BHARAT HEAVY ELECTRICALS LIMITED
CORPORATE RESEARCH & DEVELOPMENT DIVISION
VIKASNAGAR, HYDERABAD - 500 093, INDIA
PHONES:23774494 (EXCHANGE)
DIRECT:23882104/23882204/
23778474/23776772
FAX : 91 40 23770698

ENQUIRY

To -

-

-

Pin

Email :

Attn. .

Enquiry No:	Enq Date:	Due Date:	Delivery By:
540690431	27-SEP-06	28-OCT-06	31-JAN-07

PLEASE SUBMIT YOUR QUOTATION IN SEALED COVER SUPERSCRIBED WITH ENQUIRY NO, ENQUIRY DATE AND DUE DATE SUBJECT TO OUR TERMS AND CONDITIONS ENCLOSED, FOR THE FOLLOWING MATERIALS SO AS TO REACH US ON OR BEFORE THE DUE DATE BY 12 NOON. THE TENDERS WILL BE OPENED AT 2 PM ON THE SAME DAY

PLEASE GIVE REFERENCE OF ENQ NUMBER , ENQ .DATE AND DUE DATE IN ALL YOUR CORRESPONDENCE FOR PROMPT ACTION. IN CASE IF YOU ARE NOT MAKING THE OFFER PLEASE POST A REGRET LETTER AND RETURN THE DOCUMENTS.

SL NO	DESCRIPTION / SPECIFICATION	UNIT	QTY
1	SUPPLY, ERECTION AND COMMISSIONING OF CONTROL LOOP TEST FACILIKTY AT BHEL CORP. R&D AS KPER ENCLOSED SPECIFICATIONS	SET	1

NOTES:
(1)EARNEST MONEY DEPOSIT OF Rs. 100000/-(RUPEES ONE LAKH ONLY) TO BE PAID BY DEMAND DRAFT AT OUR CASH COUNTER AND A COPY OF THE RECEIPT TO BE ENCLOSED ALONG WITH THE QUOTATION. OFFERS WITHOUT THE EMD WILL NOT BE CONSIDERED. EMD WILL BE REFUNDED TO ALL UNSUCCESSFUL TENDERERS WITHIN 15 DAYS OF THE FINALISATION OF THE CONTRACT. EMD WILL NOT CARRY ANY INTEREST.
(2) THE SUCCESSFUL TENDERER HAS TO PAY A SECURITY DEPOSIT AS PER THE POLICY OF BHEL
(3) PLEASE SUBMIT YOUR OFFER IN TWO PARTS AS PER THE ENCLOSED ANNEXURE "AA" IN SEPARATE SEALED COVERS AS DETAILED BELOW:
A) FIRST COVER CONTAINING TECHNICAL, COMMERCIAL AND UNPRICED PRICE BID ALONG WITH COMPLIANCE STATEMENT, MENTIONING APPLICABLE DUTIES, TAXES ETC., AND DELIVERY TIME CLEARLY.
B) SECOND COVER CONTAINING PRICE BID.
C) COMBINED BID OFFERS WILL BE REJECTED SUMMARILY.

AS WE ARE ENGAGED IN R&D ACTIVITY "C" FORM WILL NOT BE ISSUED

PLEASE FILL UP THE ENCLOSED VENDOR REGISTRATION FORM AND SEND IT ALONG WITH YOUR QUOTATION. OTHERWISE YOUR QUOTATION WILL NOT BE CONSIDERED. (IGNORE THIS IF YOU HAVE ALREADY SUBMITTED THIS FORM)

Yours faithfully
for
BHARAT HEAVY ELECTRICALS LTD

PK Kakkar
Manager

Email: pkkakkar@bhelrnd.co.in

Technical Specifications For The Contract Supply, Erection & Commissioning of Control Loop Test Facility Customer : M/s BHEL Corp. R&D, Hyderabad

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INTRODUCTION

1.1 Objective :

Control Loop Test Facility (CLTF), which broadly consists of Mechanical Equipment, Instruments & Control Equipment and Electronic Equipment, is being setup to fulfill the following requirements.

1. To test advanced control algorithms developed by BHEL in C or C++ or Java in the **Real Time**.
2. Establish Foundation Fieldbus based architecture for Control System.

1.2 Information in this document :

Section I deals with eligibility criteria of Supplier for submitting the Quotation. Bids will NOT be considered if the criteria in this Section are NOT met. Section II deals with the general terms and conditions regarding scope of supply, erection & commissioning, testing and documentation. P&I Diagram is given in Section III along with legends. Tapping details of tanks & Structure design are given in Section IV. Section V gives guidelines for electrical wiring scheme. Field Instrument Schedule is given in Section VI. Detailed Technical specifications for Mechanical Equipment, Instruments & Control Equipment and Electronic Equipment are given in Sections VII, VIII and IX respectively. The Supplier should note their deviations in the columns given in these specifications. Bill of Material (BOM) is given in Section X. Supplier should give the commercial bid as per BOM for materials followed by E&C and other such service charges.

SECTION – I

ELIGIBILTY CRITERIA FOR OFFERS / QUOTATIONS

1.1 Terms & Conditions :

To qualify for technical bidding given in subsequent sections, the following requirements are to be strictly met by the Supplier failing which their Offer will NOT be considered.

1. **Supplier should quote for the Entire Scope of Work. Part offer will NOT be considered.**

2. Suppliers having **experience in executing similar activities** only should quote. Supplier should **enclose a list of such activities executed** in India / abroad.

3. **Supplier to enclose an Authorization Letter from the Principals for all the equipment / instruments for which the Supplier is an Authorized Agent.** Authorized Agents shall be preferred.

4. Offers should be accompanied with **detailed Technical Catalogs / Manuals or Documentation, Engineering Drawings and Quality Plan(s)** for technical scrutiny.

5. **Supplier should be prepared to carry out 10% deviations in the work scope at no extra cost to BHEL.**

6. Supplier should quote **Make(s) of the items as given in Technical Specification enclosing the Make, Model No. along with Technical Catalog / Documentation for each item.**

7. Supplier should **clearly give their remarks against each clause / item in all sections.** Also supplier should **clearly indicate any deviations. Acceptance of** these **deviations is subject to BHEL approval.**

8. Supplier should have suitable facility and workshop to fabricate the tanks and offer for inspection before dispatch. The system is to build at BHEL Corp. R&D, Hyderabad.

9. **No subcontracting** of the mechanical fabrication, erection and commissioning work **shall be accepted**.

10. Offer should contain the **complete / detailed Bill of Material for the Sections VII, VIII & IX (as in Section X),** and **only Unit Price / Rates are to be quoted for all the items including Software and Electronic Equipment**. The charges for Erection & Commissioning of the entire system are to be quoted separately and **NOT** to be included in the material cost.

SECTION – II

GENERAL TERMS AND CONDITIONS

2.1 GENERAL SCOPE OF SUPPLY

Sl. No.	Description	Quantity
1.0	Supply, Erection, Testing and Commissioning of Control Loop Test Facility comprising of equipment, structure, data acquisition and control system employing Foundation Fieldbus Architecture as detailed in Sections II to X of tender document	1 set

2.1.1 SCOPE OF SERVICES:

1. Supplier should provide detailed documentation like Technical Catalogs, Engineering Drawings and Quality Plans with their offer for technical scrutiny by BHEL.
2. Supplier should revise the Engineering Drawings and Quality Plans after they are finalized and approved by BHEL (after the placement of order).
3. Supplier should submit the hard and soft copies of the approved documentation for all equipment and instruments prior to fabrication and supply.
4. Supplier should submit Test / Material Quality Certificates and O&M Manuals after successful completion of factory tests before dispatch.

2.1.2 GENERAL

1. All the Equipment / Items offered shall be of Reputed Make and Industrial Grade as per the Technical Specifications.

2. Items shall be inspected and subjected to functional testing in the presence of a BHEL representative prior to dispatch as per the Inspection guidelines. Erection and commissioning of the Equipment shall be carried out by the supplier at BHEL Corp. R&D, Hyd.
3. **Supplier should clearly indicate recommended spares, tools and tackles and quote for them as optional**.
4. For quotation purpose, the cable lengths can be taken as about 35m (average).

2.2 SCOPE OF SUPPLY

2.2.1 Mechanical Equipment :

Supply of Mechanical Equipment shall be as per BOM (Section- X) and confirming to Technical Specifications given in Section - VII. It may please be noted that only indicative drawings of equipment and structure are enclosed in the tender document. Supports, Stiffeners, Flanges, Nozzles, nuts, bolts etc. as required for the equipment shall be taken into account while submitting the offer. For any further clarifications, bidders to contact BHEL.

Successful bidder to supply detailed fabrication drawings (based on BHEL drawings) for the tanks, pipeline isometrics and structural details conforming to applicable standards for approval by BHEL prior to fabrication.

2.2.2 Instruments and Control Equipment :

Supply of Instruments and Control Equipment shall be as per BOM (Section - X) and confirming to Technical Specifications given in Section - VIII.

2.2.3 Electronic Equipment :

Supply of Electronic Equipment shall be as per BOM (Section - X) and confirming to Technical Specifications given in Section - IX.

2.3 SCOPE OF ERECTION

2.3.1 Mechanical Equipment :

1. All Mechanical Equipment, except Air Compressor, shall be structure mounted. P&I Diagram for the entire system is given in Section - III and the Details of Tanks & Structure are given in Section - IV.
2. All process connections (with equipment and tube to tube), shall be of Flange Joints Type.
3. Piping layout for the facility will be inspected by BHEL and the Supplier to carry out the necessary changes, if any, at no extra cost.

2.3.2 Instruments and Control Equipment :

1. All Field Instruments and Control Valves shall be Structure mounted as per Section - III and Section - IV. Industrial Type Marshalling Box is to be provided to house TBs, MCBs, SCR, Relays etc. General guidelines are provided in Section - V for electrical wiring for SCR, Heaters, Relays, Valves, Power Supplies etc. Supplier to prepare the detailed wiring diagrams and obtain BHEL approval prior to execution. The wiring / cabling, external to Marshalling Box, shall be carried out at BHEL, Corp. R&D, Hyd.
2. Impulse Line layout, Tubing layout for air and wiring layout for the facility will be inspected by BHEL and the Supplier to carry out the necessary changes if any at no extra cost.

3. All instrument connections shall be as recommended by OEM of the instruments.

2.3.3 Electronic Equipment :

1. All the Electronic Modules (except plug-in type) shall be housed in a Rack / Panel as per the OEM guidelines.
2. The electrical wiring for Electronic Equipment shall be as per the OEM & BHEL guidelines given in Section - V. The wiring / cabling, external to Rack / Panel, shall be carried out at BHEL, Corp R&D, Hyderabad.
3. The housing, wiring layout for the facility will be inspected by BHEL and the Supplier to carry out the necessary changes, if any, at no extra cost.

2.3.4 General Instructions for Erection :

1. All the Instruments and Control Valves shall be provided with proper supports and mounted as per the OEM instructions.
2. Instruments, wherever required, shall be provided with 5-way Manifolds.
3. Signal and Power Cables shall be routed separately through GI Conduits of suitable size. Supplier to submit the detailed routing diagram to BHEL for approval prior to execution.
4. Instruments, valves and cables should be provided with tag numbers and service descriptions.
5. Termination ends of wires (like in Marshalling Box) should have proper ferrules and lugs.
6. Supplier to submit detailed earthing diagram for approval by BHEL.

7. BHEL will provide Main Power Supply, Water Supply, Earthing Point at the available locations, from which the Supplier scope of work will start.
8. Supplier to bring all tools and tackles, consumables etc needed for the execution of job at BHEL, Corp. R&D, Hyderabad.
9. For illustration purpose, the tapping details and Instrument connections have been shown using BSP units. However, the **Supplier to use either NPT or metric units** for preparing the drawings for the execution of the job.
10. **Supplier to quote unit rates** for the impulse & process tubing, cables & conduits and structure material, as the quantities may vary according to site location.
11. Supplier should indicate the cooling requirements for DAS & CONTROL SYSTEM and provide cooling fan(s), if required, in the rack / panel.
12. Rack / Panel should be of industrial grade for housing non plug-in modules of DAS & CONTROL SYSTEM (with cooling fan(s) if required).
13. Supplier should indicate the earthing requirements for DAS & CONTROL SYSTEM and enclose a detailed earthing scheme with the Offer for approval.

2.4 SCOPE OF COMMISSIONING

2.4.1 Mechanical Equipment :

1. Tanks and Pipelines shall be cleaned and flushed before commissioning.
2. All Tanks and Pipelines shall be tested hydraulically for leaks with 4 kgf / cm^2 pressure for 2 hours.

2.4.2 Instruments and Control Equipment :

1. All Field Instruments and Control Valves shall be calibrated before commissioning.
2. All cables shall be checked for continuity before powering-up.
3. All Impulse lines shall be hydraulically tested for leaks with 4 kgf / cm^2 line pressure for 2 hours.

2.4.3 Electronic Equipment :

1. All Electronic Modules and Software shall be tested as per OEM Instructions and guidelines before commissioning.
2. All cables shall be checked for continuity before powering-up.

2.5 BOM Note:

Quantity of material mentioned in the Sections VII, VIII, IX & X (10.1, 10.2, 10.3), under each category, is an indicative minimum requirement. Any other material including hardware /software / firmware, not mentioned above, but needed for the system to meet the functional requirements shall be provided by the supplier at no extra cost to BHEL. **The Final BOM shall include these materials also**.

2.6 GUARANTEE / WARRANTY

1. Supplier should clearly indicate BHEL Corp. R&D as End User for all the Equipment required for the facility.
2. Supplier should include minimum one year warranty for the entire system after successful commissioning of the facility at BHEL Corp. R&D, Hyd. **During this period, Supplier should provide necessary materials and services at no extra cost for the replacement of any defective components to achieve full functionality of the entire system**. Further, for the items whose warranty period is beyond one year as offered by OEMs, the Supplier should replace defective components free of cost.

3. Any patches, updates and service for software provided, should be given free of cost during the Warranty period.

2.7 INSPECTION & TESTING

1. Following tests are to be carried out at Supplier's works in the presence of a BHEL representative, as per the BHEL Inspection Test schedule given below and the test certificates should be submitted to BHEL before the dispatch of system.
2. Final Inspection and Testing will be carried out at BHEL Corp. R&D, Hyd after the completion of erection & commissioning of the system wherein the system capability is to be demonstrated.

S.No	Test Description	Test / Inspection method	Remarks
1	Material Verification	Make / Model of the Items as per Purchase Order BOM	For Entire System (All Equipment)
2	Visual inspection & Dimensional check ups	Physical inspection & Dimensional check ups as per the drawings / catalogues approved by BHEL	For Mechanical Equipment
3	Functional Test		
		Necessary tests (like leakage check) as recommended by OEMs	For Mechanical Equipment
		Necessary hardware, software & diagnostic tests and calibration of instruments as recommended by OEMs	For Instruments & Control Equipment
		Necessary hardware, software and diagnostic tests as recommended by OEMs	For Electronic Equipment

2.8 DOCUMENTATION

Documents shall be submitted to BHEL for review / information / approval at different stages which include the following:-

S No.	Description	Form	Qty.	Stage
1.	Detailed Technical Catalogs / Manuals, Engineering Drawings and Quality Plan for scrutiny	Original	1	Along with Technical Offer
2.	Finalized (or Revised as per BHEL requirements) Engineering Drawings and Quality Plan for approval	One original and two photo copies	1+2	After placement of Purchase Order before fabrication
3.	Test / Material Quality Certificates for relevant Equipment	One original and two photo copies	1+2	For clearance to dispatch after testing at Supplier's Factory
4.	Operation and Maintenance Manual for all Equipment	One original and two photo copies	1+2	For information along with dispatch
5	Operation and Maintenance Manual, Final Approved Drawings and Test / Material Quality Certificates for relevant Equipment	Soft copies on CDs	3	For information along with dispatch

Note:

1. Test certificates shall consist of details such as S.No. of equipment, Customer details etc.

2. All test certificates and other relevant documents shall be certified by the competent authority of the Supplier.

SECTION – III

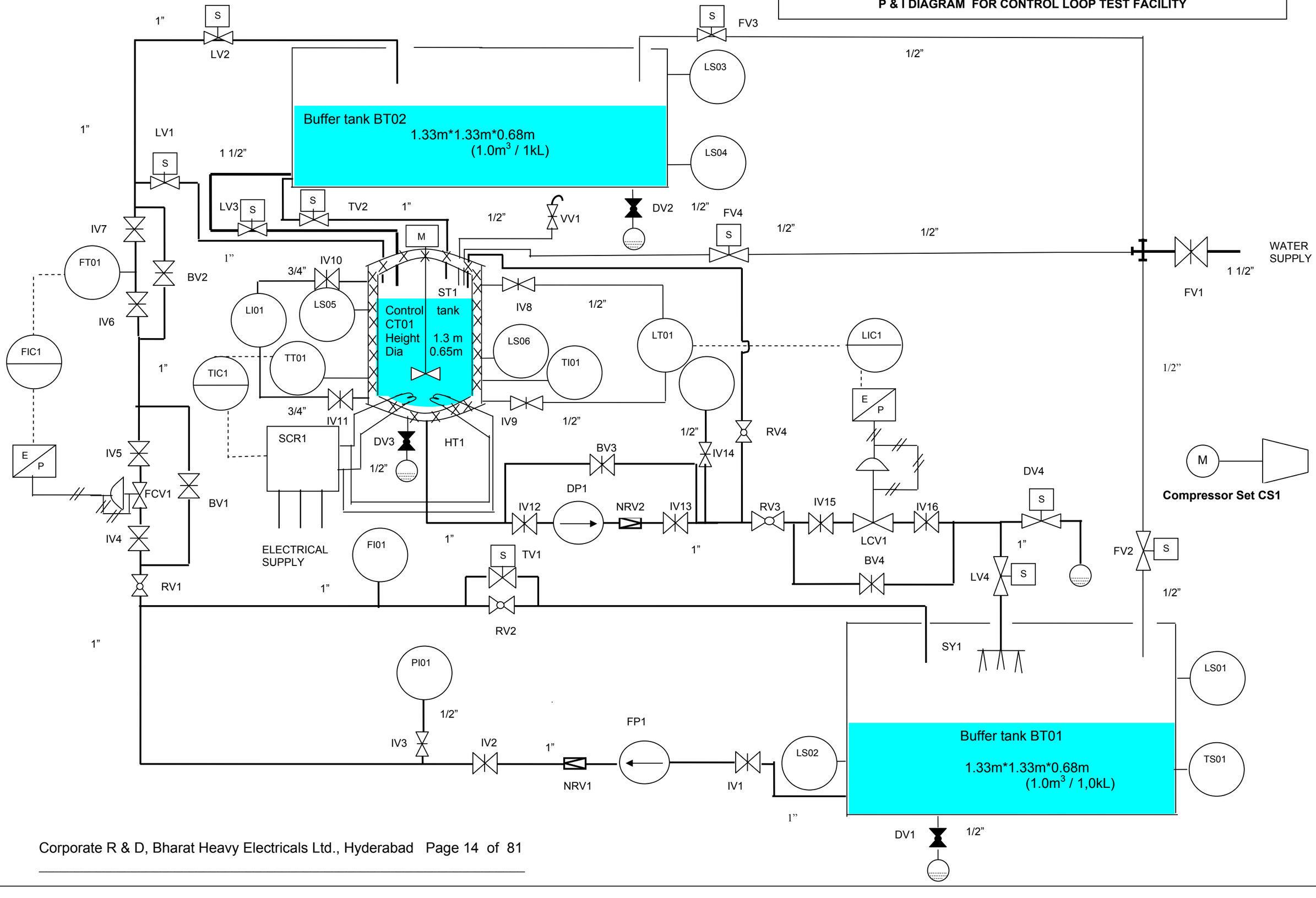
PROCESS & INSTRUMENTATION DIAGRAM

3.1 DRAWING : Refer drawing Fig 3.1 for detailed PID diagram.

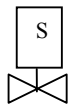
Note :

1. This Section should be used with Section – IV for the erection of the entire system.
2. P&I diagram is drawn as per the conventional practice. However, it is to be noted that, the transmitters and control valves use Digital Signals based on Foundation Fieldbus Protocol and Control Algorithms are executed in the DAS & CONTROL SYSTEM.

P & I DIAGRAM FOR CONTROL LOOP TEST FACILITY



3.2 LEGENDS


- Solenoid valve

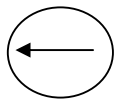

- Spray


- Gate valve

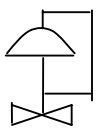

- Electrical Heater


- Globe valve (Normally Open)

Globe valve (Normally Closed)


- Pump


- Non return Valve (NRV)


- Control valve

HT - Electrical Heater
CS - Compressor Set
M - Motor


- Drain to waste

ST - Stirrer
SP - Spray
CT - Control Tank
BT - Buffer Tank
FP - Feed Pump
DP - Drain Pump


- Stirrer

LT - Level Transmitter with indicator

LS - Level Switch

LI - Level Indicator

FT - Flow Transmitter with indicator

FI - Flow Indicator

TT - Temp. Transmitter with indicator

TS - Temp. Switch

PI - Pressure Indicator

BV – **B**ypass **V**alve

CV – **C**ontrol **V**alve

DV – **D**rain **V**alve

FV – **F**eed **V**alve

IV – **I**solation **V**alve

LV – **L**ine **V**alve

RV – Th**r**ottle **V**alve

TV – **T**urbulence **V**alve

VV – **V**ent **V**alve

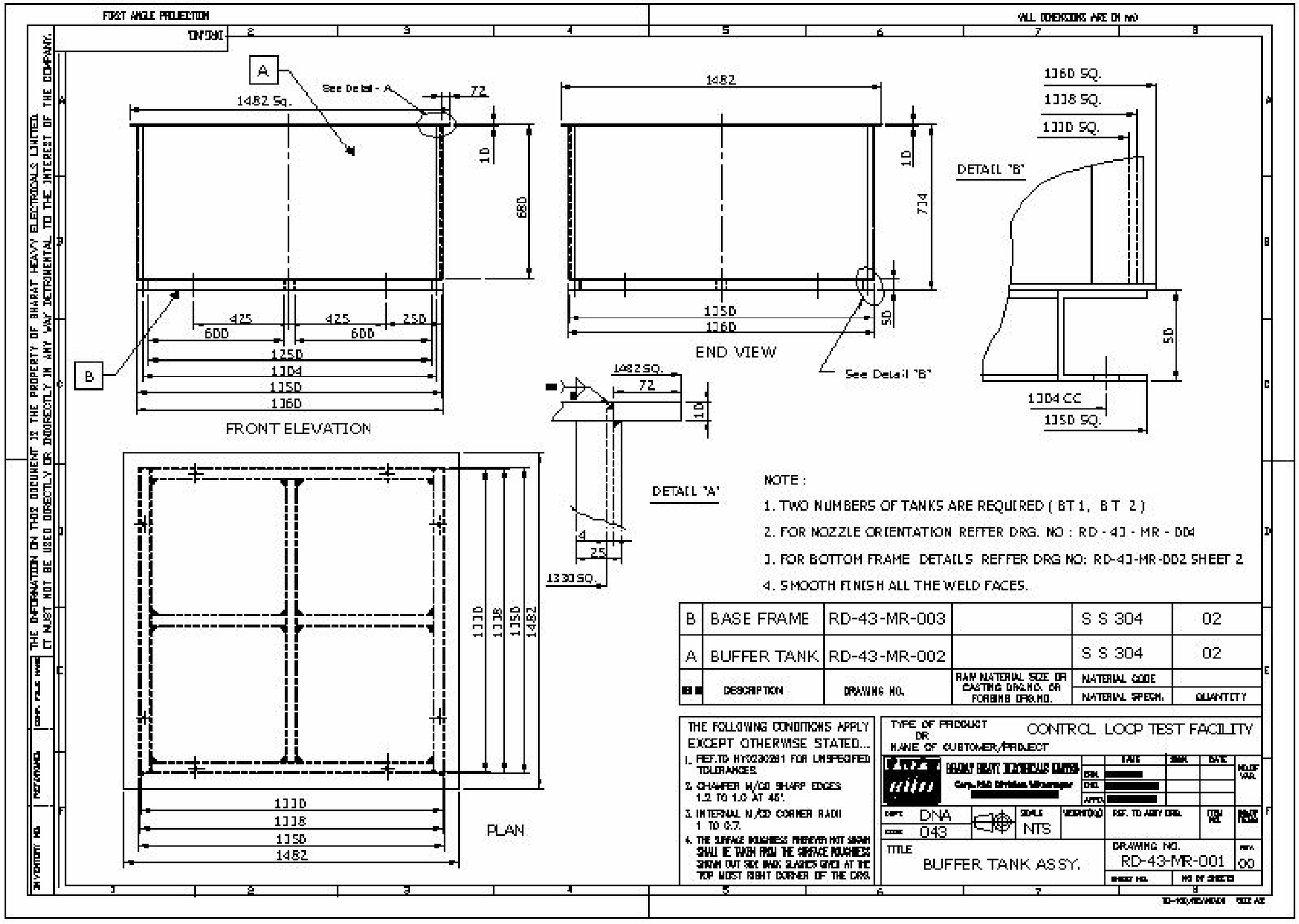
SECTION – IV

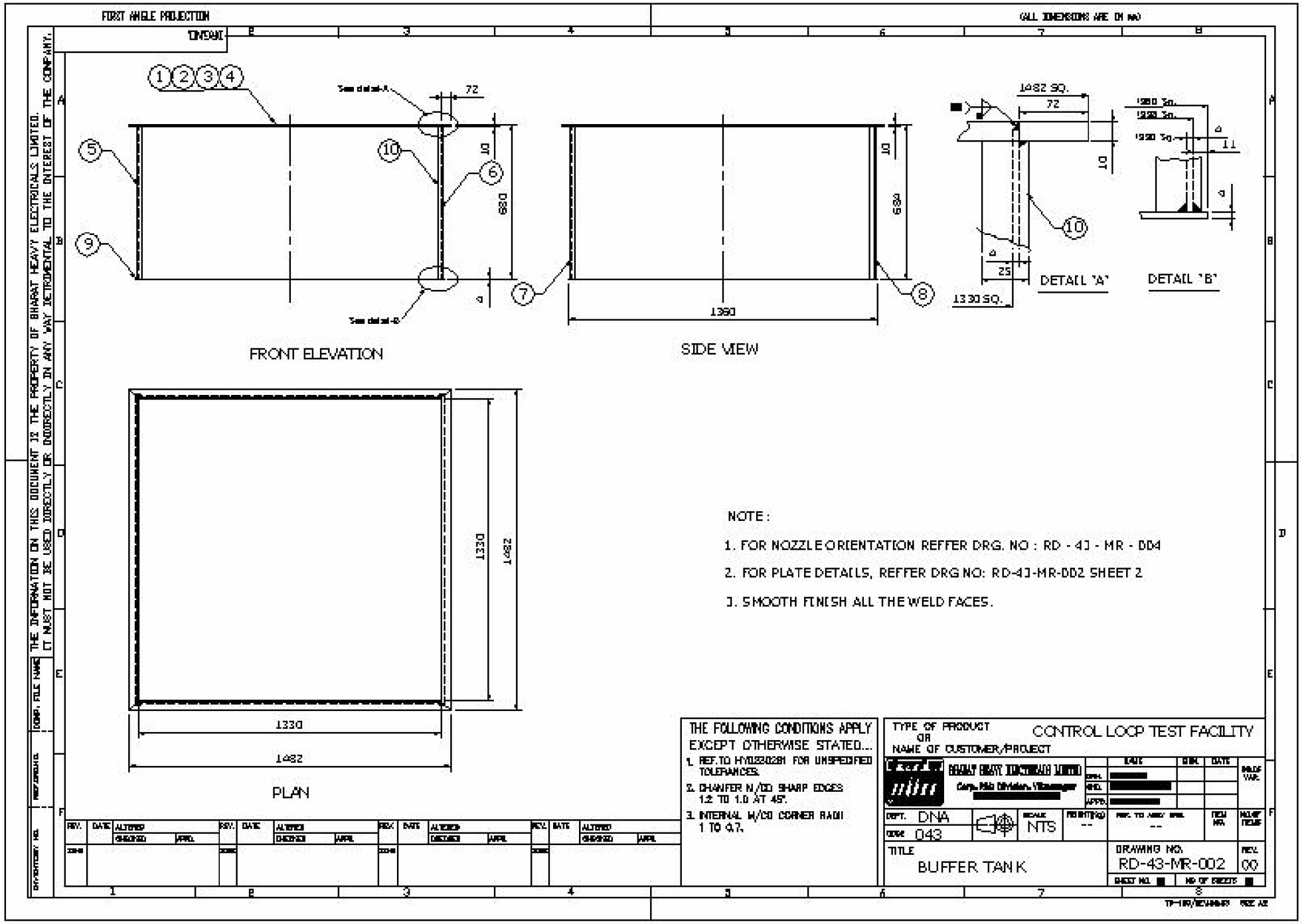
TAPPING DETAILS OF TANKS AND STRUCTURE DESIGN DRAWINGS

4.1 DRAWINGS :

Note :

1. This Section should be used with Section – III for the erection of the system.
2. The drain lines of Instruments, Equipment and System should be brought to a common point for disposal.
3. For all the tanks, chequered plates (Stainless Steel material) are to be provided at the bottom.
4. For approach to tanks and instruments, suitable arrangements have to be provided.
5. Layout diagrams of process tubing and impulse line / pneumatic lines are to be prepared and submitted to BHEL for approval before execution.
6. Height of the structure may be increased by 1m based on site location, whereas the dimensions of tanks shall remain the same.


FIRST ANGLE PROJECTION
ALL DIMENSIONS ARE IN mm
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.
A
See Detail - A
1482 Sq.
72
10
680
425
425
250
600
600
1250
1104
1150
1160
FRONT ELEVATION
1482
10
714
1150
1160
50
END VIEW
See Detail "B"
DETAIL "B"
1160 SQ.
1118 SQ.
1100 SQ.
50
1104 CC
1150 SQ.
1482SQ.
72
10
4
25
1330SQ.
DETAIL "A"
1100
1118
1150
1482
1100
1118
1150
1482
PLAN
NOTE :
1. TWO NUMBERS OF TANKS ARE REQUIRED (BT 1, BT 2)
2. FOR NOZZLE ORIENTATION REFFER DRG. NO : RD - 43 - MR - 004
3. FOR BOTTOM FRAME DETAILS REFFER DRG NO: RD-43-MR-002 SHEET 2
4. SMOOTH FINISH ALL THE WELD FACES.
B BASE FRAME RD-43-MR-003 S S 304 02
A BUFFER TANK RD-43-MR-002 S S 304 02
DESCRIPTION
DRAWING NO.
RAW MATERIAL SIZE OR CASTING DRG.NO. OR FORGING DRG.NO.
MATERIAL CODE
MATERIAL SPECN.
QUANTITY
THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...
1. REF.TO HYD230281 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE MACH. SURFACES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
CONTROL LOOP TEST FACILITY
BHARAT HEAVY ELECTRICALS LIMITED
DEPT. DNA
CODE 043
SCALE NTS
TITLE
BUFFER TANK ASSY.
DRAWING NO.
RD-43-MR-001
REV. 00
NO OF SHEETS
INVENTORY NO.
MATERIAL
PERFORMANCE
CONFIG. FILE NAME


FIRST ANGLE PROJECTION
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN MM
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.
1 2 3 4
5
9
10
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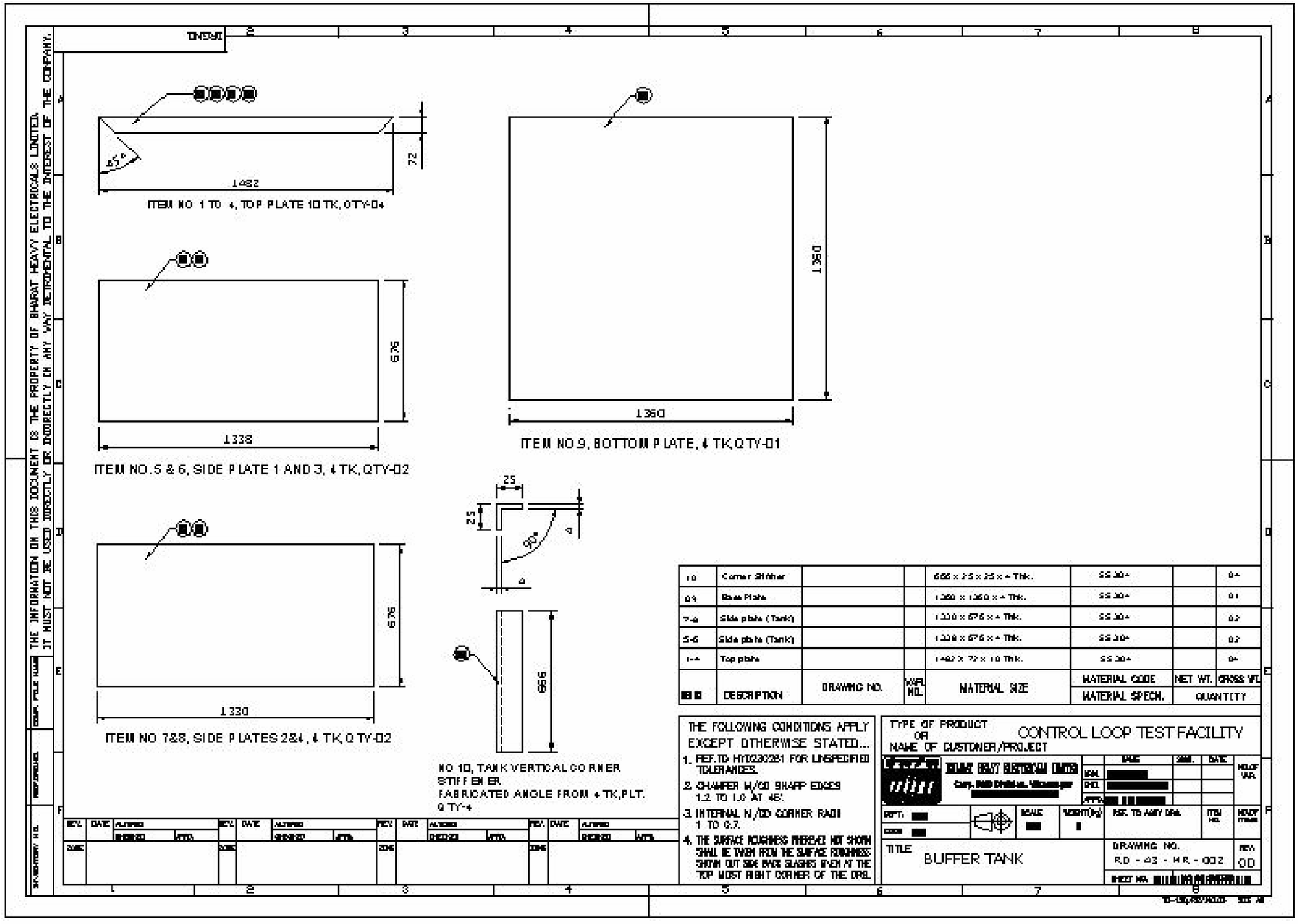
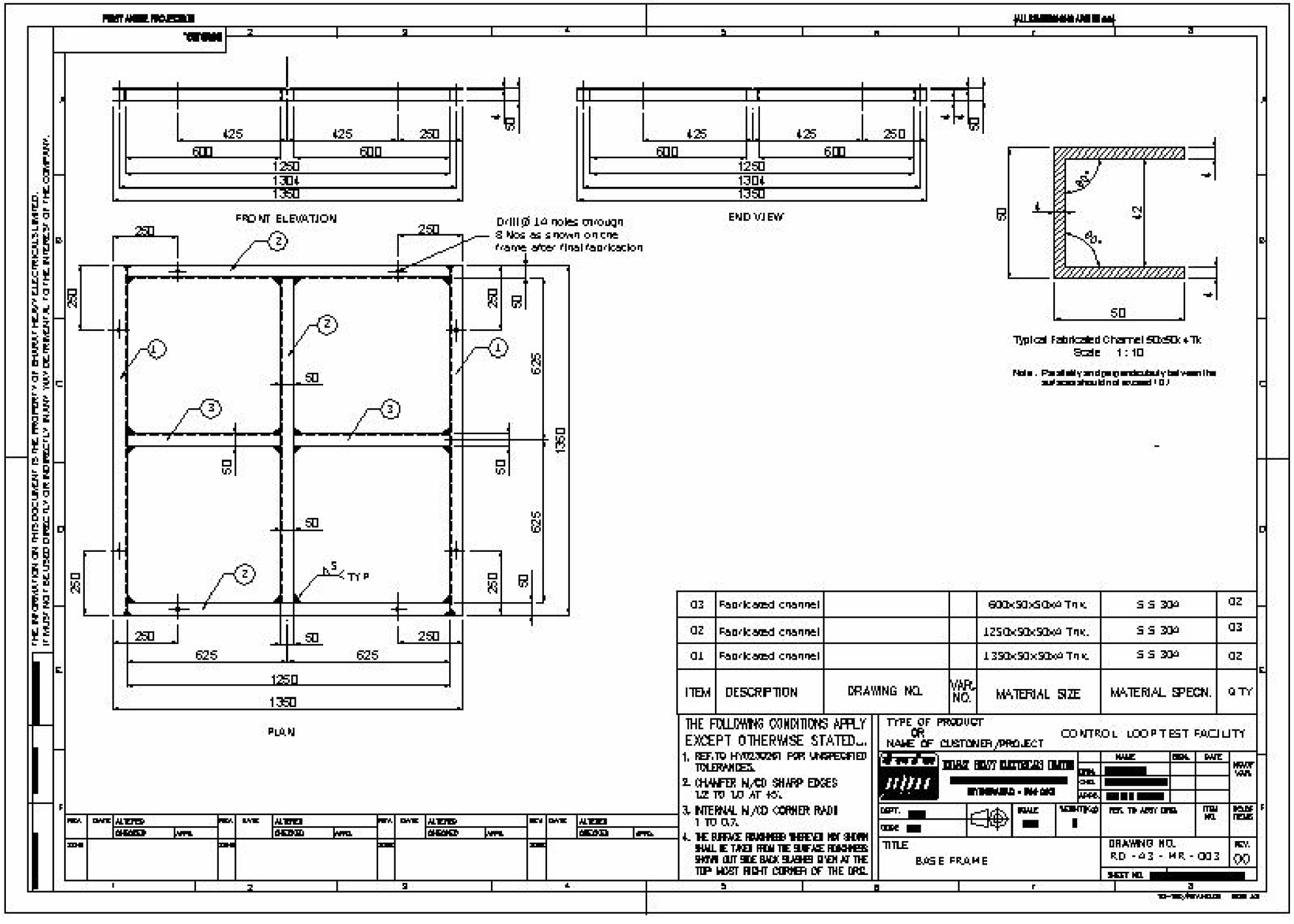
7
8
72
680
1390
1482 SQ.
1330 SQ.
DETAIL 'A'
DETAIL 'B'
FRONT ELEVATION
SIDE VIEW
1330
1482
PLAN
NOTE :
1. FOR NOZZLE ORIENTATION REFFER DRG. NO : RD - 43 - MR - 004
2. FOR PLATE DETAILS, REFFER DRG NO: RD-43-MR-002 SHEET 2
3. SMOOTH FINISH ALL THE WELD FACES.
THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...
1. REF.TO HY0220281 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 4.7.
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
CONTROL LOOP TEST FACILITY
BHARAT HEAVY ELECTRICALS LIMITED
DEPT. DNA
CODE 043
SCALE NTS
WEIGHT(kg) --
TITLE
BUFFER TANK
DRAWING NO. RD-43-MR-002
REV. 00
DATE
DRN.
CHD.
APPD.
REV. DATE ALTERED CHECKED APPD.


THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.
45°
72
1482
ITEM NO 1 TO 4, TOP PLATE 10 TK, QTY-04
975
1338
ITEM NO.5 & 6, SIDE PLATE 1 AND 3, 4 TK, QTY-02
1350
1350
ITEM NO 9, BOTTOM PLATE, 4 TK, QTY-01
675
1330
ITEM NO 7&8, SIDE PLATES 2&4, 4 TK, QTY-02
25
25
45°
a
a
666
NO 10, TANK VERTICAL CORNER STIFFENER FABRICATED ANGLE FROM 4 TK, PLT. QTY-4
10 Corner Stiffner 666 x 25 x 25 x 4 Thk. SS 304 04
09 Base Plate 1350 x 1350 x 4 Thk. SS 304 01
7-8 Side plate (Tank) 1330 x 675 x 4 Thk. SS 304 02
5-6 Side plate (Tank) 1338 x 675 x 4 Thk. SS 304 02
1-4 Top plate 1482 x 72 x 10 Thk. SS 304 04
DESCRIPTION DRAWING NO. MAT'L NO. MATERIAL SIZE MATERIAL CODE / MATERIAL SPECN. NET WT. GROSS WT. QUANTITY
THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...
1. REF. TO HTD/30/281 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
CONTROL LOOP TEST FACILITY
BHARAT HEAVY ELECTRICALS LIMITED
TITLE
BUFFER TANK
DRAWING NO.
RD - 03 - MR - 002
REV.
00



ITEM	DESCRIPTION	DRAWING NO.	VARI. NO.	MATERIAL SIZE	MATERIAL SPECN.	QTY
03	Fabricated channel			600x50x50x4 Tnk.	S S 304	02
02	Fabricated channel			1250x50x50x4 Tnk.	S S 304	03
01	Fabricated channel			1350x50x50x4 Tnk.	S S 304	02

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...

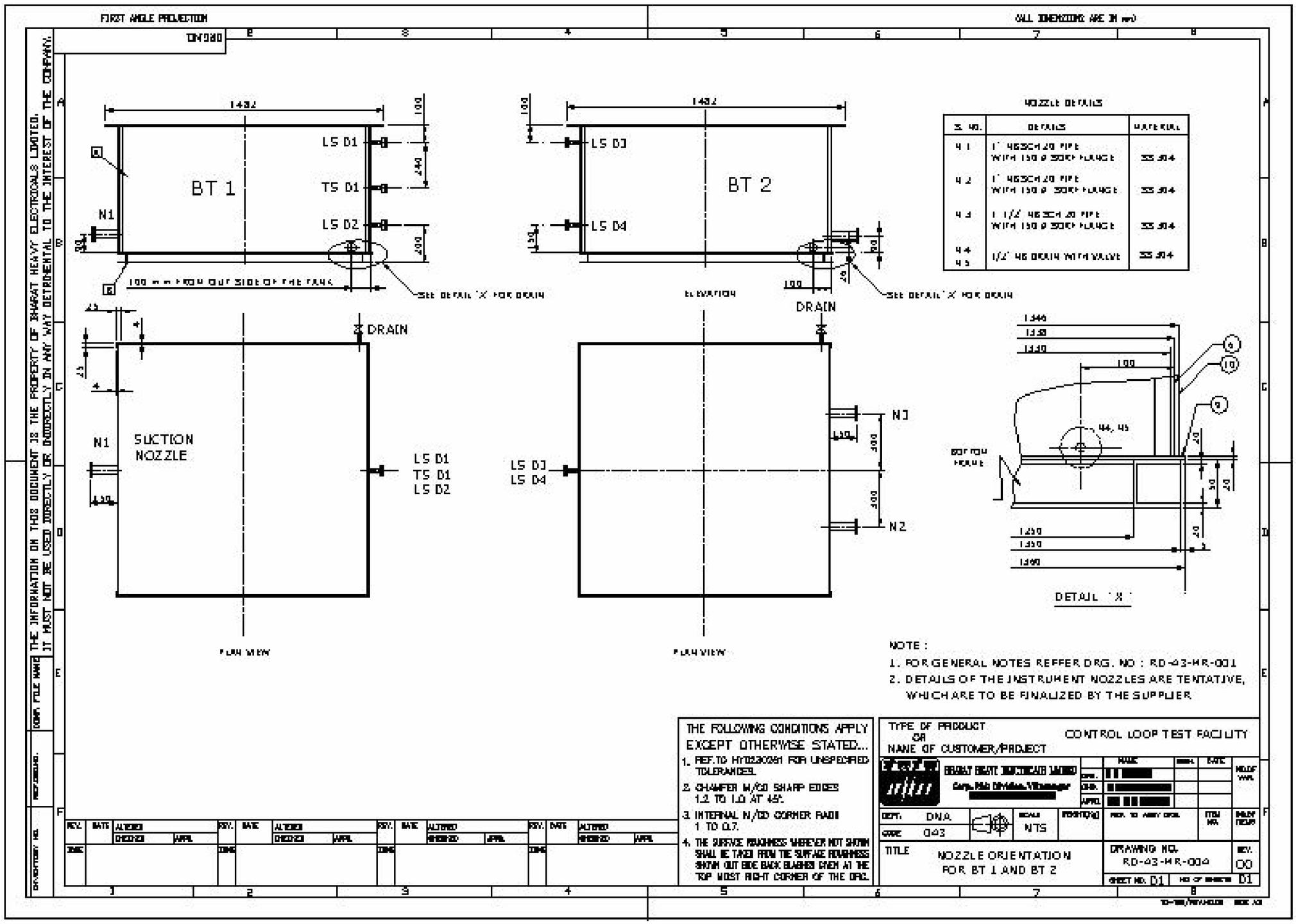
1. REF.TO HY02J0261 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER N/CO SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL N/CO CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.

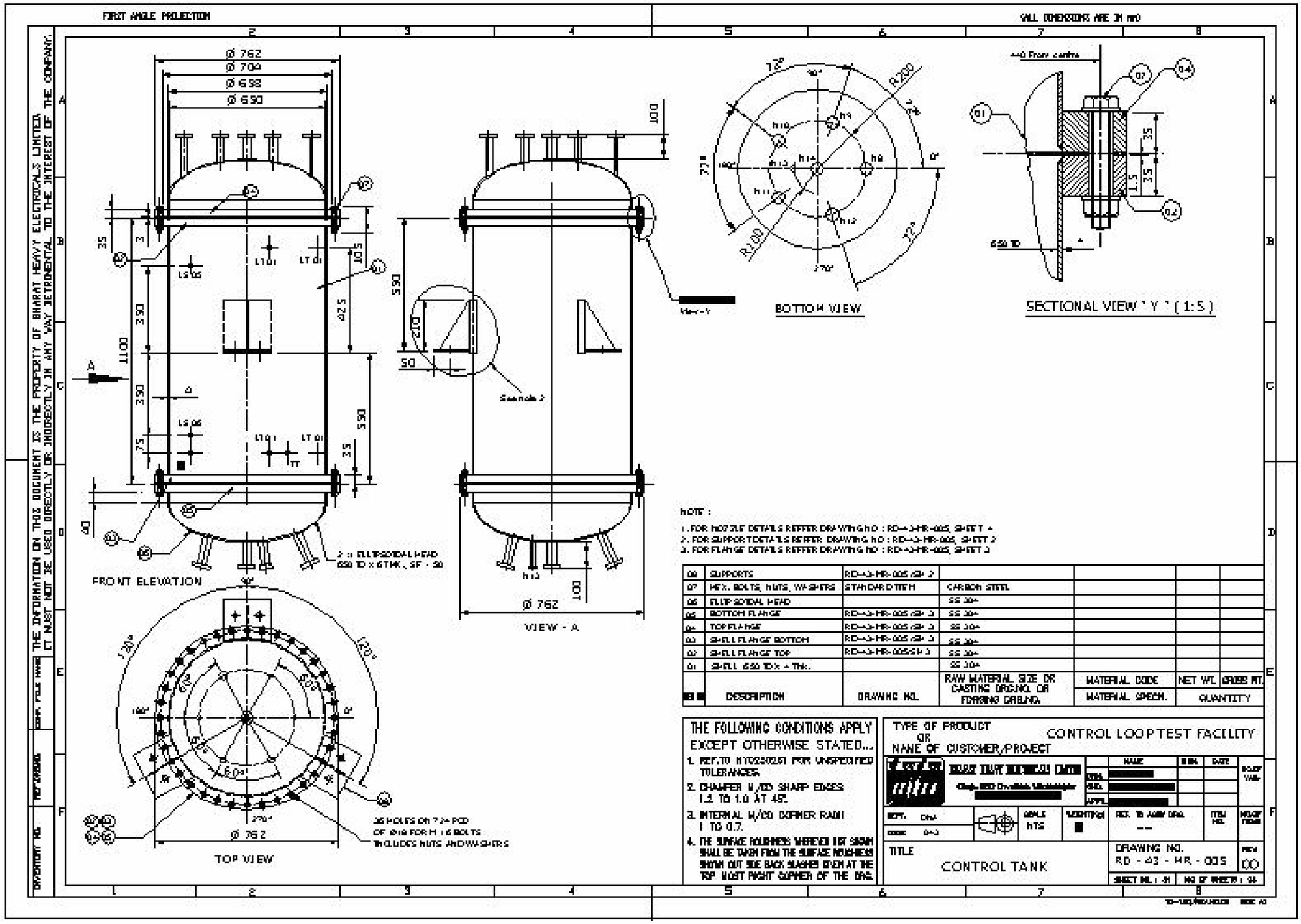
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CONTROL LOOP TEST FACILITY

BHARAT HEAVY ELECTRICALS LIMITED

TITLE: BASE FRAME

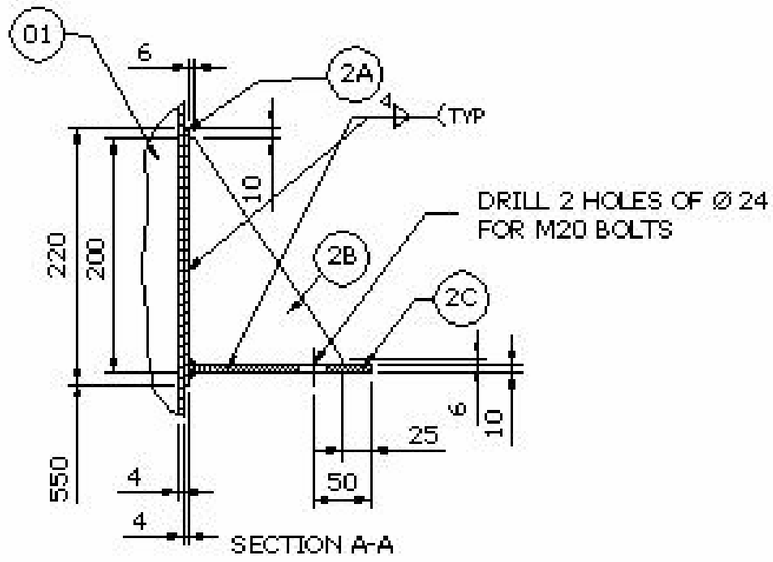
DRAWING NO. RD - 43 - MR - 003 REV. 00

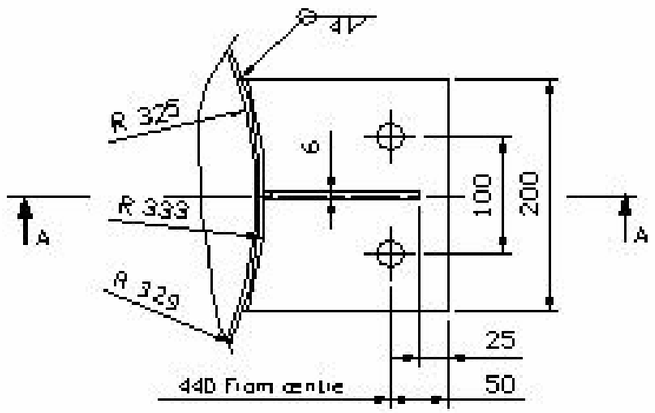

FIRST ANGLE PROJECTION
ALL DIMENSIONS ARE IN mm
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.
BT 1
BT 2
LS D1
TS D1
LS D2
LS D3
LS D4
N1
N2
N3
1482
100 mm FROM OUT SIDE OF THE TANK
SEE DETAIL 'X' FOR DRAIN
DRAIN
SUCTION NOZZLE
PLAN VIEW
ELEVATION
NOZZLE DETAILS
SL NO.
DETAILS
MATERIAL
N1
1" NB SCH 40 PIPE WITH 150 # SORF FLANGE
SS 304
N2
1" NB SCH 40 PIPE WITH 150 # SORF FLANGE
SS 304
N3
1 1/2" NB SCH 40 PIPE WITH 150 # SORF FLANGE
SS 304
N4 N5
1/2" NB DRAIN WITH VALVE
SS 304
DETAIL 'X'
NOTE :
1. FOR GENERAL NOTES REFFER DRG. NO : RD-43-HR-001
2. DETAILS OF THE INSTRUMENT NOZZLES ARE TENTATIVE, WHICH ARE TO BE FINALIZED BY THE SUPPLIER
THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...
1. REF.TO HY0230261 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK BLANKED EACH AT THE TOP MOST RIGHT CORNER OF THE DRG.
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
CONTROL LOOP TEST FACILITY
BHARAT HEAVY ELECTRICALS LIMITED
DEPT. DNA
CODE 043
SCALE NTS
TITLE
NOZZLE ORIENTATION FOR BT 1 AND BT 2
DRAWING NO. RD-43-HR-003
REV. 00
SHEET NO. 01
NO OF SHEETS 01


FIRST ANGLE PROJECTION
ALL DIMENSIONS ARE IN mm
THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED
THE INFORMATION ON THIS DOCUMENT IS THE PROPRIETARY OF BHARAT HEAVY ELECTRICALS LIMITED
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.
Ø 762
Ø 709
Ø 698
Ø 650
FRONT ELEVATION
TOP VIEW
VIEW - A
BOTTOM VIEW
SECTIONAL VIEW ' Y ' (1:5)
NOTE :
1. FOR NOZZLE DETAILS REFER DRAWING NO : RD-03-HR-005, SHEET 4
2. FOR SUPPORT DETAILS REFER DRAWING NO : RD-03-HR-005, SHEET 2
3. FOR FLANGE DETAILS REFER DRAWING NO : RD-03-HR-005, SHEET 3
DESCRIPTION
DRAWING NO.
RAW MATERIAL SIZE OR CASTING DRGNO. OR FORGING DRGNO.
MATERIAL CODE
MATERIAL SPECN.
NET WT.
GROSS WT.
QUANTITY
THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...
1. REF. TO HYDROGEN FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
CONTROL LOOP TEST FACILITY
TITLE
CONTROL TANK
DRAWING NO.
RD - 03 - HR - 005
00

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN mm





ITEM No.	DESCRIPTION	DRAWING NO.	MATL. SPECN.	QTY.
02B	STIFFNER	---	CARBON STEEL 6 THK.	03
02C	SUPPORT BASE PLATE	---	CARBON STEEL 10 THK.	03
02A	CURVED PLATE	---	S S 304 PLATE 4 THK.	03
01	SHELL			

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...

1. REF. TO HY0230061 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER N/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL N/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CONTROL LOOP TEST FACILITY

BHARAT HEAVY ELECTRICALS LIMITED — HYDERABAD - 500 093

DEPT. DNA | CODE 043 | SCALE NTS

TITLE: SUPPORT

DRAWING NO. RD-43-MR-005/02 | REV. 00

REV. TO ASSY DRG. RD-43-MR-005/01

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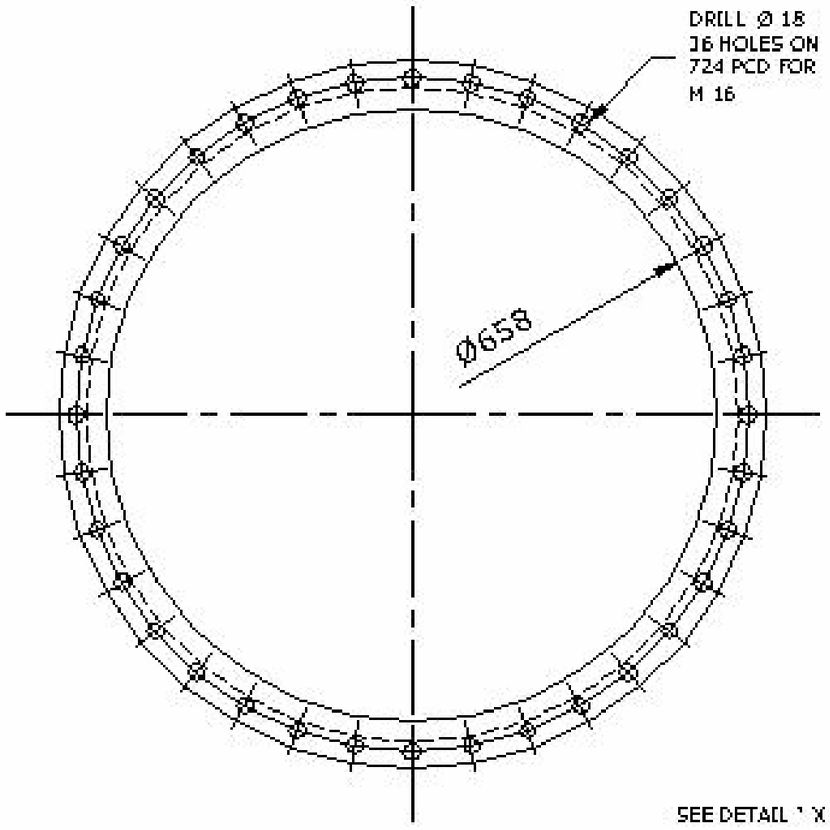
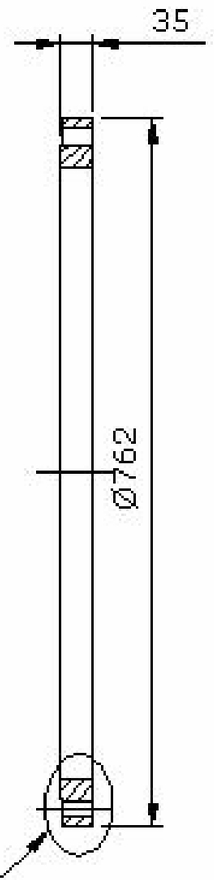
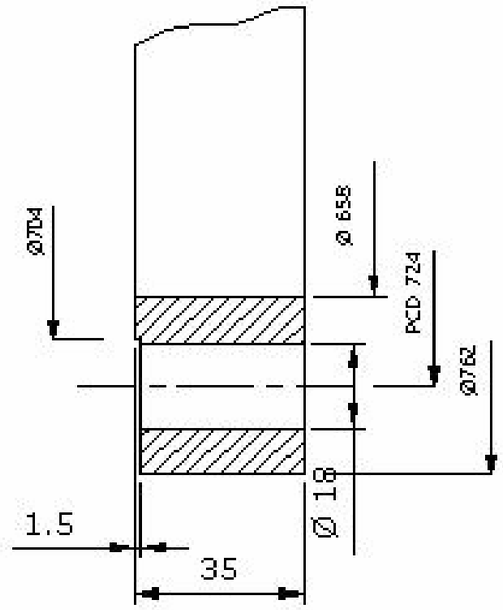
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN mm







DETAIL " X "

ITEM NO.	DESCRIPTION	DRAWING NO.	MATERIAL CODE	QUANTITY
2, 3, 4, 5	FLANGE		S S 304	04
			MATERIAL SPECN.	

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...

1. REF.TO HY0230081 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CONTROL LOOP TEST FACILITY

BHARAT HEAVY ELECTRICALS LIMITED

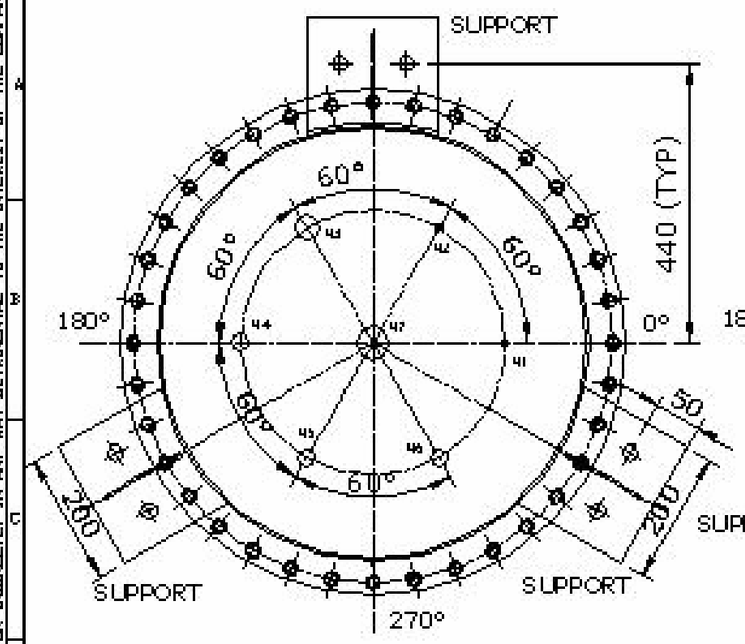
TITLE: FLANGE

DRAWING NO. R.D-A3-HR-0015/03

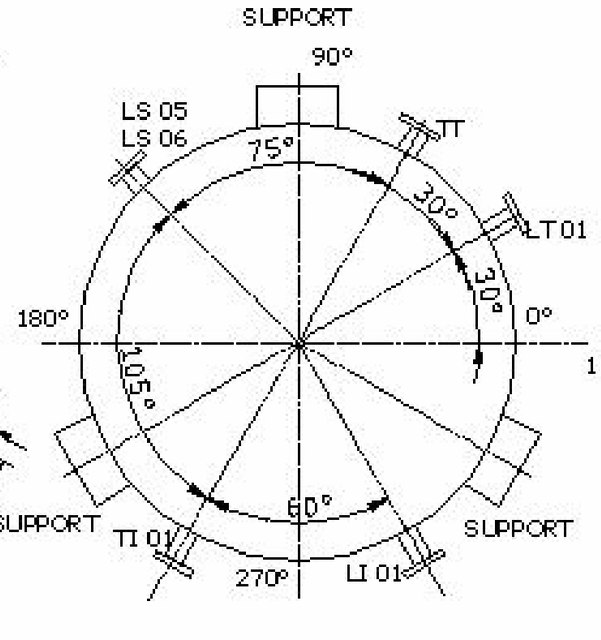
REV. 00

FIRST ANGLE PROJECTION

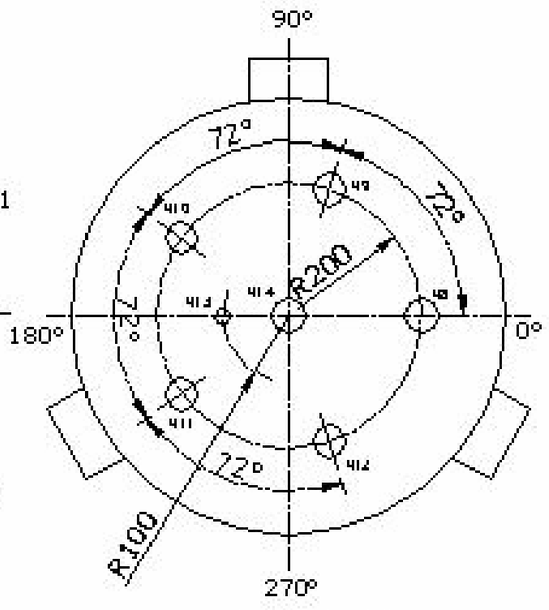
ALL DIMENSIONS ARE IN mm



TOP VIEW



ORIENTATION OF NOZZLE
FOR INSTRUMENTS



BOTTOM VIEW

NOZZLE SHEDULE

NO	SIZE	TYPE OF JOINT
N1, N2	1/2" NB	SCREWED CONNECTION
N3	1 1/2" NB	150 # FLANGED JOINT
N4, N5, N6, N13	1" NB	150 # FLANGED JOINT

NOTES :

1. NOZZLE N7 AND N14 TO BE DECIDED BASED ON THE STIRRER BEING PROVIDED.
2. NOZZLES N8 TO N12 TO BE DESIDED BASED ON THE ELECTRICAL HEATERS BEING PROVIDED.
3. THERMAL INSULATION HAS TO BE PROVIDED ON THE VESEL FOR A TEMPERATURE DIFFERENCE OF 30°C.

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...

1. REF. TO HY0230041 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CONTROL LOOP TEST FACILITY

BHARAT HEAVY ELECTRICALS LIMITED

	NAME	SIGN.	DATE
DRN.	[redacted]		
CHD.	[redacted]		
APPD.			

DEPT. 0441 CODE 0441 | SCALE 4:5 | VERSION(S) | REF. TO ASSY DRG. | DRG NO. | MAT'L SPEC.

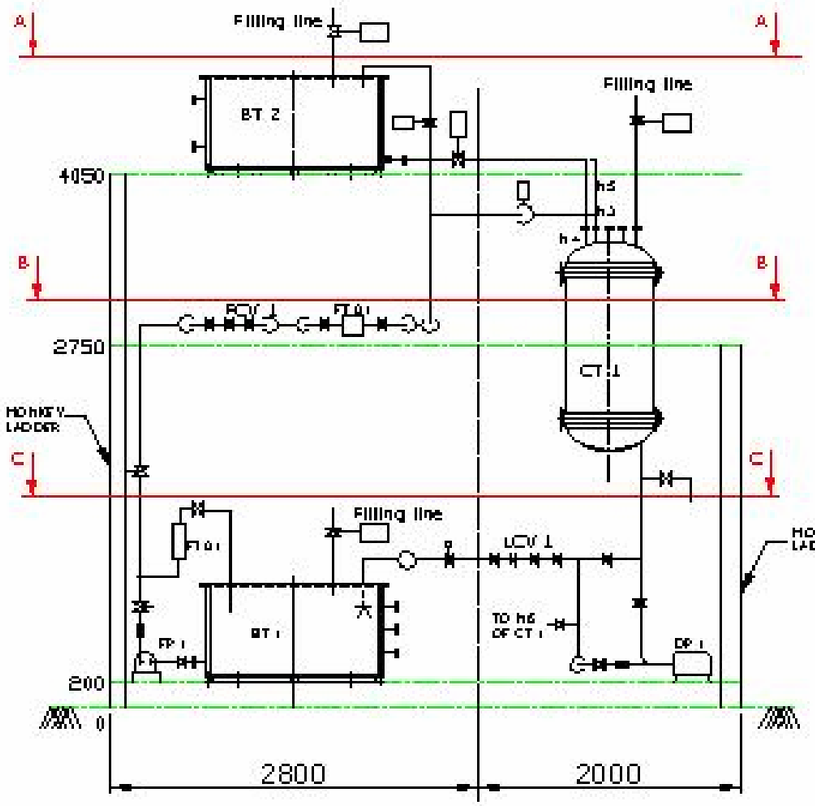
TITLE: NOZZLE DETAILS

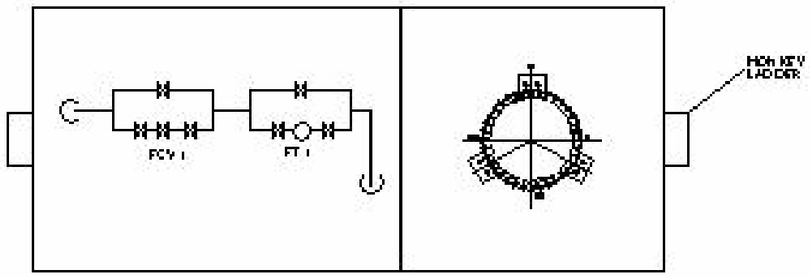
DRAWING NO. R.D-03-HR-005/04 | REV. 00

SHEET NO. 04 | NO OF SHEETS 04

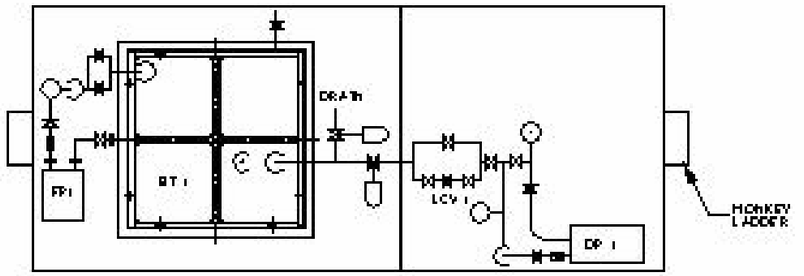
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

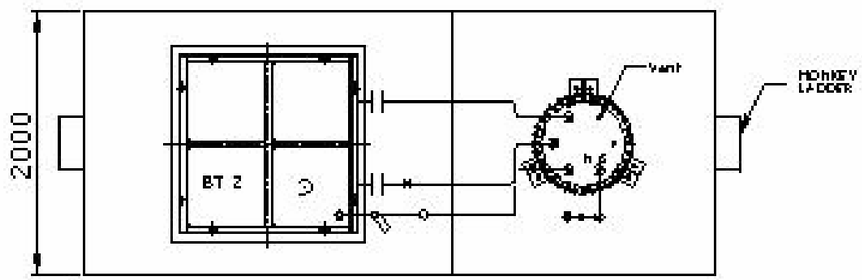




PLAN AT ELEVATION B B



PLAN AT ELEVATION C C



PLAN AT ELEVATION A A

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COMP. FILE NAME

REF.DRGNO.

INVENTORY NO.

REV.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CONTROL LOOP TEST FACILITY

BHARAT HEAVY ELECTRICALS LIMITED

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	T R Krishna			
CHD.	S Raghavachary			
APPD.	Dr. P B Gadhale			

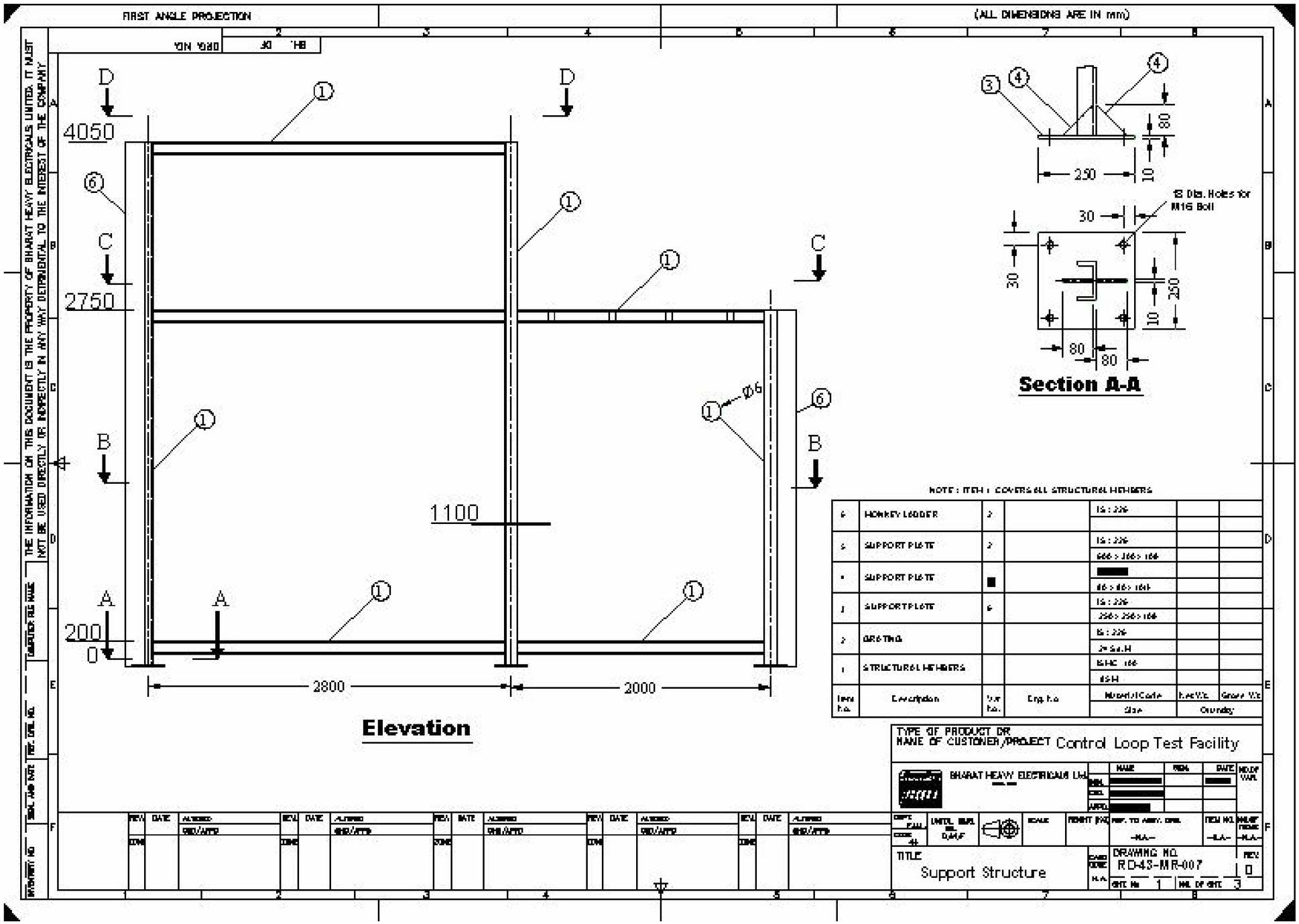
DEPT.	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
DNA					
CODE 043	NTS	---	---	---	--

TITLE: SCHEMATIC LAYOUT

DRAWING NO. RD-43-MR-006 REV. 00

SHEET NO. 01 NO OF SHEETS 01

TD-161/REV. 03 SIZE A3


FIRST ANGLE PROJECTION
(ALL DIMENSIONS ARE IN mm)
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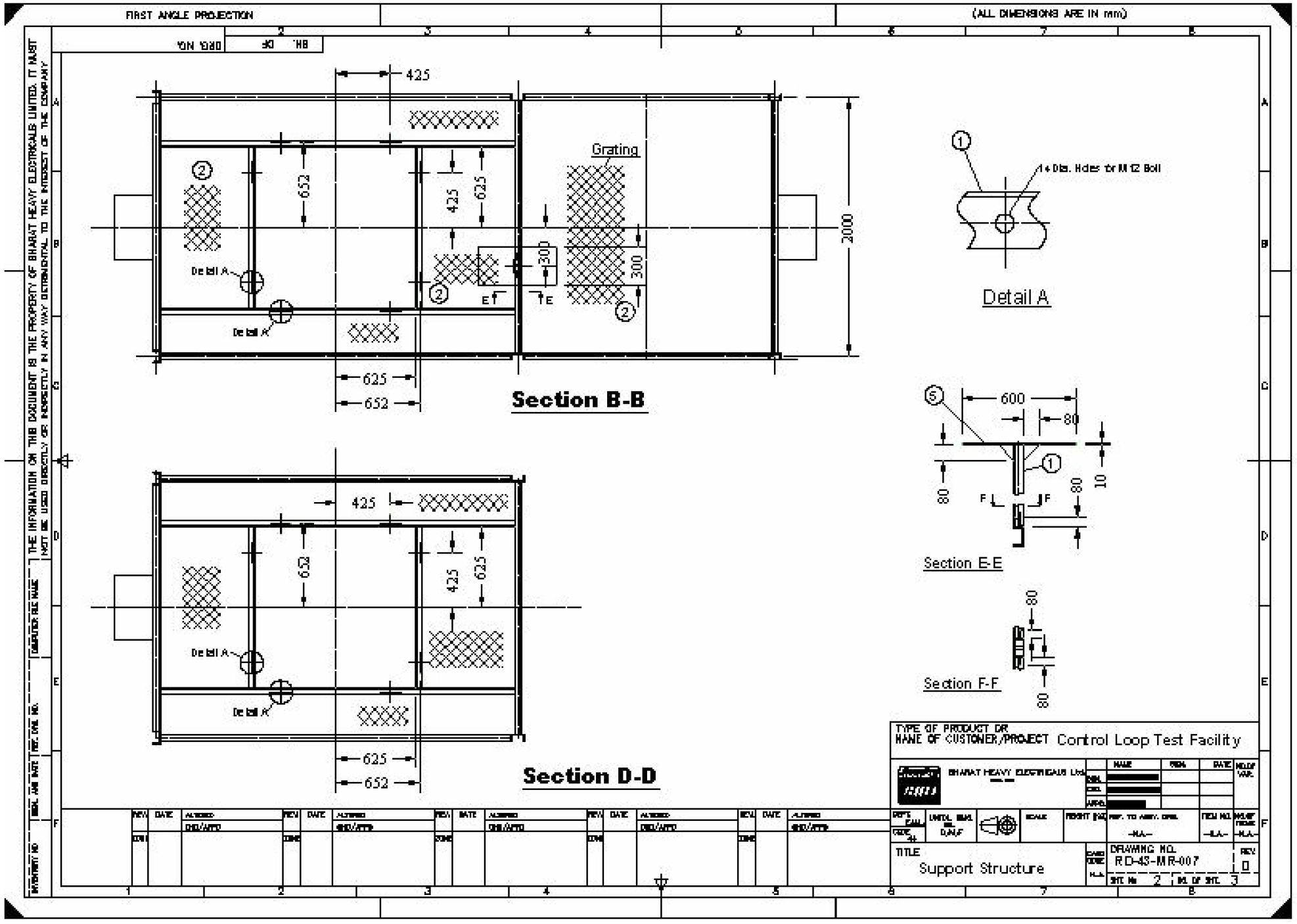
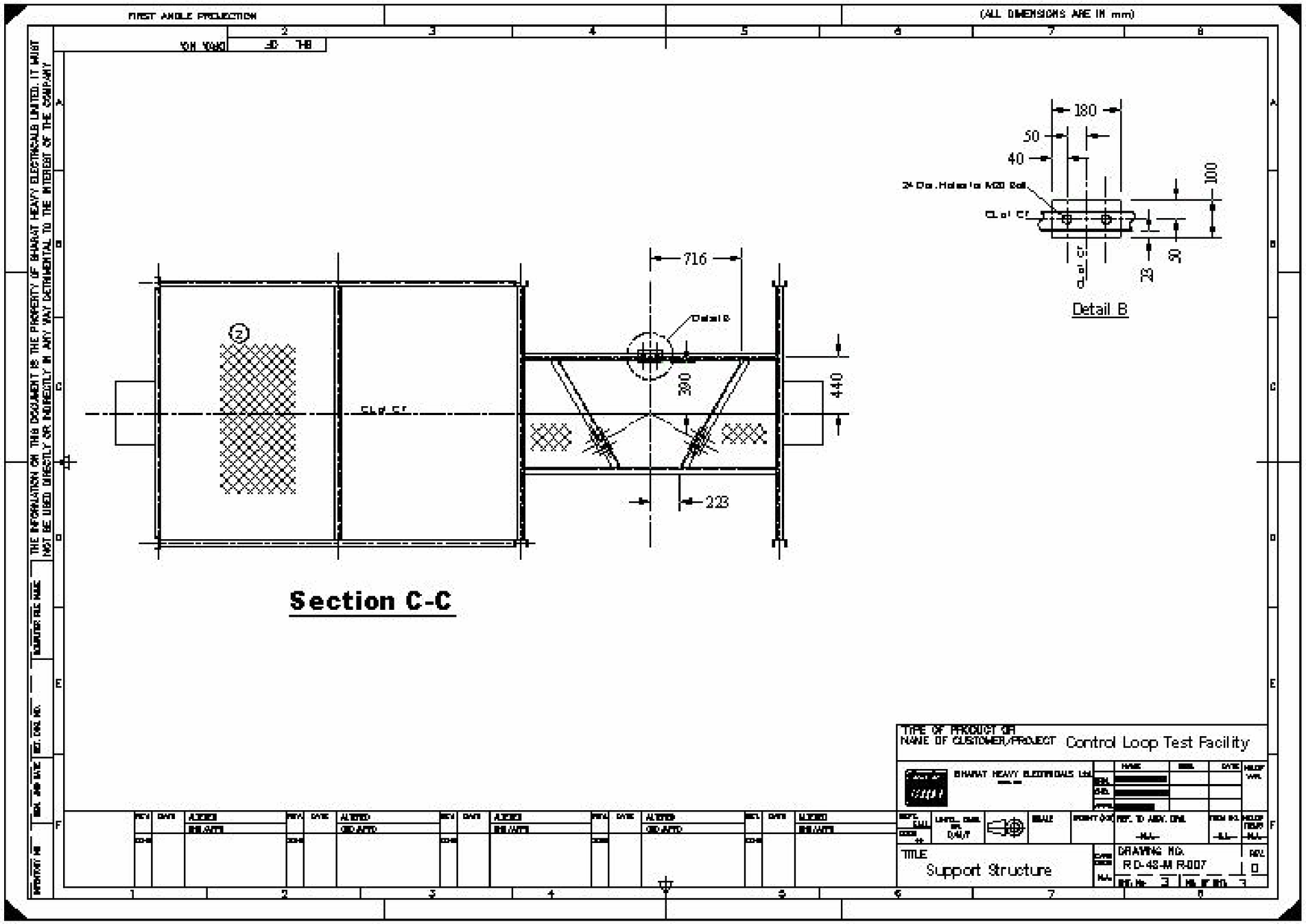
4050
2750
1100
200
0
2800
2000
Elevation
Section A-A
30
250
80
10
18 Dia. Holes for M16 Bolt
NOTE : ITEM 1 COVERS ALL STRUCTURAL MEMBERS
HOKEY LADDER
SUPPORT PLATE
SUPPORT PLATE
SUPPORT PLATE
GRATING
STRUCTURAL MEMBERS
Description
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT Control Loop Test Facility
BHARAT HEAVY ELECTRICALS LTD.
TITLE
Support Structure
DRAWING NO.
RD-43-MR-007
REV
0
SHT No 1
NO. OF SHT 3


FIRST ANGLE PROJECTION
(ALL DIMENSIONS ARE IN mm)
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY
425
652
425
625
Grating
300
300
2000
Detail A
Detail A
625
652
Section B-B
1
4 Dia. Holes for M12 Bolt
Detail A
600
80
80
10
80
F
F
Section E-E
425
652
425
625
Detail A
Detail A
625
652
Section D-D
80
80
Section F-F
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT Control Loop Test Facility
BHARAT HEAVY ELECTRICALS Ltd.
TITLE
Support Structure
DRAWING NO.
RD-43-MR-007
SHT No 2 NO OF SHT. 3
REV.
0


FIRST ANGLE PROJECTION
(ALL DIMENSIONS ARE IN mm)
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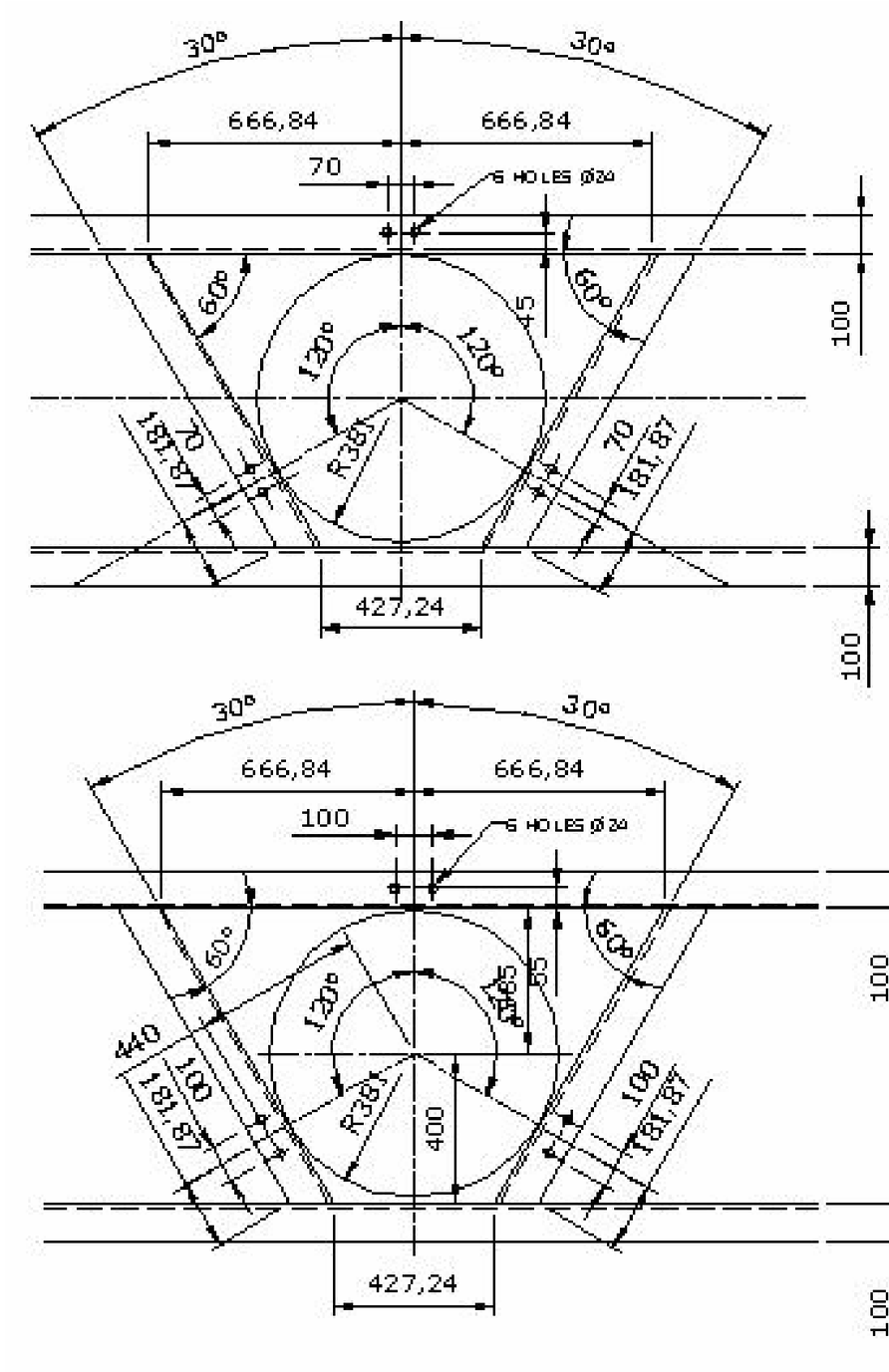
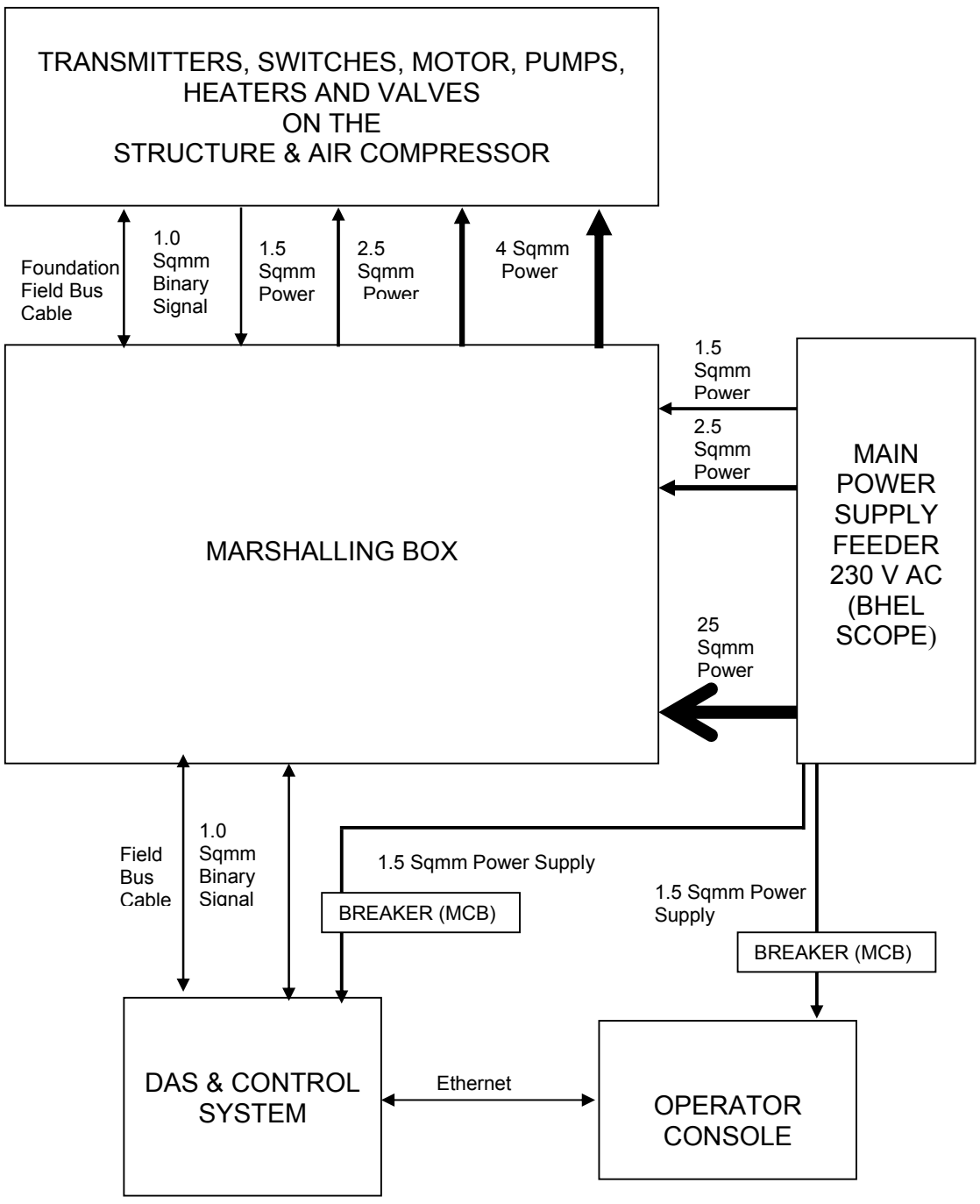
716
Detail B
390
440
223
CL of CT
Section C-C
180
50
40
100
50
23
Detail B
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
Control Loop Test Facility
BHARAT HEAVY ELECTRICALS Ltd.
TITLE
Support Structure
DRAWING NO.
RD-43-M R-007
REV
0


30°
30°
666,84
666,84
70
6 HOLES Ø24
60°
60°
45
100
120°
120°
70
181,87
R385
70
181,87
427,24
100
30°
30°
666,84
666,84
100
6 HOLES Ø24
60°
60°
55
100
120°
440
100
181,87
R385
400
100
181,87
427,24
100

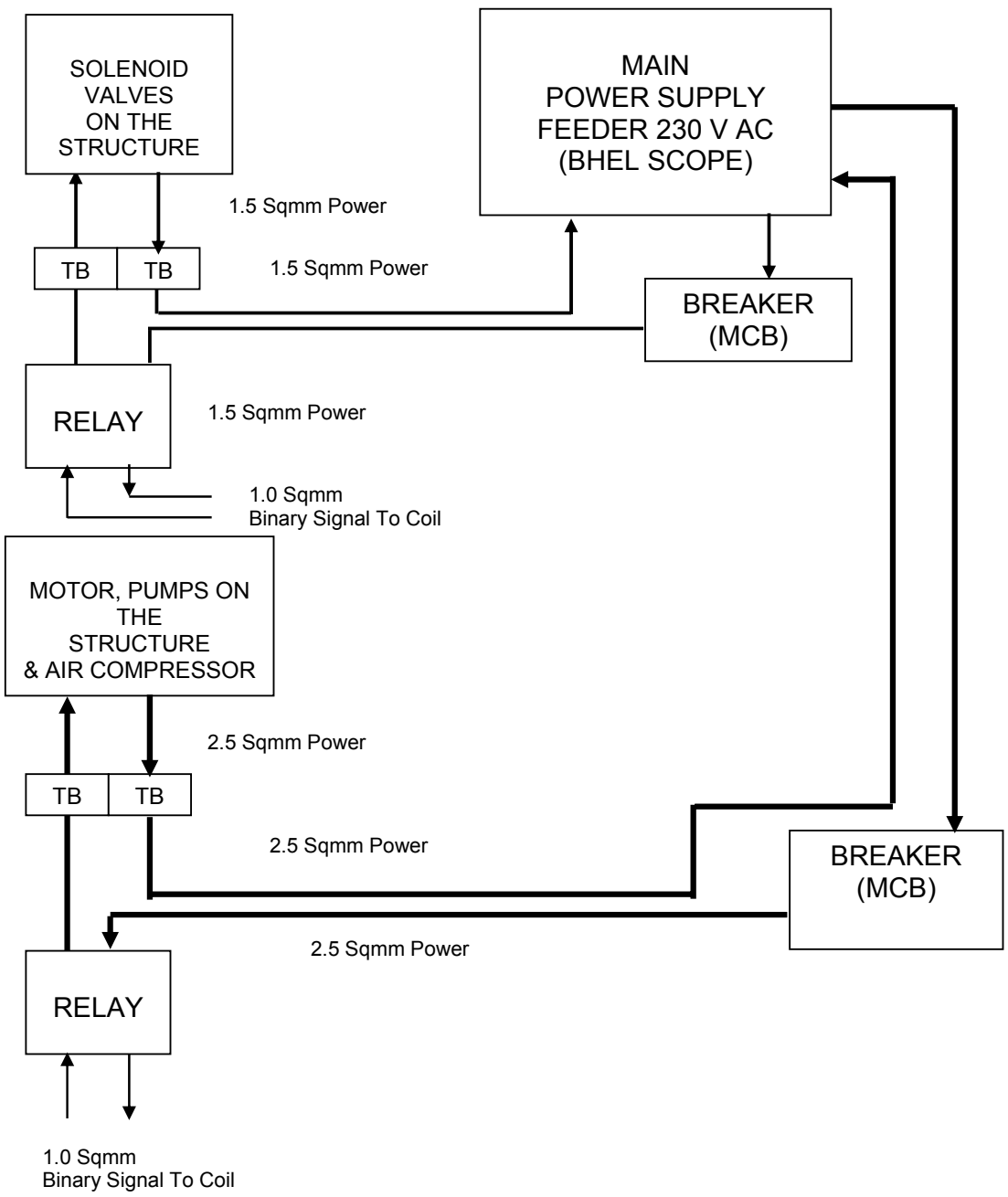
SECTION – V

ELECTRICAL WIRING DIAGRAMS

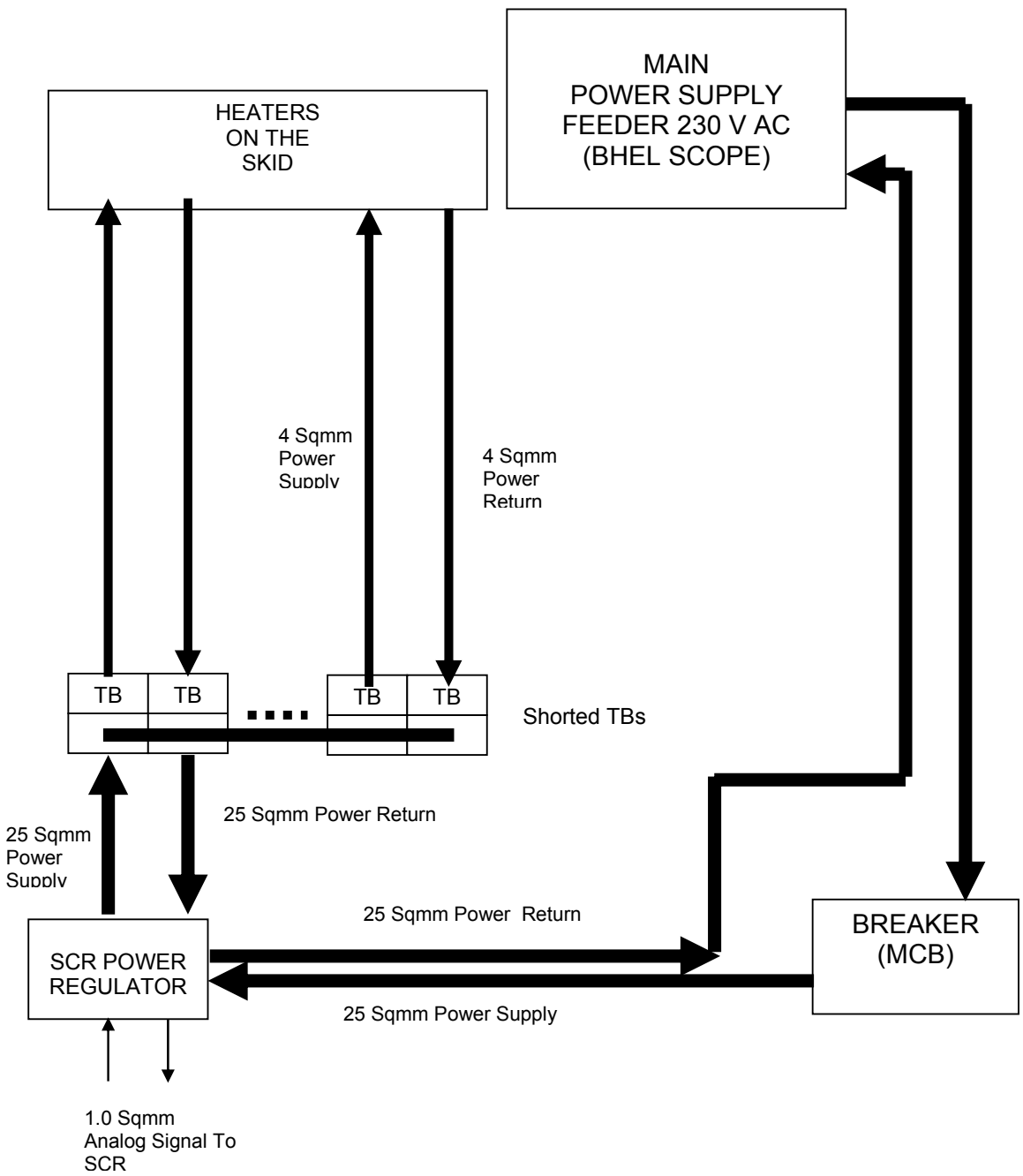
5.1 TYPICAL CABLING SCHEME FOR CLTF



5.2 TYPICAL WIRING SCHEME FOR RELAY IN MARSHALLING BOX



5.3 TYPICAL WIRING SCHEME FOR HEATERS IN MARSHALLING BOX



Note :

1. The above wiring diagram is only a guideline for the layout of Relays, Breakers (MCBs), SCR and TBs in a Marshalling Box.
2. Supplier to submit the detailed wiring diagram with the Offer.
3. Supplier should clearly indicate the earthing requirements both electrical and electronic for the entire system and submit detailed earthing scheme for approval before execution.
4. If needed to avoid power signal interference, Supplier to provide two Marshalling Boxes one for SCR and the other for instrument and control signals (Refer to the Note given in section VIII, 8.14.1).

SECTION – VI

SCHEDULE OF FIELD INSTRUMENTS

6.1 Field Instruments :

S.No	Tag No.	Description	Medium	Range / Setting
1	**PI01**	Feed Pump Discharge Pressure Indicator	Water	0 - 6 kgf/cm2
2	**PI02**	Drain Pump Discharge Pressure Indicator	Water	0 - 6 kgf/cm2
3	**FI01**	Recirculation Line Flow Indicator	Water	0 - 70 LPM
4	**FT01**	Main (feeding) Line Flow Transmitter	Water	0 - 70 LPM
5	**LT01**	Control Tank Level Transmitter	Water	0 - 850 mmWC
6	**LI01**	Control Tank Level Indicator	Water	0 - 850 mmWC
7	**TT01**	Control Tank Temperature Transmitter (with sensor)	Water	0 - 100 Deg C
8	**TI01**	Control Tank Temperature Indicator	Water	0 - 100 Deg C
9	**TS01**	Buffer Tank - **01** High Temperature Switch	Water	45 Deg C
10	**LS01**	Buffer Tank **- 01** High Level Switch	Water	500 mmWC
11	**LS02**	Buffer Tank **- 01** Low Level Switch	Water	225 mmWC
12	**LS03**	Buffer Tank **- 02** High Level Switch	Water	500 mmWC
13	**LS04**	Buffer Tank **- 02** Low Level Switch	Water	225 mmWC
14	**LS05**	Control Tank High Level Switch	Water	1037 mmWC
15	**LS06**	Control Tank Low Level Switch	Water	387 mmWC

Note :

1. For Detailed Technical Specifications of the above items, please refer to the concerned data sheets.

SECTION – VII

TECHNICAL SPECIFICATIONS FOR MECHANICAL EQUIPMENT

7.1 Control Tank :

Quantity : 1 No.

Make : Fabricated as per BHEL requirements given below and relevant sections like Section IV.

7.1.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	CT01	
2	Type	Cylindrical with dished ends on both sides connected by flanges	
3	Material of Construction	SS304	
4	Sheet Thickness	4 mm	
5	Thickness of Dished Ends	6 mm	
6	Diameter of Cylinder (ID)	650 mm	
7	Height of Cylinder	1100 mm	
8	Max. Height of Dished Ends	456 mm	
9	Total Height of Tank	2012 mm	
10	Design Pressure	4 Kgf / cm^2	
11	Design Temperature	100 Deg C	
12	Thermal Insulation	Thermo-wool for a temp. diff. of about 25 Deg C	
11	Stirrer with Motor	To be provided	
12	Tapping Points	As per Section - IV	

Note :

1. Permissible Manufacturing Tolerance shall be ± 2%.
2. Stirrer shall be supported at the bottom also and designed for level of 700 mm in the vessel. Stirrer Motor to operate on 230 V AC Power Supply.
3. Test Certificates and Material Quality Certificates shall be submitted for approval.
4. Supplier to indicate the Place of Manufacture in the Offer.

7.2 Buffer Tank :

Quantity : 2 Nos.

Make : Fabricated as per BHEL requirements given below and relevant sections like Section IV.

7.2.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag Nos.	BT01, BT02	
2	Type	Rectangular	
3	Material of Construction	SS304	
4	Sheet Thickness	4 mm	
5	Length	1338 mm	
6	Breadth	1330 mm	
7	Height	676 mm	
8	Design Pressure	4 Kgf / cm^2	
9	Design Temperature	100 Deg C	
10	Tapping Points	As per Section - IV	

Note :

1. Permissible Manufacturing Tolerance shall be ± 2%.
2. Test Certificates and Material Quality Certificates shall be submitted for approval.
3. Supplier to indicate the Place of Manufacture in the Offer.

7.3 Pump :

Quantity : 2 Nos.

Make : M/s Texmo

7.3.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag Nos.	FP1, DP1	
2	Process Fluid	Water	
3	Type	Mono-block ,Heavy Duty, Cast Iron Body & Self Priming Type	
4	Power Rating	0.5 HP	
5	Power Supply	230 V AC Single Phase	
6	Suction Pipe Size	25 mm (1" NB)	
7	Discharge Pipe Size	25 mm (1" NB)	
8	Flow Characteristics	24 m head at about @ 20 LPM & 6 m head at about @ 42 LPM	

Note :

1. Supplier to enclose pump characteristics of the pump with the Offer.
2. One Non Return Valve for horizontal installation is to be provided in the discharge line of each pump.

7.4 Heater :

Quantity : 5 Nos.

Make : M/s Electrocell, Hyd

7.4.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	HT1A, HT1B, HT1C, HT1D, HT1E	
2	Process Fluid	Water	
3	Type	Immersion	
4	Material of Construction	SS316	
5	Entry	Bottom	
6	Immersion Length	About 10”	
7	Process Connection	2” NPT / Flange	
8	Design Pressure	4 Kgf / cm^2	
9	Design Temperature	100 Deg C	
10	Power Rating	2 kW each (Total 10 kW)	
11	Tapping Points	As per Section - IV	

Note :

1. Total heating capacity required is 10 kW.

7.5 Air Compressor :

Quantity : 1 No.

Make : M/s ELGI

7.5.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	CS01	
2	Capacity	SCFM with 45 L (litres) tank	
3	Design Pressure	7 Kgf / cm^2	
4	Power Supply	230 VAC, Single Phase	
5	Accessories	a) Pressure switch	
		b) Air Drying Unit	
		c) Air Filter Regulator Unit	
		d) Starter	
		e) Pressure Indicator	
6	Type	**OIL FREE**, Single Stage	
7	Portable	Yes	

Note :

1. Air Filter Regulator shall be M/s SHAVONOGREN Make.
2. Air Dryer shall be of M/s Trident Make and Model No. DSP 5.

7.6 Solenoid Valve :

Quantity : 10 Nos.

Make : M/s Avcon

7.6.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	LV1, LV2, LV3, LV4, FV2, FV3, FV4, TV1, TV2, DV4	
2	Process Fluid	Water	
3	Max. Pressure	4 Kgf / cm^2	
4	Max. Temperature	75 Deg C	
5	Type	2-way, power to open	
6	Coil Voltage	230 V AC, Single Phase	
7	Material of Construction	SS304	
8	Enclosure	Weather Proof	
9	Quantity & Size	3 Nos. of ½" NB	
		6 Nos. of 1" NB	
		1 No. of 1½" NB	
10	Connection	Flange Type	
11	Cable Entry	½" NPT(F)	

Note :

1. FV2, FV3 and FV4 are of ½"size, LV3 is of 1 1/2" size and others are of 1" size.
2. List of Valves required (total) are given in the table at the end of the section.

7.7 Globe Valve :

Quantity : 7 Nos

Make : M/s Valmax

7.7.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	DV1, DV2, DV3, RV1, RV2, RV3, RV4	
2	Process Fluid	Water	
3	Max. Pressure	4 Kgf / cm^2	
4	Max. Temperature	75 Deg C	
5	Material of Construction	SS304	
6	Quantity & Size	3 Nos. of ½" NB	
		4 Nos. of 1" NB	
7	Connection	Flange Type	

Note :

1. DV1, DV2 and DV3 are of ½"size, and the rest are of 1" size.
2. List of Valves required (total) are given in the table at the end of the section.

7.8 Gate Valve :

Quantity : 21 Nos.

Make : M/s Valmax

7.8.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	IV1, IV2, IV3, IV4, IV5, IV6, IV7, IV8, IV9, IV10, IV11, IV12, IV13, IV14, IV15, IV16, BV1, BV2, BV3, BV4, FV1	
2	Process Fluid	Water	
3	Max. Pressure	4 Kgf / cm^2	
4	Max. Temperature	75 Deg C	
5	Material of Construction	SS304	
6	Quantity & Size	4 Nos. of ½" NB	
		2 Nos. of 3/4" NB	
		14 Nos. of 1" NB	
		1 No. of 1 1/2" NB	
7	Connection	Flange Type	

Note :

1. IV3, IV8, IV9 and IV14 are of ½" size, IV10, IV11 are of ¾" size, FV1 is of 1 ½" size and the rest are of 1" size.
2. List of Valves required (total) are given in the table at the end of the section.

7.9 Stainless Steel Tubing :

Quantity : Refer to the Main Specifications given below.

Make : Material of Reputed Make subject to BHEL Approval.

7.9.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Process Fluid	Water	
2	Max. Pressure	4 Kgf / cm^2	
3	Max. Temperature	75 Deg C	
4	Type	Seamless (Stainless)Tubing SCH 40	
5	Material	SS304	
6	Quantity & Size		
		1/4” NB Quantity As required (Refer to the Note given below)	
		½” NB Quantity As required (Refer to the Note given below)	
		¾” NB Quantity As required (Refer to the Note given below)	
		1” NB Quantity As required (Refer to the Note given below)	
		1 1/2” NB Quantity As required (Refer to the Note given below)	

Note :

1. **Supplier to quote lump-sum and unit rates** for the material.

7.10 Structure :

Quantity : 1 No.

Make : Material of Reputed Make subject to BHEL Approval (refer to the Note given below).

7.10.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Material	Carbon Steel	
2	Quantity of the material	As required (Refer to the Note given below)	
3	Size	Supplier to Furnish details	
4	Exposure	0 – 70 Deg C and 0 – 100% RH	
5	Construction	Welded Type	
6	Finish	Should be free from all wielding marks & should be smooth	
7	Painting	Red oxide Primer to be applied and finished with good quality paint. Color: TA Grey	

Note :

1. **Supplier to quote lump-sum and unit rates** for the material.

7.11 Mechanical Equipment Accessories :

1) Stirrer with Motor shall be of M/s REMI Make and Model No. RQ134 H/D.

2) Non-returnable Valves for pump shall be of reputed Make and good quality (subject to BHEL approval).

3) Fittings and other items required to complete the system shall be of reputed Make and good quality (subject to BHEL approval).

7.12 Table for Requirement of Valves (Total) :

S.No.	Valve	Solenoid			Gate				Globe		Control	Total				Net
	Size	1/2"	1"	1 1/2"	1/2"	3/4"	1"	1 1/2"	1/2"	1"	1"	1/2"	3/4"	1"	1 1/2"	
1	**BV**	0	0	0	0	0	4	0	0	0	0	0	0	4	0	**4**
2	**CV**	0	0	0	0	0	0	0	0	0	2	0	0	2	0	**2**
3	**DV**	0	1	0	0	0	0	0	3	0	0	3	0	1	0	**4**
4	**FV**	3	0	0	0	0	0	1	0	0	0	3	0	0	1	**4**
5	**IV**	0	0	0	4	2	10	0	0	0	0	4	2	11	0	**16**
6	**LV**	0	3	1	0	0	0	0	0	0	0	0	0	3	1	**4**
7	**RV**	0	0	0	0	0	0	0	0	4	0	0	0	3	0	**4**
8	**TV**	0	2	0	0	0	0	0	0	0	0	0	0	2	0	**2**
	Total	**3**	**6**	**1**	**4**	**2**	**14**	**1**	**3**	**4**	**2**	10	2	26	2	**40**

SECTION – VIII

TECHNICAL SPECIFICATIONS FOR INSTRUMENTS AND CONTROL EQUIPMENT

8.1 Level Transmitter :

Quantity : 1 No.

Make : M/s Smar, M/s Honeywell, M/s Emerson, M/s Yokogawa

8.1.1 Main Specifications:

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	LT01	
2	Calibration Range	0 – 850 mmWC	
3	Process Fluid	Water	
4	Process line pressure	1 kgf / cm^2 (max)	
5	Temperature Range	5 deg C to 70 deg C	
6	Over Pressure and Static Pressure Limits	1 kgf / cm^2 (max)	
7	Power supply	24 V DC	
8	Output	Digital signal complying to **Foundation Fieldbus protocol**	
9	Indicator	4 1/2 digit numerical and 5 character alpha numerical LCD indicator with display in Engg. Units	
10	Zero / Span	Local adjustment to be provided	
11	Accuracy	+/-0.075%	
12	Repeatability	+/- 0.025%	
13	Enclosure	Weather proof and intrinsically safe confirming to NEMA – 4X standard	
14	Humidity limits	0 to 100 % RH	
15	Power Supply Effect	+/- 0.005% of calibrated span per volt	
16	Electro-magnetic Effect	Should comply with IEC 801	
17	Diaphragm material	SS 316L	

18	Process Head material	SS 316	
19	Vent and drain valves	SS 316	
20	Cable Entry	1/2”NPTF (2 Nos.)	
21	Surge Protection	Required	
22	Accessories	a) Mounting bracket	
		b) 5-way valve manifold	

8.2 Flow Transmitter with Integral Orifice:

Quantity : 1 No.

Make : M/s Smar, M/s Honeywell, M/s Emerson, M/s Yokogawa

8.2.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	FT01	
2	Calibration Range	0 – 70 LPM	
3	Process Fluid	Water	
4	Process pipe size	1” NB	
5	Temperature Range	5 deg C to 70 deg C	
6	Process line pressure	4 kgf / cm^2 (max)	
7	Over Pressure and Static Pressure Limits	6.0 kg / cm^2	
8	Power supply	24 V DC	
9	Output	Digital signal complying to **Foundation Fieldbus protocol**	
10	Indicator	4 1/2 digit numerical and 5 character alpha numerical LCD indicator with display in Engg. Units	
11	Zero / Span	Local adjustment to be provided	
12	Accuracy	+/-0.075%	
13	Repeatability	+/- 0.025%	
14	Enclosure	Weather proof and intrinsically safe confirming to NEMA – 4X standard	
15	Humidity limits	0 to 100 % RH	
16	Power Supply Effect	+/- 0.005% of calibrated span per volt	
17	Electro-magnetic Effect	Should comply with IEC 801	
18	Diaphragm material	SS 316L	
19	Process Head material	SS 316	
20	Vent and drain valves	SS 316	

21	Cable Entry	1/2”NPTF (2 Nos.)	
22	Surge Protection	Required	
23	Accessories	a) Mounting bracket	
		b) Manifold	
		c) Companion flanges	

8.3 Temperature Transmitter:

Quantity : 1 No.

Make : M/s Smar, M/s Honeywell, M/s Emerson, M/s Yokogawa

8.3.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	TT01	
2	Calibration Range	0 – 100 Deg C	
3	Process Fluid	Water	
4	Type of Input	4 wire RTD (PT100)	
5	Process line pressure	1 kgf /cm^2 (max)	
6	Temperature Range	5 deg C to 70 deg C	
7	Power supply	24 V DC	
8	Output	Digital signal complying to **Foundation Fieldbus protocol**	
9	Indicator	4 1/2 digit numerical and 5 character alpha numerical LCD indicator with display in Engg. Units	
10	Zero / Span	Local adjustment to be provided	
11	Accuracy	+/-0.075%	
12	Repeatability	+/- 0.025%	
13	Enclosure	Weather proof and intrinsically safe confirming to NEMA – 4X standard	
14	Humidity limits	0 to 100 % RH	
15	Power Supply Effect	+/- 0.005% of calibrated span per volt	
16	Electro-magnetic Effect	Should comply with IEC 801	
17	Cable Entry	1/2”NPTF (2 Nos.)	
18	Surge Protection	Required	
19	Accessories	a) Mounting bracket	

Note :

1. Supplier can quote either Temperature Transmitter of Integral type (Transmitter plus 4 wire RTD sensor), or Transmitter and 4 wire RTD separately.
2. Refer to section VIII 8.9 for Specifications of RTD.

8.4 Temperature Indicator :

Quantity : 1 No.

Make : M/s H. Guru, M/s GI Consortium

8.4.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	TI01	
2	Indication Range	0 – 100 Deg C with 2 Deg C resolution	
3	Process Fluid	Water	
4	Well Connection to equipment	¾ “ NPT (M)	
5	Instrument Connection to well	½ “ NPT (F)	
6	Type	Rigid stem filled with mercury	
7	Immersion length of Stem	200 mm	
8	Dial Size	100 mm	
9	Dial Colour	White with black markings	
10	Window Material	Shutter proof glass	
11	Location of Instrument Connection	Bottom	
12	Enclosure	Weather proof	
13	Zero Adjustment	To be provided	
14	Bulb Material	SS316	
15	Bulb Diameter	8 mm	
16	Bulb Connection	½ “ NPT (M)	
17	Thermo well Material	SS304	
18	Thermo well Construction	Fabricated / Bar Stock	
19	Accuracy	+/-2% of FS	
20	Over Range Protection	130%	
21	Humidity limits	0 to 100 % RH	
22	Design Pressure	1 kgf /cm^2 (max)	

8.5 Pressure Indicator :

Quantity : 2 Nos.

Make : M/s H. Guru, M/s GI Consortium

8.5.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	PI01, PI02	
2	Indication Range	0 – 6 kg / cm^2 with 0.12 kg / cm^2 resolution	
3	Process Fluid	Water	
4	Process Connection	½ ” NPT (M)	
5	Type	Direct	
6	Bezel Ring	Screwed	
7	Dial Size	100 mm	
8	Dial Colour	White with black markings	
9	Window Material	Shutter proof glass	
10	Connection Location	Bottom	
11	Enclosure	Weather proof	
12	Zero Adjustment	To be provided	
13	Element type	Bourdon	
14	Element Material	SS316	
15	Socket Material	SS304	
16	Movement Material	SS316	
17	Max. Temperature of Process Fluid	70 Deg C	
18	Accuracy	+/-2% of FS	
19	Over Range Protection	130%	
20	Humidity limits	0 to 100 % RH	

8.6 Level Indicator :

Quantity : 1 No.

Make : M/s Levcon, M/s PUNE TECHTROL

8.6.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	LI01	
2	Indication Range	0 – 850 mmWC	
3	Process Fluid	Water	
4	Process Connection	¾ “ NPT (F)	
5	Instrument Connection	¾ “ NPT (M)	
6	Type	Tubular	
7	Gauge Size & material	16 mm dia & Boro-Silicate	
8	End Block Material	SS304	
9	End Block Type	Offset Needle Valve	
10	Gland Material	SS316	
11	Max. Temperature of Process Fluid	70 Deg C	
12	Scale	Aluminum Scale with 10 mm resolution	
13	Packing	PTFE	
14	Max. Test pressure	2 kgf / cm^2	
15	Accuracy	+/- 5 mm	
16	Guards	4 Rods made of SS304	

8.7 Temperature Switch :

Quantity : 1 No.

Make : M/s Switzer

8.7.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	TS01	
2	Switch Range / Setting	35 – 70 Deg C, adjustable in steps of 5 Deg C	
3	Process Fluid	Water	
4	Well Connection to tank	¾ “ NPT (M)	
5	Instrument Connection to well	½ “ NPT (M) adjustable gland	
6	Type	Rigid Stem	
7	Rigid Stem Length	250 mm	
8	Rigid Stem Diameter	8 mm	
9	Type of Switch	Micro switch	
10	No. of Contacts	2 NO + 2 NC	
11	Contact Rating	24 VDC	
12	Enclosure	Weather proof made of cast iron	
13	Thermowell Material	SS304	
14	Thermowell Construction	Fabricated / Barstock suitable for sensor	
15	Thermowell Connection sizes	¾” NPT (M) x ½” NPT (F)	
16	Thermowell Length	200 mm	
17	Accuracy	+/-2% of FS	
18	Over Range Protection	130%	
19	Cable Entry	1/2”NPTF (2 Nos.)	

Note :

1. Supplier shall supply the switch with the setting (Factory Calibration) as per Field Instrument Schedule (Section - VI).
2. The switch operation shall be tested for two or more settings in presence of BHEL representative and reset to original value before commissioning.

8.8 Level Switch :

Quantity : 6 Nos.

Make : M/s Levcon, M/s PUNE TECHTROL

8.8.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	LS01, LS02, LS03, LS04, LS05, LS06	
2	Switch Range / Setting	0 – 1000 mm WC, adjustable in steps of 25mm	
3	Process Fluid	Water	
4	Process Connection	2 “ ANSI # 150	
5	Instrument Connection	2 “ ANSI # 150	
6	Type	Side mounted & float operated	
7	Max. Temperature of Process Fluid	70 Deg C	
8	Type of Switch	Micro switch	
9	No. of Contacts	2 NO + 2 NC	
10	Contact Rating	24 VDC	
11	Enclosure	Weather proof	
12	Accuracy	+/-2% of FS	
13	Over Range Protection	130%	
14	Cable Entry	1/2”NPTF (2 Nos.)	

Note :

1. Supplier shall supply the switch with the setting (Factory Calibration) as per Field Instrument Schedule (Section - VI).
2. The switch operation shall be tested for two or more settings in presence of BHEL representative and reset to original value before commissioning.

8.9 RTD :

Quantity : 1 No.

Make : M/s GI Consortium, M/s Key Controls

8.9.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Type	PT100, 4 wire, Duplex compatible with Temperature Transmitter	
2	Process Fluid	Water	
3	Element Diameter	6 mm	
4	Immersion Length	250 mm	
5	Sheath Material	SS316	
6	Sensor Connection to well	½" NPT (M) adjustable gland	
7	Cable Entry	½" NPT(F)	
8	Enclosure	Weather proof	
9	Thermowell Material	SS304	
10	Thermowell Construction	Fabricated / Barstock	
11	Thermowell Connection to tank	¾ " NPT (M)	
12	Thermowell Length	200 mm	
13	Accuracy	DIN Standard	
14	Over Range Protection	130%	
15	Humidity limits	0 to 100 % RH	
16	Head	Die cast Aluminum	
17	Max. Pressure	1 kgf /cm^2	

8.10 Control Valve :

Quantity : 2 Nos.

Make : M/s Instrumentation Limited, M/s Dresser Valve India Pvt. Ltd., M/s Emerson Process Management, M/s Samson

8.10.1 Main Specifications for Control Valve :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	FCV1, LCV1	
2	Process Fluid	Water	
3	Valve assembly	Single seated Globe Valve with Top guided Plug	
4	Total System Pressure Drop	0.6 kgf /cm^2 (Min.) & 2.4 kgf /cm^2 (Max.)	
5	Flow rate	5 LPM (Min.), 20 LPM (Normal) & 55.0 LPM (Max.)	
6	Pipe Size	1”NB	
7	End Connection	Flanged	
8	Max. Temperature	70 deg C	
9	Valve body	CS ASTM A 216 WCC	
10	Trim	SS316	
11	Packing	Teflon /PTFE	
12	Body Gasket	SS 316	
13	Flow characteristics	Equal Percentage for FCV1 & Linear for LCV1	
14	Rangeability	30:1	
15	Bonnet	Standard	
16	Hysteresis	1% FS or less	
17	Linearity	+/- 1% FS or less	
18	Leakage	Confirm to Class 6	
19	Max. Allowable press. Drop	30% of the line pressure in the range of flow rates	
20	Actuator / Positioner	**Digital Signal based on Foundation Fieldbus Protocol**	
21	Position Transmitter	**Digital Signal based on Foundation Fieldbus Protocol**	
22	Limit Switches	(2 NO + 2 NC) for Open & Close Status	
23	Hand Wheel	Required	
24	Accessories	a) Companion flanges	

Note :

1. Suitable Control Valves are to be selected based on Cv calculations, line size and application. Their details along with Cv calculations are to be enclosed with the Offer for scrutiny by BHEL.

8.11 SCR Power Regulator :

Quantity : 1 No.

Make : M/s Eurotherm

8.11.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	SCR1	
2	Power Supply	230 V AC Single Phase 50 Hz	
3	Input	4-20 mA DC	
4	Output	230 V AC	
5	Current Rating	50 A	
6	Control Mode	Phase Angle	
7	Remote Control Operation	Required	
8	RS-485 Interface	Required	
9	Protection	Over Current Trip and Over Temp. Trip	
10	Indication	Input and Output Current	
11	Soft Start	Programmable	
12	Alarm	With built in buzzer	
13	Built in Watch Dog Timer	Required	
14	Output Current Limitation	To be provided	
15	Load	Resistive	

Note :

1. Supplier to indicate whether **external cooling** is required and provide fan(s) in the Marshalling Box in which the SCR will be housed.
2. Operation of SCR Power regulator will be from **Remote Only** with the input (4-20 mA DC) coming from DAS & CONTROL SYSTEM.
3. Supplier to house the SCR with its MCBs, TBs etc. in separate Marshalling Box to avoid power interference.

8.12 Flow Indicator :

Quantity : 1 No.

Make : M/s Instrumentation Engineers Ltd. ., M/s Eureka

8.12.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	FI01	
2	Type	Rotameter	
3	Span Range	0 – 70 LPM	
4	Scale	LPM	
5	Process Fluid	Water	
6	Process pipe size	1” NB	
7	Max. Temperature of process fluid	70 Deg C	
8	Process line pressure	4 kgf /cm^2 (max)	
9	Over Pressure and Static Pressure Limits	6.0 kg / cm^2	
10	Zero adjustment	To be provided	
11	Accuracy	+/-2%	
12	Humidity limits	0 to 100 % RH	
13	Accessories	a) Mounting brackets	

8.13 Relay :

Quantity : 20 Nos.

Make : M/s OEN, M/s Jyothi, M/s Pla,
M/s Honeywell

8.13.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	RY1, RY2, RY3, RY4, RY5, RY6, RY7, RY8, RY9, RY10, RY11, RY12, RY13, RY14, RY15, RY16, RY17, RY18, RY19, RY20	
2	Input to coil	24 V DC	
3	Contact Rating	230 V AC @ 5A	
4	Contact Type	2 NO + 2 NC	
5	Manual operation	Required	
6	LED Indication	Required	

8.14 Marshalling Box :

Quantity : 1 No. (Refer to the Note given below)

Make : Fabricated as per BHEL requirements given below and relevant sections like Section V.

8.14.1 Main Specifications :

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Tag No.	MB1	
2	Type	Standard Industrial grade	
3	To house	SCR	
		Relays	
		TBs	
		Breakers (MCBs)	
4	Locking feature	Yes	
5	Provision for glands	Yes	
6	Cooling Fan & Provision for Fan	If required for SCR	

Note :

1. Supplier to indicate the Make and enclose the technical catalog with Offer for approval by BHEL.
2. Refer to the Note given in Section V, 5.2 and Section VIII, 8.11.

8.15 Instruments & Control Equipment Accessories :

1. For pneumatic signal, SS304 tubing of ¼" NB shall be used (Detailed Technical Specifications are given in Section 7.2.9.1).
2. Impulse piping shall be of ½" NB SS304 tubing (Detailed Technical Specifications are given in Section 7.2.9.1).
3. Signal Cable shall be of 1 mm^2, Single Pair, Shielded, Multi-strand, Unarmoured type and of Ms Finolex / HCL Make.
4. Power Distribution Cable for Solenoid Valves and Power Supplies shall be of 1.5 mm^2, 3-Core, Multi-strand, Unarmoured type and of Ms Finolex / Radiant Make.
5. Power Distribution Cable for Stirrer Motor, Pumps, Air Compressor and Power Supplies shall be of 2.5 mm^2, 3-Core, Multi-strand, Unarmoured type and of Ms Finolex / Radiant Make.
6. Power Distribution Cable from SCR Power Regulator to Heaters shall be of 4 mm^2, 3-Core, Multi-strand, Unarmoured type and of Ms Finolex / Radiant Make.
7. Power Supply Cable for SCR Power Regulator shall be of 25 mm^2, 3-Core, Multi-strand, Unarmoured type and of Ms Finolex / Radiant Make.
8. TBs should be of spring loaded type of M/s Wago Make and separate TBs are to be used for different current ratings.
9. Breakers (MCBs) should be of M/s Schidner Make.
10. Glands / Bulk Head Unions shall be of SS material.
11. Cable Conduits shall be of GI material and reputed Make.
12. 5-way Manifolds, mountings, supports shall be of reputed Make and industrial grade as recommended by OEMs (subject to BHEL approval).
13. Any other items required to complete the system shall be of reputed Make and industrial grade (subject to BHEL approval).

SECTION – IX

TECHNICAL SPECIFICATIONS FOR ELECTRONIC EQUIPMENT

9.1 DAS & Control System :

Make : M/s National Instruments, M/s Yokogawa, M/s Emerson Process Management

Quantity : 1 Set

9.1.1 Main Specifications:

Sl. No.	Description	Acceptance Criteria	Supplier Remarks
1	DAS & Control System comprising the Hardware and Software for supporting: a) 8 Analog Input Signals (minimum) b) 8 Analog Output Signals (minimum) c) 24 Binary Input Signals (minimum) d) 24 Binary Output Signals (minimum) e) Real Time Processing and Control f) Running **BHEL developed** C or C++ or Java programs in Real Time Processor Likely Hardware : 1) Embedded Real Time Processor with Ethernet Interface 2) Discrete Input Module(s) giving out 24 V DC as sensing voltage (24 channels) 3) Discrete Output Module(s) giving out 24 V DC as driving voltage (24 channels) 4) Analog Output Module(s) giving out 4-20 mA DC (8	As detailed in the Note given below	

	channels) 5) Foundation Fieldbus Interface Module(s) Likely Software : 1) HMI, Development Tool Kit Software 2) Real Time Operating System Software 3) Data logging & Supervisory Control Software 4) Foundation Fieldbus Device(s) Configuring Software 5) Control Tool Kit		

Note :

Electronic Equipment also includes an Operator Console (PC) along with the DAS & Control System with accessories. The **Functional Architecture** of this system is shown in Fig. 9.1 and is detailed below.

1. **DAS & Control System :**

   a. Hardware and Software of DAS & Control System shall be used for:

      I. Scanning & retrieving the data from process / field instruments, processing the data based on user (BHEL) defined control sequence / algorithms in (its) Real Time Processor Unit and sending the control data to field for Real Time Control of the process in user (BHEL) configurable cyclic mode.

      II. Sending data to and receiving data from Operator Console via Ethernet.

b. Details of Hardware and Software requirements are as follows.

I. The Control Loop Test Facility has three (3) transmitters (Level, Flow, Temperature), two (2) Control Valve Commands and their two (2) Position Feedback Signals all of which are **Digital Signals based on Foundation Fieldbus Protocol**. DAS & Control System should have suitable hardware interface modules to receive and transmit these Signals.

II. The DAS & Control System should have the provision for generating 4-20mA Signal needed for SCR Power Regulator.

III. The Control Loop Test Facility has ten (10) Solenoid Valves, seven (7) Switches, two (2) Pumps, one (1) Stirrer and one (1) Air Compressor all of which are **Binary Signals**. DAS & Control System should have suitable Binary Input and Output modules to receive or transmit these Signals. The output signals shall be operated from DAS & Control System via Interposing Relays (Refer to the Section - V for the wiring guidelines). Binary output modules should give 24V DC supply (self powered type) to energize the relays in the Marshalling Box. Binary input modules should use 24V DC supply (self powered type) as sensing voltage.

IV. **DAS & CONTROL SYSTEM should be capable of using 230 V AC as it's input Power Supply and no separate DC supply will be provided by BHEL**.

V. Software should be available in modular packages.

VI. **DAS & CONTROL SYSTEM Software** shall have the modules for:

1) Configuring Foundation Fieldbus (for various instruments and components of the entire electronic equipment).
2) Creating GUIs of the entire process.
3) Data logging and Supervisory Control (HMI).
4) Drivers for RS-232, GPIB, DAQ, Development Toolkits.
5) Simulating the process signals, obtaining the field data obtained from Real Time Processor via Ethernet and storing it for later use (long term storage).
6) Viewing the data in various forms like bar charts, graphs.
7) Real time Software, drivers for embedded CPU.
8) Control Tool Kit including PID Control and Fuzzy Logic.
9) Direct interface to MATLAB programs.

VII. DAS & CONTROL SYSTEM Software shall ensure that **C or C++ or Java programs (developed by BHEL)** can be downloaded into its Real Time Processor to control the process in Real Time.

VIII. DAS & CONTROL SYSTEM Software should have advanced control toolboxes / modules like Fuzzy Logic etc.

IX. DAS & CONTROL SYSTEM Software shall be **OPC Compliant** for communicating and exchanging data with third party software (This package can be quoted as optional if is modular).

2. **Operator Console :**

   a. Operator Console shall be preloaded with latest licensed version of Windows XP OS and other software as present in a standard PC before loading the DAS & Control System Software.

   b. Operator Console loaded with DAS & Control System Software (along with standard PC software) shall function as Human Machine Interface (HMI) for

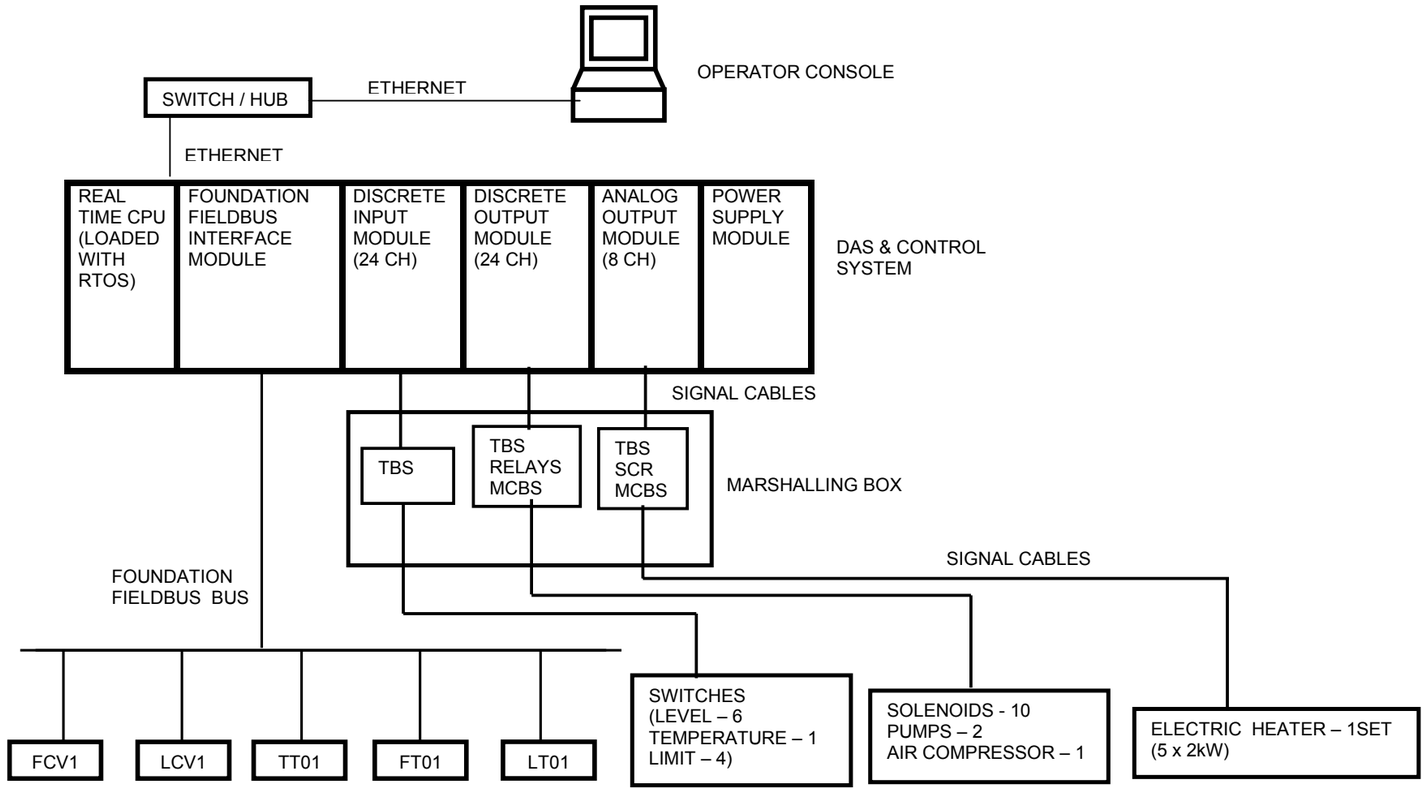
      I. Configuring various components of DAS & Control System including the Foundation Fieldbus Components.

      II. Downloading the C or C++ or Java programs (developed by BHEL) into Real Time Processor Unit of DAS & Control System.

      III. Storing data for historical use.

      IV. Issuing user commands & viewing the present & historical data.

Fig. 9.1 ARCHITECTURE OF ELECTRONIC EQUIPMENT



9.2 <u>Operator Console Specifications :</u>

Make : M/s Compaq, M/s IBM, M/s Acer

Quantity : 1 Set

S.No.	Description	Acceptance Criteria	Supplier Remarks
1	Make / Model	Supplier to Specify	
2	Processor	Intel Pentium D 820 (2.8 Ghz Dual core) Processor	
3	L2 Cache	2-MB L2 cache	
4	Front Side Bus (FSB)	800-MHz FSB	
5	Motherboard	OEM's own motherboard or Intel Original (Management agent should show the revision level*)	
6	Chipset	Intel 945G Express Or Higher Intel chipset with Dual Channel Memeory Architecture	
7	RAM	1GB (2x512MB) non-ECC DDR2 PC2-4200(533-MHz) Expandable to up to 4GB (4 Slots)	
8	HDD	80GB SATA 3.0-Gb/s Hard Disk Drive (7200 rpm)	
9	FDD	1.44 MB	
10	Optical Drive	24x or higher CD & DVD Writer Combo (OEM Make)	
11	Monitor (Asset Controlled)	17" TFT LCD Monitor (Same Make as PC) with 1280 x 1024 @ 75 Hz, Energy Star Compliant & MPR-II Compliant	
12	Graphics	Intel Graphics Media Accelerator 950 graphics with 8MB to 128 MB Shared form Main Memory (Dynamic Video Memory Technology). Should support latest software interfaces for application support over system lifetime (DX9, OpenGL 1.4)	

13	Keyboard	USB Minimum 104 keys Keyboard (OEM).	
14	Mouse	OEM USB 2 Button Optical Scroll Mouse with Mouse Pad	
15	Audio	Integrated Intel® High Definition Audio, AC'97/20-bit audio with internal speaker	
16	Ethernet	Integrated (on-board) Gigabit (10/100/1000) with RJ45 port with WOL, PXE & ASF (Alert Standard Format) 2.0 support OS independent software to monitor & analyze network connection; & 2 Nos. of factory crimped Lucent 7 ft. patch cords.	
17	Bays	Two 3.5 inch Internal HDD Bays, Two/ Three 5.25" External Bays & 1 3.5" External bay for FDD	
18	Slot (with tool free disk mounting and tool free PCI card installation)	Minimum 2 PCI slots. 1 PCI Express(x1), 1 PCI Express x16	
19	Ports	Eight USB 2.0 (Two in Front, Six in rear), Two Ethernet (RJ 45), Two Nine Pin Serial (16550 Compatible), Two parallel , One VGA Out, Stereo line In (Front), Speakers/Line Out and Headphone(front)	
20	Dust Cover	Should come with plastic dust cover for CPU Cabinet, Monitor & Keyboard	
21	Software	Windows XP Pro with Restore / Recovery CD & with OS media CD with PC; For maintenance of ordered quantity, additionally One set of Windows XP Professional Licensed OS full pack will be supplied apart from preloaded OS	
22	Form Factor with Tool free design	Small Form Factor Tower/Mini-Tower Model.	
23	Power Supply	Vendor may specify power rating (Surge Tolerant – Withstands power surges up to 2000V, Full	

		Ranging min. 365 W Power Supply)	
24	Diagnostic Tool / Software*	OEM's Diagnostic tool for hardware diagnostics	
25	Preloaded Manageability tool / agent*	OEM's Management agent to support following features: **Asset Tracking** : Asset Tag, Serial number of machine, model & manufacturer for the system, Serail no of monitor & HDD etc. **Software deployment :** Software deployment console should be able to recognize the PC for software deployment **Remote monitoring :** Console should be able to remotely monitor the PC hardware **OS Patch updates:** Automatic Patch updates	
26	Security*	Removable media boot control, Serial, Parallel & USB Interface Control, Power-On Password, Setup Password, Memory Change Alert (through BIOS, in Windows environment & on management agent / console), C2 Tamper Switch or Solenoid lock or U-Bolt Physical lock.	
27	Compliance	For OEM : ISO 9001:2000 For Desktop : OS Certification (WLP 2.0 from Microsoft website), DMI 2.0 certification (from DMTF website), FCC, Energy Star, Red Hat Linux, For Monitor : EMI / FCC Compliance, Energy Star Compliance, MPR II Compliance	
28	Certification	Certified for MS Windows XP, Support for Linux Kernel 2.4 & above, **UL Certification**	
29	Warranty	3Years (3-3-3) warranty from the manufacturer shall be offered	
30	UPS	600 VA APC make	

9.3 Electronic Equipment Accessories :

1. Ethernet Cable shall be CAT 5 and of reputed mode and subject to BHEL approval.

2. Foundation Fieldbus Bus Power Supply, Foundation Fieldbus Bus Terminator, Foundation Fieldbus Bus Impedance & Foundation Fieldbus Converter Module(s) shall be of M/s Smar or M/s MTL Instruments or M/s Pepperl-Fuchs Make.

3. Foundation Fieldbus Bus Cable(s) shall be of reputed mode as recommended by OEMs of the Foundation Fieldbus Components and subject to BHEL approval.

4. Switch / Hub if needed for Ethernet shall be of M/s D-Link Make

5. Rack / Panel shall be provided for housing the above DAS & CONTROL SYSTEM and it shall be of reputed Make as recommended by OEM and subject to BHEL approval.

6. Any other items required to complete the system shall be of reputed Make and industrial grade (subject to BHEL approval).

SECTION – X

BILL OF MATERIAL

10.1 Mechanical Equipment :

S.No	Equipment	Qty
1	Control Tank (CT01)	1 No.
2	Buffer Tank (BT01 & BT02)	2 Nos.
3	Pump	2 Nos.
4	Electrical Heater (Total 10 kW = 5 x 2 kW)	1 Set
5	Air Compressor (with Drying Unit & Air Filter Regulator)	1No.
6	Solenoid Valve	
	a) 1/2" NB	3 Nos.
	b) 1" NB	6 Nos.
	c) 1 ½" NB	1 No.
7	Globe Valve	
	a) 1/2" NB	3 Nos.
	b) 1" NB	4 Nos.
8	Gate Valve	
	a) 1/2" NB	4 Nos.
	b) 3/4" NB	2 Nos.
	c) 1" NB	14 Nos.
	d) 1 ½" NB	1 No.
9	Stainless Steel Tubing (As required to complete the system)	1 Set
	a) 1/2" NB	1 Set
	b) 3/4" NB	1 Set
	c) 1" NB	1 Set
	d) 1 ½" NB	1 Set
10	Structure (As required to complete the system)	1 Set
11	Accessories for mechanical Equipment	
	a) Stirrer with Motor	2 Nos.
	b) Non Return Valve for Pump	2 Nos.
	c) Fittings & other items (As required to complete the system)	1 Set

10.2 Instruments and Control Equipment :

S.No	Equipment	Qty
1	Level Transmitter	1 No.
2	Flow Transmitter with Integral Orifice	1 No.
3	Temperature Transmitter	1 No.
4	Temperature Indicator	1 No.
5	Pressure Indicator	2 Nos.
6	Level Indicator	1 No.
7	Temperature Switch	1 No.
8	Level Switch	6 Nos.
9	RTD (PT100)	1 No.
10	Control Valves (with Foundation Fieldbus Protocol Actuator / Positioner and Position Transmitter)	2 Nos.
11	SCR Power Regulator	1 Set
12	Flow Indicator	1 No.
13	Relay	20 Nos.
14	Marshalling Box (with TBs and MCBs)	1 No.
15	Accessories for Instruments & Control Equipment	
	a) For pneumatic signal, SS304 tubing of ¼" NB	1 Set
	b) Impulse piping shall be of ½" NB SS304 tubing	1 Set
	c) Signal Cable of 1 mm^2, Single Pair, Shielded, Multi-strand, Unarmoured type	1 Set
	d) Power Distribution Cable of 1.5 mm^2, 3-Core, Multi-strand, Unarmoured type	1 Set
	e) Power Distribution Cable of 2.5 mm^2, 3-Core, Multi-strand, Unarmoured type	1 Set
	f) Power Distribution Cable of 4 mm^2, 3-Core, Multi-strand, Unarmoured type	1 Set
	g) Power Supply Cable of 25 mm^2, 3-Core, Multi-strand, Unarmoured type	1 Set
	h) TBs of spring loaded type	1 Set
	i) Breakers (MCBs)	1 Set
	j) Glands / Bulk Head Unions of SS material	1 Set
	k) Cable Conduits of GI material	1 Set
	l) 5-way Manifolds, mountings supports	1 Set
	m) Any other items of Reputed Make and Industrial Grade	1 Set

10.3 Electronic Equipment :

S.No	Equipment	Qty
1	DAS & CONTROL SYSTEM (comprising of necessary Hardware & Software)	1 Set
2	Operator Console	1 Set
3	Accessories for Electronic Equipment	
	a) Ethernet Cable (CAT 5)	1 Set
	b) Foundation Fieldbus Bus Power Supply, Foundation Fieldbus Bus Terminator, Foundation Fieldbus Bus Impedance & Foundation Fieldbus Converter Module(s)	1 Set
	d) Foundation Fieldbus Bus Cable(s)	1 Set
	e) Switch / Hub	1 Set
	f) Rack / Panel (for housing the above DAS & CONTROL SYSTEM)	1 Set
	g) Any other items of Reputed Make and Industrial Grade	1 Set

Common Note:

1. For Detailed Technical Specifications of the Mechanical Equipment, refer to the Section - VII.
2. For Detailed Technical Specifications of the Instruments & Control Equipment, refer to the Section - VIII.
3. For Detailed Technical Specifications of the Electronic Equipment, refer to the Section - IX.
4. **For Final BOM refer BOM Note in Section II, 2.5**.

BHARAT HEAVY ELECTRICALS LIMITED

CORPORATE R&D DIVISION, VIKAS NAGAR, HYDERABAD – 500 093, AP, India

Ph: 0091-40 – 23778474, FAX: 0091-40 – 23770698

General Terms and Conditions of Enquiry & Contract for the Purchase of Goods/ Services

1. The quotation and any order resulting from this enquiry shall be governed by these General Terms and Conditions of enquiry and contract for the supply of goods and the supplier quoting against this enquiry shall, unless specifically stipulates any different terms or conditions, be deemed to have read and agreed to the same.

2. Sealed quotations in double cover with tenderer's distinctive seal, superscribing enquiry number, date and due date are to be submitted so as to reach on or before due date & time, addressed to **Additional General Manager(MM), Bharat Heavy Electricals Limited, Corporate Research & Development Division, Vikasnagar, Hyderabad, Andhra Pradesh, India – PIN–500 093, India.**

   In the case of **Two-part bid**, each inner cover shall clearly be labeled as a) **Technical & Commercial Bid** containing technical data/ drawings/ catalogues/ quality plans along with commercial terms and conditions & copy of the price bid with the price columns left blank (unpriced price bid), b) **Price bid** containing prices quotes. Installation and/or Commissioning charges shall be spelt out in absolutely lucid terms, taking into account total charges, rather than quoting vaguely, such as charges per man-day or charges per engineer per day etc. **If the price bid was found later to be different from the unpriced price bid in any way, the offer will be rejected summarily.**

3. **Tender/ Technical bid Opening**: Unless specified otherwise, tenders/ technical bids will be opened on appointed date and time as mentioned in the enquiry or as communicated changed date/time, if any, in the presence of such of those tenderers who may be present.

4. **Delayed/ Late Tender**: Tenders, which have been posted by registered post through the postal department in time before opening date but received after tender opening, shall be treated as regular tenders. Other tenders received after tender opening time shall be treated as late tenders and normally they may be rejected.

5. The Quotation should be free from overwriting and erasures. Corrections and additions, if any, must be attested. Supplier should indicate in the quotation dimensions (Size), weight, rate etc., in the metric system unless the enquiry calls for different unit.

6. **Validity of Quotation**: All quotations shall be kept open for acceptance for a period of ninety days from the date of opening of Tenders/ Technical bid and this shall be deemed to be an express condition of all quotations. The rate shall be quoted in both figures and in words.

7. In the case of Two-part bid, the vendor should furnish technical clarifications, if any, within stipulated time mentioned, failing which, it will be construed that the vendor is not interested in the tender and BHEL shall not consider the offer for further evaluation.

8. **Revision of Pricebid**: In the event of any bidder, after finalizing the technical specifications and scope of supply, opting to revise and submit their latest price bid, then BHEL reserves the right to open their original / previous price bid also while evaluating revised bid.

9. **Pricebid Opening**: Unless specified otherwise in the enquiry, the Price bids of technically qualified vendors shall be opened with prior intimation in the presence of such of those tenderers who may be present.

10. **Conformity to Specifications**: The material should be of the best quality and shall be conforming to our specification given in our enquiry. Unless otherwise agreed upon by BHEL, no payment shall be due by BHEL in respect of any sample. Offers without details of specifications/ applicable catalogues will not be considered and are liable to be rejected.

11. **Terms of Delivery**: All suppliers shall quote the lowest prices on ex-works and FOB/FCA basis. Foreign suppliers will also indicate their Indian agent's name and address with percentage of agency commission out of the quoted price, if any. Name and Address of the supplier's Bankers address should also be given. Indian suppliers for the indigenously manufactured/ imported stock shall quote on Ex-works /Free-on-Rail/Road /FOR-destination basis, indicating packing & forwarding charges, if any, separately.

12. **Taxes and Duties**: Unless specified otherwise in the enquiry, BHEL do not provide "C" or "D" Form as it is engaged in R&D. All Indian suppliers shall clearly mention Sales Tax/ VAT, Excise Duty, and Service Tax etc, if any, payable in addition to the quoted price and indicate applicable rates/ percentage, item-wise. It will be paid

only if Registration Number under State(TIN)/ Central Sales Tax or Service Tax is specifically mentioned in the Bill/Invoice. Vendors without a Sales Tax/VAT registration and applicable Service Tax registration will not be considered.

13. **Insurance:** Insurance will be arranged by BHEL in case of Ex-Works as well as FOB basis supplies.

14. **Terms of Payment:** Full payment will be made within 30 days after receipt, inspection and acceptance of the material (and where involved, Erection and commissioning of the material/ equipment at BHEL/Destination) by Crossed cheque and no Bank commission charges are admissible. The Cheque will be sent by registered post and BHEL is in no way responsible if loss occurs due to delay by postal authorities and cheques falling into improper hands or through forgery or fraud. Suppliers having RBI-SEFT-enabled accounts can seek payment though Electronic Fund transfer. For foreign suppliers, the preferred payment term will be on Sight Draft basis and bank charges inside India will be to BHEL account and outside India will be to supplier's account.

15. Suppliers shall quote competitive price and best delivery for all the items mentioned in the enquiry. BHEL reserves the right to reject partial quotations and to place order on overall landed cost basis. Correct date of effecting supplies in the event of an order should be indicated in the offer. If the supplier's quoted terms are different from BHEL standard payment terms, interest @10.5% per annum (or as indicated in the enquiry) will be loaded to the quoted prices for difference of payment period.

16. **Packing**: The supplier shall be responsible for the goods being properly and adequately packed so as to prevent any loss, damage or deterioration during transit and indicate packing charges, if any, separately.

17. **Part/ Split Ordering**: BHEL reserves right to Order part of the item/ quantity of the enquiry and split the order among qualified vendors.

18. In case the goods enquired are on Rate Contract basis with any other unit of BHEL, such fact should be clearly indicated in the quotation giving full particulars of Rate Contract number, validity and price and also your willingness to comply with order if placed against such Rate Contract. A true copy of Rate contract signed by the supplier should be sent with the quotation.

19. **Inspection**: On receipt, the goods shall be subjected to inspection and also test, if necessary, and our decision regarding the acceptability of the goods shall be final and binding on the suppliers.

20. **Consequences of Failure To Deliver**: The time stipulated for delivery of goods shall be deemed to be the essence of the contract and delivery must be completed within the stipulated date/s. In the event of supplier's failure to supply the goods by the stipulated date/s, BHEL shall be entitled to levy a penalty of ½% per week for the delayed no of weeks or part thereof for the undelivered portion of PO subject to a maximum of 10% total order value.

21. **Withdrawal from the Contract:** In case the supplier withdraws the quotation after its acceptance by BHEL or fails to supply the goods as per the terms and conditions of contract, or at any time repudiated the contract wholly or in part, BHEL shall be at liberty to cancel the Purchase Order and to recover from the supplier the extra cost and other loss incidental to the breach of contract on the part of the supplier.

22. **Guarantee/ Warranty certificate and Manufacturer's Test report**: Invariably in all cases where it is so stipulated, the supplier should furnish Guarantee/ Warranty certificate valid for a period of 18 months from date of supply or 1 year from the date of receipt, acceptance and commissioning(or more, if provide by oem) whichever earlier and manufacturer's Test report along with the goods, failing which, BHEL shall have the right to reject the goods.

23. All ferrous/ non-ferrous items shall be colour coded as per bureau of Indian standards/ or IS standards/ BHEL Standards.

24. **Recovery of Dues**: BHEL shall recover any amount due from the supplier or any amount outstanding to the credit of the supplier with BHEL R&D unit or any other BHEL unit(s) and/or by legal action.

25. **Arbitration & Forum for Legal Proceedings**: All disputes arising in connection with indigenous/ foreign supplies shall be settled through arbitration held at Hyderabad, AP, India and arbitration shall be appointed by Arbitration Tribunal of the Federation of Andhra Pradesh Chambers of Commerce and Industry, Hyderabad, AP, India. The Courts at Secunderabad/ Hyderabad, AP, India shall have jurisdiction in respect of any suit or other legal proceeding arising from or relating to this contract

The rights and remedies of BHEL stated in these General terms and conditions shall be in addition and supplemental to its rights and remedies under law and custom or usage of trade or business and shall in no way be deemed to limit, curtail, supercede or derogate from its said rights and remedies.

ANNEXURE "AA

BHARAT HEAVY ELECTRICALS LIMITED
CORPORATE RESEARCH & DEVELOPMENT DIVISION
VIKASNAGAR, HYDERABAD – 500 093. INDIA

MATERIALS MANAGEMENT DEPARTMENT
(Information for Technical & Commercial bids with general terms)

ENCLOSURE TO ENQ No: **DATE:**

a) **Please indicate(_/) for applicable or (X) for not applicable against each clause of the enquiry**
b) **Vendor shall confirm their compliance for applicable clauses (_/) in their offer without deviation.**

1) <u>Technical offer:-</u>

a) **Vendors to confirm compliance to all points of specifications, attached if any. Deviations if any should be specified in the offer.**
b) **Vendors shall furnish relevant technical Documents / Catalogues. Drawings and Quality plan duly taking care of Purchase Specification and Quality requirements along with their offer in duplicate for Purchaser's review / Verification.**

2) <u>Two Part Bid</u>:-

Vendor shall submit their offer in 2 parts.

2.1 <u>Technical Bid:-</u> Containing relevant technical data, drawings, catalogues, Quality Plan etc, along with Commercial Terms and Conditions and a <u>copy of the price bid with the price columns left blank (unpriced price bid)</u>. <u>If the price bid was found later to be different from the unpriced price bid in any way, the offer will be rejected.</u>

2.2 <u>Price Bid</u>:- Containing the Price(s) quoted. Installation and or commissioning charges shall be spelt out in absolutely lucid terms taking into account the total charges rather than quoting vaguely such as charges as per man day or charges per Engineer per day etc.,

Technical bids will be opened on the due date of the enquiry or any other date fixed by BHEL. Further, vendor should furnish clarifications, if any, required within seven days after the same is sought by Purchaser. If no clarifications/reply received within 7 days, it will be construed that vendor is not interested in the tender and Purchaser will finalise tender accordingly. Price bids received on due date along with technical offers will be recorded and opened subsequently with due intimation to vendors after finalising of technical scope of supply.

These bids shall be submitted in separate sealed covers superscribing the nature of the offer (technical bid or price bid). BHEL Enq No. Due date etc.

Note: In case of non-compliance with the TWO_-PART-BID ie.. clause number 2 and subclauses 2.1 and 2.2. Purchaser reserves the right to summarily reject all such offers.

3) Delivery:-

Vendor shall confirm supply of materials as per the delivery schedule indicated in the enquiry.

4) Negotiations:-

Vendor shall quote competitive price and best delivery to avoid negotiations.

5) Commercial Terms & Conditions:-

Terms of Delivery:

a) Vendors shall clearly indicate terms of delivery Viz: Ex-Works/FOR Despatching station/FOR Despatching station FOR Destination/FOB port of loading/FAS Port of loading in their offer. If the terms of delivery is Ex-Works, then vendors shall clearly indicate the following:

1. **Packing and forwarding charges.**
2. **Documentation / Handling charges if any**
3. **FOB FAS charges (Inland Freight & Insurance charges from vendor works to port of Loading).**

b) All Indian Vendors shall clearly specify the Excise Duty in percentage applicable for their supplies. Offers containing expressions such as "Extra as applicable" or "As applicable at the time of Delivery" will be summarily rejected.

c) CST/Local Sales Tax in percentage shall be clearly indicated.

6) Validity of Quotation:-

Validity of offer should be 90 days after the opening of price bid.

7) Part or split ordering:-

Purchaser reserves the right to order part of item / quantity of the enquiry.

8) For clauses not mentioned in this document see the enclosed "GENERAL TERMS AND CONDITIOINS OF ENQUIRY AND CONTRACT FOR THE PURCHASE OF GOODS"

9) In case your terms of payment are different from our standard payment terms, interest at the rate of 10.5% per annum (or BHEL's standard rate of interest) will be loaded to your prices for the difference of period of payment.

BHARAT HEAVY ELECTRICALS LIMITED
CORPORATE R&D Division
Vikasnagar, Hyderabad – 500093, India.

Suppliers' compliance statement to basic conditions of enquiry

(In case Order to be placed on Indian supplier in Indian currency)

Condition	BHEL R& D's terms	Supplier's compliance (indicate Yes/No. if 'No', state terms desired)
1) Validity of offer	90 days from the tender opening date	
2) Delivery requirements	Free delivery at our stores or FOR destination (as indicated in the enquiry)	
3)Warranty	Unless specifically mentioned in the enquiry, all supplied items to be provided with warrantee for one year (or more, if provided by the OEM) from the date of acceptance/commissioning. In case of equipment involving erection and commissioning, warrantee shall be for 18 months from the date of dispatch or 12 months from the date of commissioning, whichever is earlier	
4) Terms of payment	Full payment will be made within thirty days after receipt, inspection and acceptance of the material at BHEL R&D (and where involved, erection and commissioning of the material/equipment at BHEL/destination), by Crossed Cheque and no Bank commission charges are admissible.	
5) Taxes & Duties	Unless specifically mentioned in the enquiry, we do not provide 'C' or 'D' form. Supplier to specify rates of taxes and duties element wise and related percentages.	
6) Penalty for late delivery	0.5% per week beyond the delivery date as mentioned in the Purchase order on undelivered portion subject to a maximum of 10% of the total order value	

* BHEL R&D reserves the right to reject any offer due to non-compliance with the above conditions and/or non-receipt of this form in duly filled condition
* Any other elements of cost in addition to the above may please be specified in detail

(Signature and Stamp/Seal of Vendor)

BHARAT HEAVY ELECTRICALS LIMITED
CORPORATE R&D Division
Vikasnagar, Hyderbad – 500093.

IMPORTED

Suppliers' compliance statement to basic conditions of enquiry

(In case Order to be placed on the Principal and foreign currency)

Condition	BHEL R& D's terms	Supplier's compliance (indicate Yes/No. if 'No', state terms desired)
01) Validity of offer	90 days from the tender opening date (or as per enquiry)	
02) Delivery requirements	FCA – Nearest International Airport (or as indicated in the enquiry)	
03)Warranty	Unless specifically mentioned in the enquiry, all supplied items to be provided with warrantee for one year (or more, if provided by the OEM) from the date of acceptance/ commissioning. In case of equipment involving erection and commissioning, warrantee shall be for 18 months from the date of dispatch or 12 months from the date of commissioning, whichever is earlier	
04) Terms of payment	Sight draft. All bank charges inside India will be to BHEL R&D account and out side India will be to suppliers account. Documents through State Bank of India, HAL Complex, Balanagar, Hyderabad, AP, India-500 042.	
05) Agency commission	Pl specify percentage charges, if any. Indian agency/agent commission will be in Indian Currency only.	
06) Erection/ Commission	As per enquiry	
07) Documentation	As per enquiry	
08) Insurance	BHEL will arrange Insurance based on intimation to our Insurance agency, United India Insurance Co., DO-2, Secunderabad, AP, India.	
09) Penalty for late delivery	0.5% per week beyond the delivery date as mentioned in the Purchase order on undelivered portion subject to a maximum of 10% of the total order value	

* BHEL R&D reserves the right to reject any offer due to non-compliance with the above conditions and/or non-receipt of this form in duly filled condition
* Any other elements of cost in addition to the above may please be specified in detail

(Signature and Stamp/ Seal of Vendor)

BHARAT HEAVY ELECTRICALS LTD.
Corp. R&D DIVISION
VIKAS NAGAR,
HYDERABAD-500 093 (INDIA)

VENDOR REGISTRATION FORM

[FORM TO BE SUBMITTED* BY THE BIDDER ALONG WITH TECHNICAL-BID]

Before filling please refer to instructions on page-4

1.0 VENDOR PROFILE:

1.1 & 1.2 Name and address of the vender: _____

_____

_____

_____

Phone Nos.:
Fax No.:
Email:

1.4 Local representative of the vender in India/ Hyderabad:

_____

_____

_____

_____

Phone Nos.:
Fax No.:
Email:
Contact person:
Mobile No.:

2.0 & 2.1 Type of Organisation:

PROPRIETORSHIP	COMPANY	SISTER CONCERN	ANY OTHER (Please specify)
PARTNERSHIP	CORPORATION	Small Scale Industry	

3.0 Annual Turn Over:
Name and address of the Banker:

Sr.No.	Bank	Address

4.0 REGISTRATION PARTICULARS

4.1 IT Permanent Account No.(PAN):

4.2 & 4.3 State and central sales tax Registration No.:

4.4 ED/ Service Tax Registration No.:

PF Account No.:

Labour Licence No.:

ESI Account No.:

5.2 Contact person:
Mobile No. :

5.3 Total Number of employees:

Graduates (Engr./Scientists/Mgmt/Fin.)	Consultants	Workers		
		Sup./Skilled	Semiskilled	Unskilled

6.0 Wish to register for supplies/ services other than one bidding for :

Sr.No.	Service/Supplies	Capacity
1		
2		
3		
4		
5		
6		
7		

6.1 Reference list :

(Only recognized public and private sector companies, attach if printed copy available)

Sr.No.	Customer	Volume / Year
1		
2		
3		
4		
5		
6		
7		

7.0 & 8.0 Infrastructure / facilities :

Sr.No.	Facility (with specifications)	Age/ Year procured
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

9.0 Registration with other BHEL Unit/Units:

Sr.No.	9.1.1 Unit	9.1.2 Registration No.
1		
2		
3		
4		

Any Other information :

Declaration:

The information furnished above is true and authentic.

(CEO / Propritor)

SEAL:

Date:

The competent authority reserves the right to accept or reject the registration. Registered vendors will be informed by mail / email, as convenient. Contact Sr.DGM (MM) for clarification/ additional information on registration.
A separate communication will be sent to you in case of non-registration, citing reasons thereof.

Instructions

1. Answer all items, use NA for items not applicable.
2. BHEL units do not require this registration.
3. Submit the form in duplicate.
4. Use additional sheets for want of space if required.
5. Attach copies of latest document s in respect of items 4.0 (Registration no.s)
6. Photographs of registered office and the chief executive/proprietor shall be furnished.
7. Use A4 sheets for this document and the enclosures.

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* REGISTERED BIDDERS, HAVING BHEL (R&D) REGISTRATION NO./ HAVE SUBMITTED THIS FORMAT EARLIER, NEED NOT FURNISH THIS INFORMATION SECOND TIME (UNLESS DESIRE TO UPDATE IT).

BHEL CORPORATE R & D
VIKAS NAGAR- HYDERABAD - 500 093
ANDHRA PRADESH – INDIA
SUPPLIER REGISTRATION FORM

(FOREIGN SUPPLIER)

ALL COLUMNS SHOULD BE PROPERLY FILLED IN THE SPACE PROVIDED FOR. WHEREVER IT IS NOT APPLICABLE PLEASE WRITE "NOT APPLICABLE". INCOMPLETE OR INCORRECT FORMS MAY NOT BE CONSIDERED.

1.0 GENERAL INFORMATION:

1.1….NAME OF COMPANY

1.2….DETAILS OF HEAD OFFICE:

ADDRESS :
TELEPHONE :
FAX :
.EMAIL :
.WEB SITE :

1.3….DETAILS OF FACTORY/WORKS:

ADDRESS :
TELEPHONE :
FAX :
.EMAIL :
.WEB SITE :

1.4….DETAILS OF MARKETING AGENT

ADDRESS :
TELEPHONE :
.FAX :
.EMAIL :
.WEB SITE :

1.5 CHIEF EXECUTIVE

NOTE: PLEASE ATTACH SEPARATE SHEETS, IF SPACE FOUND IS INADEQUATE

AUTHORISED SIGNATORY

BHEL CORPORATE R & D
VIKAS NAGAR – HYDERABAD – 500 093
ANDHRA PRADESH – INDIA

SUPPLIER REGISTRATION FORM

(FOREIGN SUPPLIER)

1.6 CONTACT PERSON(S)
FOR PRODUCT OFFERED
NAME(S)
OFFICIAL CAPACITY
ADDRESS:
TELEPHONE
FAX
E-MAIL

1.7 YEAR OF ESTABLISHMENT

1.8 PRODUCTION CAPACITY PER ANNUM

1.9 PARTICULARS OF PRODUCT INCLUDING SPECIFICATION AND RANGE OFFERED FOR REGISTRATION
(ATTACH BROUCHERS AND CATALOGUE)

1.10 NAME(S) OF BANKERS

1.11 BANKER'S CERTIFICATE

1.12 PORT OF LOADING

1.13 NEAREST AIRPORT

1.14 NAME OF THE INDIAN AGENT, IF ANY
WITH AUTHORISATION LETTER

1.15 ANY OTHER INFORMATION:

AUTHORISED SIGNATORY

BHEL CORPORATE R & D
VIKAS NAGAR – HYDERABAD – 500 093
ANDHRA PRADESH – INDIA

SUPPLIER REGISTRATION FORM

(FOREIGN SUPPLIER)

2.0 FINANCIAL INFORMATION

2.1…TOTAL CAPACITY

2.2…ANNUAL TURN OVER FOR LAST 3 YEARS

2.3…WHEHER CREDIT LICENSE ACCEPTABLE YES/NO

3.0 QUALITY MANAGEMENT SYSTEMS
ENCLOSED FORMAT PART-B

3.1 EXPERIENCE LIST FOR SAME/SIMILAR ITEMS
TO BE ENCLOSED

4.0…..FUTURE EXPANSION PLANS:
(GIVE DETAILS)

5.0 LIST OF ENCLOSURES:
INCLUDING BROUCHERS, CATALOGUES, TECHNICAL LITERATURE etc…

6.0 ANY OTHER INFORMATION

SIGNATURE OF SUPPIER
NAME
DESIGNATION
DATE
…….OFFICIAL SEAL

AUTHORISED SIGNATORY
