URANIUM CORPORATION OF INDIA LIMITED
P.O. JADUGUDA MINES, JHARKHAND – 832102, INDIA

TENDER DOCUMENT – INDEX SHEET

REF : TENDER NO. PUR / 2 / 96 / 9676 / 583
ITEM : ROTARY DRYER

URANIUM CORPORATION OF INDIA LIMITED
P.O. JADUGUDA MINES, JHARKHAND – 832102

TENDER OPENING SCHEDULE

REF: TENDER NO	**PUR / 2 / 96 / 9676 / 583**
TENDER DATE	17.07.2013
ITEM	ROTARY DRYER
SUBMISSION OF TENDER	ON OR BEFORE 02.09.2013 BY 12.30 P.M
TENDER OPENING ON	02.09.2013
AT	3.00 PM
VENUE	PURCHASE DEPARTMENT, UCIL, JADUGUDA

SPECIFIC TERMS & CONDITIONS FOR SUBMITTING THE OFFER (Annexure-1)

A. Description & Technical Specification as per Annexure-2A

B. Scope of work: - Design, supply, install and commission the rotary Kiln complete with all electrical, instrumentation, cabling, control panel, mechanical drives, structure work etc. required for the Rotary Kiln & accessories but excluding the room for housing control, panel & civil foundation. Foundation drawing of Civil structure required for erection of the dryer shall be submitted in the offer. Apart from the enclosed specification party shall also supply any other materials not mentioned in the proforma but required for smooth and safe operation of the Rotary Dryer.

C. Special Instruction:- **Drawing No. UCIL/TMD/PEROXIDE/FEED HOPPER/A, UCIL/ TMD/PEROXIDE /COOLING FAN/B; UCIL/ TMD/PEROXIDE /C, UCIL/ TMD/PEROXIDE/D, UCIL/TMD/PEROXIDE/E, UCIL/TMD/PEROXIDE/F** are enclosed for guidance only. You may inspect the site and then submit your offer along with drawings.

1) Style of Quotation : TWO PART SINGLE STAGE SYSTEM

a) The tender will be on two part system. Part-I consisting of techno-commercial part (except price) & Part-II consisting of price only as per enclosed format Annexure-6 (6A, 6B & 6C). After evaluation of the Techno commercial offers, the price part of the suitable parties will be opened.

b) Quotations are to be submitted in 'DUPLICATE' and to be typewritten or printed on vendor's letterhead. Any correction or over writing should be authenticated.

2) Part-I, Techno Commercial Bid (Unpriced)

It shall contain

a) Technical details in all respect including GA drawings.

b) Dead weight of the Rotary Dryer unit, including mechanical, electrical & structural items.

c) Duly filled up proposal exhibit sheet as per Annexure – 2B, Annexure – 2C.

d) List of Insurance spares for Instrumentation scheme –Annexure – 2E.

e) Relevant documents in support of pre-qualification criteria to be submitted. Details of contact person, contact number to be furnished for verification of credentials.

f) Drawing, Catalogue of all quoted items.

g) List of deviations from NIT (for Scope of Supply, Services, vendor list and Technical Specifications mentioned in the tender) are to be submitted items wise, as per Annexure – 9. In case there is no deviation from the tender than also it has to be specified in the Part-1 of the offer. Anything not specified in the offer or deviation will be considered to be as per NIT.

h) Earnest Money Deposit.

i) Commercial terms & conditions of sale

j) Blank (unpriced) price bid proforma. Price should be quoted as per our price format only (copy of your price part without price).

k) All documents in support of your credentials (see clause "CREDENTIALS" below).

3) Part-II, Price Bid: This part shall contain "Price" as per enclosed price format 6 (6A, 6B, 6C) only.

4) Mode of submission of tender

a) Both parts of the offer should be sealed and superscribed with tender reference no., due date, Part No. i.e. Part-I for techno-commercial bid and Part-II for price bid and bidder's name & address.

b) Personal delivery is recommended. Tenderers forwarding tender by mail shall do so at their own risk. Tender received after the due date & hour may not be entertained. All envelops duly sealed should be addressed to the Dy. General Manager (Purchase), Uranium Corporation of India Ltd., P.O. Jaduguda Mines, East Singhbhum, Jharkhand –832 102. Incomplete offers are likely to be rejected / ignored.

c) Offer shall NOT be sent by E-mail or Fax.

5) DELIVERY SCHEDULE: Within 120 days from the placement of order, however party shall mention their earliest accepted delivery schedule.

6) PRICE: Your quotation should clearly indicate basic price, excise duty, concessional rate of sales tax, service tax, work contract tax, packing, freight, insurance if any separately as per the price format.

7) PRICE TERMS: Free delivery at Turamdih Stores on duly insured, unloaded at site basis.

8) FIRM PRICE**:** The price should be firm till execution of entire order quantity or one year from the date of purchase order.

9) PAYMENT TERMS: Progress payment shall be released through RTGS only against monthly running account bills duly certified by Engineer-in-charge after affecting the necessary deduction as per rules and breakup details described below:.

a) DESIGN & DRAWING
   a) 50% of Design value with 100% of taxes and duties will be paid within 30 days from the date of initial submission of design documents and drawings as per delivery schedule.
   b) 30% of Design value with 100% of taxes and duties will be paid within 30 days from the date of final submission of approved design documents and drawings.
   c) 10% of Design value with 100% of taxes and duties will be paid within 30 days along with installation and commissioning charges.
   d) Balance 10% of the design value will be released within 30 days of taking over from the bidder after submission of BG of equivalent value in the proforma as in Annexure –5, valid till defect liability period.

b) SUPPLY PART
   a) 60% of Supply value with 100% of taxes and duties will be paid within 30 days from the date of receipt and unloading of material at site.
   b) 20% of Supply value with 100% of taxes and duties will be paid within 30 days of inspection and acceptance of material.
   c) 10% of Supply value with 100% of taxes and duties will be paid within 30 days along with installation and commissioning charges.
   d) Balance 10% of the supply value will be released within 30 days of taking over from the bidder after submission of BG of equivalent value in the Performa as in Annexure –5, valid till defect liability period

c) ERRECTION & COMMISSIONING CHARGES
   a) 90% of E & C charges with 100% of taxes and duties will be paid within 30 days from the date of handing over of complete system.
   b) Balance 10% of the E & C charges will be released within 30 days after submission of BG of equivalent value in the Performa as in Annexure –5, valid till defect liability period.

10) VALIDITY: The offer should remain valid for 180 days from the date of opening of the tender.

11) EARNEST MONEY DEPOSIT: As per our “Instructions to tenderer and general conditions of contract” (enclosed). The E.M.D amount shall be Rs. 4,00,000/- (Rupees four lakhs only). Supplier registered with NSIC / SSI are exempted for submission of EMD.

12) SECURITY DEPOSIT: The successful bidder shall furnish a security deposit to the extent of 5% of the total value of the order within 15 days after the order is awarded. Such a deposit will be held by the Corporation until successful completion of the order/contract, and will bear no interest. It will be forfeited in the event of breach of contract. Security deposit may be in the form of a bank guarantee issued by/ counter guaranteed by an Indian nationalised bank in favour of URANIUM CORPORATION OF INDIA LTD.

13) BANK GUARANTEE (B.G)

a) Bank guarantee should be as per our proforma & issued by an Indian nationalised bank.
b) They shall be valid for periods as under:
    a) For Security : Till satisfactory completion of order.
    b) For Warranty : Till end of warranty period.
c) Bank guarantee shall provide for claim period of 6 months after the expiry date.
d) If the bank guarantee is furnished with validity period less than as stipulated above or in the likelihood of the order not being executed within the stipulated delivery schedule, it will be your responsibility to arrange for extension of the validity of BGs as necessary and furnish the same well in advance of the expiry of the bank guarantee failing which we will be at liberty to invoke the bank guarantee.

14) PRE-QUALIFICATION CRITERIA :

a) The Tenderer should have designed, supplied, erected and successfully commissioned at least 3 such type of systems during last seven financial years ending on 31.03.2013, comprising of Electrically heated Rotary Dryer/ Kiln system of with Control and Instrumentation of capacity not less than 30 Kg/h for drying temperature of 350^{o}C.
b) Tenderer shall have successfully executed at least three such jobs, costing not less than **Rs. 80,00,000/= (Rupees Eighty Lakhs)** each, or two such jobs each of at least **Rs. 1,00,00,000/= (Rupees 1 Crore)** or one similar job costing **Rs.1,60,00,000/=** (**Rupees One Crore sixty Lakhs**) in the last seven financial years.
c) The average annual turnover during the last three financial years shall not be less than **Rs 60,00,000/= (Rupees Sixty Lakhs).**
d) The Tenderer shall have positive net worth. The Tenderer shall have made profit before prior period adjustment for at least two out of last three financial years (2010-11, 2011-12 and 2012-13).

15) AGREED LIQUIDATED DAMAGE: Time shall be the essence of the contract. If successful tenderer fails to execute the order within the agreed delivery schedule, he shall be liable to pay as "agreed liquidated damages" a sum @ ½% of the contract value per week or part thereof of delay subject to a maximum of 5%.

16) DEFECT LIABILITY PERIOD: The equipment shall be warranted against defects in material, workmanship and performance for a period of 12 months from the date of taking over or 18 months from the date of supply whichever is later. In case of defects if any, the defects shall be rectified by repair or replacement of parts, free of cost on "free at our site" basis within 2 weeks from the date of intimation failing to rectify the same defect liability period shall be extended accordingly. This should be backed up by a bank guarantee for **10%** of the order value valid for the warranty period as per our Performa enclosed (Annexure-5). This shall be sent directly to us well in advance before claiming the last **10%** of the supply value.

17) PREFERENCE: Preference will be applicable as per Govt. guidelines in vogue. Party claiming exemption shall submit valid supporting documents along with their offer.

18) RISK PURCHASE: In the event of order not being executed satisfactorily, we reserve the right to purchase material from alternative sources at your risk and cost.

19) CANCELLATION OF ORDER: It will be your endeavour to execute the purchase order to our satisfaction. In case of your failure to do so, the order is liable to be cancelled.

20) **ERECTION & COMMISSIONING**: The equipment along with spares after receipt and acceptance shall be erected and commissioned as per the agreed scheduled, by your service engineers upon written information from us. Guest House accommodation to one Engineer may be provided on chargeable basis subject to availability. Water and electricity at a single point will be provided free of cost.

21) **PERFORMANCE DEMONSTRATION AND TAKING OVER**:
The entire system shall be operated continuously for a period of three days successfully at the rated capacity and NIT conditions. The system will be deemed to have been taken over after successful performance demonstration.

22) **TEST REPORT**: Manufacturers Test certificate should be furnished along with supply for raw material used such as stainless steel, gear/ sprockets, pumps, motors, gearbox, cables, electrical, instruments, etc.

23) **OPERATION AND MAINTENANCE MANUAL:** Five (5) sets each of operation and maintenance manuals with all relevant drawings, spare part list, part no., MOC, etc. of complete system including bought out items must be handed over before performance demonstration. The manual shall contain Trouble shooting, interlock details, etc.

24) **PRICE VARIATION CLAUSE**: Price variation only on account of changes in the existing Govt. levies & taxes & new imposition of levies / taxes will be considered.

25) **ASSURED SPARES AVAILABILITY:** The bidder shall confirm in writing that all spares & components of the equipment offered shall be made available for a minimum period of 10 years from the date of supply of the machine.

26) Other terms & conditions as in “Instructions to Tenderer & General Conditions of Contract” (enclosed) shall also apply.

ANNEXURE –2A

DESCRIPTION & TECHNICAL SPECIFICATIONS OF ROTARY DRYER

Scope:

A. Design, supply, installation and commission the rotary Kiln complete with all electrical, instrumentation, cabling, control panel, mechanical drives, structure work etc. required for the Rotary Kiln & accessories but excluding the room for housing control panel & civil foundation.
B. Design of the whole system including drawing of civil structure/ foundation for kiln, electrical, instrumentation, fabrication drawing of all structure.
C. Submission of design engineering and related drawings of related system (7 hard copies and soft copy).
D. Submission of 4 sets of operation and instruction manual.
E. Supply of the system – Loading and despatch from bidders site, transportation to purchaser site, transit insurance, unloading at UCIL site, safe custody till handing over of the system including insurance.
F. Sizing of the control room, MCC size and layout drawing of the control room shall be submitted along with the technical bid.
G. Submission of wiring and electrical diagram in terms of P&ID, line diagram, details of cable trench for MCC, cable laying and supply of shock resistant mat in front of MCC.
H. Supply of 1 no. of Table (Model:T-102, Make : Godrej), 2 nos. of Chair for control room (Model: PCH 6002, Make : Godrej) and 1 no. of SDU (Model: SDU1, Make : Godrej)
I. Supply as per Bill of material.
J. Any thing required for completion of the system but not mentioned above shall be in bidders scope of supply.

Duty: To heat fine power of uranium peroxide to remove oxygen.

Operating Temperature: 350^0C (325^0C – Max. 375^0C).

Residence time: in heating zone 30 minutes.

Feed material: Free flowing powder of uranium peroxide containing about 6-7 % moisture, 0.5 – 1.0 % chloride, Average particle size of powder is about 3-6 micron.

Feed rate: 80 – 90 kg/hr.

Electrically heated rotary Kiln: The rotary Kiln, tubular in construction, shall be made of sufficient thick metal taking into consideration corrosion allowance. The shell of Kiln shall be of sufficient thickness & quality to resist any corrosion and deformation due to sudden stoppage during operation.

- **The rotary Kiln shall be provided with cooling system with air to restrict the temperature of shell near bearing as well as mechanical seal. A minimum free space of one metre shall be provided in the main tube carrying the product at the discharge end after heating zone. This part shall be provided with external cooling fins and the system shall be connected with a cooling fan to supply cold air and necessary ducting to carry the hot air away from the system.**

- The Kiln shall have replaceable spiral suitably installed at the feed end for pushing forward the feed material.

- The Kiln shall have replaceable lifters/spirals all along its length for mixing & movement of material for uniform drying. The lifters shall be push fit type for easy replacement.

- The drive of Kiln shall be through replaceable split type sprocket mounted on shell of the kiln, duplex chain, gear box/motor with VFD, etc., or girth gear and pinion drive with VFD.

- The kiln shall be supported on suitable end bearings (preferably split type) and must be able to withstand the kiln skin temperature or on tyre and roller assembly.

- The kiln along with the drive shall be of suitably supported from the floor either by structural steel or concrete columns, provision for adjusting the inclination for easy discharge of material.

- The kiln shall have provisions/outlet manifolds for exhausting the moisture inside the kiln during operation at the discharge end.

- **An exhaust duct to be connected with the above outlet manifold with an exhaust fan. There shall be one running & one stand by fan in the mentioned system with suitable isolation valves for separation of the fans. The suction pressure of the fan shall be such that only moisture of the kiln chamber is carried out of the system and not the valuable product. The duct shall have a provision for measurement of suction pressure of the system.**

The Kiln drive shall have facility to regulate the rotation of dryer up to 20% higher & lower than the designed speed.

The Kiln shall be provided with mechanical or pneumatic hammer at the feed end, which shall hammer the shell from a single point 2 to 3 times at equal periodic interval in a rotation to dislodge the sticky material from inner wall of Kiln. The hammer shall be of replaceable type. Preference will be given for mechanical hammer & electrically operated. The kiln surface shall be given metallic protection where the hammer is supposed to hit the body to prevent damaging the outer wall of the kiln.

Insulation: The Kiln shall be well insulated from all the sides with replaceable compressed ceramic fibreboard / ceramic lining of sufficient thickness so that the skin temperature of outer most covering remains less than 40 ^{0}C.

Details of heater: The heating elements shall be installed on the bottom and two sides of the kiln, such that the rotary dryer is heated uniformly. It shall have facility of easy replacement of individual heating coil, preferably without disturbing/dismantling the rotary Kiln. The heater shall be provided with thyristor and PID controller of reputed make to regulate the heating according to set temp. The set temperature may be varied between 250 ^{0}C to 375^{0}C hence heater shall be capable to meet this variation at the desired feed rate of 80 to 90 kg/hr.

The electrical heater shall preferably be split into 3 or 4 separate individual segment with independent supply & shall be installed equally spaced in the periphery of rotary Kiln for uniform heating. There shall be digital display of temperature & Voltage of each of this individual segment of heater.

The heating element shall be made of Ni-chrome wire of sufficient thickness reputed make & shall be properly supported on suitable tube of ceramic/silica/ any other suitable material.

Suitable facility to measure the inside temperature of rotary Kiln near the entrance & exit, with its digital display at the control panel, shall be provided. Temperature measurement with digital display shall also be provided at two points in each heating segments of heater between heating coil & outer shell of rotary Kiln.

The electrical heater shall be designed such that it shall be operated at maximum 90% load at the maximum temperature requirement of 375^{0}C at desired feed rate of 80-90 kg/hr. The element temperature of heater shall preferably not exceed 500 ^{0}C under any condition. Hence heater trip interlock with measured temperature shall be provided for every individual

heating segment. The rotary Kiln shall be provided with replaceable mechanical seal at the entrance and exit for leak proof movement of material.

Feed Hopper: Interchangeable feed hopper for the Rotary dryer with suitable discharge spiral feeder to feed the Rotary dryer at the rate of 80 – 90 Kg/h, drive sprocket, discharge chute, pneumatic knife-edge gate valve, mechanical hammer etc., to be supplied. The top of the hopper must have an opening of about 300mm dia. With hinged type flange and bolting arrangement. Both the feed and discharge ends must be tightly sealed without leaks. The feed hopper shall be made of SS 316 with duly buffing polishing done (to ensure food grade quality) as per the drawing enclosed. There shall be two mechanical hammers electrically operated type with each hopper fitted on the slanting walls for dislodging the sticky material inside the hopper walls. The hopper surface shall be given metallic protection where the hammer is supposed to hit the body to prevent damaging the outer wall of the hopper.

Suitable stiffening, lifting hooks, and side-supported brackets to take a total load of about 2 MT must be provided. The feed hopper must be mounted on an MS angle/channel supported frame. The feed hopper and the supporting frame must be as per our Drawings No. UCIL/TMD/PEROXIDE/FEED HOPPER/A which is for guidance only. Ten nos. of the Feed hopper unit are required. A suitable motor with VFD, gearbox shall drive the discharge feeder to match the Rotary dryer output.

Discharge Spiral: The hot material from Kiln shall be discharged into a closed screw conveyor for taking into drum. The trough of the screw conveyor shall have jacketed water-cooling arrangement to bring down the temperature of material at its discharge to 50 ^{0}C or below. A one way fully enclosed discharge chute of 250mm diameter to be provided for final packing into 200 litres capacity plastic lined MS drums. The drum will be placed on platform scale

Material of construction of both the feed and discharge screw feeder shall be of SS 316.

The gearbox, sprocket & chain for feed hopper, Kiln screw feeder and discharge screw feeder shall be preferably of the same size, ratio and make.

Trolley: Manually operated Hydraulic jack trolley (Hydraulic pallet truck) to take a load of about 1.5MT is required for movement of feed hopper. The trolley shall be of reputed make; dimensions of the trolley shall be given by the bidder along with catalogues/ leaflets. Dimensions of the trolley wheelbase must be suitable for weighment on a 1.5m x 1.5m platform scale.

Cooling tower: Either ends of the heat zone of the kiln have to be sufficiently cooled to enable trouble free operations of the kiln supporting bearings/ girth gears. The product being discharged from the kiln has to be cooled to less than 50 ^{0}C for packing into plastic lined drums. The discharge spiral has to be through a water-cooled jacket. A cooling tower of sufficient capacity along with two nos. each of hot water and cold water pumps with suitable capacity have to be provided, one each will be a standby. Suitable motors and electrical shall be in the scope of supply. The cooling tower shall preferably be made of FRP and shall be compact in design.

Screw feeders:

All the screw feeders shall have a ***pipe diameter of 150 mm (minimum)*** and the ***pitch of the screw shall be 100 mm***. The drawings of the screw feeders must be submitted along with offer. M.O.C: SS-316

ANNEXURE-2B

PROFORMA FOR PROPOSAL EXHIBIT SHEET

FOR ROTARY DRYER ESSENTIAL ITEMS

SUBJECT	DESCRIPTION (UNIT)	ROTARY DRYER DETAILS	
		SPECIFIED	OFFERED
General Rotary kiln	Numbers provided Location / Service Make Weight: Kiln (Kg.): Mechanical items : Electrical items : Insulation : Others (specify) : Total Shell rpm – Design Shell rpm – Maximum Shell rpm – Minimum	One Uranium Peroxide Plant	
Duty condition	Capacity (Kg/h) Operating temperature Residence time in heating zone Feed material size Feed material inlet temperature Product outlet temperature Feed Material Bulk density Moisture content of feed Impurities of feed Product free oxygen content	80-90 250 ^{0}C –375 ^{0}C 30 minutes 3 – 6 microns Ambient Less that 50 ^{0}C Uranium peroxide ~1.5 MT/ Cu M 6 – 7 % 0.5 – 1.0% chloride Zero	
Screw Feeder at Kiln inlet	Capacity MOC Speed - rpm Spiral Plate thickness – mm Spiral length No of spirals OD of spiral Spiral pitch Loading efficiency Spiral inclination to horizontal End Sealing arrangement Type of bearings Coupling: Motor to G/B : Make : Service factor Drive Motor-Type & make -Class of protection -Rating (KW) / Voltage(V) -Insulation class -Speed (rpm) Gear box Type	80 – 90 Kg/h SS 316 150mm 100mm Mechanical dust leak proof SKF/FAG, sealed, life time greased Tyre coupling Unique/Fenner TEFC, Sq. cage 1400 Radicon Worm & worm reducer	

	Reduction ratio Lubrication Transmission G/B to feeder Chain & sprocket Make Sprocket MOC	 Oil immersed Chain & sprocket Rol Kobo CS 1030 Gr. II, flame hardened to 300 BHN	
Kiln Shell	Design standard Shell MOC Shell plate thickness (mm) ± Shell diameter (mm) ± Type of construction No. of joints if any Test standard for the shell Tolerance in shell Straightness Trueness. Roundness Shell length – (mm) Total Heat zone length Feed end length Discharge end length Pneumatic/ mechanical hammer	 SS 310 or any other suitable material. 500 Seamless 2 – 3 strikes / revolution	
Kiln Drive Motor	Motor type & make Class of protection Rating (Kw) / Voltage (V) Speed (rpm)	TEFC	
Kiln drive Gear box	Type of gears Make/ size Reduction ratio Lubrication Service Factor	Horizontal foot mounted, Worm & worm reducer Radicon Oil immersed	
Kiln drive Couplings	Coupling Motor to G/B : Make : Service factor Transmission G/B to feeder Chain & sprocket Make Sprocket MOC	Tyre Unique / Fenner Chain & sprocket Rol Kobo CS 1030, Gr. II, flame hardened to 300 BHN	
Kiln end support	Type	Bearing/ roller	
	Bearing - Type - Make - Lubrication	 Taper Roller SKF Life time greased	
	Metallic tyre and roller - Tyres - Type	 Split, replaceable, bolted --Two nos.	

	- Make - Roller - No. of rollers - Rollers bearings - Lubrication - MOC of tyre and roller	Replaceable liner type Four SKF Life time greased		
Kiln Drive	Type	Girth gear/ sprocket		
	Girth gear - Type - Make - Mounting details - No. of teeth - Pitch - Width - PCD - MOC - Material hardness - Lubrication - Girth gear guard	 Spur Split, bolted Fully contained with leak proof lubrication collection box/ tray		
	Pinion - Type - Make - Mounting details - No. of teeth - Pitch - Width - PCD - MOC - Material hardness - Lubrication - Pinion shaft MOC - Shaft dimensions L&↓ - Bearing details	 Spur Shaft mounted with key EN 8		
	Sprocket Drive & driven - Type - Make - Mounting details - No. of teeth - Pitch - Width - PCD - MOC - Material hardness - Chain length - Lubrication	**<u>Drive</u>** Duplex Rol Kobo Split, Bolted CS 1030, Gr. II Flame Hardened to 300 BHN	**<u>Driven</u>** Duplex Rol Kobo Shaft & key CS 1030, Gr. II Flame Hardened to 300 BHN	

Spiral/ Lifter	Spiral/lifter type MOC Height Thickness	Push fit SS 310 S 50 mm 5 mm	
Heating coil	Ni-Chrome Make Product temperature No of segments Max coil temperature Heating coil details - Full length - Turns/meter - Coil wire gauge - Coil diameter - End connection details - Power rating (Kw) Power supply	3 sides Midhani 250 ^{0}C – 375 ^{0}C 3 – 4 500 ^{0}C 440/3/50 AC	
Coil support	Tubing material - Length - Diameter - Thickness	Sileminite/ quartz/ silica	
Heating segment	Support details - Type - MOC - Nos.		
Lining	Type of lining for the Kiln Skin temperature of cover Liner thickness – mm Liner cover material details	Replaceable compressed ceramic fibreboard/ firebrick lining. < 40^{0}C	
Air exhaust fan for kiln moisture	Centrifugal forced draft fan Make: Dustven Fans, Bangalore. Indvent Fans, Kolkata etc. Motor KW: Specify VVFD(if any): Specify	To exhaust moisture inside the kiln. To regulate the fan.	
End seals	Dust seal Make Details	Mechanical type on both the ends Enclose literature	
Shell Cooling	Outside the heating zone by cold air flow Air flow rate (m3/hr.) Skin temperature of shell after air cooling	Both ends To be furnished To safeguard the bearing and mechanical seal	
Air cooling fan for shell cooling	Centrifugal forced draft fan Make: Dustven Fans, Bangalore. Indvent Fans, Kolkata etc. Motor KW: Specify	To safeguard the bearing and mechanical seal	

Safety devices	Details (over load relay/Limit switches}		
Electricals	Cable - Make - Rating - Size - Conductor material MCC/control panel - Contractor - Fuse - Switch, O/L relay Cable for heater - Make - Rating - Size - Conductor material VVFD - Make - Rating - Panel Size - Conductor size & type requirement Thyristor Drive - Make - Rating - Panel Size - Conductor size & type requirement	 Fortgloster/CCI/NICC/ Polycab/ KEI 3,5,7.5,10…..HP 2.5,4,4,6……Sq. mm Copper for motor up to 5HP & Aluminium for above 5HP motor Siemens/L&T E.E./Siemens/L&T Siemens/ L&T/Siemens Fortgloster/CCI/NICC/ Polycab/ KEI ABB AUTODATA	
Instrumen-tation	**As per Annexure – 2E1**	**As per Annexure – 2E**	
Additional	Whether the following items have been furnished - Leaflets & brochure - Dimensional G.A. drawings - Electric circuit diagram - P & I Diagram		

ANNEXURE – 2C

PROFORMA FOR PROPOSAL EXHIBIT SHEET
FOR TAKE IN ITEMS

SUBJECT	DESCRIPTION (UNIT)	ROTARY DRYER DETAILS	
		SPECIFIED	OFFERED
Feed hopper	MOC Capacity Discharge arrangement Feed inlet Dimensions Motor type & make Class of enclosure/protection Rating (Kw) / Voltage (V) Speed (rpm) VFD	SS 316 ~400 litres. Screw feeder ~300mm dia. Proposed drawing: UCIL/TMD/PEROXIDE/ FEED HOPPER/A	
Feed hopper G/B	Type of gears Make/ size Reduction ratio Lubrication Service Factor Motor to G/B Coupling : Make : Size Transmission G/B to screws Make MOC	Worm & worm reducer Radicon Oil immersed Tyre Unique / Fenner Chain & sprocket Rol Kobo CS 1030, Gr. II, flame hardened to 300 BHN	
Feed hopper stand on wheels	Dimensions MOC Max height with feed hopper Type of wheels Wheel size Wheel material Wheel assembly Bearing make & details	Proposed drawing: UCIL/TMD/PEROXIDE/ FEED HOPPER/A MS ~1.30 to 1.35 m Swivel castor, heavy duty 100 ↓, 50 mm width Phenolic fibre Replaceable type SKF;	
Hopper trolley	Manually operated hydraulic trolley Make MOC Maximum height along with feed hopper & stand Maximum load with material in hopper Trolley floor area Trolley height	1.5 MT capacity MS 1.6 m 1.5 MT 1 m x 1.5 m < 100 mm	
Discharge screw conveyor	Spiral screw feeder with jacketed shell for water cooling Product inlet temperature Product outlet temperature	 To be furnished	

	Cold Water quantity Cold Water temp. Hot Water temperature MOC of shell and spiral Speed of spiral – rpm Spiral Plate thickness – mm Spiral length No of spirals OD of spiral Spiral pitch End Sealing arrangement Details of spirals bearings Coupling: Type : Make & size : Service factor Drive motor rating and make Gear box - Type of gears - Make/ size - Reduction ratio - Lubrication - Service Factor	< 50 ^{0}C To be furnished 30 ^{0}C To be furnished SS 316 To be furnished 5 mm To be furnished To be furnished To be furnished To be furnished Mechanical seal SKF, Tyre Unique/ Fenner 415/3/50 AC Horizontal foot mounted, Worm & worm reducer Radicon Oil immersed	
Dust seal	Bellow type for product packing		
Cooling tower	Capacity Hot water temperature Cold water temperature Make up water requirement Floor area requirement	5 M^3/h < 30 ^{0}C	
Hot & cold water pump	Capacity Type of pump Make & Model Head RPM Motor HP & RPM Coupling details	5 M^3/h Centrifugal pump KSB	

Annexure – 2D

TECHNICAL SPECIFICATIONS – ELECTRICAL

UCIL will provide 415V ± 10%, 50 Hz power supply at a single point, where the Rotary Dryer will be installed. All Electrical items required to manufacture, installation & commissioning the Dryer, will be within the bidders' scope including supply and laying of all cables for electrical equipments .

The scope shall include manufacturing and supply of Control panel/ MCC for the entire Rotary dryer system including motors, all electrical both panel and field control. Over load protection, under voltage trip, single-phasing preventer and triple pole switch with back up fuse to be provided for each motor. Interlocking with field control shall be in the scope of the Tenderer.

Bidder may note that there will be only one Control Desk for Electrical & Instrumentation System. Details of control Desk and control philosophy is given in Instrumentation part of this tender document.

The system shall consist of motors/heaters for feed hopper drive, feed screw drive, rotary kiln drive, discharge feeder drive, cooling tower drive, cold & hot water pump drives and heating system along with suitable starter/ control panel/ MCC's for each drive, etc. Supply of cables, cable tray, cable gland, earthing system and other supporting material for cable laying shall be in the scope of bidder. Cable laying and Finishing and termination of cables for above drives shall be in the scope of the Tenderer.

The bidder shall give full description of the insulation and G.A. drawing of support/ installation of heater/ insulation/ kiln in their offer.

In addition to the above, provision for two feeders for heating system (one will be spare), two nos. 7.5 HP and six nos. 5 HP drives, shall be made in the MCC/ control panel for auxiliary site requirement. Altogether two MCCs and one control panel for heater shall be provided.

The following vender list to be followed: -

Motor	: Kirloskar/ Crompton
Contractor	: Siemens / L&T,
Fuse	: E.E.
Switch, O/L relay	: Siemens / L&T (independent mounting type)
Power Cable	: FORTGLOSTER / CCI / NICCO.

ELECTRIC MOTOR

1.00.00 *GENERAL*.

1.01.00 Motors shall be furnished in accordance with both this general specification and the driven equipment specification.

1.02.00 In case of any discrepancy, the driven equipment specification shall govern.

2.00.00 *STANDARDS*

2.01.00 All motors shall conform to the latest applicable IS and IEC Standards/Publications except when otherwise stated herein or in the driven equipment specification.

2.02.00 Major standards that shall be followed are IS-325 and IEC-34. Other applicable Indian Standards for any component part shall also be followed.

3.00.00 *SERVICE CONDITIONS:*

3.01.00 The motors will be installed in hot, humid and tropical atmosphere, highly polluted and corrosive.

3.02.00 Unless otherwise noted, electrical equipment/system design shall be based on the service conditions.

3.03.00 For motor installed outdoor and exposed to direct sun rays, the effect of solar heat shall be considered in the determination of the design ambient temperature.

4.00.00 *TYPE AND RATING*

4.01.00 A.C. Motors

4.01.01 Motors shall be general purpose, constant speed, squirrel cage, three phase, induction type.

4.01.02 All motors shall be rated for continuous duty. They shall also be suitable for long period of inactivity.

5.01.00 Painting

Motor including fan shall be painted with corrosion proof paints.

6.00.00 *TESTS*

6.01.00 Upon completion, each motor shall be subject to standard routine tests as per IS. In addition, any special test called for in the driven equipment specification shall be performed.

CONTROL PANEL/ MCC

1.00.00 *CODES AND STANDARDS*

1.01.00 Major standards which shall be followed are IS: 13947 and IEC: 947. Other applicable standards for any component, if not covered in the listed standards, shall also be followed.

2.00.00 *SERVICE CONDITIONS*

2.01.00 The equipment shall be suitable for hot, humid, and tropical atmosphere, heavily polluted with dust and corrosive chemical fumes.

3.00.00 *DESIGN CRITERIA*

3.01.00 Bus bars of MCC shall be sized to carry continuously the total running load of the MCC (including customer's load, wherever applicable) plus a 20% margin.

All bus bars shall be capable of withstanding the mechanical forces and thermal stresses due to maximum short circuit current. Designed for 50 KA rms/1 sec and 105KA peak fault withstand.

3.02.00 In-cubicle ratings of incomer and bus-section breakers/switches shall be identical to the associated bus bar rating.

3.03.00 Motors shall be contactor operated.

3.04.00 For continuous operation at specified ratings, the temperature rise of various equipment/components shall be limited to the permissible values specified in relevant standards and/or this specification.

4.00.00 *SPECIFIC REQUIREMENTS*

4.01.00 Construction

4.01.01 MCC shall be constructed from 14 SWG thick CRCA sheet.

4.01.02 MCC shall be indoor, air insulated, and metal-clad type.

The design construction shall be such as to permit extension at either end.

4.01.03 MCC shall be non-draw out (fixed) type.

4.01.04 MCC shall be suitable for floor-mounting

4.01.05 MCC in general shall be of single-front construction.

4.01.06 MCC assemblies shall comprise of a continuous line-up of dead-front, free-standing vertical sections, housing the control modules in multi-tier formation.

All MCC shall be front-wired and front-connected

4.01.07 MCC shall be fully compartmentalised with metal/insulating partitions between compartments

Working height shall be limited between 450mm and 1800mm from floor level.

Each vertical section shall have a removable back cover. All doors and covers shall be gasketted.

For MCC modules, all push-buttons, lamps and indicating instruments shall be flush/semi-flush mounted on respective module compartment.

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4.01.08 For single-front assemblies, a full-height vertical cable alley with cable supports shall be provided in each section to facilitate unit wiring

The alley shall be liberally sized to accommodate all cables and shall have removable cover at the front for access.

4.01.09 MCC shall be supplied with base frames made out of structural steel sections.

4.01.10 After isolation of power and control circuit connections, it shall be possible to safely carry out maintenance in a compartment with the bus bar and adjacent circuit live. Necessary shrouding arrangement shall be provided for this purpose over the cable terminations located in cable alley.

4.01.11 The minimum clearance in air between phases and between phases and earth for the entire run of horizontal and vertical bus bars shall be 25mm. For all other components, the clearance between two live parts, a live part and an earthed part, and isolating distance shall be at least 10mm throughout. Wherever it is not possible to maintain these clearances, suitable barriers shall provide insulation. However, for horizontal and vertical bus bars, the clearances mentioned above should be maintained even when these are sleeved or insulated. All connections from bus bars up to fuses shall be fully shrouded to minimize the risk of phase to phase and phase to earth shorts.

4.02.00 Bus and Bus Taps

4.02.01 All MCC shall be provided with three phase bus bars and neutral bus bar.

All bus bar compartments shall be completely enclosed.

4.02.02 Horizontal and vertical bus bars and bus connections shall be of high conductivity copper/aluminium/aluminium alloy.

The maximum temperature of bus bars and bus connections shall be limited to 90^0C i.e. 40^0 C rise over 50^0 C ambient.

No diversity factor shall be allowed for temperature rise.

4.02.03 All bus connections shall be provided with anti-oxide grease. Adequate contact pressure shall be ensured by means of two-bolt connection with plain and spring washers and locknuts.

4.02.04 Bimetallic connectors shall be provided for connections between dissimilar metals. The bus bar shall be in accordance with IS1898.

4.02.05 Cross-section of the bus bars shall be uniform throughout the length of the assembly. All bus bars and bus connections shall be supported and braced to withstand the stresses due to maximum short circuit current and also to take care of any thermal expansion.

4.03.00 MCC

4.03.01 MCC modules shall have self-aligning power/control disconnects. All disconnects shall be silver-plated to ensure good contacts.

4.03.02 Various module sizes should be multiples of one basic unit to facilitate modifications at site. Suitable provision for this purpose should also be incorporated in the vertical bus bars.

4.03.03 Modules shall house the control components for a circuit such as switch, fuse, contactors, relays, push-buttons, lamps, meters, etc. only the push-button actuators, lens' of indicating lamps, and transparent windows for meters shall be mounted on module door such that when the module is withdrawn, the cubicle door shall provide specified degree of protection when the module door is closed. Provision for remote start/ stop should be given.

4.03.04 Contactor operated motor feeder modules shall be provide with one (1) MCC-NORMAL-TRIAL selector switch.

These selector switches shall be lockable type and shall be mounted inside the panel.

4.03.05 The equipment layout shall provide sufficient working space in between the components.

4.04.00 Switches

4.04.01 Switch handle shall have provision for padlocking in ON and OFF position.

4.04.02 The compartment door shall be interlocked mechanically with the switch such that the door cannot be opened unless the switch is in OFF position. Means shall be provided for releasing this interlock at any time.

4.05.00 Fuses

4.05.01 Fuses shall be HRC type with operation indicator.

4.06.00 A.C. Starter

4.06.01 Contactors

a) Motor starter contractors shall be of air break, electromagnetic type as per IS: 13947 Part-4, Section-1 suitable for DOL starting of motor and shall be of utilization category AC-3 for ordinary and AC-4 for reversing starters.

b) Contactor starters shall comply with the requirements of 8544 (Part-1) in respect of co-ordination of the characteristics of contactor, overload relay, and fuse. The type of co-ordination shall be Type-2 as per IS-8544.

4.06.02 Thermal Overload

a) Thermal overload relays shall be manual reset type and ambient temperature compensated with adjustable settings. Thermal overload relay shall be independent mounting type

b) Single phasing preventer shall be provided as an inbuilt feature of the thermal overload relay.

4.07.00 Control and Indication

4.07.01 Detailed requirements of individual circuits shall be developed by the Tenderer.

4.07.02 All indicating lamps shall be of high intensity cluster LED type.

4.07.03 For control supply, 2x100% adequately rated 415/240V control transformers with provision of momentary paralleling during changeover and with necessary taps shall be provided. Auxiliary bus bars shall be used to distribute 240V AC control supply. The control supply of different modules shall be tapped individually from the auxiliary bus bars. Transformer ratings shall have adequate spare capacity. All power and Control wiring shall be done through sufficiently rated copper wire (P.V.C insulated). Size of the control wire should be 2.5 sq. mm.

4.07.04 Provision for remote start stop and remote on off indication may be kept in each feeder module. The heater control panel shall have provision for remote operation, control and indication.

4.08.00 Meter and Meter Selector Switch

4.08.01 All indicating instruments (96 x 96 mm) shall be flush-mounted on front panel with 250 Deg. scale, anti-glare glass and accuracy class of + 2% full scale. Each meter shall have zero adjuster on the front.

4.08.02 Motor ammeters shall have an extended suppressed end-scale range to indicate starting current (6 to 8 times full-load current).

4.09.00 Secondary Wiring

4.09.01 Wiring shall be done with flexible, 650V grade, PVC insulated switchboard wires with stranded copper conductors of 2.5 mm2 for control & current circuits and 1.5 mm2 for voltage circuits.

4.10.00 Terminal Blocks

4.10.01 Terminal blocks shall be 660V grade box-clamp type with marking strips, similar to ELMEX 10 mm2 or equal. Terminals for C.T. secondary leads shall have provision for shorting. Terminals blocks used for interface with DCS via termination cabinet shall be suitably sized to facilitate proper termination of interconnecting cables.

4.11.00 Cable Termination

4.11.01 Generally, all assemblies shall be designed for cable entry from the bottom.

4.11.02 Gland plates shall be minimum 4 mm thick. The gland plate and supporting arrangement for 1/C power cables shall be of non-magnetic material.

4.12.00 Ground Bus

4.12.01 A ground bus, rated to carry maximum fault current, shall be provided which shall extend the full length of the assembly.

4.12.03 All hinged doors shall be earthed by flexible copper braid.

4.13.00 General

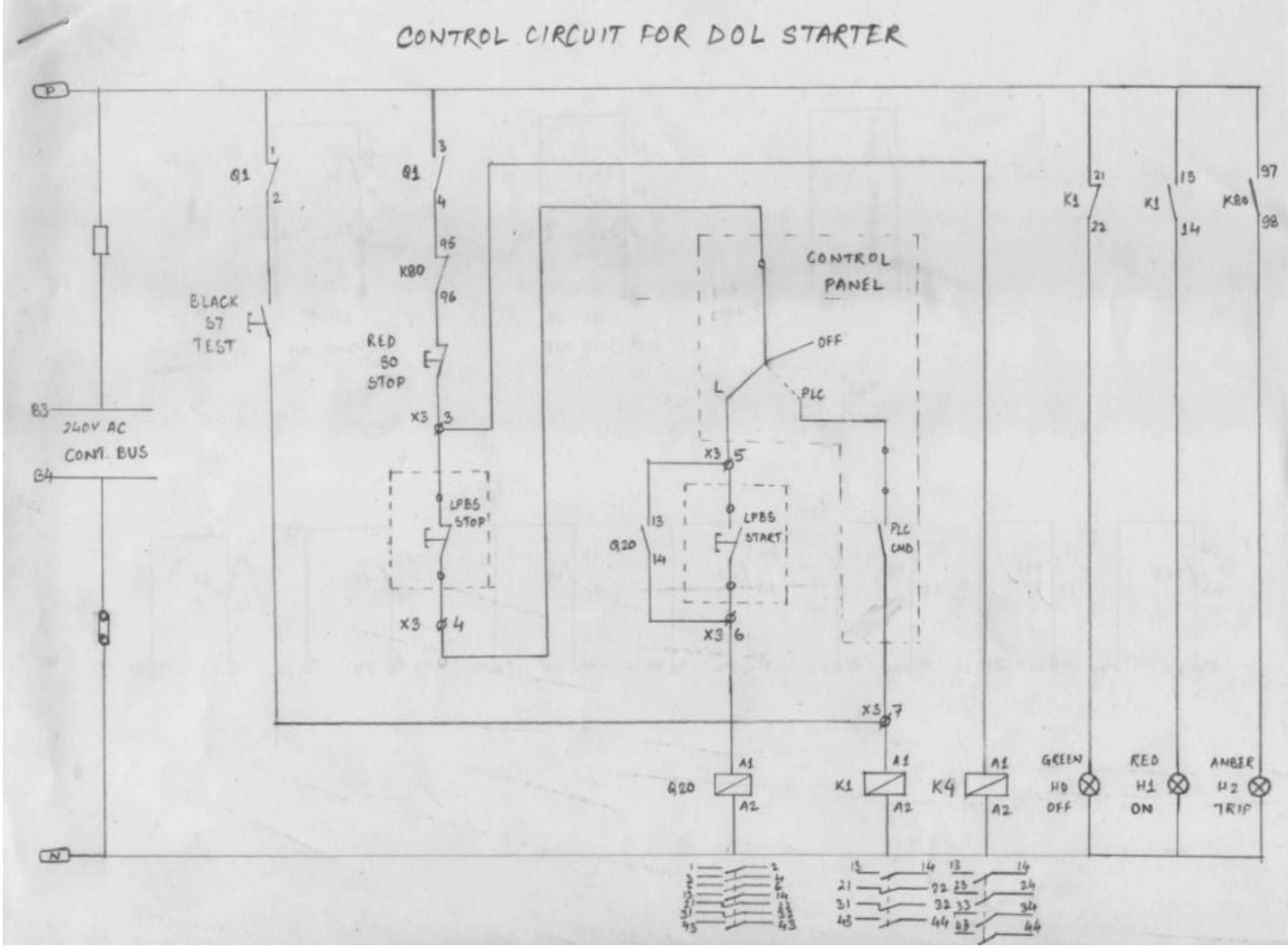
4.13.01 Nameplates :Nameplates of approved design shall be provided on each cubicle, at the top of the assembly and on each instrument & device mounted on or inside the cubicle.

4.13.02 All motor feeders other equipments shall be provided with Current Tranducers (Dual channel) of output 4-20 mA for remote metering

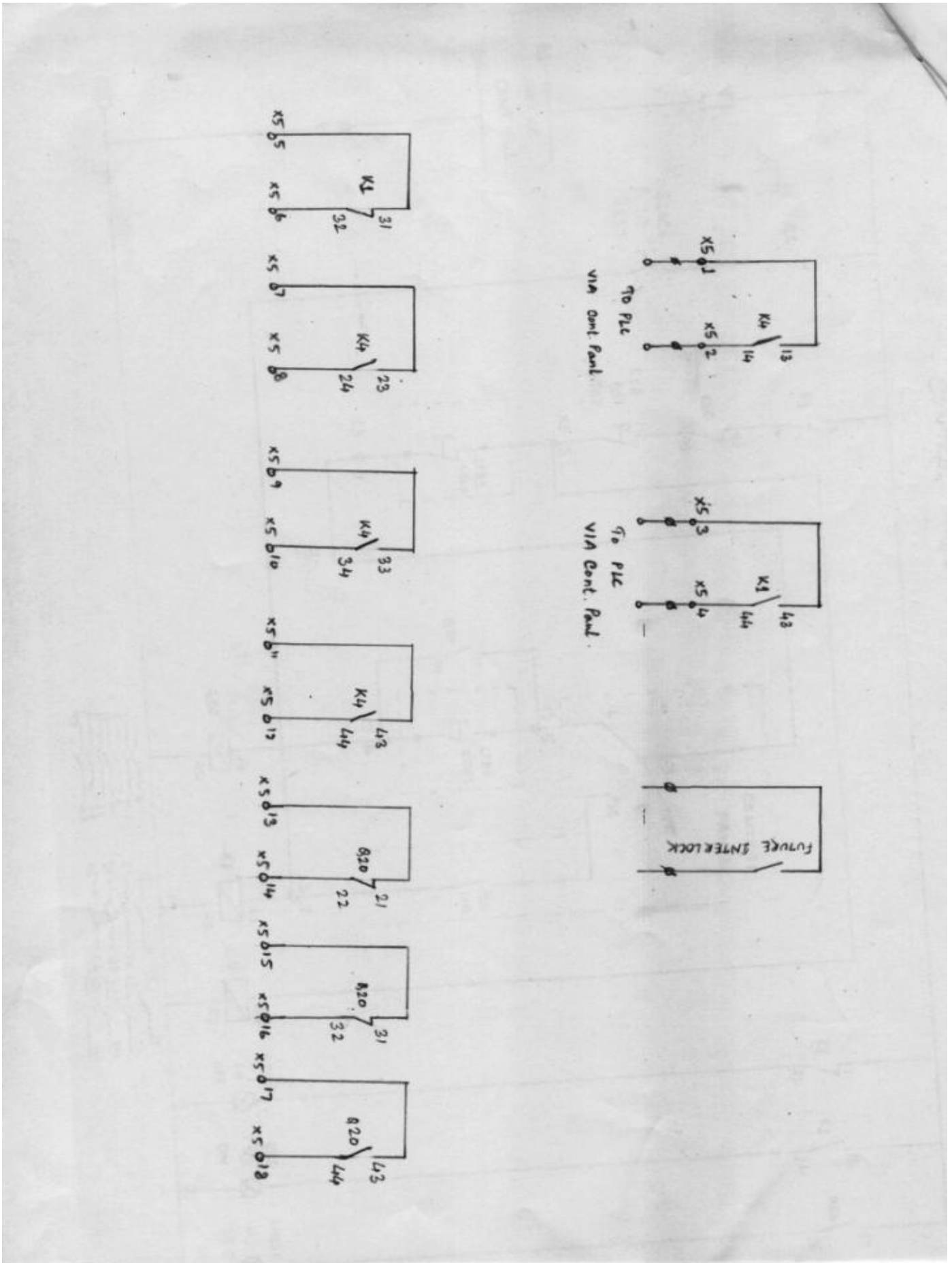
4.13.03 All motor feeders shall have a test push button inside the feeder for testing the healthiness of the control circuit when the main SFU is in OFF position. This has been also reflected in our attached control circuit of DOL starter indicated below.

4.13.04 Local Push Button Stations (LPBS) shall be supplied with the MCC Panel for each and every motor & SFU feeders. The LPBS shall be double door type with canopy at the top and shall be of 290 mm X 290 mm X 250 mm (H X W X D). The LPBS shall have 1 no. Start push button and 1 no. Emergency Stop push button (Mushroom head type).

4.13.05 The color of the MCC panel shall be smoke grey


CONTROL CIRCUIT FOR DOL STARTER
P
N
B3
240V AC
CONT. BUS
B4
Q1
BLACK
S7
TEST
RED
S0
STOP
K80
LPBS
STOP
LPBS
START
CONTROL
PANEL
OFF
PLC
L
Q20
K1
K4
PLC
CMD
GREEN
H0
OFF
RED
H1
ON
AMBER
H2
TRIP
A1
A2
X3

CONTROL TERMINAL ARRANGEMENT FOR DOL STARTER



5.00.00 *TEST*

5.01.00 The switchgear shall be completely assembled, wired, adjusted and tested at the factory as per the relevant standards.

5.02.00 Routine Tests shall be carried out as per relevant standards.

Control Panel of Thyristor Controller

Purpose: The purpose of the control panel is to operate a Thyristor Controller through push buttons/ PID loop (from PLC) after satisfying the necessary interlocks.

1. The Panel shall consists of the following facilities:
    a. Contactor and Overload suitable for Heater Bank Power Rating
    b. Push Buttons for:
        - Thyristor Start
        - Thyristor Stop
        - Load Reset
    c. Remote / Local Operation Selector Switch
    d. Ammeter for 3 Phase with ASS. (Analog)
    e. Voltmeter for 3 Phase with VSS. (Analog)
    f. Potentiometer for Local Control of Load Current
    g. Indicating lamps (LED type) & potential free contacts for:
    i) Thyristor Ready to Start
    ii) Thyristor Running
    iii) Thyristor Stop
    iv) Thyristor Trip
    v) 3-Phase Supply indications.
    h. Degree of protection: As per IP – 55
    i. Cable to be used: 2.5 sq. mm flex copper for internal wiring of the panel.

(II) General Instructions

a. Sheet Thickness: 14 SWG
b. The Thyristor Controller should be mounted inside the Panel and its display should be visible from outside.

Thyristor Controller for Electric Heater

Type: Integral Cycle Heater Controller for control heating applications. The powers input to the heaters are to be controlled by the control signals at the input of the heater controller.

a. Input Voltage: Three phase, 415V +/- 10 % 3 Wire.
b. Frequency: 50 Hz. +/- 3 %
c. Ambient Temp. : 45 deg C
d. Output: Continuous output current
e. Control range: 0 to 100 % Voltage
f. Control Inputs: 4 to 20 mA DC
g. Fault Indication: Output fail of individual phase

h. Protection: 1.dv/dt through snubber

i. Short circuit through high speed Thyristor fuses at the input and output of the Controller

- There should be Thyristor controller for each Heater bank
- Provision for external interlock for tripping of Heater circuit connection should be there.
- Digital output to indicate tripping at remote place should be there.
- Both Auto (through control signal from PLC) and Manual (through potentiometer at the front panel) options of running the controller should be there.
- Cooling fan of ebm-NADI make should be provided for proper cooling of the controller panel.
- Output voltage adjustable option through potentiometer should be there in the cards, which is to be used in case desired temperature is not achieved in the heater.

Specification of VVVFD Panels

1. The VVVFD Panels shall be suitable for 3-phase, 440 volts AC, 50 Hz., 3 wire system and fully controlled. The speed control range for frequency controlled VVVF Drives shall be 1:10.
2. The VVVFD Panels shall be controlled by microprocessor based, voltage source converters and should possess the following features at minimum:
    i) They should permit good dynamic performance and stable motor operation over the speed control range.
    ii) Fully digital, microprocessor based.
    iii) Simplified tuning and start-up.
    iv) Quick fault diagnostics through plain and simple text display.
    v) Remote control and monitoring feasibility of the drive.
    vi) Proper provision for suppression of harmonics.
3. The VVVFD Panels shall provide the following protections along with fault diagnostics:
    i) Power Supply failure
    ii) Defective module
    iii) Line fault
    iv) Over Current
    v) Over voltage
    vi) Under voltage
    vii) Earth fault
    viii) Short Circuit Fault
    ix) Thermal Over load
    x) Motor protections such as motor stall, negative phase seq., locked rotor etc.

General Specifications:

1) The VVVFD panels shall consist of vertical sections, fabricated from minimum 3 mm. thick sheet steel duly treated by the seven tank process, shaped and reinforced to form a rigid free-standing, drip proof, vermin proof structure and powder painted gray with RAL 7032.
2) All panels will be of same depth and height. The doors shall have concealed hinges, properly gasketed and easy operating type fasteners. There shall be lifting eye-bolts at the top of the panel for lifting it properly and safely.

3) The bottom of the panel shall be complete with base channel frames of suitable size with anchor bolts and/or foundation bolts, nuts and leveling attachments for fixing the equipment to the floor which shall be furnished along with the panels where required.
4) All equipment, accessories and wiring shall be provided with tropical finish for prevention of fungus growth and the panels shall be made dust tight and the paints shall be such as to prevent corrosion and rusting.
5) The entry and exit of the cables shall be from the bottom of the panel and through detachable gland plate.
6) There should be minimum 250 mm clearance between gland plate and termination point in order to facilitate easy termination of incoming and outgoing cables.
7) All nuts, bolts, washers shall be cadmium plated or zinc passivated.
8) All equipment and accessories required for individual drives shall be segregated and housed separately in sheet steel enclosed cubicles.
9) The VVVFD Panels shall be suitable for 3-Phase, 440 Volts AC, 50 Hz., system. The control supply shall be 230 Volts AC, 50 Hz. and shall be through a suitably rated 440/230 Volts Control Transformer.
10) Necessary control equipment and accessories shall be provided to achieve control, indication and metering from central control panel and local control stations in Remote mode and Panel control in Panel mode.
11) The VVVFD Panels shall have R, Y and B phase indication lamps mounted on the door for indication of 3-phases for incoming supply. It shall also have AMBER, GREEN and RED indication lamps for indicating Drive healthy, running and fault status.
12) Each VVVFD Panel shall be supplied with Local Control Stations(LCS). The provision of control/metering/indication in VVVF Drive Panel, LCS & control room shall be as follows:

I) VVVF Drive Panel

a) Control
i) Panel / Remote selector switch
ii) Panel start/stop
iii) Emergency stop
iv) Speed increase decrease

b) Metering
i) Multi function meter

c) Indication
i) R-Y-B indication
ii) Drive healthy
iii) Drive running
iv) Drive fault

II) Control Room

a) Control
i) Local & PLC selection SW
ii) PLC start/stop
iii) Speed reference from PLC

b) Metering
i) Motor current
ii) Motor Speed

c) Indication
i) Drive healthy
ii) Drive running
iii) Drive fault

III) Local Control Stations

a) Control
i) Drive start/stop

ii) Emergency stop
iii) Speed increase/decrease

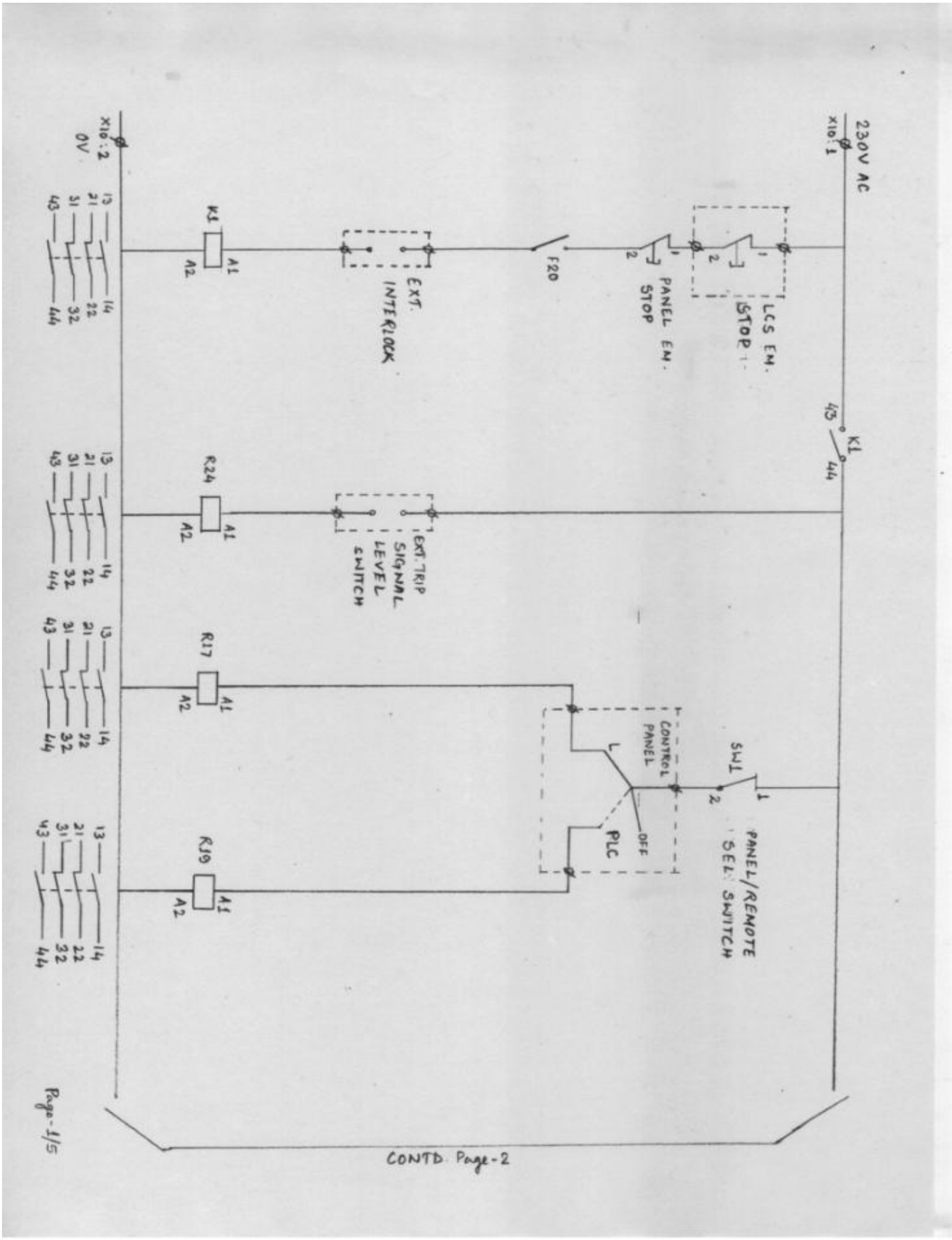
b) Metering
i) Motor current
ii) Motor speed

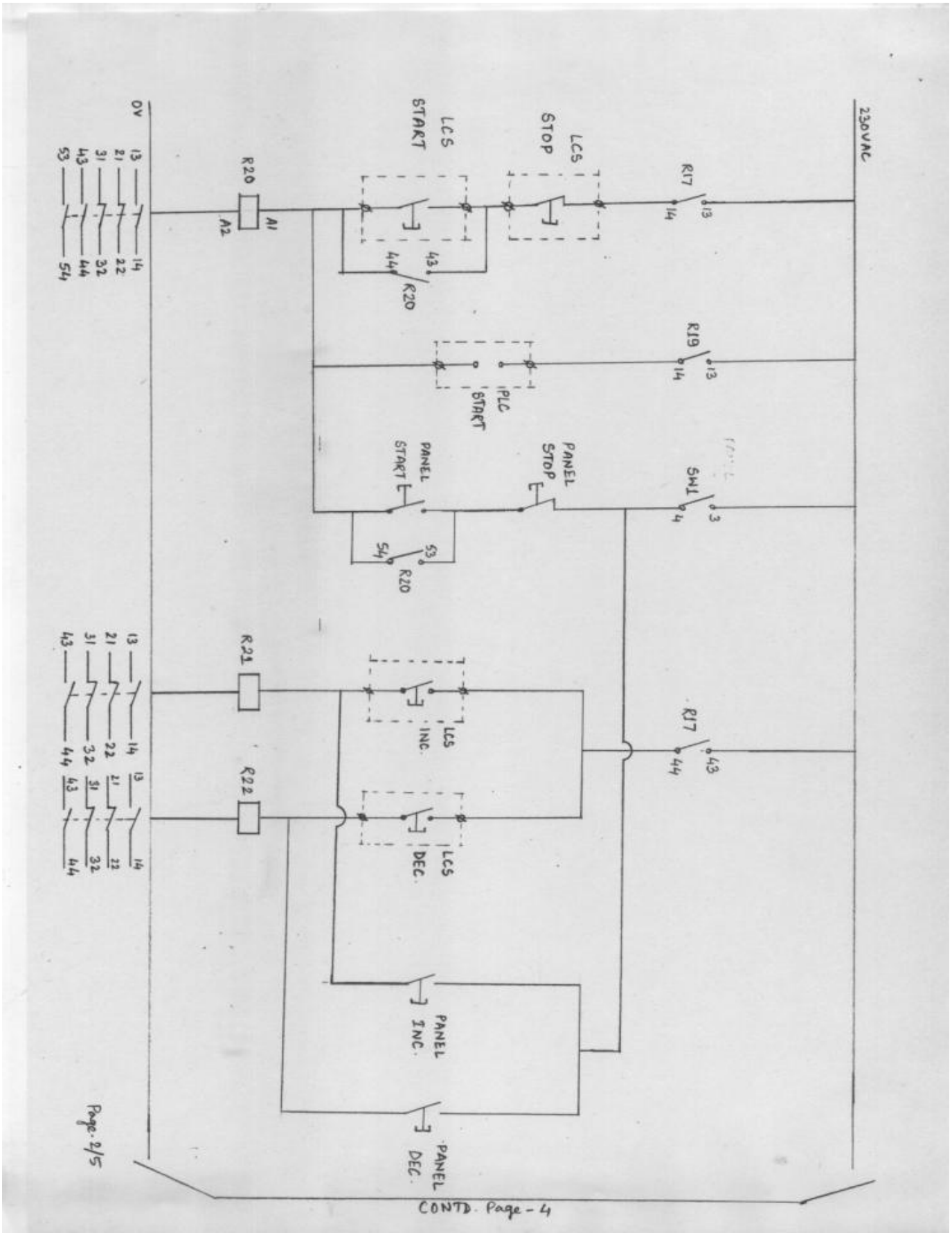
c) Indication
i) R-Y-B Indication
ii) Drive healthy
iii) Drive running
iv) Drive fault

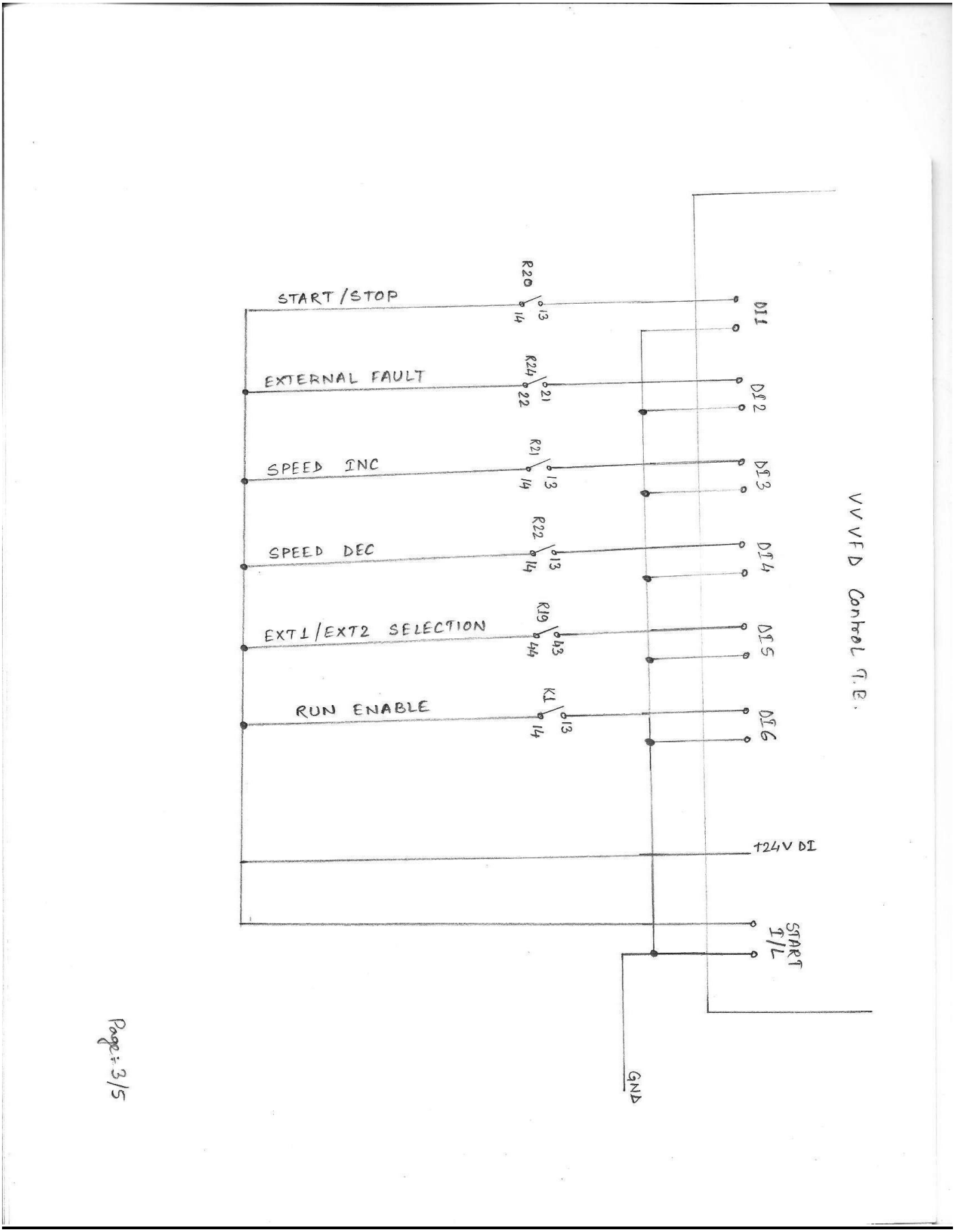
13) The VVVFD Panels shall be properly tagged and duly ferruled as per approved drawings.
14) All the terminals shall be properly tagged and ferruled and control and power cables shall be ferruled and duly socketed.
15) The VVVFD Panels shall be supplied with HMI device to control and operate and it should be mounted on the Panel door.
16) The Control wiring shall be done with 2.5 sq.mm. PVC insulated flexible stranded copper conductor and duly lugged, ferruled and socketed.
17) The Power connections shall be done with copper conductor stranded flexible cables / copper bus –bars of suitable rating. This shall be clearly specified by the bidder.
18) The VVVFD Panels shall have a 230 Volts AC plug and socket for auxiliary supply along with proper illumination with CFL Lamp for each panel with door interlock.
19) The VVVFD Panels shall also have Thermostat and space heater.
20) The 3 phase copper bus-bars (if any) shall be properly covered with PVC sleeves maintaining proper color coding.
21) In addition to above each of the VVVFD Panels shall have earth bus-bar at the bottom to facilitate the continuity of earthing connections.
22) The VVVFD Panels shall have 3-pole Input and Output Contactor of suitable rating for incoming and outgoing 3-phase supply voltage.
23) The VVVFD Panels shall also have the provision of the following:
    a) Digital Inputs: min. 6 nos. for START/STOP, RUN ENABLE, EXTERNAL FAULT, SPEED INC./DEC., PLC/LOCAL reference selection etc.
    b) Analog Inputs: 0 - 10 Volts – 1 no.
    Analog Input: 4 – 20 mA for PLC control – min. 2 nos.
    c) Analog Outputs: 4 – 20 mA for Current feedback and Speed feedback – min. 3 nos. with spare
    d) Potential free relay output contacts: min. 3 nos., 1 no. each for Drive healthy, Drive running and Drive fault status.
24) The VVVFD Panels shall have 2 nos. of 4 – 20 mA dual output channel Current transducers duly connected and wired for 4 – 20 mA current and speed feedback to PLC and Local Control Station. The auxiliary supply for transducers shall be 230 Volts AC.
25) Accepted make of components of VVVFD Panels:
    VVVF Drive module: ABB
    Contactors: SIEMENS / L & T / SCHNEIDER / ABB
    Push buttons: SIEMENS / L & T / SCHNEIDER
    Indication Lamps: SIEMENS / L & T / VAISHNO
    Meters: Automatic Electric / Conzerv / IMP
    SFU: SIEMENS / L & T
    MCB and MPCB: SIEMENS / HAGER (L & T) / ABB
    Emergency Stop push buttons: TEKNIC/VAISHNO
    Control Fuses: EE / SIEMENS / L & T /
    Current Transducers: Automatic Electric
    Selector Switches: Kaycee or equivalent.
26) The control circuit scheme for VVVFD Panels has been indicated below.
27) The following shall be furnished with the offer:
    1. Dimensional G.A. drawing of the offered VVVFD Panels.

2. Internal component lay out of the VVVD Panel clearly showing the clearances.
3. Bill of materials with make, type, rating and quantity.
4. Single line drawing of the VVVFD Panels.
5. Drawing of the control circuit of the VVVFD Panels.
6. Deviations from the tender specifications if any.

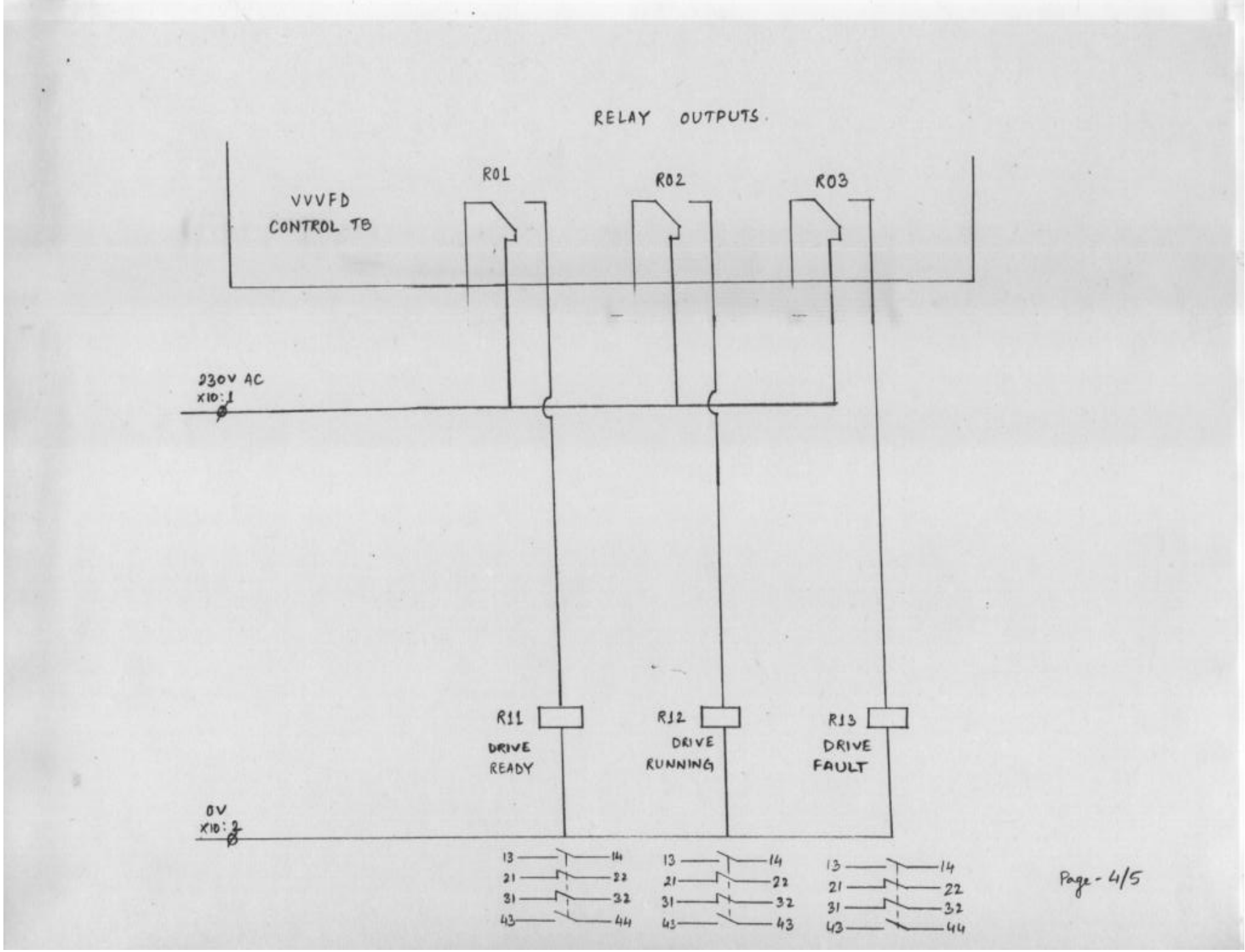
CONTROL CIRCUIT FOR VVVFD PANELS

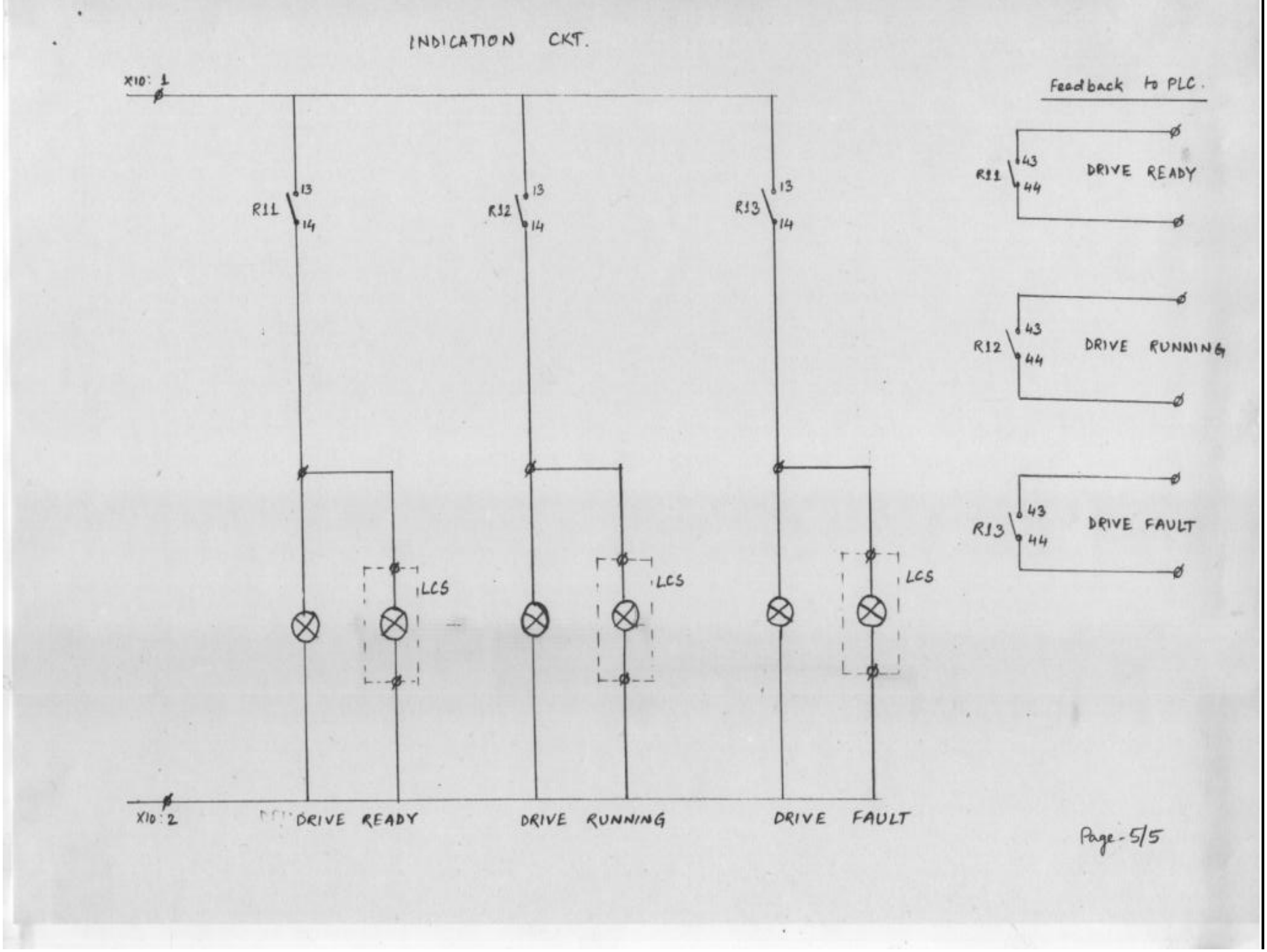



230VAC
0V
LCS START
LCS STOP
R17
R20
A1
A2
13
14
21
22
31
32
43
44
53
54
R19
PLC START
PANEL START
PANEL STOP
SW1
R21
R22
LCS INC.
LCS DEC.
PANEL INC.
PANEL DEC.
CONTD. Page - 4
Page 2/5


VVVFD Control T.B.
START /STOP
R20
13
14
DI1
EXTERNAL FAULT
R24
21
22
DI2
SPEED INC
R21
13
14
DI3
SPEED DEC
R22
13
14
DI4
EXT1/EXT2 SELECTION
R19
43
44
DI5
RUN ENABLE
K1
13
14
DI6
+24V DI
START I/L
GND

Page: 3/5


RELAY OUTPUTS.
VVVFD
CONTROL TB
R01
R02
R03
230V AC
X10: 1
R11
DRIVE
READY
R12
DRIVE
RUNNING
R13
DRIVE
FAULT
0V
X10: 2
13
14
21
22
31
32
43
44
Page - 4/5


INDICATION CKT.
X10: 1
R11
13
14
R12
13
14
R13
13
14
LCS
LCS
LCS
X10: 2
DRIVE READY
DRIVE RUNNING
DRIVE FAULT
Feedback to PLC.
R11
43
44
DRIVE READY
R12
43
44
DRIVE RUNNING
R13
43
44
DRIVE FAULT
Page-5/5

C A B L E S

1.00.00 *CODES AND STANDARDS*

Major standards which are to be followed are IS: 1554, IS: 6380, IS: 7098, IS: 9918 and IEC: 502

2.00.00 All cables shall be suitable for a hot, humid and tropical atmosphere with dust and corrosive chemical fumes. All cables shall be designed to withstand the mechanical, electrical and thermal stresses under the steady state and transient / fault conditions, and shall be suitable for the proposed method of installation**.**

3.00.00 *DESIGN CRITERIA*

3.01.00 For continuous operation at specified rating, maximum conductor temperature shall be limited to the permissible value as per relevant standard and / or this specification.

3.02.00 Armouring shall be single round wire of galvanised steel for multicore cables and aluminium for single core cable.

3.03.00 Core identification for multicore cable shall be provided by colour coding.

4.00.00 *SPECIFIC REQUIREMENTS*

4.01.00 Selection Criteria

4.01.01 In cable sizing the following are to be taken into consideration

a) Short circuit current and duration b) Continuos current

c) Installation conditions d) Voltage drop under normal running and starting condition.

4.01.02 The standard cable sizes ampere capacities and derating factors as given in IS will be generally followed.

4.01.03 All control cables shall be of 2.5 Sq.mm copper.

5.00.00 TESTS

5.01.00 Tenderer shall submitted Cable Manufacturer's test certificate.

RATINGS AND REQUIREMENTS OF POWER AND CONTROL CABLES

POWER CABLE

Rating	Cable size (Copper /Aluminium conductor)
3 HP	2.5 Sq. mm copper
5 HP	4 Sq. mm. copper
7.5 HP	4 Sq. mm
10 HP	6 Sq. mm
25 HP	16 Sq. mm
50 HP	50 Sq. mm
75 HP	95 Sq. mm
100 HP	120 Sq. mm

L. V. POWER CABLES

1.0 1100 V grade, 85º C rating, heavy duty, HR (Heat Resistant) PVC power cable in line with IS-1554, IS-5831 & IS-8130, IS-3975.

2.0 For heaters suitable cable with relevant IS code shall be used.

MOTOR FEEDER

MOTOR RATING (Kw)	SWITCH RATING	CONTACTOR	MODULE SIZE (MIN.) (In mm)
0 – 5.5	32A	25 A	600
5.6 – 11.0	63 A	40 A	600

Annexure – 2D1

LIST OF FEEDERS TO BE ACCOMODATED IN CONTROL PANEL/ M.C.C

Control panel/ MCC with emergency power supply

Sl . No.	Equipment description	Rating of feeders	Approx. power cable length – mtr.
1.	Feed hopper drive	To be decided by the bidder	40
2.	Feed screw drive (VVFD)	To be decided by the bidder	40
3.	Rotary kiln drive (VVFD)	To be decided by the bidder	40
4.	Discharge feeder drive	To be decided by the bidder	40
5.	Cooling tower drive	To be decided by the bidder	80
6.	Cold water pump 2 nos.	To be decided by the bidder	80
7.	Hot water pump 2 nos	To be decided by the bidder	80
8.	Spare feeders	5 HP 2 nos	80
9.			

Control panel/ MCC with normal power supply

Sl . No.	Equipment description	Rating of feeders	Approx. power cable length – mtr.
1.	Heating system * (only fuse switch to be provided in MCC) Thy. Controller	To be decided by the bidder	40
2.	Vertical sump pump 2 nos.	7.5 HP each	50
3.	Area Exhaust fan 2 nos.	5 HP each	50
4.	Spare feeders	(a) 5 HP 4 nos. (b) Heating system	50 40
5.	Kiln Exhaust fan(02 nos.) & Kiln Cooling fan(01 no.)	To be decided by the bidder	60

- Heater control circuit shall be kept separately at one end of the Control Desk and Control Panel.

TECHNICAL SPECIFICATIONS – INSTRUMENTATION

Control & Operation Philosophy:

Control and monitoring from Control Room through PLC has been envisaged in this project.

The Control Desk, VVFD Panel, Thyristor Panel and PLC panel shall be placed in the one room where all PLC VVFD Panel, Thyristor Panel and exchange signals shall be terminated. Control room shall be dust free Air Conditioned room having two (2) air conditioning Unit (1 working & 1 stand by).

PLC System, Control Room and Room Air-conditioning, Room Lighting etc is excluded from the scope of present job and shall be provided by the purchaser for above plant.

REMARK: Bidder has to submit approximate dimensions of above equipment (i.e. Control Desk, VVFD Panel and Thyristor Panel) in the technical part of the offer so that control room size can be finalised by the purchaser.

There shall be a three position selector switch for each & every drive/ heater / Valves/ Hammers (PLC/LOCAL/OFF). Selection of the mode i.e. PLC/LOCAL would be done through the Selector Switch at Control Desk in Control Room.

1. **PLC Operation Mode** (From HMI Station from Control Room)
2. **Local Operation Mode**

a) PLC Operation: In PLC operation mode, CRT and keyboard would carry out whole sequence of operation of each section from central control room through PLC system. Also in this type of operation, the sequential operation of the drive can be performed by group selection mode as well as individual selection mode.
b) Local Operation Mode: In this mode starting and stopping of the drives will be carried out from Local Pushbutton Station (LPBS) by pushbuttons. LPBS would be suitably located near to each drive. Safety interlocks and protection of equipments should be provided hardwired into the drive level at MCC.

However, LOCAL STOP Push Button will always remain active in both the modes. In case of failure of HMI Station/PLC, any/all equipment can be stopped by selecting OFF position of respective Mode Selector Switch at Control Room

As shown in MCC Scheme, One **EMERGENCY STOP** Push Button at Control Desk has been envisaged**. Complete plant can be stopped by pressing above push button in PLC Mode only.**

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Scope of Supply (For Instrument)

Scope of supply by Tenderer grossly includes the following:

1. Control Panel having all Entire electrical accessories like, Local/ PLC /OFF Mode Selector Switch, Indicating Lamp.
2. All exchange of "Start Command" / "Stop Command" from PLC / Local Start Stop Push Button Station to MCC, "Started Feed Back" / "Stopped Feed Back" from MCC to PLC Panel shall be routed directly to avoid duplication of terminals. All Annunciation shall be provided in PLC HMI SCADA as listed elsewhere.

3. All Field Instruments as mentioned in the P&ID.
4. Local Start Stop Push Button Stations
5. Junction Boxes
6. Erection Hardware
7. Insurance Spares

The list of material of **'ESSENTIAL ITEMS'** and **'TAKE IN ITEMS'** are given in the tender document elsewhere in this tender documents. P&ID of Rotary drier for Uranium Peroxide is as per Annexure – 12.

All Field Instruments, which are required for operation & control of Rotary Kiln, are listed in **'Essential Items'**. Balance quantities of field instruments of P&ID are listed in **'TAKE IN ITEMS'**.

Exclusion (For Instrumentation)

Control Cable, Multi core Instrument Cable and Thermocouple Compensating Cable required to take the signal from Field Instruments through Junction Box to Control Panel is excluded from the scope of supply of the Tenderer. But supply of cable glands is included in the scope of bidder.

Scope Of Services

Erection & Installation

Installation of all sensors, instruments and transmitters, control panel, etc. which are covered under the scope of supply and cable termination between Local Pushbuttons, MCC & Control Desk, MCC & PLC, Control Desk & PLC as listed below:

- Field to Junction Box (JB)
- Junction Box (JB) to PLC Panel
- MCC to Control Panel
- Control Desk to Local Push Button Station
- Control Desk to MCC
- Control Desk to PLC
- MCC to PLC Panel

Laying of all type of cables is excluded from the scope of service. However, cable glanding & termination of cables as mentioned above is in the scope of services

Calibration & Commissioning

Individual calibration of all erected instruments, control loop commissioning and Complete system testing is under the scope of supply and services.

Power Supply And Its Distribution

Purchaser will provide single Phase AC power supply at single point for field instruments and Control desk. Further distribution of power supply shall be in Tenderers' scope. Solenoids shall be powered with 24V DC power supply through interposing relays. Any other power supply required for C&I system will be generated by Tenderer from the available power supplies. All instruments will be given UPS power from existing source, which will be in the scope of purchaser.

Measurement & Control Loops (PID)

Following measurement and closed control loops are envisaged. Bidder may suggest additional requirement, if any, for better process control.

Measurement:

1. Inlet Container Weight measurement
2. Inlet Container Level measurement through Radar type Level Transmitter
3. Outlet Container Weight measurement
4. Temperature measurement at Feed and Discharge end of Rotary Kiln.
5. Air temperature measurement between Heater and outer shell of Rotary Kiln.
6. Air Temperature measurement for Heater Controller (2 positions)
7. Cooling water inlet and outlet temperature measurement (2 nos.)
8. Uranium Peroxide temperature measurement at discharge end.
9. Cooling water flow measurement.
10. Load Current Measurement of Electric Heaters (3 nos.).

Closed Control Loops (in PLC):

1. Inlet feed rate control. **Process Variable**: Inlet Container weight measurement, **Manipulated Variable**: Screw Conveyor speed through VVFD.
2. Rotary Kiln temperature Control. **Process Variable**: Kiln Temperature measurement, **Manipulated Variable**: Electric power to heater bank through Thyristor controller

Process Interlocks

1. Tripping of any Thyristor Controller shall trip Inlet Screw Feeder Motor
2. Rotary Kiln Low outlet temperature shall trip Inlet Screw Feeder Motor
3. Rotary Kiln Very High outlet temperature shall trip electrical heater through Thyristor Controller.
4. Tripping of Outlet Screw Feeder Motor Shall trip Inlet Screw Feeder Motor and kiln drive after a preset time.
5. Tripping of Rotary Kiln Motor shall trip Inlet Screw Feeder & heater.

List of Annunciation (in PLC HMI)

1. Feed Rate is too high (More than 25% of Set Point)
2. Feed Rate is too low (Less than 25% of Set Point)
3. Cooling Water: Flow Low
4. Cooling Water :Outlet Temperature High
5. Rotary Kiln Tripped
6. Inlet Screw Feeder Tripped.
7. Outlet Screw Feeder Tripped.
8. Thyristor Controller Tripped.
9. Outlet Container Weight High.

Acceptable Makes List

SIGNAL MULTIPLIER /ISOLATOR

- P & F
- Omron
- Masibus

MAGNETIC FLOWMETER

- ABB
- Endress & Houser
- Siemens
- Honeywell
- FORBES MARSHALL

CONTROL PANELS

- Rittal, Bangalore
- Pyrotech, Udaypur

RELAYS

- Larsen & Toubro,
- OEN,
- Siemens,
- Telemechanique (India),
- PLA
- OMRON

INDICATING LAMPS (LED TYPE)

- Binay
- Bharatiya Cutler-Hammer,
- Telemechanics
- EAO
- Siemens,
- L&T
- TECHNIK

FUSES

- BUSSMANN
- Siemens
- Rockwell automation
- Telemechanics

TERMINAL BLOCKS

- Elmex, Baroda
- Phoenix Contact, New Delhi
- Weidmuller, W. Germany

SELECTOR SWITCH

- L& T
- Kay Cee
- BCH
- Siemens

- EAO

RTD, THERMO-COUPLE & THERMO WELLS

- Pyrotech, Udaipur
- Asiatic Engineers, Kolkata
- Japsin Products, New Delhi
- Forbes Marshall

AIR FILTER REGULATOR

- Shavo Norgren
- FESTO
- Fairchild

SOLENOID VALVE

- ASCO
- Burket

CURRENT TRANSMITTER

- ADEPT FLUIDYNE, PUNE
- MECO
- MTL
- P&F
- AUTOMATED ELECTRIC

WEIGHING SCALE

- REED MEDWAY PACKAGING COMPANY
- CHRONOUS RECHARDSON
- IPA, Bangalore
- AVERY
- TRANSWEIGH, Mumbai

THYRISTER CONTROLLER

- Technocom, Kolkata
- Autodata, Mumbai

AIR CYLINER

- SCHRDER BELLOWS
- FESTO

RADAR TYPE LEVEL TRANSMITTER

- SIEMENS
- HONEYWELL
- E & H
- FORBES MARSHALL

Instrument's Specification

Control Panel cum Operator Console:

Control Panel cum Operator Console shall be fabricated with 2.00mm CRCA sheet on all sides except desktop, which shall be of glazed stainless steel of 1.6mm thickness and sand blasted for surface finish.

The operator's side shall be provided with Electrical accessories like Illuminated lamp (IL) and Selector Switches (S/S). Provision for installation of a 32" Plasma/LED Display in vertical section shall be provided. Above Plasma/LED Display shall be supplied by the purchase as free supply item and shall be used as HMI Station of PLC System.

IL and S/S shall be provided on the top inclined cover. The components shall be well laid out for easy operation and ergonomic design. The top sheet should have arrangement for lifting and a locking arrangement for holding.

All the terminals shall be provided at the bottom, which shall be covered with hinged doors.

1	Material of Construction	:	Cold rolled sheet steel
2	Thickness of sheet	:	2.00mm
3	Construction	:	Welded throughout
4	Post-welding operation	:	(i) Grounding of all welds to smoothness (ii) Rounding of corners (iii) Cleaning of weld spatters
5	Corners	:	7mm inner radius
6	Dimensional tolerances	:	(i) In height & length – 3mm (ii) In height between adjacent sections – 2mm (iii) Total for a group – 6 mm
7	Surface preparation	:	(i) Sand blasting (ii) Grounding (iii) Sanding for removal of rust & scale (iv) Solvent cleaning
8	Primer	:	Spray coat of epoxy surface
9	No. of primer coats	:	2 Nos.
10	Final Finish	:	Power Coating
11	Unacceptable imperfections	:	Sags, cracks, blisters, teardrops, fat edges, etc.
12	Doors	:	Double, recessed, turned back edges. Lift-off type for control desk (with additional bracings, as required).
13	Thickness of door sheet	:	2mm

14	Hinges	:	Stainless steel
15	Door gaskets	:	Three-point type
16	Door gaskets	:	Neoprene rubber on fixed frame
17	Opening of the doors	:	Outward
18	Louvers	:	With removable wire mesh to ensure dust and vermin proof ness
19	Color of exterior	:	IS 5, shade 631 (Light Grey)
20	Color of interior	:	Enameled white
21	Gland plates	:	Removable 4mm thick undrilled, separate for desk and panel parts (top and/or bottom depending on Cable/Impulse pipe entry)
22	Internal dissipation	:	500 W/m^3 (max)
23	Cable entry	:	Backside
24	Hardware accessories	:	i) Removable eyebolt type lifting lugs ii) 15mm thick anti vibration rubber pad all throughout base channel iii) Predrilled base channel ISMC – 100 or equivalent for all sides iv) Foundation bolts v) Stainless steel buff-finished 2mm thick plate for all sides vi) Stainless steel scratch strips along desk edges and kick plate for panels fixed with pan-head recessed screws vii) Rubber strips to ensure air-tightness between kick plate and finished floor
25	Name plates	:	For all instruments and accessories except those having integral service engraving
26	Name plate material	:	Laminated phenolic (3 layers)
27	Fixing of name plates	:	Stainless steel pan head screws
28	Lettering	:	Black with white engraved
29	Mounting of terminal blocks	:	Vertical angle support bracket tack welded on heat steel plate, screwed on integral wall of enclosure
30	Illumination fixture	:	Mounting bracket at the top for two CFL fixture

Internals Wiring

1	Wiring standard	:	NEC and NEMA

2	Wiring material	:	i)	Cross link polyethylene/PVC insulated timed copper, stranded conductor or switch board wire for all high level signal wiring
			ii)	Wiring to door mounted devices provided with 49 strands (minimum) and adequate loop lengths of hinge wire to be maintained to prevent exc4essive fatigue due to multiple door openings
3	Wire sizes	:	i)	Control switch wiring – 16 AWG
			ii)	Ammeter Circuits – 12 AWG
			iii)	Indicating lamps and push buttons – 16 AWG
			iv)	Annunciation – AWG
			v)	Interlocking- 16 AWG
			vi)	Power supplies – $2mm^2$
			vii)	Control systems – to suit requirement
			viii)	Transmitted signals – 16 AWG
			ix)	All others – 12 AWG
4	Wire Color	:		All AC (phase & Neutral) supply, DC (positive and negative), Control supply and signal cable shall have different colour for easy identification.
4	Dressing	:	i)	Internal wiring shall be grouped so that all outgoing wiring to each particular remote location is terminated on adjacent terminal blocks
			ii)	All low level signal cables shall be separately bundled from control cable and maintained at 300mm minimum spacing from control bundles
			iii)	Wiring shall be arranged to ensure free access to all instruments or devices necessary for adequate maintenance services
			iv)	No wiring shall be routed across the face or rear of any device, which will restrict the opening of covers or obstruct access to leads, terminals or devices
			v)	Tapping or splicing between terminal points is not permissible
			vi)	Interior wiring and jump rings shall be arranged so that external corrections can be made from internal side of terminal blocks
			vii)	Common connections limited to 2 (two) wires per terminal

			viii)	Groups of wires shall be bunched with cable straps(lockable unlock able type) provided at frequent intervals
5	Running of Wire	:		Suitably grouped wires placed in polyethylene wiring tray with clam on type covers
6	Terminal Lug	:		Compression, Insulated Sleeve, ring tongue type.
7	Identification	:		Wire number of each termination shall be by means of cross ferrules (printed on PVC tube)
8	Internal Lighting	:		Switch fuse unit for lighting supply separated from instrument power supply isolator are mounted inside the cabinet in each access door
9	Maximum Allowable Supply Voltage	:		220 Volt
10	Power Supply Isolation	:		MCB for individual instruments

Internals Terminal Block

1	Wiring material	:	i)	Moulded, Heavy Duty, Barrier type and single depth
			ii)	Having 6 or 12 points and equipped with corrosion resistant washer head binding screw
2	Rating	:		600 Volts 30 Ampere AC
3	Applicability	:	i)	For incoming & outgoing wires except where prefabricated cable are used for direct connection to electronic cubical
			ii)	Interconnecting wiring between all electrical device terminals shall be terminated in terminal blocks and jumpered across
4	Spare Capacity			20% after final wiring.

Indicative Lamp

1	Type	:	LED Type
2	Voltage Rating	:	24 V DC
3	Wattage	:	2.0 watts (approx.)
4	Lens	:	Screw on glass
5	Bulb replacement	:	From front

6	Wire connection	:	Rear
7	Color of lamps	:	Green & Red
8	Legend plate	:	Black anodized aluminum
9	Standard legends	:	Close, running, open, ready
10	Lamp fixing	:	Screwed type
11	Lamp size	:	24 x 24 mm to suit mosaic compact
12	MTBF of lamp	:	5000 glowing hours

Auxiliary Relay

1	Type	:	Plug in type / flag relay as required
2	Power supply	:	240V AC, 1 phase, 50 Hz
3	Operating principle	:	Electro-mechanically operated
4	Contact configuration	:	2NO + 2 NC
5	Contact rating	:	a) 5 Amp At 240V AC b) 0.5 Amp At 220V DC
6	Body material	:	Heavy-duty material
7	Connection	:	a) Fork type lug connection for contact b) Ring type lug connection for relay coil connection
8	Circuit application	:	Normally in energized condition; de-energizes on interlock or fault actuation.
9	Special features	:	i) Fork flag type relay, flag should drop down for display on de-exercitation. The relay shall be hand reset type. ii) Plug in type relays shall be compact and dustproof. The transparent plastic cover should be easily removable iii) For plug in type relays also status display will be preferred
10	Mounting	:	Flag relay - Flush mounting Plug in relay - Base mounted inside panel
11	Accessories	:	Mounting bases and other necessary items

Electromagnetic Flow meter

1. Material:
   - Flow Tube-SS316 PTFE Lined. PTFE Thickness details are given below:
     - Upto DN 15 : 1.65 mm
     - Upto DN 25 : 2.20 mm
     - Upto DN 50 : 2.30 mm
     - Upto DN 100 : 3.00 mm

- Flanges-Carbon Steel ANSI 150
- Sensing Element-Haste-alloy C

2. Flange: Drilled to ANSI 150, drilled to ANSI 16.5
3. Flow range: As per process requirement
4. Pipe line: As per process requirement
5. Flow Medium: Industrial water
6. I/P power supply – 220 V, 50 Hz. +/- 15%
7. O/P signal – 4 to 20 mA
8. Converter: Digital, Separated unit, microprocessor based having LCD Display with Totalizer facility.

Accessories:

- At least 10 meter Signal Cable for interconnecting Converter and MFM Tube shall be supplied with each instrument
- Grounding Rings
- Matching Flanges.

Weighing Scale

Capacity: 2 Ton, full tarring range

Electronic Unit details:

1. Weighing Range: 10% to 110%, Platform size 1.5m x 1.5m
2. Temp Range of Operation: +5 to +70 Deg C
3. Type of Load Cell: Strain Gauge based shear beam load cell
4. No. of Load Cells : 4 Nos.
5. Calibration System: Microprocessor based
6. Accuracy: +/- 0.5% Static and +/- 1.0% Dynamic
7. Supply: 220 V AC, 50 Hz
8. Type: Microprocessor based
9. Display: Digital display for weight indication
10. Output signal: 4 – 20 Ma Analog Optically isolated outputs for weight display in Control Room (PLC HMI)
11. Enclosure type: Fully sealed against dust and moisture (IP – 65)

Pushbutton

1	Type	:	Shrouded (mushroom head for important trips/illuminated push button/stay put type/ key operated PB, as required
2	Construction	:	Modular
3	Enclosure	:	Dust-proof type
4	Contact configuration	:	4 stacks (2 NO + 2 NC in general)
5	Contact element	:	Nickel-silver alloy
6	Gasket	:	Rubber gasket between actuator and panel
7	Cable connection	:	Rear with screws for accepting full ring lug (6 Sq.mm cable)
8	Legend plate	:	Start-stop, forward, reverse, fast, slow, on, off, raise lower, accept reset, test enable
9	Colours	:	To be decided after award of contract
10	Body material	:	Chrome plated zinc alloy
11	Contact housing	:	Moulded melamine
12	MTBF of pushbutton	:	10^7 operations or more
13	Frequency of operations	:	10 times / minute or better
14	Voltage rating	:	500V AC / 250V DC
15	Breaking capacity (unless otherwise specified)	:	40A AC up to 500V 10A – 24V DC non-inductive 3.5A – 110V DC non-inductive

			1.0A - 220V DC non-inductive
16	Overall size	:	Mosaic compacts (24x24mm, preferred)
17	Fixing on panel	:	Single cut out on panel with locknut

Selector Switch

1	No. of poles	:	Two / Three
2	No. of points	:	Four / Six / Twelve as required along with neutral position
3	Mounting	:	Flush panel type
4	Contact material	:	Silver / Gold plated
5	Bezel dimension	:	48 x 48 mm as required

Current Transducer

1	Type of mounting	:	Inside panel
2	Power supply	:	220V / 240V AC, 1 phase, 5 Hz
3	Input signal	:	From CT secondary 1 Amp Or 5 Amp Directly from line
4	Continuous input overload	:	2 times or more
5	Range	:	Shall be intimated later
6	Output	:	4-20 Ma DC linear, galvanically isolated
7	Load	:	750 Ohm or more
8	Output voltage on open ckt.	:	Less than 20V
9	Galvanic isolation	:	Between input & output
10	Accuracy	:	+ 0.5% or better
11	Temp. effect for temperature variation of 10 deg. C	:	Less than 0.2%
12	Ripple content in output	:	Less than 0.1%
13	Response time	:	Less than 1 sec
14	Amb. Operating temp. range	:	0 deg. C – 50 deg. C
15	Internal consumption	:	2.5VA.
16	Housing	:	Conforming to NEMA-4 or IP-55.

Thermocouple

1	Application	:	Temperature measurement upto 800 deg. C
2	Type	:	K (Chrome-Alumel), Ungrounded
3	Element Size	:	AWG 16

4	No. of Element	:	Two
5	Accuracy	:	Type-K Range 0-275 deg. C; Accuracy ±2.2 deg. C
6	Inset tube	:	AISI 304-SS
7	Filling	:	MgO powder (purity – 99.4%)
8	Extension length	:	150 mm
9	Extension nipple	:	AISI 316-SS seamless ¾" Sch.80 pipe M/M
10	Mounting fittings (element)	:	AISI 316 compression fitting threaded both sides
11	Response time	:	15 seconds (for 63.2% change – max.)
12	Response lag	:	4 seconds (max)
13	Connection head	:	Coated cast aluminum body and cover with zinc plated carbon steel retaining chain and heat & moisture proof gaskets, water / weather proof type
14	Terminal blocks	:	Silver plated
15	Cable connection	:	½" NPT
16	Codes & standards	:	ANSI MC 96.1 – 1975
17	Accessories	:	Thermo well and 3m long flexible conduit

Resistance Temperature Detector

1	Application	:	Temperature measurement upto 400 deg. C (except vibration prone areas/ applications)
2	No. of elements	:	Two (2) nos
3	Material	:	Platinum
4	Resistance	:	100 Ohms at deg. C ± 0.1 Ohm.
5	Base	:	Wound on ceramic
6	Windings	:	Two (anti-inductive)
7	Type	:	3 wire (each)
8	Inset tube	:	Stainless steel (8 mm OD)
9	Insulators	:	Sileminite
10	Filling	:	MgO powder
11	Extension wire	:	Silver / Constantan
12	Tolerance	:	As per DIN 43760
13	Accuracy	:	0.5% (600 deg. C span) or better
14	Element length	:	30 mm
15	Vibration	:	50 G, 60 to 2 KHz
16	Shock	:	1000 G (min)
17	Stability	:	0.05% after thermal cycling (ASTM E 235)

18	Insulation	:	100 M Ohms at 250V DC at ambient temp.
19	Measuring current	:	Upto 20 μa
20	Extension length	:	150 mm
21	Extension nipple	:	AISI 316-SS with F/F union
22	Response time	:	25 seconds (for 63.2% change) (max)
23	Response lag	:	6 seconds (max)
24	Connection head	:	Coated cast aluminum body & cover with zinc plated carbon steel retaining chain and, heat and moisture-proof gaskets, water / weather-proof type
25	Terminal blocks	:	Silver plated
26	Cable connection	:	½" NPT
27	Codes & standards	:	a) Temperature measurement by electrical resistance thermometer- IS: 2806 b) Temperature element – platinum resistance – IS: 2848 c) As per DIN 43760
28	Accessories	:	Thermo well and 3m long flexible conduit

24V DC Power Supply

- Input : 230V AC, 50Hz, ±10%
- Output: 24 V DC, 10 Amp (Max.)
- Indication : LED type for availability of AC supply, DC output and fuse status
- Ripple : 480mV (Max.)
- Voltage regulation : ± 1% (max.)
- Load regulation : ± 1.5% (max.)
- Design: SMPS based, fan less design heat dissipation through vents
- Mounting : DIN Rail
- Overload protection : 105% to 160% of rated load current, voltage drop, intermittent, automatic reset
- Over Voltage protection : 130% or higher of rated input
- Ambient Temp.: 5 to 50 deg. C

Solenoid Valve

- Application: For automatic control double/ single acting Air Cylinders.
- Type: Direct Acting, Single Coil Operation
- Solenoid Enclosure: Metal general purpose (IP41) with embedded screw terminal coil and electrical entry hole to suit 20 mm fittings.
- MOC: Body- SS303, Seals- Buna-N and Viton, Core tube- 305SS, Springs: 302SS
- Response time: 5 to 25 mSec

- Coil Wattage : 11.2 Watts
- Electrical: Supply Voltage- 24V, DC, +10/ -15%
- Coils: Molded continuous duty coils with minimum insulation class 'F'
- Pressure Rating: 0 to 7 Kg/Sq.cm
- Indication : LED type during excitation
- Temperature: Maximum (Fluid & Ambient): 70 Deg C
- Stay put type Manual Override

Radar type Level Measuring System

- Microprocessor based Radar based Transceiver and Integral transducer with a range of 0.25 – 5.0 mtr
- Application : Bin filled up with Powder
- Preprogrammed echo detection and processing algorithms
- All calibration data held in Transceiver with EEPROM, no battery backup required
- Accuracy of +/- .25 % of full range
- Resolution 3mm over selected range
- Three-character 7mm. Digit (LCD) Multi segment graphics display for setup and operational status
- Measurement display in feet or meters
- Current output of 4 – 20 ma up to 750 ohms
- Fully encapsuled integral transducer operating at 50 KHz. With inbuilt temperature compensation
- Power supply: 24 VDC
- Two wire system
- Enclosed rugged body with conduit entrance from either side

ANNEXURE – 2F

Rotary dryer system consisting of following essential items.

S.No.	EQUIPMENT (essential Items)	Quantity
1.	Rotary kiln shell assembled with sprocket/ girth gear	1 no.
2.	Replaceable lifters/ spiral	1 set
3.	Kiln Feed screw assembly	1 set
4.	Two nos. mechanical seal one each for feed and discharge end	2 nos.
5.	Feed & discharge end bearings of kiln/ tyre and roller assembly	1 no. each
6.	Drive sprocket and chain/ pinion assembly for kiln	1 no. each
7.	Kiln hammer	1 set
8.	Kiln drive gearbox	1 no.
9.	Couplings for kiln drive gear box	1 set
	ELECTRICAL (essential items)	
1.	Heating coil	2 sets
2.	Insulators for heating system	2 sets
3.	Terminal block for heating system	2 sets
4.	Insulators/ washers, etc.	2 sets
5.	Supporting tubes for heating coils	2 sets
6.	HRC fuses for heater and other drives	2 sets
7.	Essential spares for heating panel	1 lot
8.	Thyristor Controller for Heater Bank with Control Panel	3 set.
9.	Variable frequency Drive for Kiln Drive with control Panel	1 set
10.	Current Transmitter & Current Transformer for heaters	3 Sets
11.	Variable Frequency Drive for Screw Feeder with Control Panel	2 Set
	INSTRUMENTATION (essential items)	
1.	Control Panel	1 Set
2.	Duplex Thermocouple	6 Nos.
3.	Duplex RTD	5 Nos.
4.	Magnetic Flow meter	3 Nos.
5.	Platform Scale of 2T Capacity	3 Nos.
6.	Sol. Valve and Air Cylinder for (Inlet) Gate Valve	1 Set
7.	Sol. Valve and Air Cylinder for Hammers	2 Set
8.	Smart type Pressure transmitter	03 No.
9.	Radar Type level transmitter	01 No.
10.	Illuminated Lamp	40 Nos.
11.	Selector Switches (3 Position)	16 Nos.
12.	Relays for Interlock, Contact Multiplication & Status Indication	40 Nos.
13.	Erection Hardware	1 Lot
14.	Junction Boxes	1 Lot
15.	24V DC, 10 Amp. power supply	1 no.
16.	Class – 1 Earthing (for Instruments & PLC)	1 Set

Note: Above list is indicative only. Any other item required for complete system shall be supplied with Main equipment.

	Insurance Spares	1 Lot
1.	Equipment	
a.	Two nos. of Mechanical Seal one each for feed and discharge ends	2 nos.
b.	Replaceable lifters / Spiral	1 Set
c.	Kiln feed screw assembly	2 Sets
d.	Coupling of all sizes one set	1 Lot
e.	Kiln Hammer	1 Set
f.	Feed and discharge bearing of kiln tyre and roller assembly	1 no. each
g.	Kiln discharge screw assembly	2 sets
h.		
2.	Electrical	
a.	Current transformer for Thyristor controller	1 no.
b.	All Kind of PCBs, IGBT, Cooling Fan, Thyristor Fuse for Thyristor Controller-Electric Heaters	1 set each
c.	Heater coils	1 set
d.	Thyristor module for heater	1 No.
3.	Instrument	
a.	Local Push Button Station	16 Nos.
b.	Air cylinder for pneumatic hammer	1 no.
c.	Seal kit for pneumatic hammer	1 set
d.	Air cylinder for ON/OFF valve (Gate Valve)	1 no.
e.	Seal kit for ON/OFF valve (Gate Valve)	1 set
f.	RTD & thermocouple Rotary kiln with thermo well	3 no. each
g.	24V , 10Amp DC power supply	1 No.
h.	All kinds of PCBs and load cells for inlet and outlet container weighing scales	1 set each

1. Any Hardware that will be required for completeness but is not mentioned in the tender shall be offered by the Tenderer and the same should be mentioned specifically in the part-1 of the offer. Items necessary for completeness, not mentioned by the Tenderer, to be supplied free of cost.
2. Control Cable, Multi core Instrument Cables, Compensating Cable & Cable Trays: Supply & Laying is excluded from the scope but successful bidder will submit the requirement within 30 days of placement of work order.

1. <u>List of optional spares required for two years trouble free operation</u>.

List of optional spares to be submitted by the Tenderer along with item description, quantity required and price as per Annexure 6D.

ANNEXURE – 2G

LIST OF ITEMS WITH QUANTITY (TAKE IN PRICE)

S.No.	Item	Quantity
1.	Feed Hopper	10 nos.
2.	Feed Hopper spiral / Screw assembly	4 nos
3.	Feed hopper discharge end pneumatically operated knife gate valve	4 nos
4.	Feed hopper gearbox	1 no.
5.	Feed hopper stand with wheels	10 nos.
6.	Wheel assembly for feed hopper stand (Spare)	6 nos.
7.	Couplings, sprocket and chain for feed hopper	4 sets
8.	Jacketed Discharge Spiral	1 unit
9.	Kiln discharge screw drive gearbox	1 no.
10.	Couplings, sprocket and chain for kiln discharge spiral	1 set
11.	Discharge spiral unit	1 no.
12.	Hydraulic Trolley Cap. 1.5 MT	6 nos.
13.	Cooling Tower with 2 sets of hot and cold water pumps	1 set
14.	Pump impeller	1 each
15.	Pump shaft	1 each
16.	Shaft sleeve	2 nos each

ANNEXURE – 3

INSTRUCTIONS TO TENDERER A GENERAL CONDITIONS OF CONTRACT.

Tenderers are required to give their sealed Tender in duplicate.
No Tender shall be considered if:

a) Tenders are received after the specified date and time.
b) The quotations are not legible and contain overwriting.
c) Prices are tendered telegraphically on the due date and not confirmed subsequently.
d) Competent and authorised persons do not sign all the pages of offer. Any person given a tender shall furnished documentary evidence that his signature on the tender, submitted by him is legally binding upon himself, his firm or company as the case may be.

Prices: The prices quoted must be net per unit quantity Sales tax/Excise duty, packing and delivery charge if applicable should be shown separately. Wherever necessary the prices may be shown separately if the material or part is imported.

Prices shall be given as under:

a) F.O.R. destination (Jaduguda) by road.
b) If the item is imported, break up shall be furnished indicating:
   i) F.O.B. port of shipment in foreign currency.
   ii) Insurance & freight up to Calcutta Port.
   iii) Foreign Exchange rate.
   iv) Customs tariff heading and custom's duty.
   v) Clearance & charges for delivery at Jaduguda.

Acceptance of Tender: The final acceptance of the tender rests with UCIL, who reserves to itself the right to reject any or all tenders without assigning any reason. It does not bind itself to accept the lowest or the whole of a tender. Order may be placed on more than one Tenderer.

Validity: The prices should remain firm for acceptance for 90 days from the date of opening of the tender.

Responsibility of Completeness: Goods quoted for must be complete in all respect. Any fittings or accessories which may not be specifically mentioned in the specification but which are usual or necessary are to be provided by the Tenderer without extra charges.

Quantity: The Corporation reserves the right to order less or more than the specified quantity at the offered rates.

Insurance: Transit insurance should cover all risks up to the destination. Insurance will be arranged by the Corporation or the supplier depending on the basis of the contract.

Earnest Money: Offers should be accompanied by an earnest money deposit as noted below, without which, the offer is liable to be rejected.

(a) The Small Scale Industrial unit which are registered with NSIC if submit their valid registration certificate in this regard, they will be exempted from submission of the EMD amount.

(b) The value of the EMD shall be as specified in "Specific Terms & Conditions".

(c) E.M.D. amount for Rs. 1,00,000/- or less shall be tendered either by way of a demand draft only drawn on State Bank of India, Jaduguda Branch (code No. 0227) or a branch at

Jamshedpur, India of any Indian Scheduled Commercial bank drawn in favour of URANIUM CORPORATION OF INDIA LTD.

(d) E.M.D amount more than Rs. 1,00,000.00 can also be deposited in the form of a bank guarantee (as per proforma enclosed) issued by / or in the case of a BG of a foreign bank, counter guaranteed by an Indian Scheduled commercial bank in favour of URANIUM CORPORATION OF INDIA LTD.

E.M.D. shall not bear any interest.

Security Deposit: The successful bidder shall furnish a security deposit to the extent of 5% of the total value of the order, before the order is awarded. Such a deposit will be held by the Corporation until successful completion of the order/contract, and will bear no interest. It will be forfeited in the event of breach of contract. Security deposit may be in the form of a bank guarantee issued by/ counter guaranteed by an Indian scheduled commercial bank in favour of URANIUM CORPORATION OF INDIA LTD.

Inspection: UCIL reserves the right of stage and/or pre-despatch inspection for which due notice shall be given by the supplier. However, final inspection shall be done on receipt of goods at destination.

Capability: List of customers of repute with Photostat copies of order may be submitted along with your offer.

Rejection of Goods: UCIL reserves the right to reject goods which are not as per specification and also if supplied in breach of the terms & conditions stipulated. In case of rejection you shall have to replace free of cost or refund the amount paid.

UCIL shall be entitled to recover from the supplier costs incurred by UCIL in respect of the rejected goods. Rejected goods will be lying at the UCIL's store at the supplier's risk and shall be removed by the supplier at his own cost immediately on receipt of rejected advice. The Corporation will not be responsible for any loss on account of deterioration etc. of the rejection goods. If rejected goods are not removed by the supplier, UCIL may charge penal rent and dispose off the goods as deemed.

Failure and Termination of Contract: When once the tender is opened, the Tenderer is bound to abide by the rate, delivery and other terms & condition quoted by him. For any default in this connection or withdrawal of the quotation, the earnest money deposit shall be forfeited. If the Tenderer fails to deliver any stores in accordance with to the terms & conditions, as per specifications stipulated, replace any stores rejected within such time as may be stipulated or breach of contract in any other way, the Corporation shall be entitled to anyone or more of the following:

a) Cancel the contract, wholly or partly.
b) Forfeit the earnest money and/or security deposit
c) Impose penalty ranging from 3% to 10% of the contract value.
d) To procure from alternative sources and recover extra cost incurred by the Corporation.
e) Removal of supplier's name from the approved list of suppliers.
f) To receive from the Tenderer as agreed liquidated damages a sum equal to half a percent of the value of the stores which the Tenderer fails to deliver per each week or part thereof during which the delivery of such stores may be in arrears.
g) Recovery of Liquidated damages.

In the event of action taken under clause (d) and (f) above, the Tenderer shall be liable for any loss which the Corporation (UCIL) may sustain on that account but the Tenderer shall not be entitled to any saving on such purchases made against default.

The decision of the Corporation (UCIL) shall be final as regards the

- Acceptability of stores supplied by the Tenderer and the Corporation.
- Shall not be required to give any reason in writing or otherwise at
- Any time for the rejection of the Stores.

Warranty Clause: The tender shall declare that the goods/stores/articles sold to the Corporation, (UCIL) under contract shall be of the best quality, workmanship and shall be strictly in accordance with the specifications and duty parameters contained in the contract. The corporation reserves the right to call for a performance guarantee backed by a bank guarantee. Notwithstanding the fact that the Corporation (UCIL), or any person on its behalf, may have inspected and/or approved the said goods/stores/articles, if it be discovered not to conform to the description and quality aforesaid or deteriorated goods may be rejected. On such rejection all the provisions relating to 'Rejection of goods' shall apply. The Tenderer shall, if so called upon, replace the good, or such portion thereof as is rejected by the Corporation and compensate such damages as may arise by reason of the break of the condition here in contained. Nothing, here in contained shall prejudice any other right of the corporation (UCIL) in that behalf under a contract or otherwise.

Payment terms: Unless otherwise agreed to, payment will be made within 30 days of receipt and acceptance of goods.

Force Majeure: In the case of strikes/lockouts, closure of works (whole or partial) breakdown of machinery, act of God or any other cause beyond the control of the Corporation preventing or hindering the normal operation, the Corporation shall be at liberty to cancel this order at any time before receipt of the goods without being liable to the supplier for damages or other claims.

Disputes: Both parties agree in, disputes arising out of this order may be settled by arbitration, in accordance with the Indian arbitration Act, 1940 by a sole arbitrator who shall be appointed by the Chairman & Managing Director of this Corporation (UCIL).

Jurisdiction: This agreement/order shall be deemed to have been executed at Jaduguda, District Singhbhum (East), Jharkhand and it is subject to the jurisdiction of the court of Law in Ghatshila only irrespective of anything to the contrary that may be mentioned in the offer of the Tenderer.

ANNEXURE – 4

PROFORMA FOR BANK GUARANTEE AGAINST SECURITY DEPOSIT.

TO

URANIUM CORPORATION OF INDIA LIMITED
P.O. JADUGUDA MINES,
DIST: EAST SINGHBHUM (JHARKHAND)
PIN : 832102

Sir,

WHEREAS on or about the _____ day of _____M/s (Supplier's name & address), a Company / Firm registered under (companies Act 1956/…..) and having its registered office situated at (Postal address) (herein after referred to as 'The Supplier') entered into a contract bearing reference no. _____ dtd. _____ with Uranium corporation of India Limited., (A Govt. of India Enterprises), P.O. Jaduguda Mines, Dist: Singhbhum East, Jharkhand – 832102 (herein after referred to as UCIL) for supply (details of order) (herein after referred to as 'The Contract').

AND WHEREAS under the terms and conditions of the contract the supplier is required to keep with UCIL a security deposit of Rs. _____(Rupees_____ only) or submit a Bank Guarantee in lieu of cash deposit for the fulfillment of the terms and conditions of the contract, and whereas the supplier has chosen to submit a Bank Guarantee.

NOW WE (Bankers) hereby agree and undertake to indemnify UCIL and keep UCIL indemnified to the extent of a sum not exceeding the sum of Rs. _____(Rupees _____) against any damage or loss that may be suffered by UCIL by reason of non-fulfillment of any of the terms and conditions of the contract by the supplier.

AND WE, (Bankers) hereby undertake to pay on demand in writing by UCIL or any officer of UCIL within 48 hours and without any demur to UCIL on behalf of the supplier any sum of sums not exceeding in the total Rs. _____(Rupees_____) as may be claimed by UCIL as the damages or loss that UCIL may have suffered by reasons of the non-fulfillment of any particular terms and conditions of the contract by the supplier.

We undertake to pay to you any money so demanded notwithstanding any dispute or disputes raised by the supplier in any suit or proceeding pending before any court or tribunal or arbitrators relating thereto.

AND WE, (Bankers) hereby further agree that the decision of UCIL as to whether the supplier has committed breach of any such terms & conditions of the contract or not and assessment of UCIL as to the amount of damages or loss suffered by UCIL on account of such breach would be final and binding on us and it need not be established.

AND WE, (Bankers) lastly agree that our liability hereunder shall not be discharged by virtue of agreements between UCIL and the supplier whether with or without our knowledge, and / or consent or by reason of UCIL showing any indulgence or forbearance to the supplier whether as to payment, time, performance or any other matter whatsoever or any modification of the said contract which but for this provision would amount to discharge of the surety under the law.

This guarantee shall not be revoked by us whether before its coming into force or any time during its currency without your previous consent in writing.

AND WE, (Bankers) also agree that our liability hereunder shall not be discharged by any change in the constitution of this bank or the firm of supplier. Our liability under the guarantee shall not in any event whatsoever exceed the sum of Rs._____(Rupees_____).

Our guarantee shall remain in force until (date) or such further date up to which this bank guarantee is renewed or extended and unless a claim under the guarantee is lodged with us within 6 (six) months from such date all rights of UCIL under the guarantee shall be forfeited and we shall be relieved and discharge from all liabilities thereunder.

For the purpose of enforcing legal rights / remedies under this guarantee we agree that the court of law of GHATSILA, Singhbhum East, Jharkhand State shall have exclusive jurisdiction.

We have power to issue this guarantee and the undersigned has full power to sign this guarantee on our behalf under POWER OF ATTORNEY granted to him by the Bank.

Dated at (Place) this _____ day of _____201___

For (BANKER'S NAME)

_____ Signature

(Name in Capital letter)
Designation _____
_____

_____ Signature

(Name in Capital letter)
Designation

ANNEXURE – 5

PROFORMA FOR BANK GUARANTEE AGAINST WARRANTY

TO

URANIUM CORPORATION OF INDIA LIMITED
P.O. JADUGUDA MINES,
DIST: EAST SINGHBHUM (JHARKHAND)
PIN : 832102

Sir,
WHEREAS M/s (Name and full address) (hereinafter referred to as the 'contractor' received an order bearing reference number _____ dated _____ (hereinafter referred to as the 'Contract') from Uranium Corporation of India Limited, P.O. Jaduguda Mines, District: Singhbhum, Jharkhand – 832102 (hereinafter referred to as 'UCIL') for the supply of _____.

And whereas the contractor is required to guarantee that the goods supplied is free from defects in its material of construction workmanship and its performance and further required to rectify by repair or replacement free of all costs to UCIL any defect / defects in the goods and / or its performance, if noticed within the warranty period stipulated.

And whereas UCIL has agreed to pay the contractor the full value (inclusive of duties and taxes) of the goods supplied on the contractor furnishing a bank guarantee in the manner here in contained for a sum of Rs. _____(Rupees _____) to cover the said guarantee.

Now we (the Banker) hereby agree and undertake to indemnify UCIL and keep UCIL indemnified to the extent of a sum not exceeding the sum of Rs. _____(Rupees_____) against any damage or loss that may be suffered by UCIL by reason of non-fulfillment of the obligations under the said guarantee by the contractor.

AND WE, (Banker) hereby undertake to play on demand in writing by UCIL or any officer of UCIL within 48 hours and without any demur to UCIL on behalf of the supplier any sum or sums not exceeding in the total Rs._____(Rupees_____) as may be claimed by UCIL as the damages or loss that UCIL may have suffered by reasons of the non-fulfillment of any particular terms and conditions of the contract by the suppliers.

We undertake to pay to you any money so demanded notwithstanding any dispute or disputes raised by the supplier(s) in any suit or proceeding pending before any court or Tribunal or arbitrators relating thereto.

AND WE (Bankers) hereby further agree that the decision of UCIL as to whether the contractor has committed breach of any such terms and conditions of the contract or not and assessment of UCIL as to the amount of damages or loss suffered by UCIL on account of such breach would be final and binding on us and it need not be established.

AND WE, (Bankers) lastly agree that our liability hereunder shall not be discharged by virtue of arrangements between UCIL and the supplier whether with or without our knowledge, and / or consent or by reason of UCIL showing any indulgence or forbearance to the supplier whether as to payment, time, performance or any other matter whatsoever or any modification of the said contract which but for this provision would amount to discharge of the surely under the law.

This guarantee shall come into force simultaneously with your making the payment to the supplier and shall not be revoked by us whether before its coming into force or any time during its currency without your previous consent in writing.

AND WE, (Bankers) also agree that our liability hereunder shall not be discharged by any change in the constitution of this bank or the firm of supplier. Our liability under the guarantee shall not in any event whatsoever exceed the sum of Rs._____(Rupees_____).

Our guarantee shall remain in force until_____ (date)_____ or such further date up to which this bank guarantee is renewed and unless a claim under the guarantee is lodged with us within 6 (six) months from such date, all rights of UCIL under the guarantee shall be forfeited and we shall be relieved and discharge from all liabilities thereunder.

For the purpose of enforcing legal rights / remedies under this guarantee we agree that the court of law of GHATSILA, Singhbhum East, Jharkhand State shall have exclusive jurisdiction.

We have power to issue this guarantee and the undersigned has full power to sign this guarantee on our behalf under POWER OF ATTORNEY granted to him by the Bank.

Dated at (Place) this _____ day of _____201__

For (BANKER'S NAME)

_____ Signature

(Name in Capital letter)
Designation _____

_____ Signature

(Name in Capital letter)
Designation _____

PROFORMA FOR BANK GUARANTEE AGAINST EARNEST MONEY DEPOSIT

Annexure-5A

Uranium Corporation of India Limited
P.O. Jaduguda Mines,
Dist: East Singhbhum (Jharkhand)
Pin: 832 102

Dear Sir,

In accordance with invitation to Bid under your Tender no. _____, M/s (Supplier's name & address) hereinafter called the (Bidder) wish to participate in the said bid for supply of (Material Description & Quantity) and you, as a special favour have agreed to accept an irrevocable and unconditional, Bank Guarantee for an amount of Rs. _____ valid upto _____ on behalf of the bidder in lieu of the Earnest Money Deposit (EMD) by way of demand draft required to be made by the bidder, as a condition precedent for participation in the said bid.

We, (Banker's name & address) guarantee and undertake to pay immediately on demand by Uranium Corporation of India Limited, the amount of Rs _____(Rupees _____) without any reservation, protest, demur and recource. Any such demand made by the said owner shall be conclusive and binding on us irrespective of any dispute or difference raised by the bidder.

This Guarantee shall be irrevocable and shall remain valid upto and including (Validity of offer + 6 months). If any further extension of this guarantee is required, the same shall be extended to such required period (not exceeding one year) on receiving instructions from M/s (Supplier's name) on whose behalf this guarantee is issued.

AND WE, (Bankers) lastly agree that our liability hereunder shall not be discharged by virtue of agreements between UCIL and the supplier whether with or without our knowledge, and / or consent or by reason of UCIL showing any indulgence or forbearance to the supplier whether as to payment, time, performance or any other matter whatsoever or any modification of the said contract which but for this provision would amount to discharge of the surety under the law.

This guarantee shall not be revoked by us whether before its coming into force or any time during its currency without your previous consent in writing.

AND WE, (Bankers) also agree that our liability hereunder shall not be discharged by any change in the constitution of this bank or the firm of supplier. Our liability under the guarantee shall not in any event whatsoever exceed the sum of Rs._____(Rupees_____).

Our guarantee shall remain in force until (date) or such further date up to which this bank guarantee is renewed or extended and unless a claim under the guarantee is lodged with us within 6 (six) months from such date all rights of UCIL under the guarantee shall be forfeited and we shall be relieved and discharge from all liabilities thereunder.

NOT withstanding anything contained herein:

i. Our liability under this Bank Guarantee shall not exceed Rs. _____ (Rupees _____)
ii. This Bank Guarantee shall be valid upto _____.
iii. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before _____.

For the purpose of enforcing legal rights / remedies under this guarantee we agree that the court of law of GHATSILA, Singhbhum East, Jharkhand State shall have exclusive jurisdiction.

We have power to issue this guarantee and the undersigned has full power to sign this guarantee on our behalf under POWER OF ATTORNEY granted to him by the Bank.

Dated at (Place) this _____ day of _____201___

For (BANKER'S NAME)

_____	_____
Signature	Signature
(Name in Capital letter)	(Name in Capital letter)
Designation _____	Designation
_____	

NOTE TO SUPPLIERS:

i) BANK GUARANTEE submitted by you should be sent to us directly by the issuing bank under Registered Post (A.D).

NOTE TO ISSUING BANK:

i) In case you desire to submit the BANK GUARANTEE directly to us, you are requested to send by Registered Post (A.D) an unstamped duplicate copy of the guarantee directly to us with a covering letter to compare with the original BGs and confirm that it is in order.

ANNEXURE-6

PRICE FORMAT FOR ROTARY DRYER

Sl. No.	DESCRIPTION	VALUE IN RUPEES
1.	Lump sump cost for Design engineering & submission of drawings and detail engineering as per scope of work (as per annexure 6A)	
2.	Supply part (as per annexure 6B)	
3.	Erection & Commissioning charges (as per annexure 6C)	
4.	**TOTAL**	
5.	Total price of optional spares for one year trouble free operation (as per annexure 6D)	
6.	**GRAND TOTAL (Rs.)**	

Note: ***Price of Optional spares (item No. 5, Annexure –6D) for 2 years trouble free operation shall not be considered for deciding the lowest bidder.***

ANNEXURE-6A

Price Format for Design Engineering

1	2	3	4	5	6	7
Sl. No	Item	Qty.	Prices	Service Tax (as applicable)	Other taxes & duties (pl. specify)	Total Price (4+5+6)
1	Lump sump cost for Design engineering & submission of drawings and detail engineering as per scope of work	1 lot				
					Total (Rs.) in Fig.	
Total Rs. (in Words): _____						

Note: Taxes in % shall be furnished in the above format

Remark: Party shall submit details of billing schedule after placement of order. Payment shall be released on pro rata basis as per mutually agreed and approved billing schedule (Basic engineering – Approval /information category, Detail Engineering – Approval/ information Category, Electrical and Instrumentation drawings, Civil foundation drawings, Structural Drawings, P&ID, Process flow diagram, Equipment List, Drive interface diagram, Cable schedule, Cable trench layout, Control room layout, document deliverable list etc.)

ANNEXURE-6B

Price Format for supply items

1	2	3	4	5				6	7	8	9
Sl. No	Item	Qty.	Ex-works prices	Taxes & Duties For Supply				Total taxes & duties on Supply = 5a + 5b + 5c + 5d	Freight charges	Loading & Unloading charges (if any)	Total Price (4+6+7+ 8)
				5a	5b	5c	5d				
				P&F	ED + Cess	CST / VAT	Other taxes & duties (pl. specify (Sales Tax/Service tax/WCT etc.)				
1	Manufacturing and supply of complete rotary dryer including all essential items, structure and accessories (as per annexure – 2F)										
2	Cost of Take in Items (as per annexure – 2G)										
3	Cost of insurance spares(as per annexure – 2E)										
										TOTAL (in Fig.) Rs.	
Total (in words) Rupees_____											

Note: Taxes in % shall be furnished in the above format

Remark: Party shall submit details of billing schedule after placement of order. Payment shall be released on pro rata basis as per mutually agreed and approved billing schedule. Detail of cost breakup as per annexure 2E/F/G shall be submitted in the offer.

ANNEXURE-6C

Price Format for Erection & Commissioning

1	2	3	4	5
Item Description	Quantity	Erection & Commissioning Charges	Taxes if any (please specify WCT / Service tax)	Total Cost
1				
			TOTAL (in Fig.) Rs.	
	Total (in Words): Rupees _____			

ANNEXURE – 6D

PRICE FORMAT FOR OPTIONAL SPARES REQUIRED FOR 2 YEARS TROUBLE FREE OPERATION

Sl. No.	Item Detail	Qty. Req.	Basic Price	Excise duty	Edu. Cess	CST/ VAT	Insura--nce	Other Taxes if any (please specify)	Freight	Total
1										
2										
3										
4										
5										
:										
:										
:										
:										
Grand Total										

Note: ***Price of Optional spares (Annexure –6D) for 2 years trouble free operation may not be considered for deciding the lowest bidder.***

***

ANNEXURE-7

DETAILS OF PAST SUPPLY/CREDENTIALS OF ROTARY DRYER/KILN .

1.	Capacity & Size of Rotary Dryer				
2.	Order details				
3.	Order value				
4.	Date of commissioning				
5.	Completion certificate to be attached				
6.	Performance report from the customer to be attached				
7.	Name of Customer				
8.	Name of contact person				
9.	Address, fax and phone nos. of contact person				

ANNEXURE-8

SCHEDULE

Sl. No.	Item	Schedule date of supply
1.	7 sets of G.A. drawings and details of drawings for approval	Within 15 days from the date of order/ LOI
2	Submission of final approved G.A. drawings and details of drawings in 7 sets for approval	15 days from date of approval of drawing by UCIL
3.	Inspection of Rotary Dryer at works	Within 100 days from the date of approval of drawing
4.	Delivery of Rotary Dryer along with materials as per Annexure 2E,F&G	Within 30 days from the date of inspection and approval
5.	Erection, Commissioning, Trial run & System handing over	Within 60 days of receipt and acceptance of material

***

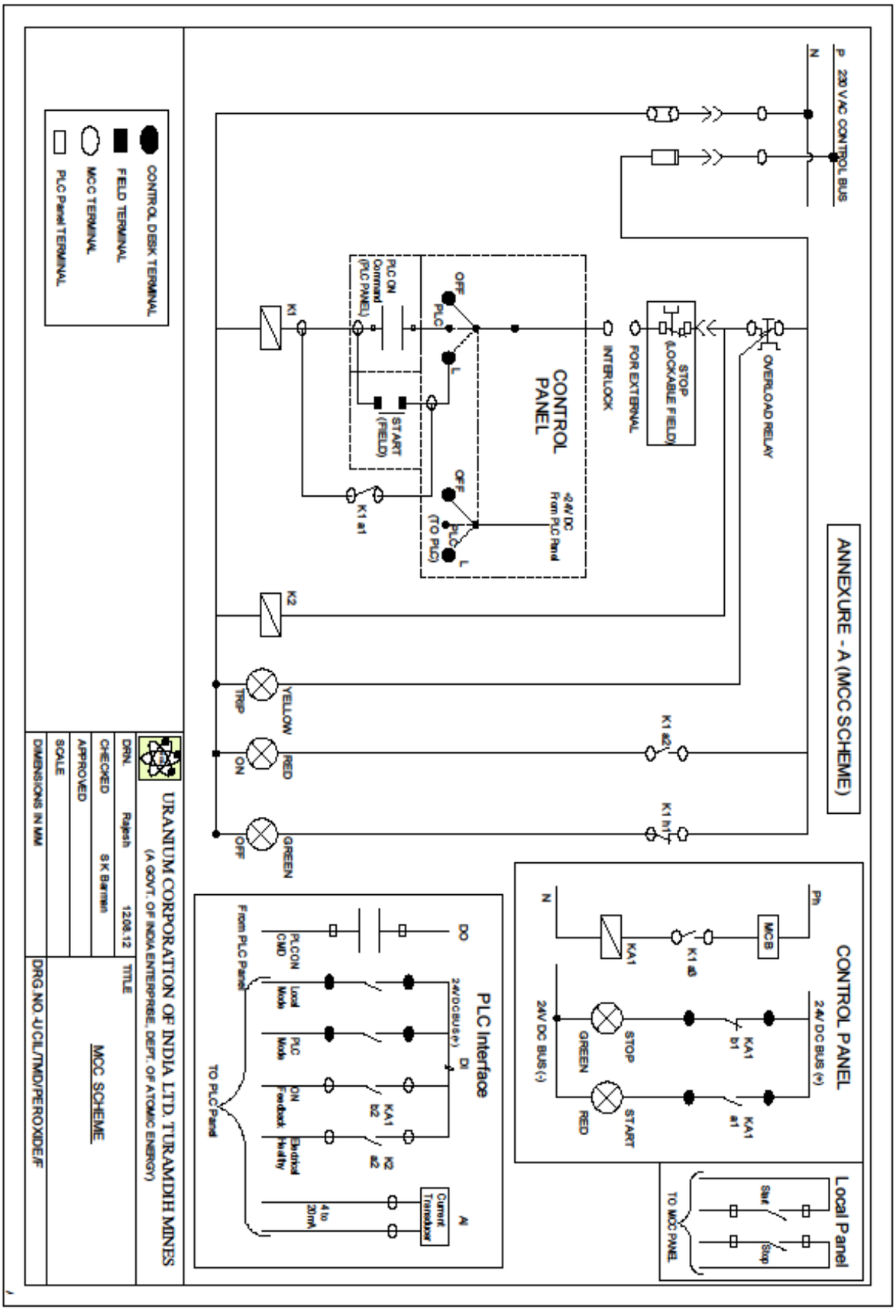
ANNEXURE – 9

Deviations from NIT

Sl. No.	Items detail	Specification	Offered
1.	Description:_____, Page No. _____, Point No. / Para _____		
2.			
3.			
:			
:			
:			
:			
:			

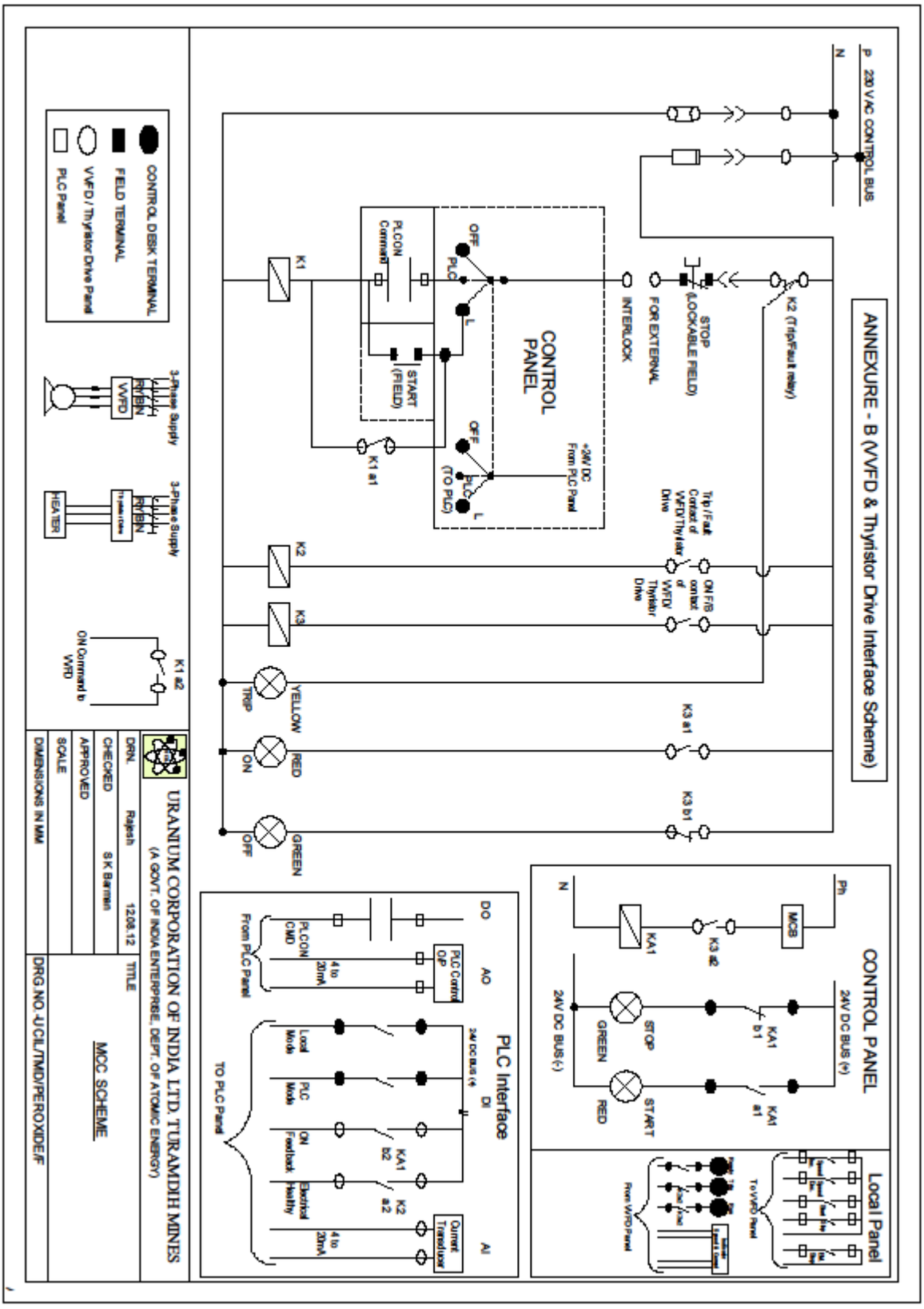
ANNEXURE – 10

APPROVED SCHEME FOR MCC



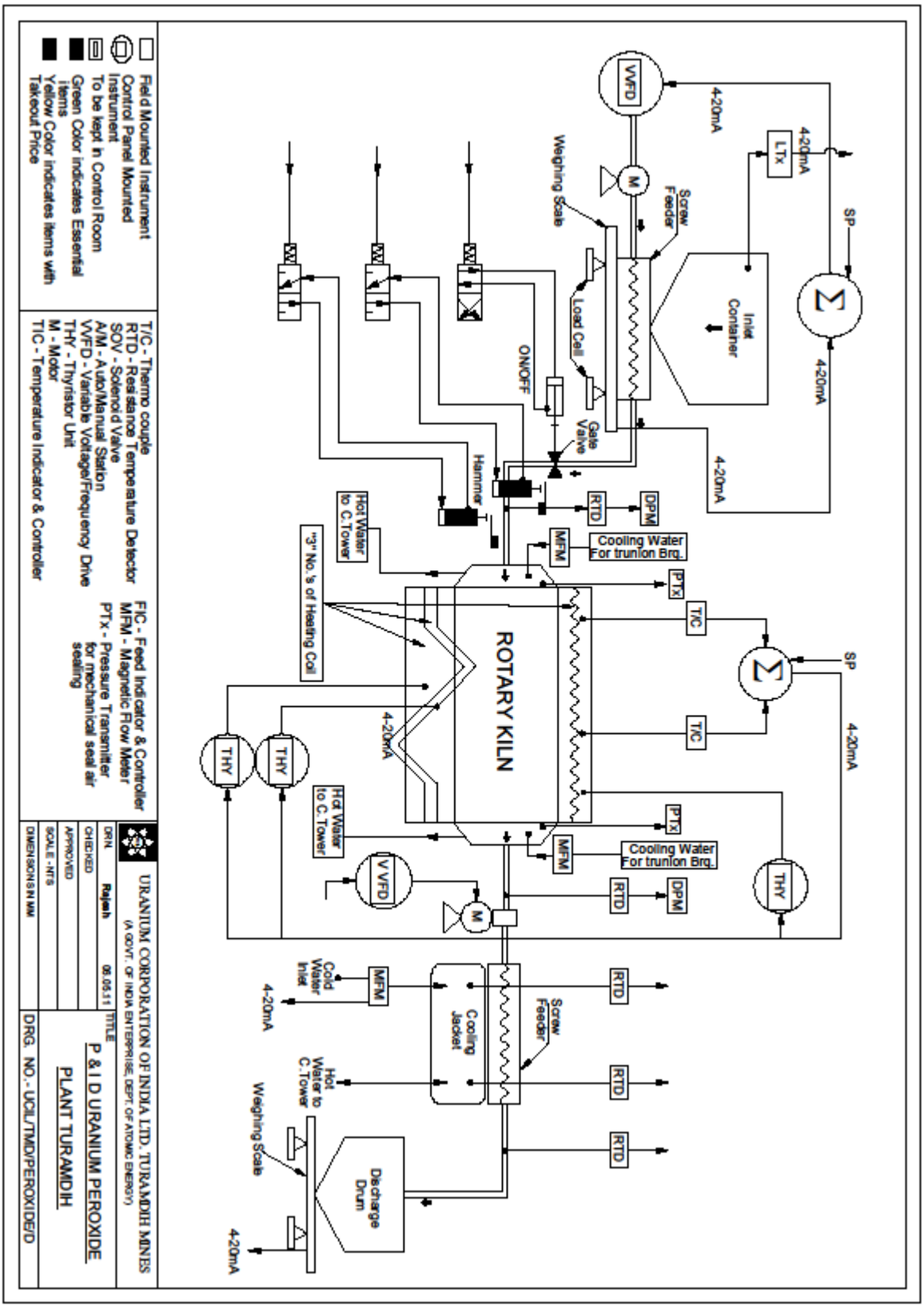
ANNEXURE – 11

APPROVED SCHEME FOR VVFD/ THYRISTOR CONTROLLER



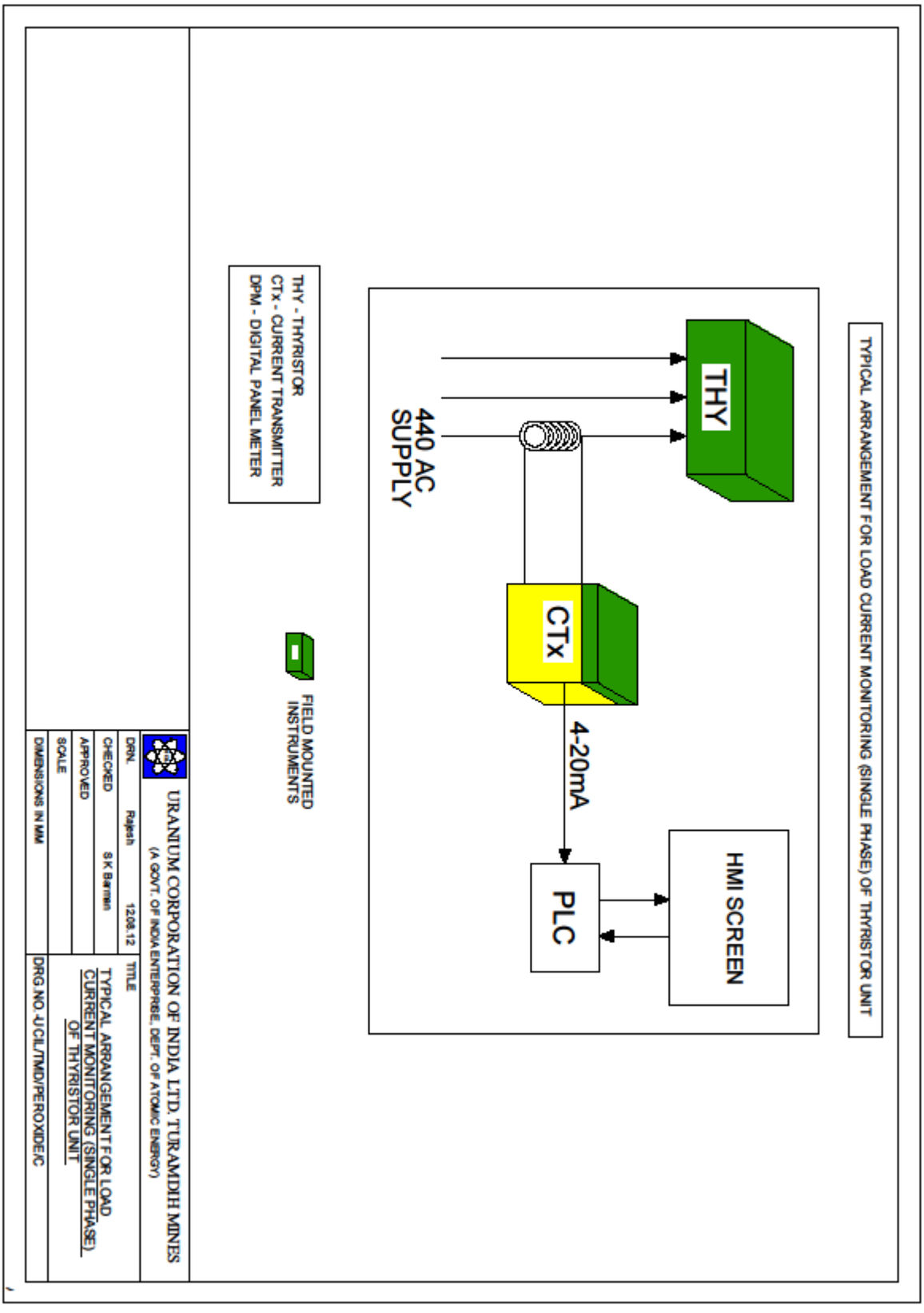
ANNEXURE – 12

P&ID OF URANIUM PEROXIDE PLANT



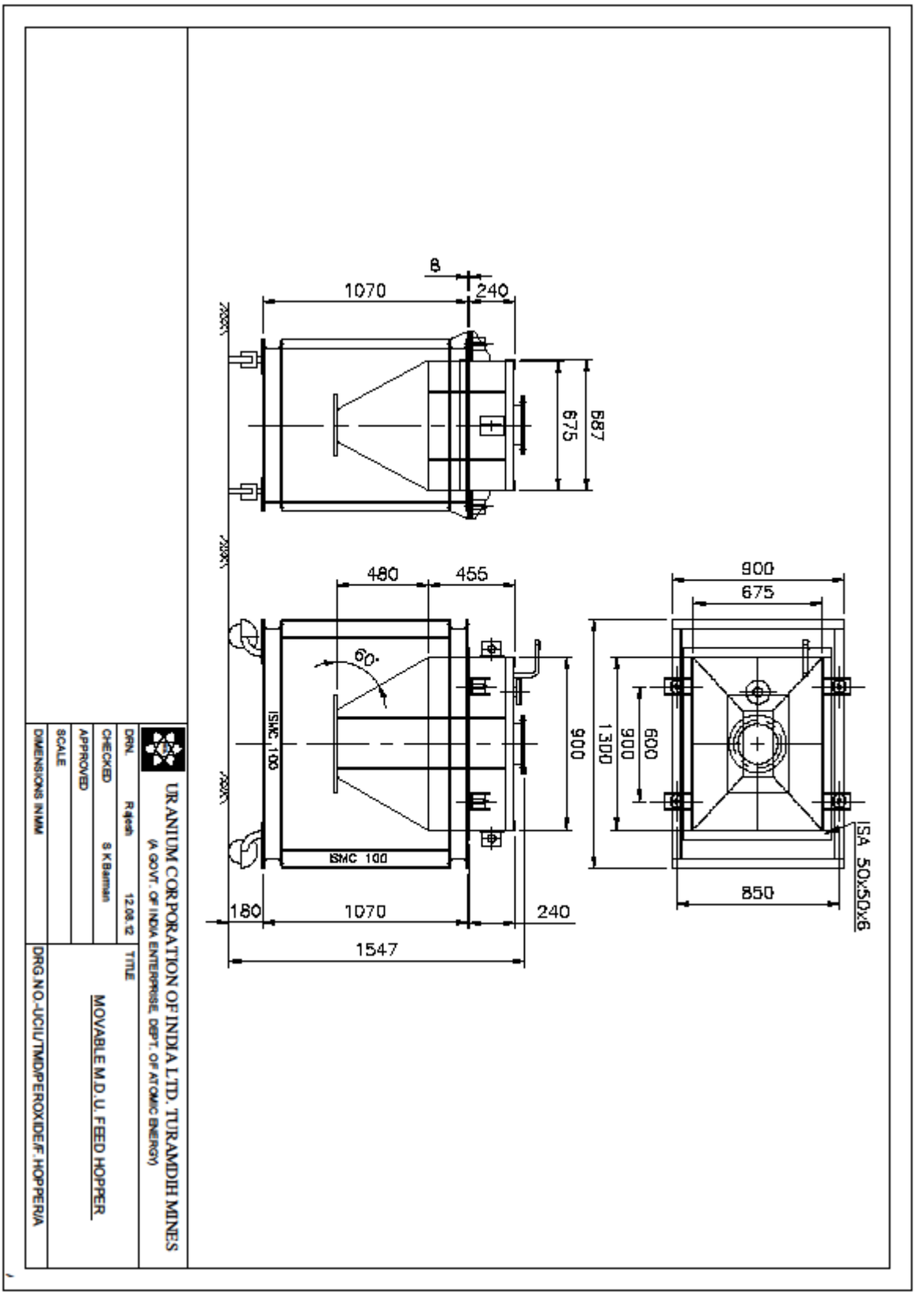
ANNEXURE – 13

TYPICAL ARRANGEMENT FOR LOAD CURRENT MONITORING (SINGLE PHASE OF THYRISTOR UNIT



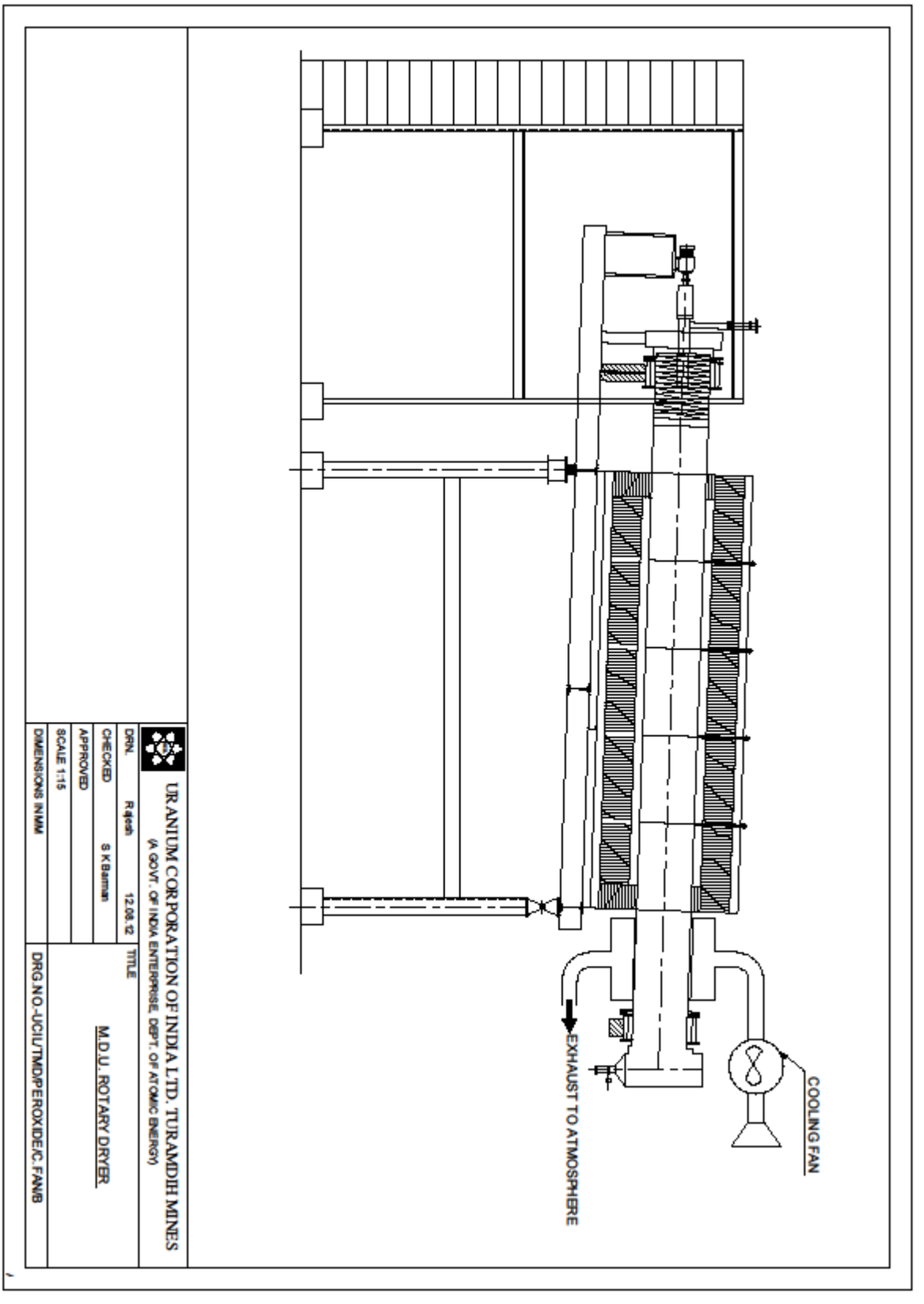
ANNEXURE-14

PROPOSED SCHEMATIC DIAGRAM FOR FEED HOPPER



ANNEXURE-15

PROPOSED SCHEMATIC DIAGRAM FOR COOLING FAN



DRAWINGS

1. **UCIL/TMD/PEROXIDE/FEED HOPPER/A**
2. **UCIL/TMD/PEROXIDE/COOLING FAN/B**
3. **UCIL/TMD/PEROXIDE/C (ANNEX-13)**
4. **UCIL/TMD/PEROXIDE/D (ANNEX-12)**
5. **UCIL/TMD/PEROXIDE/E (ANNEX-11)**
6. **UCIL/TMD/PEROXIDE/F (ANNEX-10)**
7. **CONTROL CKT. DRAWING FOR DOL FEEDER**
8. **CONTROL CKT. DRAWING FOR VVVFD PANEL**