary components/equipments/materials etc required for Conversion of existing "10T EAF UNIT" into "30T LRF UNIT" & Erecting Commissioning of Converted Unit" but are not mentioned in this specification are to be provided by the supplier.	
10.0	**UTILITIES / SERVICE TO BE PROVIDED BY BHEL**	
10.1	Dismantling of existing pedestal	
10.2	All Civil construction including of New Foundation of Rail Track for Ladle Transfer Trolley etc. will be done by BHEL.	
10.3	Supply of Electric Power up to an Appropriate Point. High Tension : 11KV, 3 Phase, 50 Hz Low Tension: 415V, 3 Phase, 50 Hz	
10.4	Water Supply (Pressure 2-3 Kg/cm^2) up to an Appropriate Point for LRF.	
10.5	Compressed air: 4 Nm3/h at 4 to 6 kg/cm^2, dry, intermittent requirement	
10.6	Argon Gas in Cylinder.	
11.0	**INSPECTION BEFORE DISPATCH 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 & Tackles 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 is 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 30T LR Furnace 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.	

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)

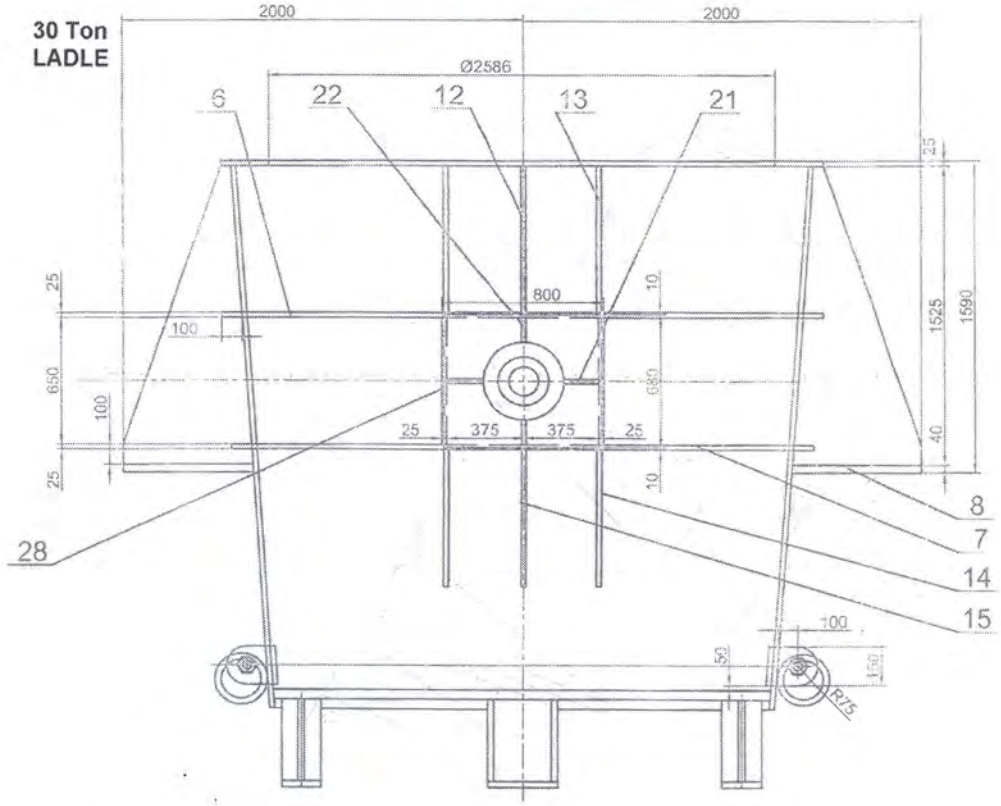
NOTE:

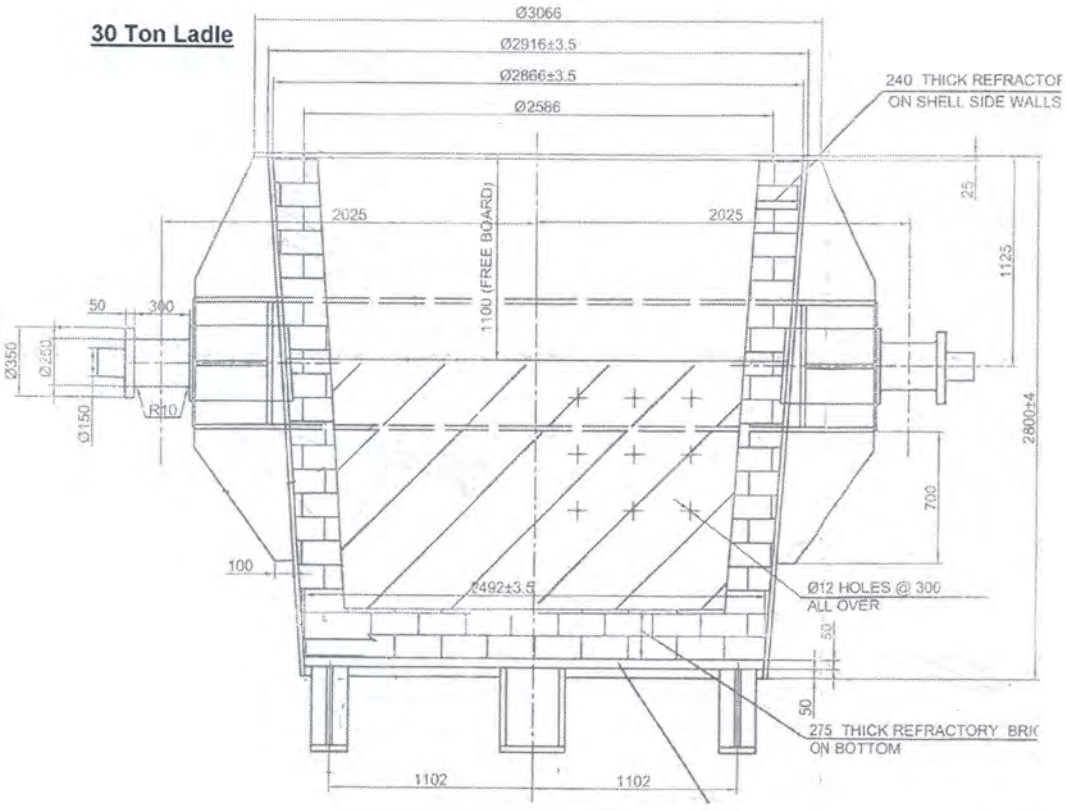
1. Following mandatory spares and Tools shall be supplied along with the 30T LRF.
2. Set means one no. quantity of each spare item of each type in one assembly.

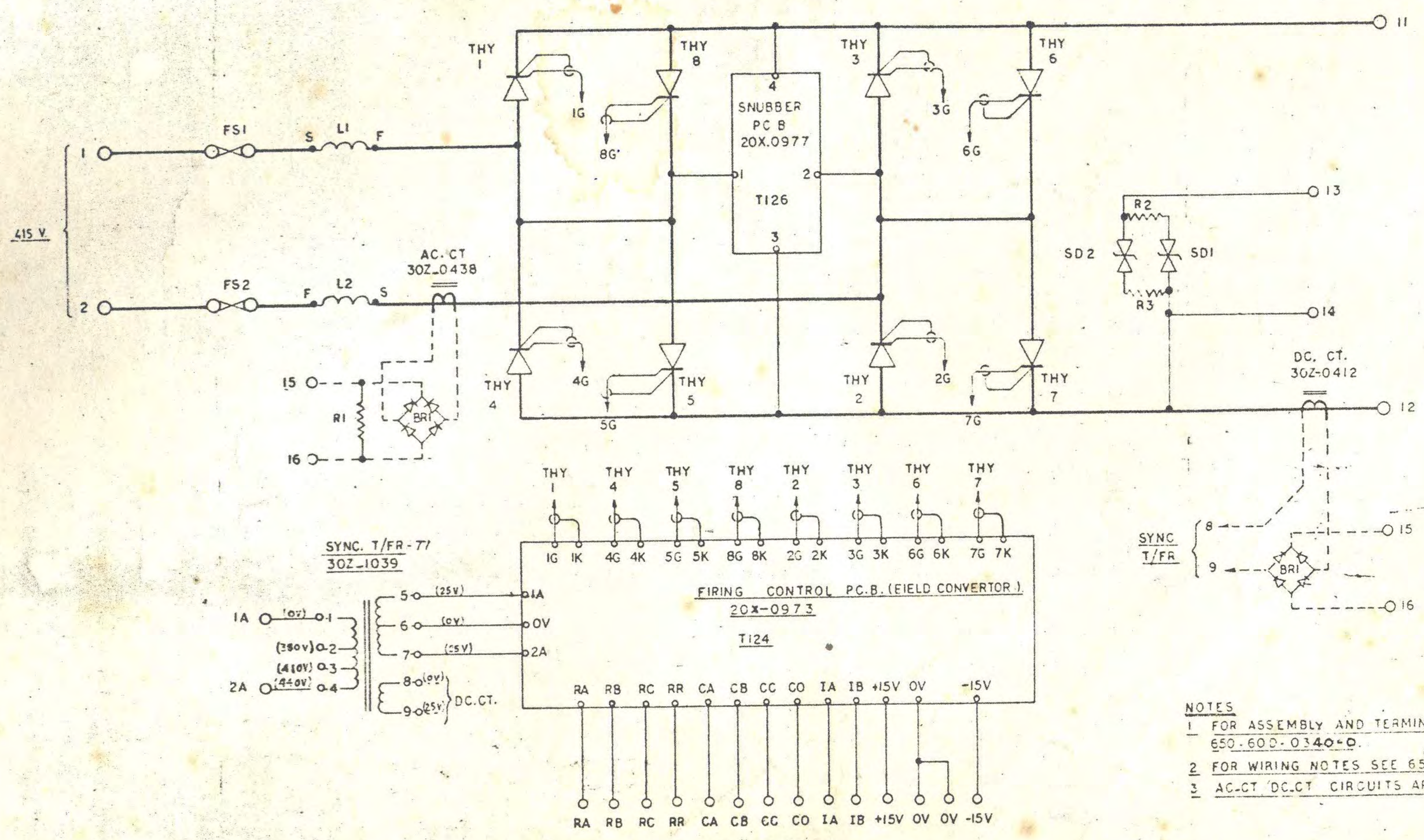
S.No	Item Description	Unit	Quantity	Unit Price	Total Price
A	**Spares:**				
1.	Centre Delta Ring	NO	2		
2.	Electrode Clamping Cylinder	NO	2		
3.	Copper Insert Assembly	NO	1		
4.	Phase Control Switch	NO	3		
5.	Master Control Switch	NO	2		
6.	Indicating Lamp.	NO	20		
7.	Push Button.	NO	10		
8.	Electrode Arm Insulations	SET	2		
9.	Current adjusting Rheostat	NO	3		
10.	Set of Electronic Card of Thyristor Regulator	SET	1		
11.	Set of Valves for water flow	SET	1		
12.	Set of Water and Air Hoses	SET	1		
B	**Tools:**				
1.	Electrode Tightening Wrench	NO	1		
				TOTAL	

ANNEXURE-B

DRAWING OF 30T LADLE







NOTES

1. FOR ASSEMBLY AND TERMINAL ARRG^T SEE 650-60D-0340-D.
2. FOR WIRING NOTES SEE 650-62D-0179-F
3. AC-CT DC-CT CIRCUITS ARE OPTIONAL

TRACED FROM GEC ELLIOTT INDUSTRIAL CONTROLS LTD
DRG. NO. 650-62D-0175-M

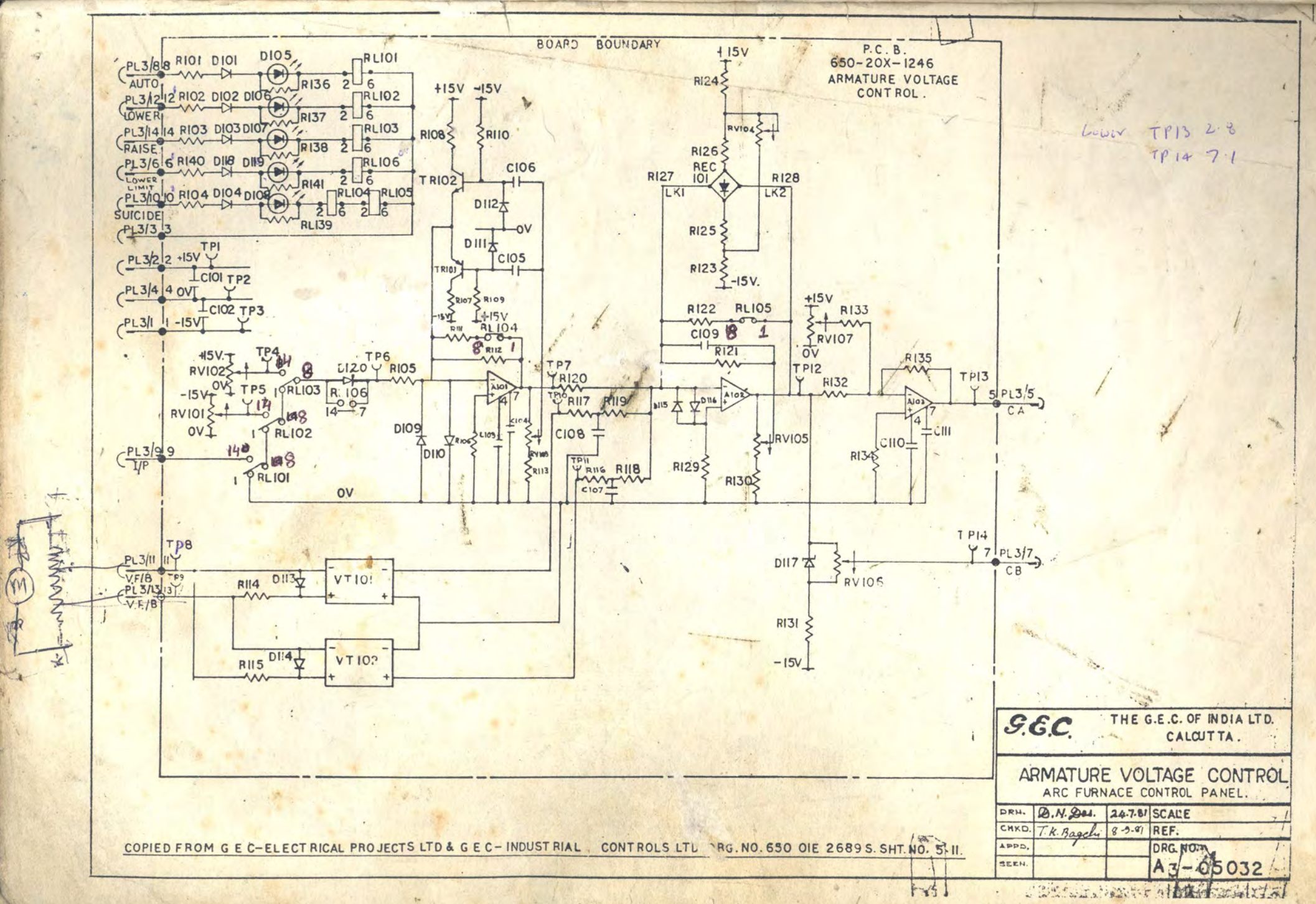
REVISION

G.E.C. THE GENERAL ELECTRIC CO. OF INDIA LIMITED
CALCUTTA

CIRCUIT DIAGRAM FOR FORM CORR 40A AP. SIL. FIELD CONVERTOR

APC FURNACE CONTROL PANEL

DRAWN			BY	SCALE
DESIGNED				
CHECKED			DRAWING NO. PREF	
APPROVED			A2-05044	
SEEN				



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G.E.C. THE G.E.C. OF INDIA LTD. CALCUTTA.

ARMATURE VOLTAGE CONTROL

ARC FURNACE CONTROL PANEL.

DRN.	D.N. Das.	24.7.81	SCALE 1
CHKD.	T.K. Bagchi	8-9-81	REF.
APPD.			DRG. NO. A3-05032
SEEN.			