

**HARYANA POWER GENERATION CORPORATION
LIMITED**



DCRTPP YAMUNA NAGAR (2X300 MW)

PART - E

TENDER DRAWINGS

SECTION – VI

FOR

**FLUE GAS DESULPHURISATION (FGD)
SYSTEM PACKAGE**

BIDDING DOCUMENT NO.: 32/CE/PLG/DCRTPP/FGD-251

**HARYANA POWER GENERATION CORPORATION
LIMITED**



DCRTPP YAMUNA NAGAR (2X300 MW)

PART - E

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FOR

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SYSTEM PACKAGE**

BIDDING DOCUMENT NO.: 32/CE/PLG/DCRTPP/FGD-251

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CLAUSE NO.**TENDER DRAWING LIST****1.00.00****APPLICABLE DRAWINGS**

The drawings listed below and forming part of the specification (Refer Part-E) shall supplement the requirements specified herein. The scope and terminal points of the equipment to be furnished under this package shall be as identified in these drawings and read in conjunction with text of the specification:

(A) SCHEMES

S.No	Drawings Title	Drawings No.	No. of Sheets
1)	Scheme of Absorber system	9944-251-POM-A-001	1
2)	Scheme of Limestone Milling system	9944-251-POM-A-002	1
3)	Scheme of Gypsum De-watering system	9944-251-POM-A-003	1
4)	P&ID Diagram for ECW System of FGD	9944-251-POM-A-004	1
5)	Limestone Flow Diagram	9944-251-POM-A-005	1
6)	Gypsum Flow Diagram	9944-251-POM-A-006	1
7)	Compressed Air System	9944-251-POM-A-007	1
8)	HVW/MWN Spray System	9944-251-POM-A-008	1



(B) CONTROL & INSTRUMENTATION

Sl. No.	Drawings Title	Drawings No.	No. of Sheets
1.	Standard configuration diagram for control system	0000-151-POI-A-013	1
2.	G.A. of Junction Box	0000-999-POI-A-017	1
3.	Instrumentation cabling diagram grounding scheme for cabinets/panels/Power Supply	0000-999-POI-A-019A	2
4.	Scheme of 24V DC Power supply system	0000-999-POI-A-019B	1
5.	Scheme for Uninterruptible Power Supply System	0000-999-POI-A-019C	1
6.	Instrumentation/control/power supply cabling diagram	0000-101/102-POI-A-021	3
7.	Instrument Source Connection details	0000-999-POI-A-035	14
8.	Typical GA of Local Instrument Enclosure, purging scheme, DP transmitter	0000-999-POI-A-036	1
9.	Interfacing of actuators	0000-999-POI-A-063	1
10.	Interfacing of field instruments/Electrical interface/PLC Interface	0000-999-POI-A-065	15

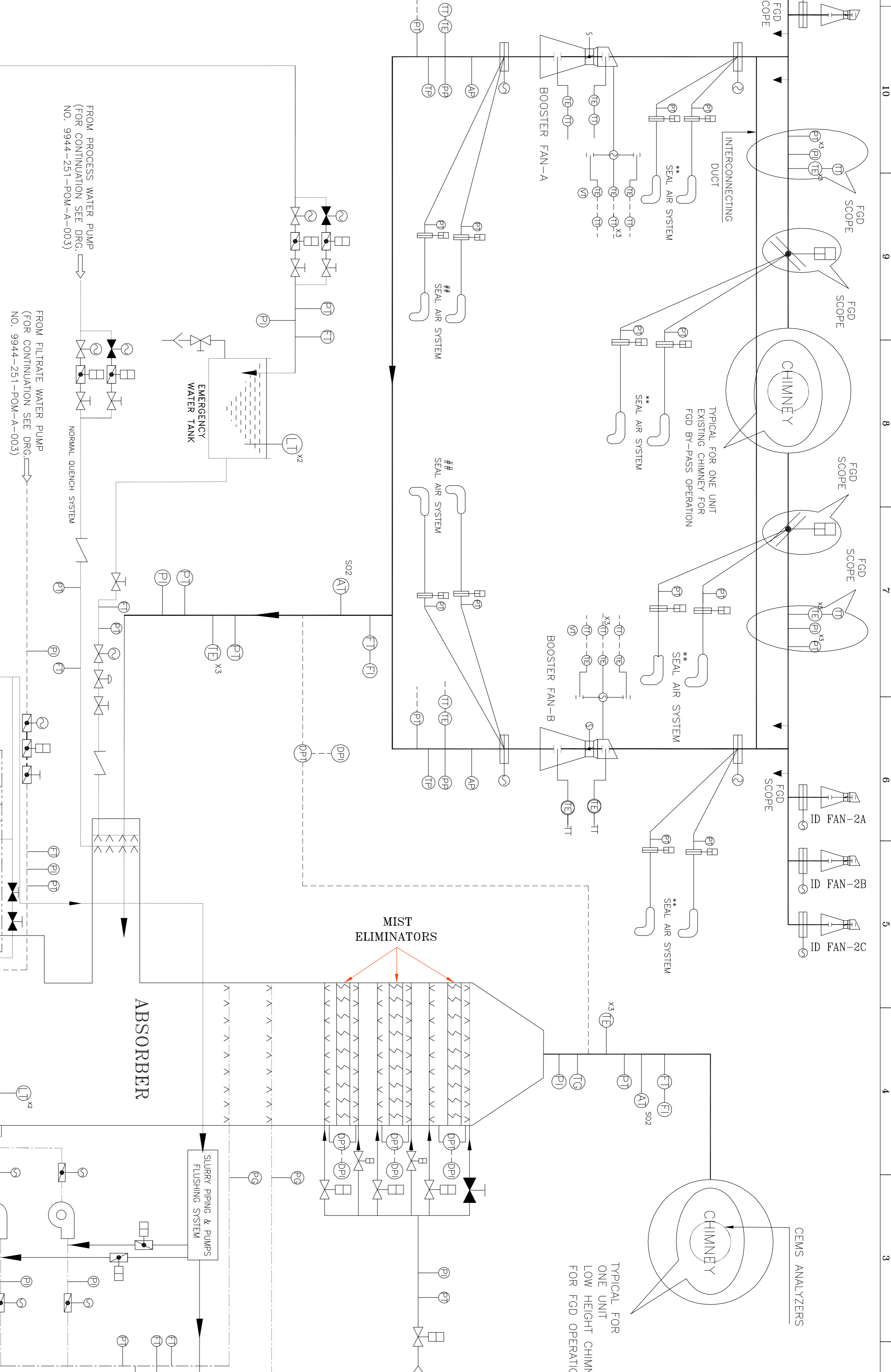
(C) ELECTRICAL

- (1) Electrical single line diagram for FGD Package– DCRTPP(2x300MW) 9944-000-POE-J-001 Rev1

Note : All the above drawings are indicative of Employer’s requirements to enable the Bidder to make a suitable offer. All variations/alternations shall be clearly brought out in the technical deviation schedule with implications, if any. Such variations may be acceptable, after assessment of its implication and shall be subjected to the Employer’s approval. However, the flexibility of operation and maintenance desired by the schemes and layouts shall be binding.

Electrical drawings (except Electrical single line diagram) are attached with respective Electrical Chapters in Part B, Section VI.

LEGEND :	
	PUMP
	AIR COMPRESSOR
	NON RETURN VALVE
	MANUAL GATE VALVE(OPEN)
	MANUAL GATE VALVE(CLOSED)
	MOTORISED GATE VALVE(OPEN)
	MOTORISED GATE VALVE(CLOSED)
	MOTORISED GATE
	AGITATOR
	PNEUMATIC CONTROL VALVE
	PNEUMATIC OPERATED BI-PLANE DAMPER
	MOTOR OPERATED LOUVER DAMPER
	PNEUMATIC OPERATED LOUVER DAMPER
	PNEUMATIC OPERATED PINCH CONTROL VALVE
	KNIFE GATE/BUTTERFLY VALVE
	FAN
	HEATER
	PNEUMATIC GATE
	PNEUMATIC OPERATED
	MOTORIZED



---	PROCESS WATER
---	FILTRATE
---	CRUSHED LIMESTONE
---	GYPSUM SLURRY
---	RECIRCULATION SLURRY
---	AIR
---	GAS
---	VACUUM

- NOTES**
- THE SCHEME SHALL BE FINALIZED DURING DETAILED ENGINEERING BASED ON SPECIFICATION AND SYSTEM REQUIREMENT.
 - ANY EQUIPMENT / VALVE / PIPE NOT SHOWN IN THE DRAWING BUT REQUIRED FOR SYSTEM COMPLETION SHALL BE IN THE SCOPE OF THE CONTRACTOR.
 - NUMBER OF AGITATORS / SLURRY SPRAY LEVELS/PUMPS SHALL BE AS PER THE CONTRACTOR'S PROVEN PRACTICE WITH REDUNDANCIES AS STIPULATED IN THE SPECIFICATION.
 - UTILITIES LIKE COOLING WATER, SERVICE WATER, INSTRUMENT AIR, SERVICE AIR, AUXILIARY STEAM SHALL BE PROVIDED TO THE CONTRACTOR AT EMPLOYER'S TERMINAL POINT AS ELABORATED IN SUB-SECTION-IV, PART-A, SECTION-VI OF THE SPECIFICATION. ALL PIPING/SYSTEM FROM THE TERMINAL POINT SHALL BE IN THE CONTRACTOR'S SCOPE.
 - ALL INSTRUMENTS SHALL BE PROVIDED WITH ISOLATION VALVES.
 - ALL INSTRUMENTS IN SLURRY LINES SHALL BE PROVIDED WITH ISOLATION VALVES AND DIAPHRAGM.
 - ALL TEMPERATURE ELEMENTS (TEs) SHALL BE PROVIDED WITH TEMPERATURE TRANSMITTERS.
 - ONLY ULTRASONIC/RADAR TYPE LEVEL TRANSMITTER SHALL BE PROVIDED FOR SLURRY TANK/SUMPS.
 - ALL MANUAL PUMP SUCTION VALVES SHALL BE PROVIDED WITH OPEN LIMIT SWITCHES.
 - ALL SLURRY TANKS SHALL BE PROVIDED WITH FIELD INDICATORS FOR LOCAL LEVEL INDICATION AND OTHER TANKS SHALL BE PROVIDED WITH LEVEL GAUGES FOR LOCAL LEVEL INDICATION.
 - PROPER DRAINAGE AND WATER WASHING ARRANGEMENT AS PER CONTRACTOR'S PROVEN PRACTICE SHALL BE PROVIDED.
 - PROVISION FOR FLUSHING OF SLURRY SHALL BE PROVIDED.
 - **## THE BIDDER AS PER ITS PROVEN PRACTICE CAN ALSO PROVIDE A COMMON 2X100% SEAL AIR SYSTEM TO MEET THE SEALING REQUIREMENTS.
 - CONTRACTOR SHALL ENSURE THE SIGNALS TO BE EXCHANGED WITH SG/BOF-DDOWNS (IN EMPLOYER'S SCOPE) FOR SAFE AND SATISFACTORY OPERATION OF FGD SYSTEM.
 - * AS PER THE BIDDER'S PROVEN PRACTICE, PNEUMATIC CAN BE PROVIDED.
 - SUPPLY, INSTALLATION AND COMMISSIONING OF INSTRUMENTS REQUIRED FOR FGD SYSTEM SHALL BE IN THE SCOPE OF CONTRACTOR. MINIMUM INSTRUMENTS INDICATED ON THE DUCT (BEING SUPPLIED BY SG SUPPLIER) SHALL BE SUPPLIED, INSTALLED AND COMMISSIONED BY THE CONTRACTOR UNDER THIS PACKAGE.

NO.	DESCRIPTION	DATE	BY	CHECKED BY	SCALE	DRG. NO.	REV. NO.
1	9944-251-POM-A-001	A

HARYANA POWER GENERATION CORPORATION LTD.

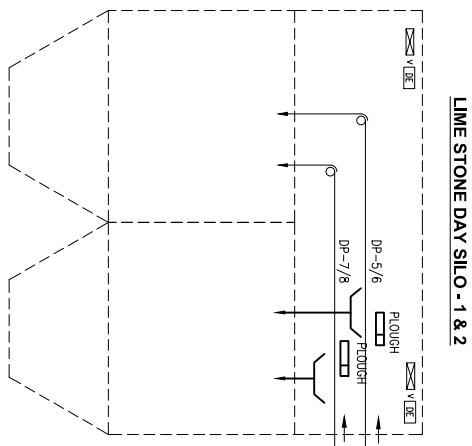
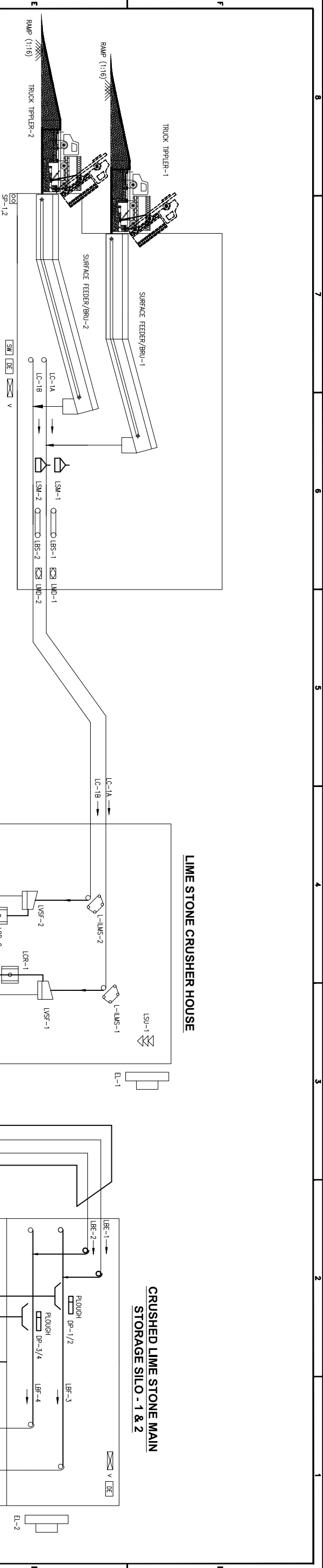
NTPC LTD.
(A Subsidiary of India's Public Sector)

ENGINEERING DIVISION

PROJECT: DGR THERMAL POWER PROJECT
YAMUNA NAGAR
(2X300 MW UNIT 1&2)

TITLE: SCHEME OF FGD-A-SOR-ER SYSTEM

SCALE: ... DRG. NO.: 9944-251-POM-A-001 REV. NO.: A



EQPT. DESIGN	EQUIPMENT	QTY.	CAPACITY
LC 1A/1B LC 2A/2B	LIMESTONE CONVEYOR	4	150 TPH RATED CAPACITY
EL	PASSENGER CUM GOODS ELEVATOR	2	CONVENTIONAL TYPE ELEVATOR
LMD - 1 to 4	LIME STONE METAL DETECTOR	4	
LSM - 1 to 4	SUSPENDED MAGNET	4	
SF	SURFACE FEEDER / BRU	2	
SP	SUMP & SUMP DRAINAGE PUMPS	6	
LCR	LIME STONE CRUSHER	2	150 TPH RATED CAPACITY
LBS	LIME STONE BELT WEIGH SCALE	2	
L-LIMS 1-2	IN LINE MAGNETIC SEPARATOR ALONG WITH TRAMP IRON CHUTE	2	
LBF-1/2 3/4/5/6/7/8	LIME STONE BELD FEEDER	6	150 TPH RATED CAPACITY
TRUCK TIPPLER	TRUCK TIPPLER	2	150 TPH
LBE-1,2 LBE-3,4	BUCKET ELEVATOR	4	150 TPH RATED CAPACITY

LEGEND	SYMBOL	DESCRIPTION
○	○	LIME BELT FEEDER
SW	SW	SERVICE WATER SYSTEM
DW	DW	DRINKING WATER SYSTEM
DE	DE	DRY DUST EXTRACTION SYSTEM
SP	SP	SUMP & SUMP DRAINAGE PUMPS
LC	LC	LIME STONE BELT CONVEYOR
ROD	ROD	ROD GATE
PG	PG	PACK & PINION GATE
CR	CR	LIME STONE CRUSHER
EL	EL	CONVENTIONAL TYPE ELEVATOR
LBS	LBS	LIME STONE BELT SCALE
LSU	LSU	LIME STONE SAMPLING UNIT
L-LIMS	L-LIMS	LIME STONE MAGNETIC SEPARATOR (IN LINE)
LMD	LMD	LIME STONE METAL DETECTOR
V	V	VENTILATION
DP	DP	DIVERTER FLOW
LSM	LSM	SUSPENDED MAGNET

FOR TENDER PURPOSE ONLY

NOTES :

1. THE SCHEME SHOWN IS INDICATIVE. THIS DRG. IS MEANT TO SHOW ONLY LIMESTONE FLOW PATH AND DOES NOT INDICATE COMPREHENSIVE SCOPE OF WORK. THE BIDDER MUST PROVIDE BULK MATERIAL RECEIVING UNIT/TRUCK TIPPLER/SURFACE FEEDER/BOX FEEDER ALONG WITH TRUCK TIPPLER.
2. ALL CONVEYORS SHALL BE PROVIDED WITH ACCESSORIES SUCH AS PULL CORO, BELT SWAY AND ZERO SPEED SWITCHES, BELT WIPER UNITS, TENSIONING DEVICES ETC. ALL BUCKET ELEVATORS SHALL BE PROVIDED SUITABLE PROTECTION DEVICES AS PER TECHNICAL SPECIFICATION. THESE ARE NOT SHOWN IN THE FLOW DIAGRAM FOR CLARITY.
3. ALL ACCESSORIES, ITEMS OF WORK, THOUGH NOT INDICATED BUT REQUIRED TO MAKE THE SYSTEM COMPLETE FOR ITS SAFE, EFFICIENT, RELIABLE & TROUBLE FREE OPERATION AND MAINTENANCE SHALL ALSO BE INCLUDED IN BIDDER'S SCOPE UNLESS SPECIFICALLY EXCLUDED.
4. SERVICE WATER, POTABLE WATER, COOLING WATER, DUST EXTRACTION & VENTILATION SHALL BE PROVIDED AS PER TECHNICAL SPECIFICATION REQUIREMENT.
5. TOTAL LIME STONE STORAGE REQUIREMENT SHALL BE ACCOMMODATED IN TWO NO. OF SILO OF IDENTICAL CAPACITY.

REV.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	C	E	CHK	APPD.	DATE
A	RELEASED FOR TENDER									18/02/18

OWNER: HARYANA POWER GENERATION CORPORATION LTD.

CONSULTANT: NTPC LIMITED (A GOVT. OF INDIA ENTERPRISE)

PROJECT: DCRTTPP YAMUNANAGAR (2x300 MW)

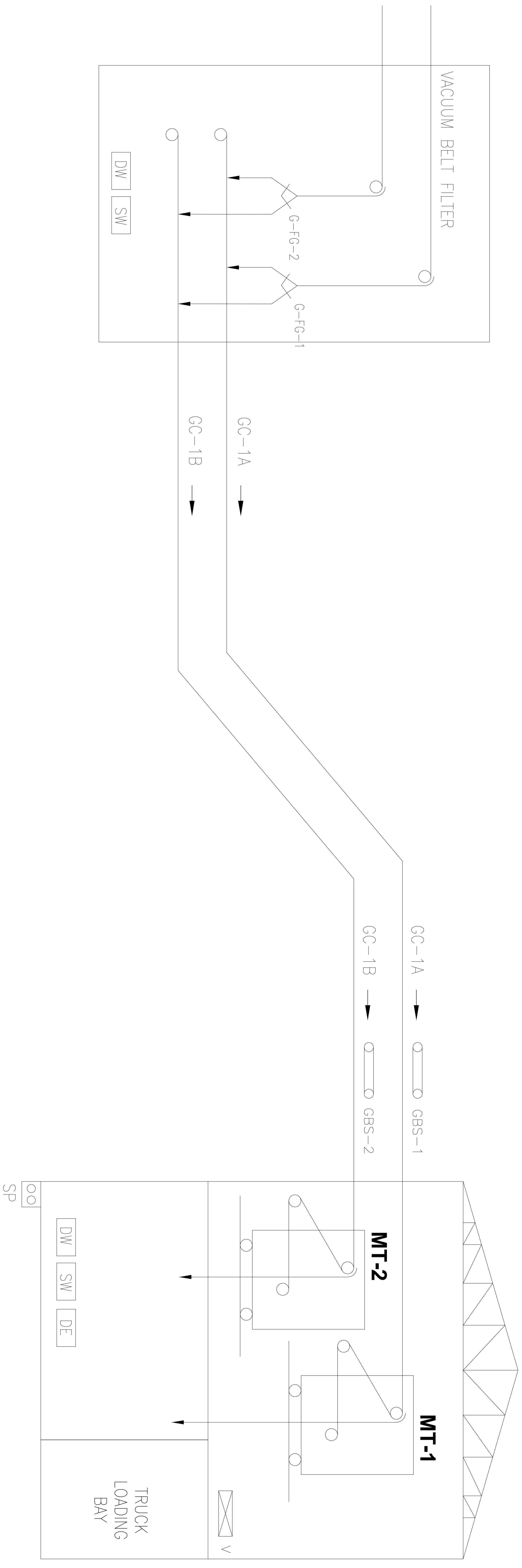
TITLE: FGD PACKAGE
LIME STONE FLOW DIAGRAM

SCALE: DRGNO. 9944-251-POM-A-005

REV.: A

cod file name : 9944-251-POM-A-005.dwg

GYPSUM STORAGE SHED



LEGEND	
	GYPSUM BELT CONVEYOR
	SERVICE WATER SYSTEM
	DRINKING WATER SYSTEM
	DRY DUST EXTRACTION SYSTEM
	GYPSUM FLAP GATE
	GYPSUM BELT SCALE

NOTES :

1. THIS DRG. IS MEANT TO SHOW ONLY GYPSUM FLOW PATH AND DOES NOT INDICATE COMPREHENSIVE SCOPE OF WORK.
2. ALL CONVEYORS SHALL BE PROVIDED WITH ACCESSORIES SUCH AS PULL CORD, BELT SWAY AND ZERO SPEED SWITCHES, BELT WIPER UNITS, TENSIONING DEVICES ETC. AS PER TECHNICAL SPECIFICATION. THESE ARE NOT SHOWN IN THE FLOW DIAGRAM FOR CLARITY.
3. ALL ACCESSORIES, ITEMS OF WORK, THOUGH NOT INDICATED BUT REQUIRED TO MAKE THE SYSTEM COMPLETE FOR ITS SAFE, EFFICIENT, RELIABLE AND TROUBLE FREE OPERATION AND MAINTENANCE SHALL ALSO BE INCLUDED IN BIDDER'S SCOPE UNLESS SPECIFICALLY EXCLUDED.
4. SERVICE WATER, POTABLE WATER & DUST EXTRACTION SHALL BE PROVIDED AS PER TECHNICAL SPECIFICATION REQUIREMENT.
5. NECESSARY MAINTENANCE AND OPERATING PLATFORM FOR VARIOUS EQUIPMENT SHALL BE PROVIDED.
6. IN PLACE GYPSUM STORAGE SHED, BIDDER MAY ALTERNATELY PLACE EURO SILO / EQUIVALENT FOR STORAGE CONVENTIONAL SILO ARE NOT ACCEPTABLE.

FOR TENDER PURPOSE ONLY

REV.	DESCRIPTION	DATE	BY	CHKD.	DATE
A	RELEASED FOR TENDER				

OWNER: HARYANA POWER GENERATION CORPORATION LTD.

CONSULTANT: NTPC (A GOVT. OF INDIA ENTERPRISE)

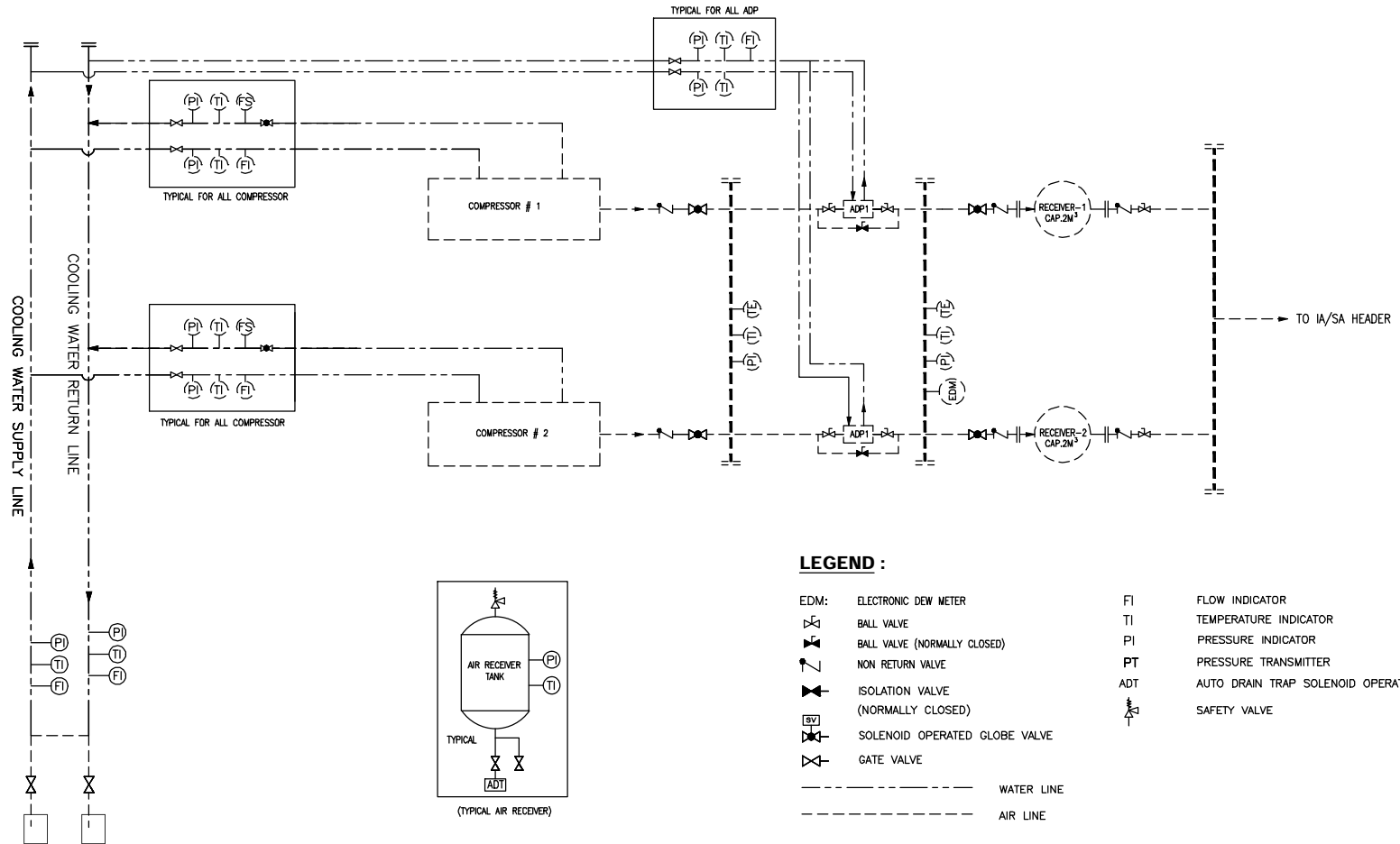
PROJECT: DCRTPP YAMUNANAGAR (2x300 MW)

TITLE: FGD PACKAGE GYPSUM FLOW DIAGRAM

9944-251-POM-A-00

REV. A

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LEGEND :

- | | | | |
|-------|-----------------------------------|-----|-----------------------------------|
| EDM: | ELECTRONIC DEW METER | FI | FLOW INDICATOR |
| | BALL VALVE | TI | TEMPERATURE INDICATOR |
| | BALL VALVE (NORMALLY CLOSED) | PI | PRESSURE INDICATOR |
| | NON RETURN VALVE | PT | PRESSURE TRANSMITTER |
| | ISOLATION VALVE (NORMALLY CLOSED) | ADT | AUTO DRAIN TRAP SOLENOID OPERATED |
| | SOLENOID OPERATED GLOBE VALVE | | SAFETY VALVE |
| | GATE VALVE | | |
| --- | WATER LINE | | |
| - - - | AIR LINE | | |

NOTES :

1. THE SCHEMATIC DRAWING SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATION.
2. ALL CONTROLS, INTERLOCKS & PROTECTIONS REQUIRE FOR SAFE, RELIABLE AND EFFICIENT OPERATION & MAINTENANCE OF AIR COMPRESSORS & ADP SHALL BE IMPLEMENTED IN CONTROL SYSTEM.
3. ALL IMPORTANT & CRITICAL MEASUREMENTS REQUIRED FOR PROTECTION OF EQUIPMENTS SHALL BE PROVIDED WITH REQUIRED/ADEQUATE
4. VARIOUS FIELD INSTRUMENTS ON AIR AND WATER HAVE BEEN SHOWN. HOWEVER ANY OTHER ADDITIONAL INSTRUMENTS TO MEET THE SYSTEM REQMT. & FOR SAFE OPERATION OF THE PLANT & EQUIPMENT SHALL BE INCORPORATED IN THE SCHEME BY CONTRACTOR AT NO ADDITIONAL COST TO EMPLOYER.
5. THE SCHEME DOES NOT SHOW THE CIRCUIT, INSTRUMENTS, VALVES ETC. FOR LOADING/ UNLOADING/MODULATION OF COMPRESSORS, REPRESSURISATION/DEPRESSURISATION OF ABSORBER TOWER OF ADP & THE SAME SHALL BE PROVIDED BY RESPECTIVE CONTRACTOR.
6. THE SCHEME HAS BEEN ENVISAGED CONSIDERING HEAT OF COMPRESSION TYPE AIR DRYER (TWIN TOWER TYPE) IN CASE OF ROTARY DRUM TYPE (HOC) AIR DRYER, SCHEME SHALL BE FINALISED DURING DETAILED ENGINEERING
7. IN CASE OF ZLD PLANT COMING FAR AWAY FROM COMPRESSOR LOCATION THEN ONE NUMBER AIR RECEIVER OF CAPACITY 2 CUM (NORMAL) SHALL BE PROVIDED FOR ZLD PLANT (IF APPLICABLE).

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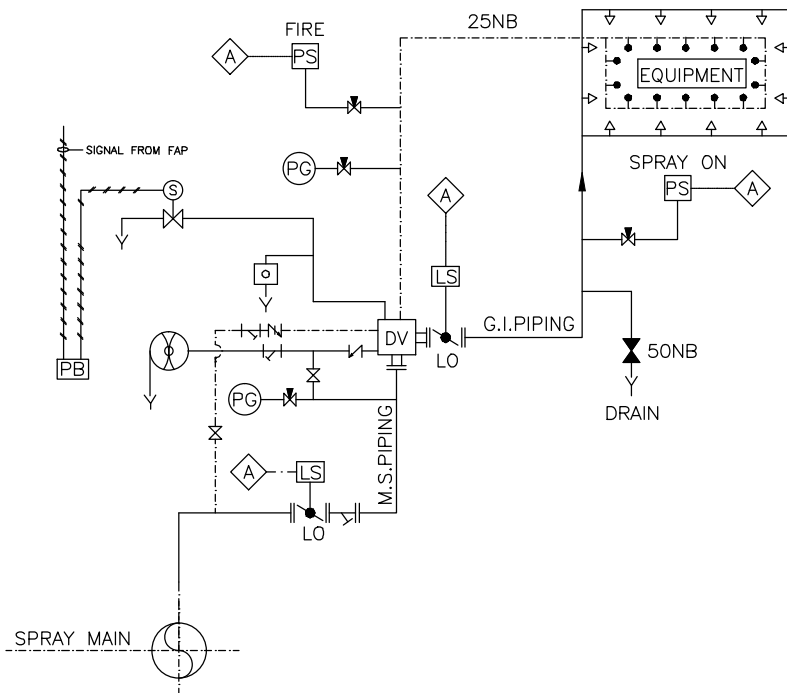
Haryana Power Generation Corporation Ltd. (HPGCL)	
NTPC LIMITED <small>(A GOVT. OF INDIA ENTERPRISE) (CORPORATISED)</small>	

PROJECT: DCRTPP, YAMUNA NAGAR (2x300MW)

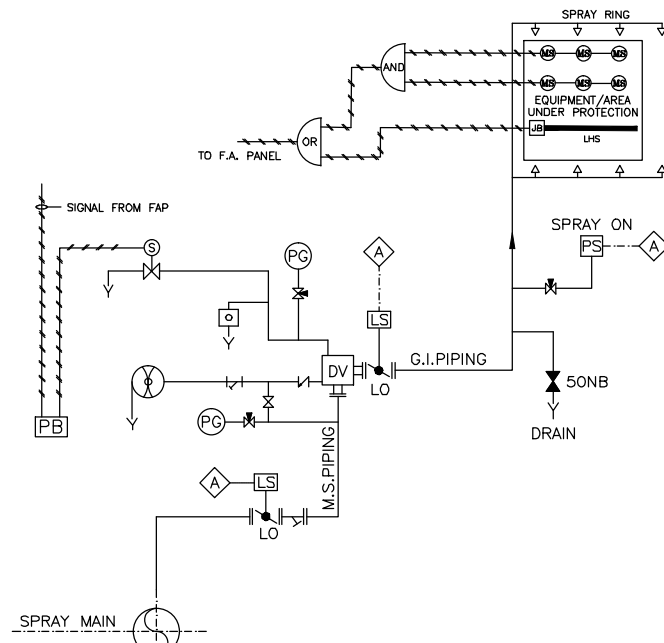
TITLE: SCHEMATIC DRAWING OF COMPRESSERD AIR SYSTEM

REVNO.	DESCRIPTION	DRAWN	DESIGN	CHG.	M	E	C	CM	AMCH	APPR.	DATE	SIZE	SCALE	DRW. NO.	REV. NO.
												A-2		9944-251-POM-A-007	A

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AUTOMATIC HWV SPRAY SYSTEM (TYP)



AUTOMATIC MVV SPRAY SYSTEM (TYP)
FOR CABLE VAULT/CABLE GALLERIES

LEGEND :

- | | | | |
|--|----------------------------------|--|--------------------------|
| | SPRAY LINE | | PRESSURE SWITCH |
| | CONTROL CABLE | | PRESSURE GAUGE |
| | WET DETECTION PIPE | | MULTISENSOR DETECTOR |
| | SOLENOID VALVE | | LINEAR HEAT SENSOR |
| | BUTTERFLY VALVE/GATE VALVE | | INFRA RED DETECTOR |
| | NON RETURN VALVE | | PUSH BUTTON STATION |
| | GATE VALVE WITH LIMIT SWITCH | | JUNCTION BOX |
| | 'Y' TYPE STRAINER | | LIMIT SWITCH |
| | ANNUNCIATION IN FIRE ALARM PANEL | | QUARTZOID BULB DETECTORS |
| | WATER MOTOR GONG | | |
| | DRAIN | | |

REV. NO.	DESCRIPTION	DESIGN	CHKD.	APPD.	DATE	SIZE	SCALE	DRW. NO.	REV. NO.
						A-2		9944-251-POM-A-008	A

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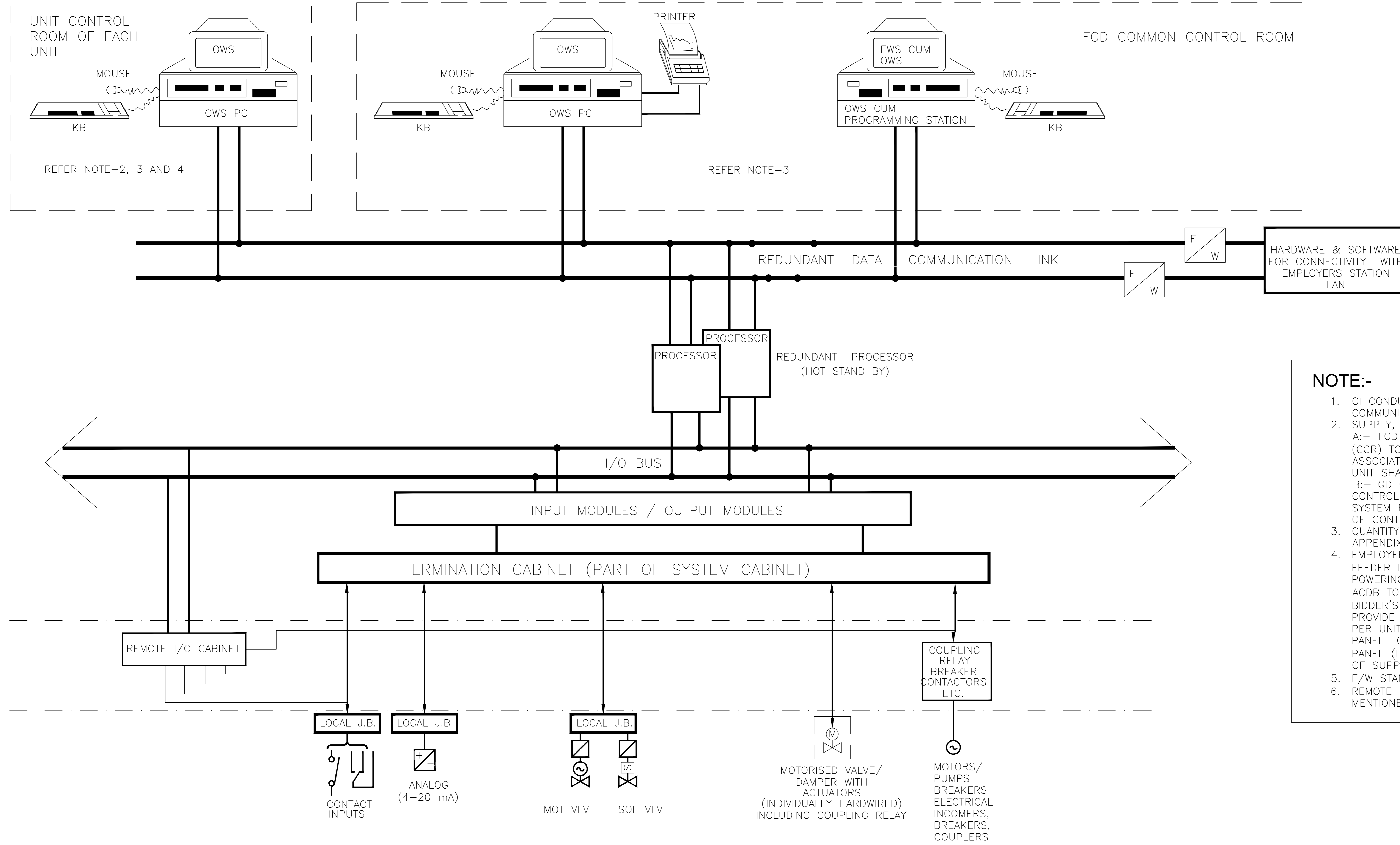
ORDER
Haryana Power Generation Corporation Ltd. (HPGCL)

CONSULTANT
NTPC LIMITED
(A GOVT. OF INDIA ENTERPRISE)
(CORPORATE)

PROJECT
DCRTPP, YAMUNA NAGAR (2x300MW)

TITLE
P&I DIAGRAM OF HWV/MVV SPRAY SYSTEM

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- NOTE:-**
- GI CONDUIT SHALL BE PROVIDED FOR IO BUS/DATA COMMUNICATION LINK LEAVING FGD CONTROL ROOM.
 - SUPPLY, INSTALLATION AND COMMISSIONING OF:
A:- FGD OWS PLACED IN CENTRAL CONTROL ROOM (CCR) TO CONTROL, OPERATE AND MONITOR FGD AND ASSOCIATED SYSTEM FROM MAIN PLANT CCR OF EACH UNIT SHALL BE IN SCOPE OF CONTRACTOR.
B:-FGD OWS PLACED IN FGD CONTROL ROOM TO CONTROL, OPERATE AND MONITOR FGD AND ASSOCIATED SYSTEM FROM FGD CONTROL ROOM SHALL BE IN SCOPE OF CONTRACTOR.
 - QUANTITY OF HMI HARDWARE SHALL BE AS PER THE APPENDIX 1 TO PART-A.
 - EMPLOYER SHALL PROVIDE 02 NOS. OF UPS POWER FEEDER PER UNIT FROM EMPLOYER'S ACDB, FOR POWERING FGD OWS LOCATED IN CCR CABLING FROM ACDB TO FGD OWS (LOCATED IN CCR) SHALL BE IN BIDDER'S SCOPE OF SUPPLY. EMPLOYER SHALL PROVIDE 2 NOS. OF 24V DC POWER SUPPLY FEEDERS PER UNIT FROM EMPLOYERS DCDB, FOR POWERING RIO PANEL LOCATED IN CER. CABLING FROM DCDB TO RIO PANEL (LOCATED IN CER) SHALL BE IN BIDDER'S SCOPE OF SUPPLY.
 - F/W STANDS FOR FIREWALL.
 - REMOTE INPUT OUTPUT (RIO) SHALL BE SUPPLIED AS MENTIONED IN PART A OF THE SPECIFICATION.

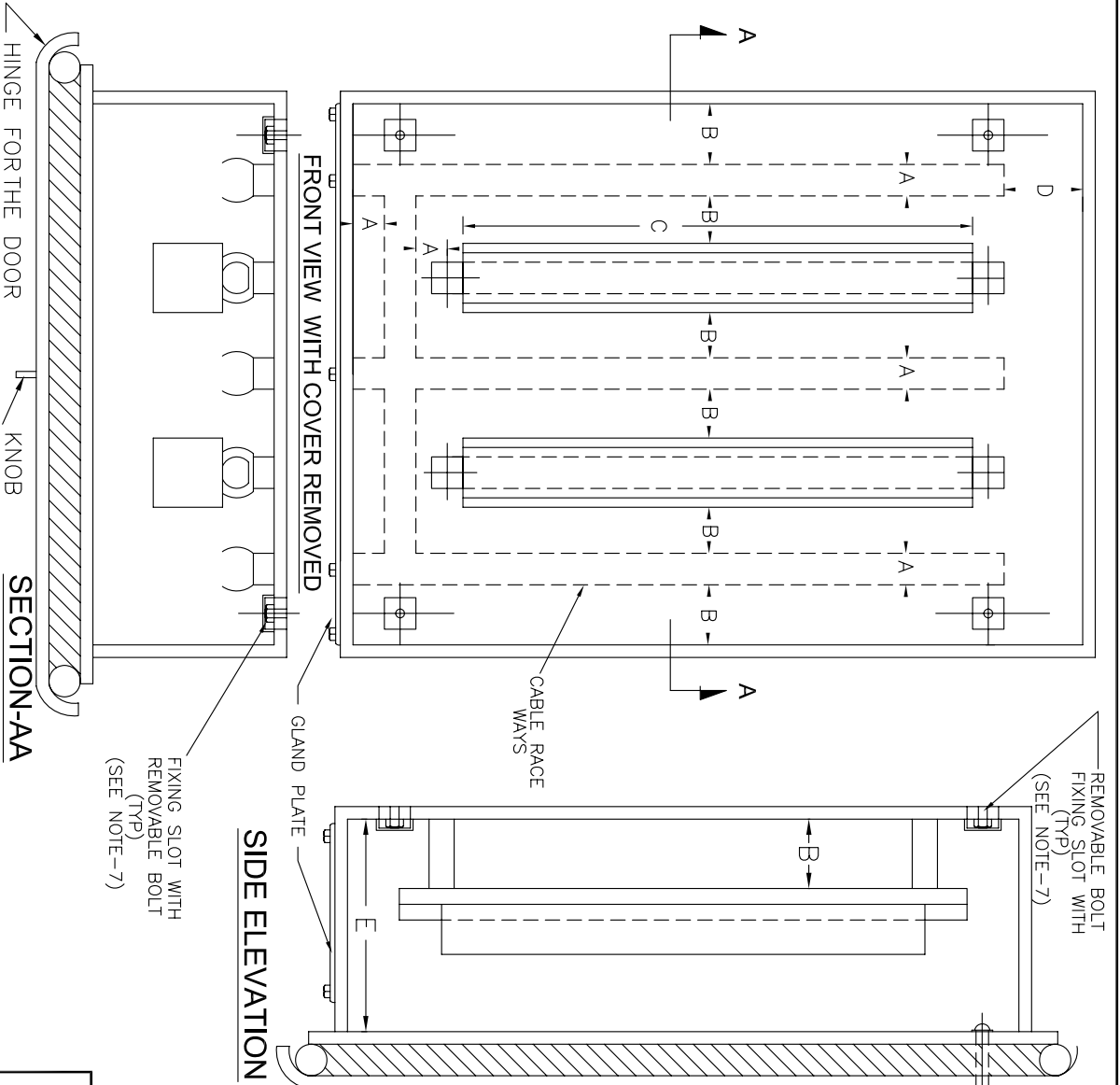
FOR TENDER PURPOSE ONLY



NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT:-	TYPICAL THERMAL POWER PROJECT		
TITLE:-	STANDARD CONFIGURATION DIAGRAM FOR CONTROL SYSTEMS		
SIZE	SCALE	DRG. NO.	REV. NO.
A4	N.T.S.	0000-151-POI-A-013	C

REV.NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE
					CLEARED BY						



A	-	75 mm
B	-	25 mm
C	-	SEE NOTE-4
D	-	100 mm
E	-	150 mm

NOTES:-

1. JUNCTION BOXES SHALL HAVE GLAND PLATES AT THE BOTTOM OF THE BOX ONLY.
2. TUBULAR TYPE GASKETS WILL BE USED.
3. FRP JUNCTION BOXES, SHALL BE PROVIDED WITH POLYETHYLENE COATING. ALSO REFER SUB SECTION INST CABLE, PART-B SECTION-VI FOR DETAILS.
4. DIMENSION OF 'C' SHALL BE BASED ON NO. OF TERMINAL BLOCKS.
5. THE EXACT TYPE & DIMENSION OF JUNCTION BOXES TO BE USED FOR A PARTICULAR APPLICATION SHALL BE AS DECIDED DURING DETAIL ENGG. STAGE AND SHALL BE SUBJECT TO EMPLOYER'S APPROVAL WITHOUT ANY PRICE REPERCUSSION.
6. THE KNOB FOR ALL THE JUNCTION BOXES SHALL BE IDENTICAL.
7. ANY TYPE OF SEALED FIXING ARRANGEMENT AS PER MANUFACTURER'S STANDARD CAN ALSO BE PROVIDED SUBJECT TO EMPLOYER'S APPROVAL.

FOR TENDER PURPOSE ONLY

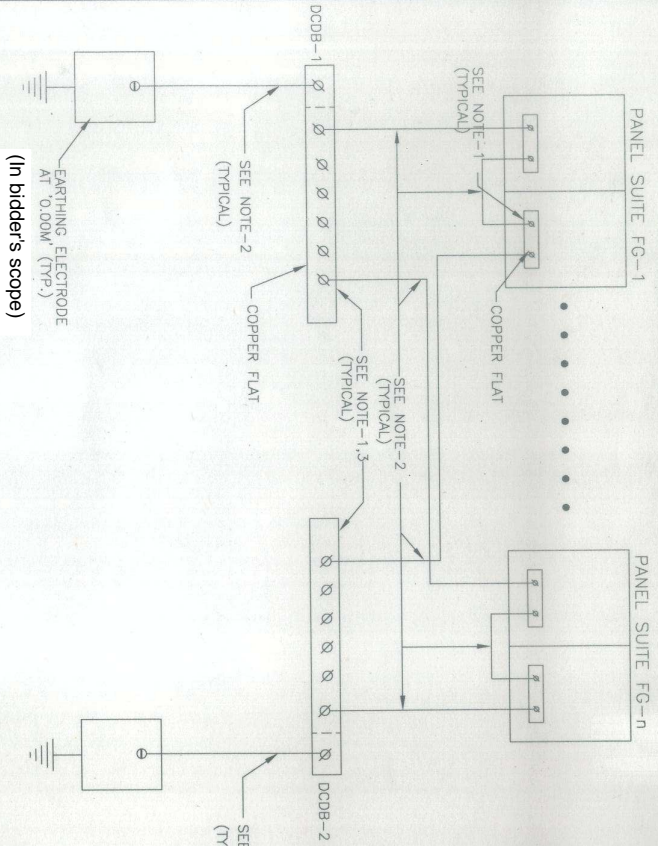
एन टी पी सी
NTPC
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PLANT

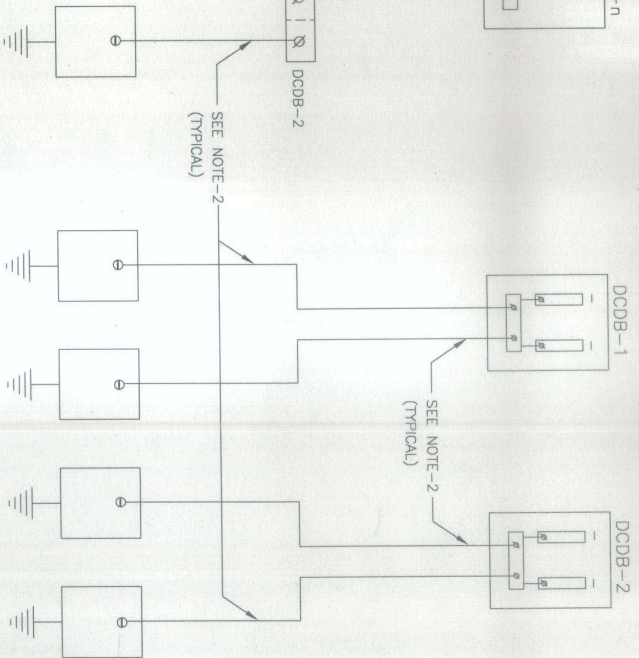
TITLE
G.A. OF JUNCTION BOX

REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	CLEARED BY	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
D	GENERALLY REVISED	JM	KS			21.08.12	A4	N.T.S.	0000-999-POI-A-017	D
C	GENERALLY REVISED	JM	KS			04.08.06				
B	GENERALLY REVISED	S.K.	PS							
A	FIRST ISSUE	S.K.	PS			04.05.05				

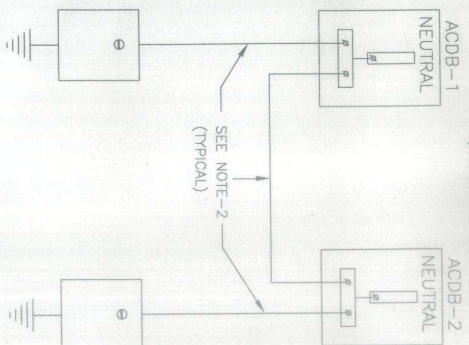
SYSTEM/SHIELD GROUNDING (TYPICAL)



POWER GROUNDING (TYPICAL)



ACDB GROUNDING (TYPICAL)

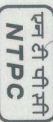


NOTES:-

1. SUPPLY, ERECTION, TERMINATION OF CABLES, FLATS ETC. REQUIRED FOR PROPER GROUNDING OF CONTRACTOR'S CONTROL SYSTEM, SYSTEM CABINETS, POWER SUPPLY CABINETS ETC. ARE IN THE SCOPE OF CONTRACTOR.
2. CABLE IN CONTRACTOR'S SCOPE.
3. TO BE LOCATED IN DCDB.
4. EXACT LOCATION, ARRANGEMENTS OF FLATS ETC. SHALL BE AS FINALISED WITH CONTRACTOR DURING DETAILED ENGINEERING.
5. CABINET BODY, CABINET BOTTOM PLATE, CABINET DOORS ARE TO BE CONNECTED TO PANEL EARTH FLAT COPPER CABLE BY CONTRACTOR.
6. Separate earth pit for C&I System to be provided. Details shall be finalised during detailed engineering.

(In bidder's scope)

FOR TENDER PURPOSE ONLY



NTPC LIMITED
 (A GOVERNMENT OF INDIA ENTERPRISE)
 ENGINEERING DIVISION

TYPICAL THERMAL POWER PROJECT

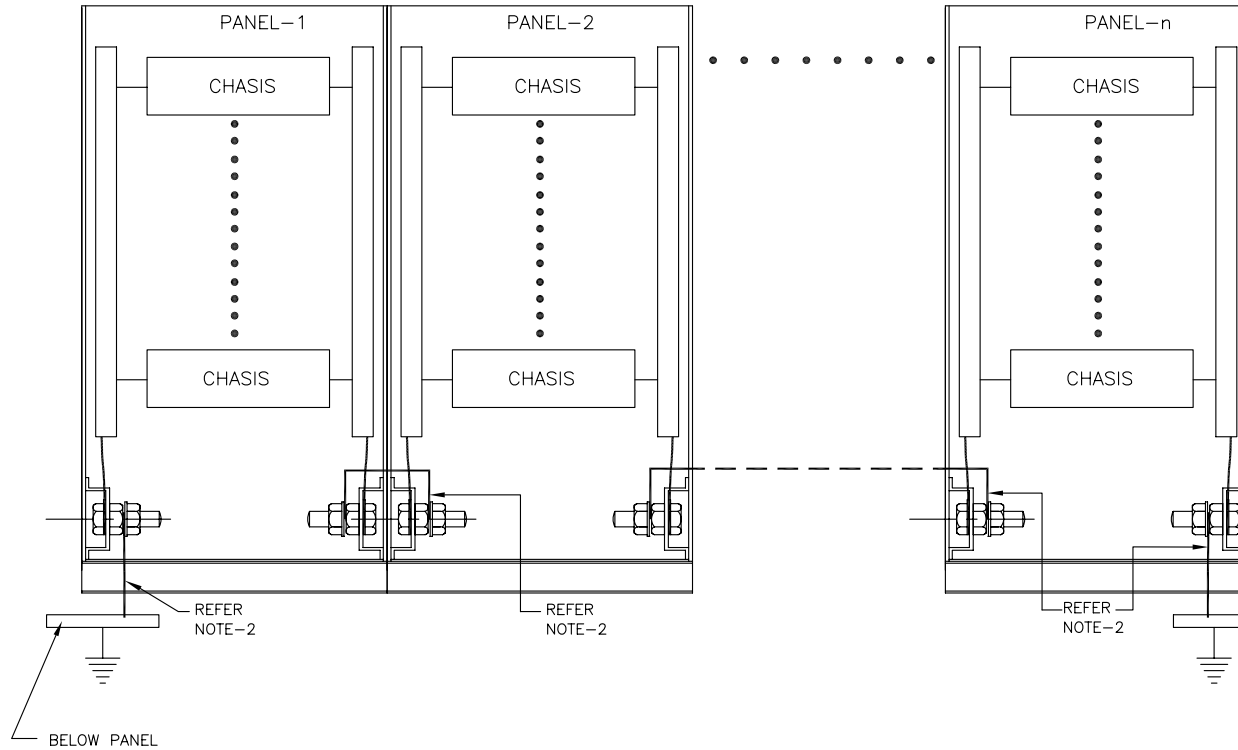
TITLE
 INSTRUMENTATION CABLING DIAGRAM
 GROUNDING SCHEME FOR CABINETS / PANELS / POWER SUPPLY

REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE
												28.03.15
DESCRIPTION												

PROJECT	TYPICAL THERMAL POWER PROJECT													
SIZE	A3	SCALE	N.T.S.	DRG. NO.	0000-999-PO1A-019A								REV. NO.	A
SH-1 OF 2														

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GROUNDING FOR EACH ROW OF PANELS (TYPICAL)



NOTES:-

1. SUPPLY, ERECTION, TERMINATION OF CABLES, FLATS ETC. REQUIRED FOR PROPER GROUNDING OF CONTRACTOR'S CONTROL SYSTEM, SYSTEM CABINETS, POWER SUPPLY CABINETS ETC. ARE IN THE SCOPE OF CONTRACTOR.
2. CABLE IN CONTRACTOR'S SCOPE.
3. TO BE LOCATED IN DCDB.
4. EXACT LOCATION, ARRANGEMENTS OF FLATS ETC. SHALL BE AS FINALISED WITH CONTRACTOR. DURING DETAILED ENGINEERING.
5. CABINET BODY, CABINET BOTTOM PLATE, CABINET DOORS ARE TO BE CONNECTED TO PANEL EARTH FLAT COPPER CABLE BY CONTRACTOR.

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ENGINEERING DIVISION

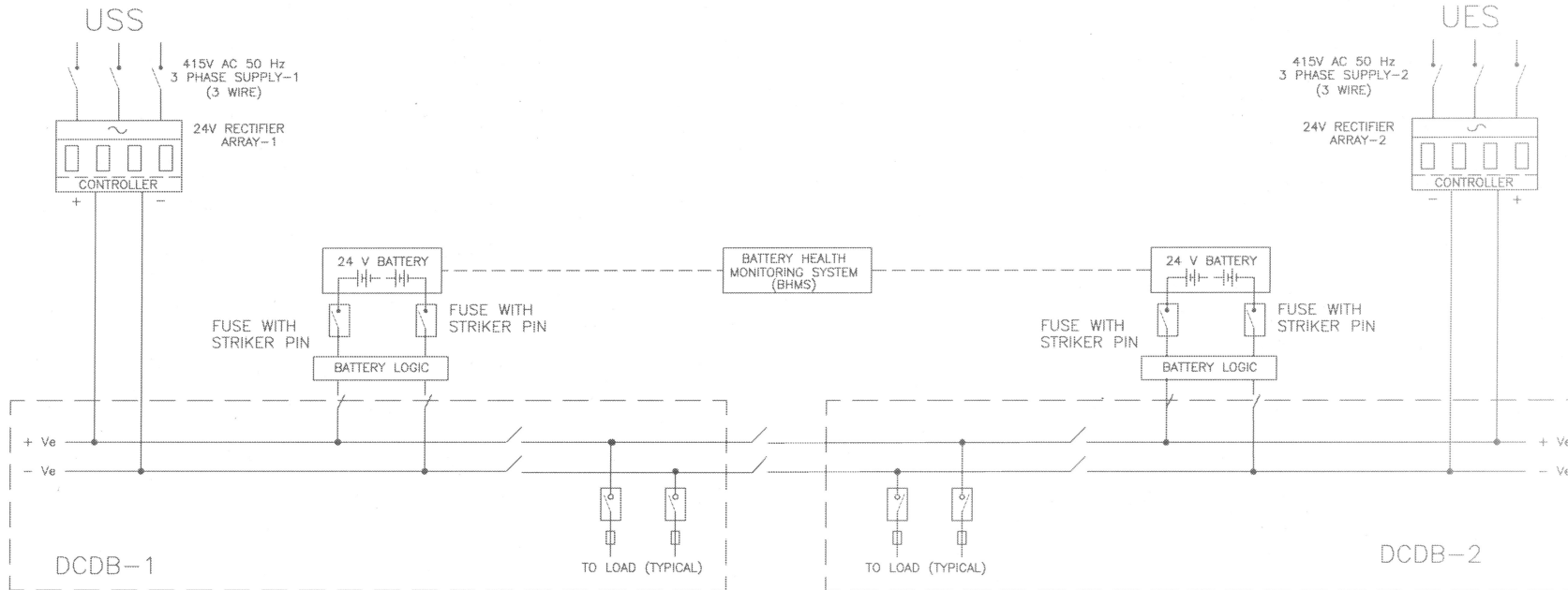
PROJECT TYPICAL THERMAL POWER PROJECT	
TITLE INSTRUMENTATION CABLING DIAGRAM GROUNDING SCHEME FOR CABINETS / PANELS / POWER SUPPLY	
REV. NO.	DATE
A	21.08.12
SIZE	SCALE
A3	N.T.S.
DRG. NO.	REV. NO.
0000-999-POI-A-019A	A
SH-2 OF 2	

DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE		
DESCRIPTION											CLEARED BY

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SET-1

SET-2



NOTES:—

- SUITABLE INTERLOCK SYSTEM SHALL BE PROVIDED IN FLOAT/BOOST CHARGING MODE.

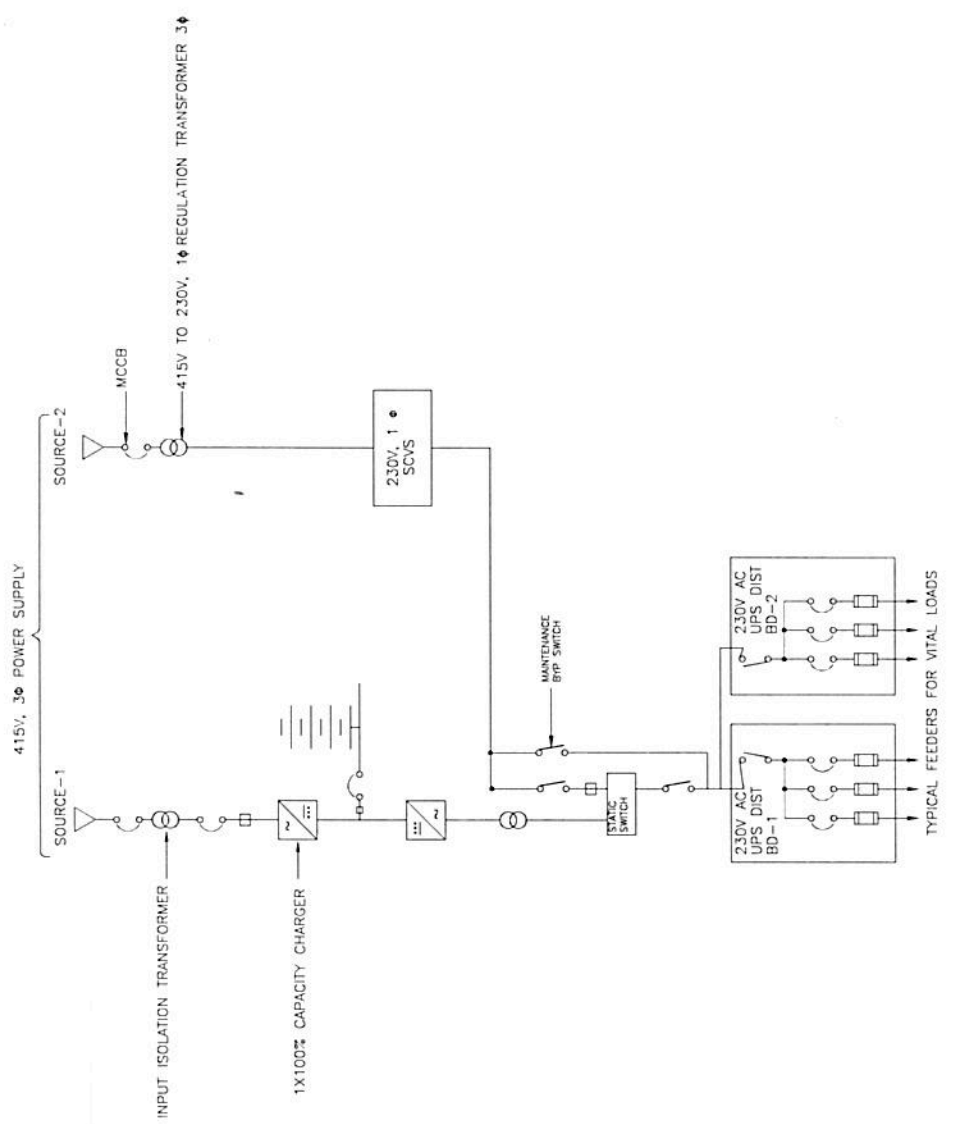
TWO SET CONFIGURATION

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ENGINEERING DIVISION

PROJECT	TYPICAL THERMAL POWER PROJECT		
TITLE	SCHEME FOR 24 V DC POWER SUPPLY SYSTEM		
SIZE	SCALE	DRG. NO.	REV. NO.
A3	N.T.S.	0000-999-POI-A-019B	A

REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE
A	FIRST ISSUE										21.08.12
CLEARED BY											



LEGENDS :-

	CIRCUIT BREAKER
	TRANSFORMER
	FUSE
	BATTERY BANK
	CONTACTOR / SWITCH

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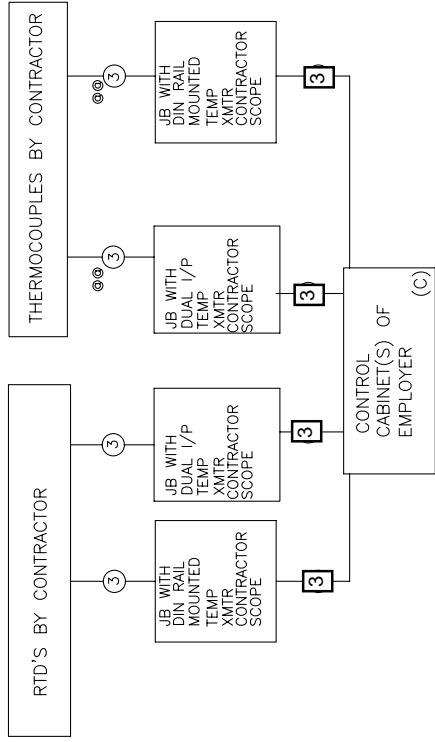
NOTE :- ABOVE INDICATED IS A TYPICAL SCHEME OF CONFIGURATION-B UPS. SYSTEM. ANY ADDITIONAL COMPONENT, DEVICE AS REQUIRED BY THE BIDDER AS PER HIS PROVEN SCHEME CAN BE OFFERED OVER & ABOVE THE SCHEME INDICATED ABOVE.

NTPC **एन टी पी सी**
National Thermal Power Corporation Ltd.
 (A GOVERNMENT OF INDIA ENTERPRISE)
 ENGINEERING DIVISION

PROJECT		TYPICAL THERMAL POWER PROJECT C&I			
TITLE		SCHEME FOR UNINTERRUPTIBLE POWER SUPPLY SYSTEM- CONFIGURATION-B			
REV. NO.	SCALE	DRG. NO.	REV. NO.		
A	A3	0000-999-POI-A-019C	A		
DESCRIPTION		(SHEET 2 OF 2)			
DRAWN DESIGN		CHKD.	CLEARED BY		
MJ AM		AKA	M	E	C
APPD		DATE	ARCH.		
		21.08.17	RK		

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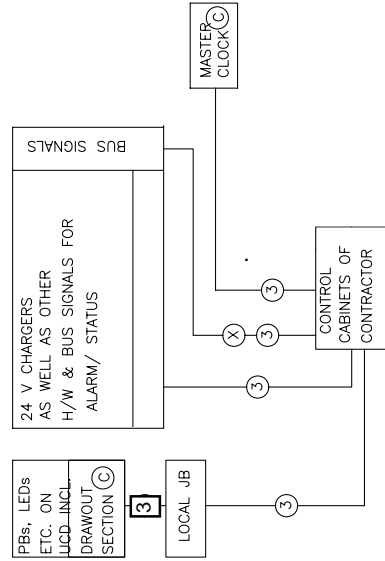
**CONTRACTOR'S RTD & THERMOCOUPLES AND TEMP TRANSMITTERS
 USED IN EMPLOYER'S CONTROL SYSTEM**



NOTES

- Ⓒ --- EMPLOYER'S SCOPE
- ⚡ --- WHEREVER APPLICABLE
- 1- CABLES IN EMPLOYER'S SCOPE
- 3- CABLES IN CONTRACTOR'S SCOPE
- ⊗ --- COMPENSATING CABLES
- ⚡(X) --- SOFT LINKS
- 4- FOR SCOPE OF CABLE ALSO REFER CLAUSE NO. 4.00.00 SUBSECTION-III-C PARTA-A OF TECHNICAL SPECIFICATION.

**CONTROL DESK MOUNTED DEVICES AND OTHER MISC
 SIGNALS INCLUDING ALARM/ STATUS SIGNALS ETC.**



A	FIRST ISSUE											21.08.12
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	Ⓒ	ARCH.	APPD.	DATE	
CLEARED BY												



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 ENGINEERING DIVISION

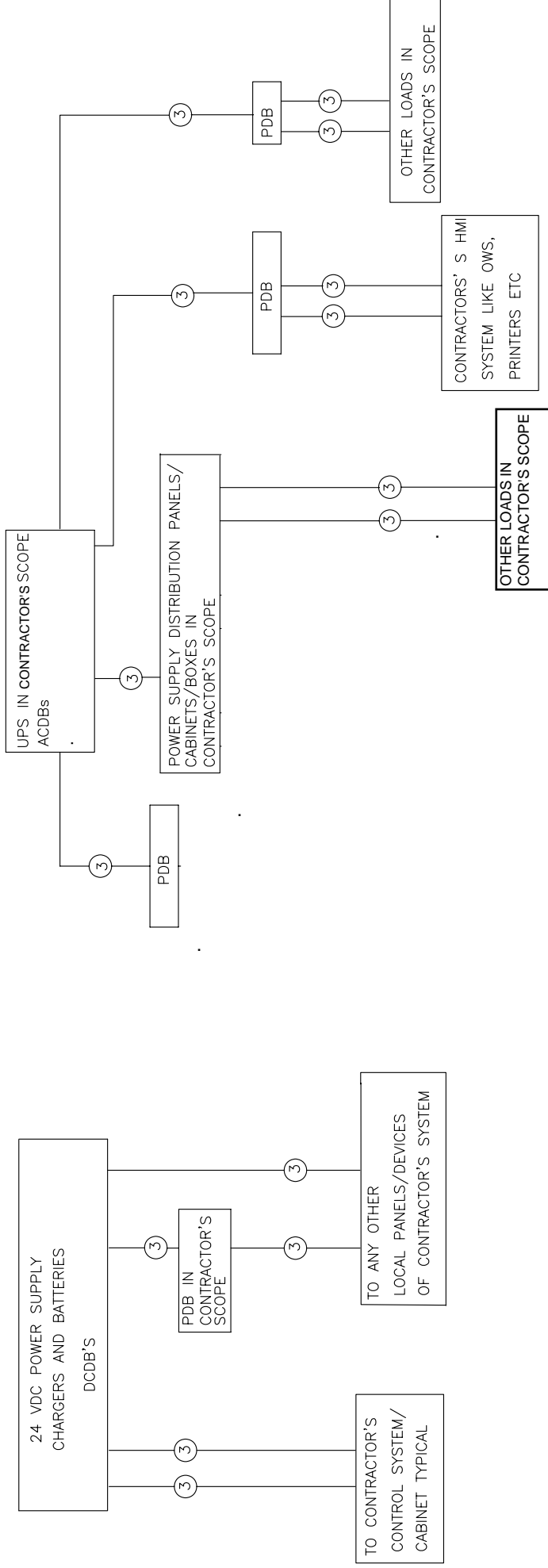
PROJECT: **TYPICAL THERMAL POWER PROJECT**

TITLE: **INSTRUMENTATION / CONTROL / POWER SUPPLY
 CABLING DIAGRAM**

SIZE A4	SCALE NTS	DRG. NO. 0000-101/102-POI-A-021	REV. NO. A
			SH 2 OF 3

CAD FILE NAME :

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NOTES :-

- ③ --- EMPLOYER'S SCOPE
- * --- WHEREVER APPLICABLE
- 1- CABLES IN EMPLOYER'S SCOPE
- 2. DELETED
- 3- CABLES IN CONTRACTOR'S SCOPE
- ⊙- COMPENSATING CABLES
- ←(X)→ - SOFT LINKS
- 4- FOR SCOPE OF CABLE ALSO REFER CLAUSE NO. 4.00.00 SUBSECTION-III:C PARTA-A OF TECHNICAL SPECIFICATION.

A	FIRST ISSUE											21.08.12
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	CAI	ARCH.	APPD.	DATE	
CLEARED BY												



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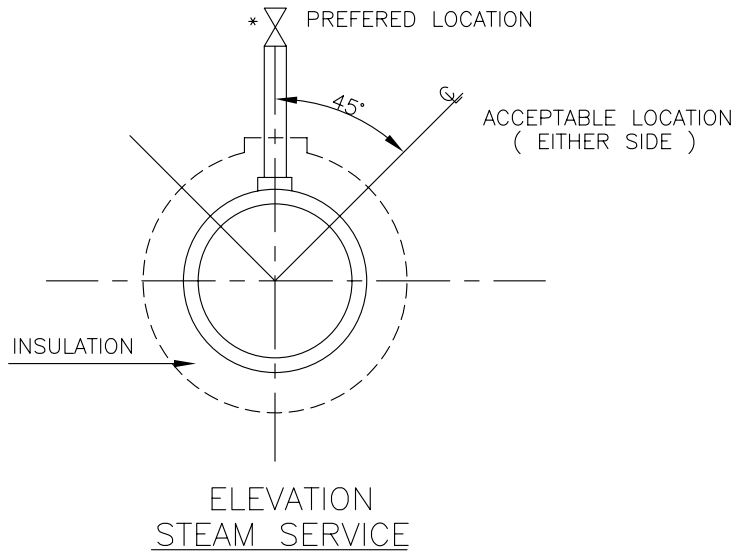
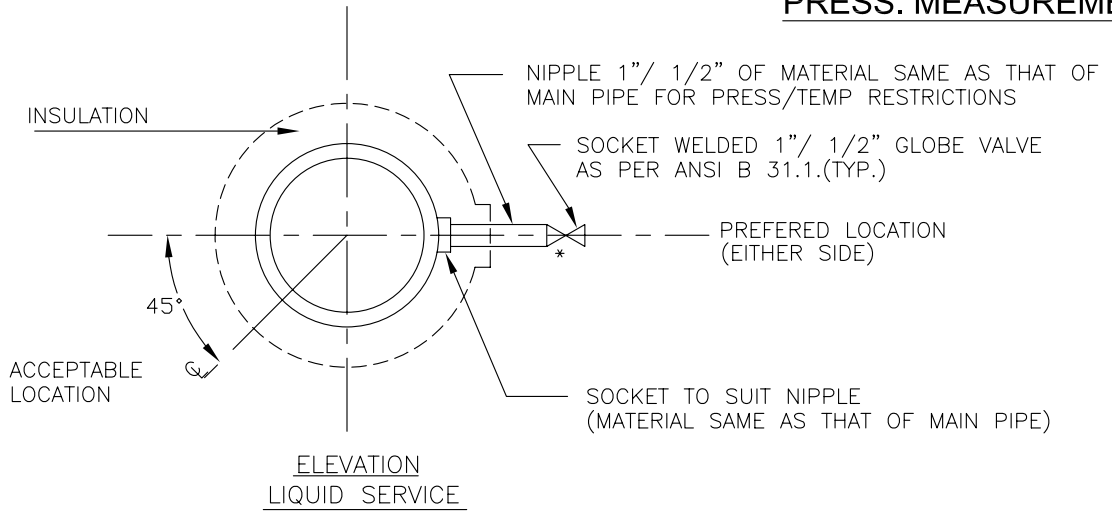
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TITLE: **INSTRUMENTATION / CONTROL / POWER SUPPLY CABLING DIAGRAM**

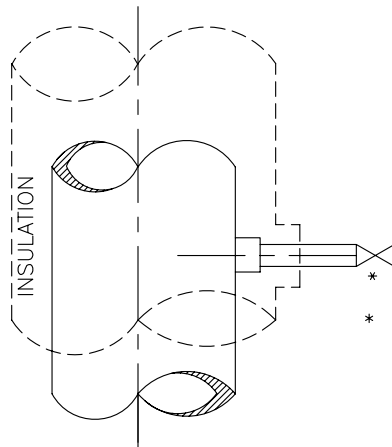
SIZE A4	SCALE NTS	DRG. NO. 0000-101/102-POI-A-021	REV. NO. A
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PRESS. MEASUREMENT



PRESSURE CONNECTION ON HORIZONTAL PIPE



* USE DOUBLE ISOLATION VALVES FOR PRESSURE EQUAL TO OR EXCEEDING 40 Kg/Cm2.

PRESSURE CONNECTIONS ON VERTICAL PIPES

FOR TENDER PURPOSE ONLY



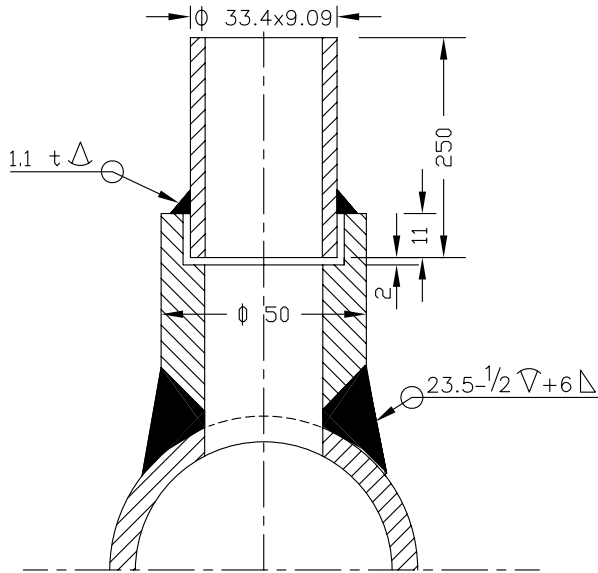
NTPC LIMITED
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ENGINEERING DIVISION

PROJECT											TYPICAL THERMAL POWER PROJECT					
TITLE											INSTRUMENT SOURCE CONNECTION DETAILS					
A	FIRST ISSUE							T.G.		21.08.12	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.	A
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	A4	N.T.S.	0000-999-POI-A-035	Sh-1 Of 14	A
CLEARED BY																

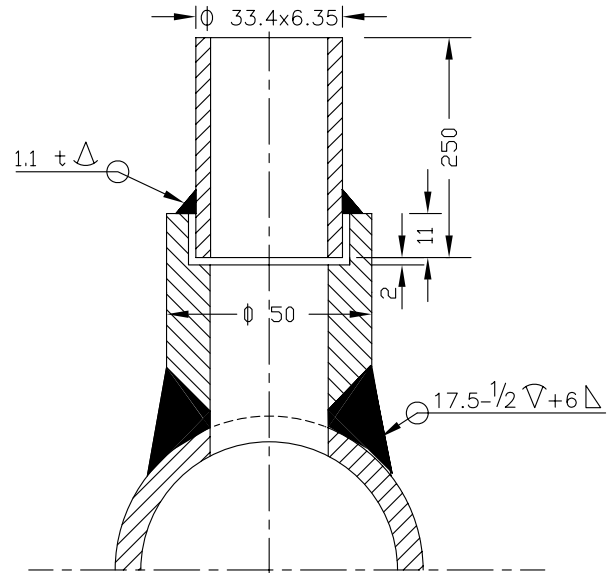
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PRESSURE MEASUREMENT

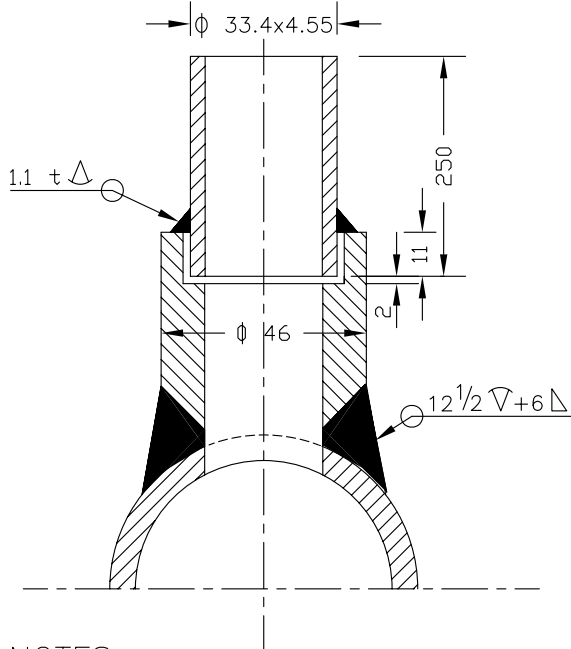
(SYSTEM PR. >40Kg/Sq Cm CL 9000)



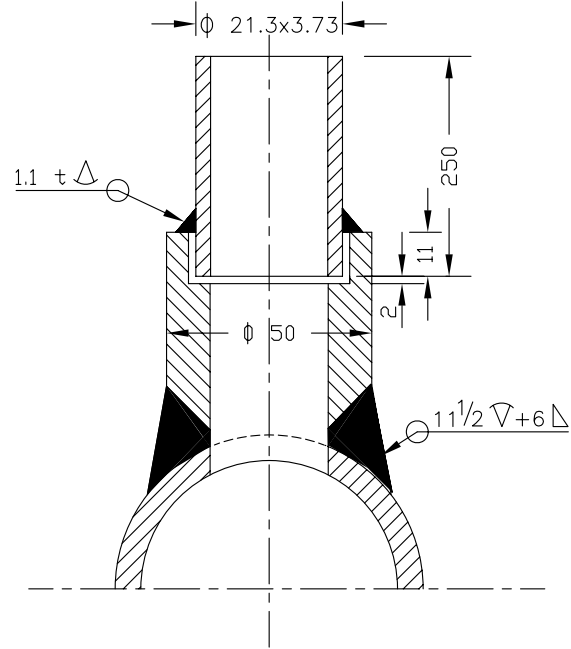
(SYSTEM PR. >40Kg/Sq Cm CL 6000)



(SYSTEM PR. <40Kg/Sq cm Nb 25 CL 3000)



(SYSTEM PR. <40Kg/Sq cm Nb 15 CL 3000)



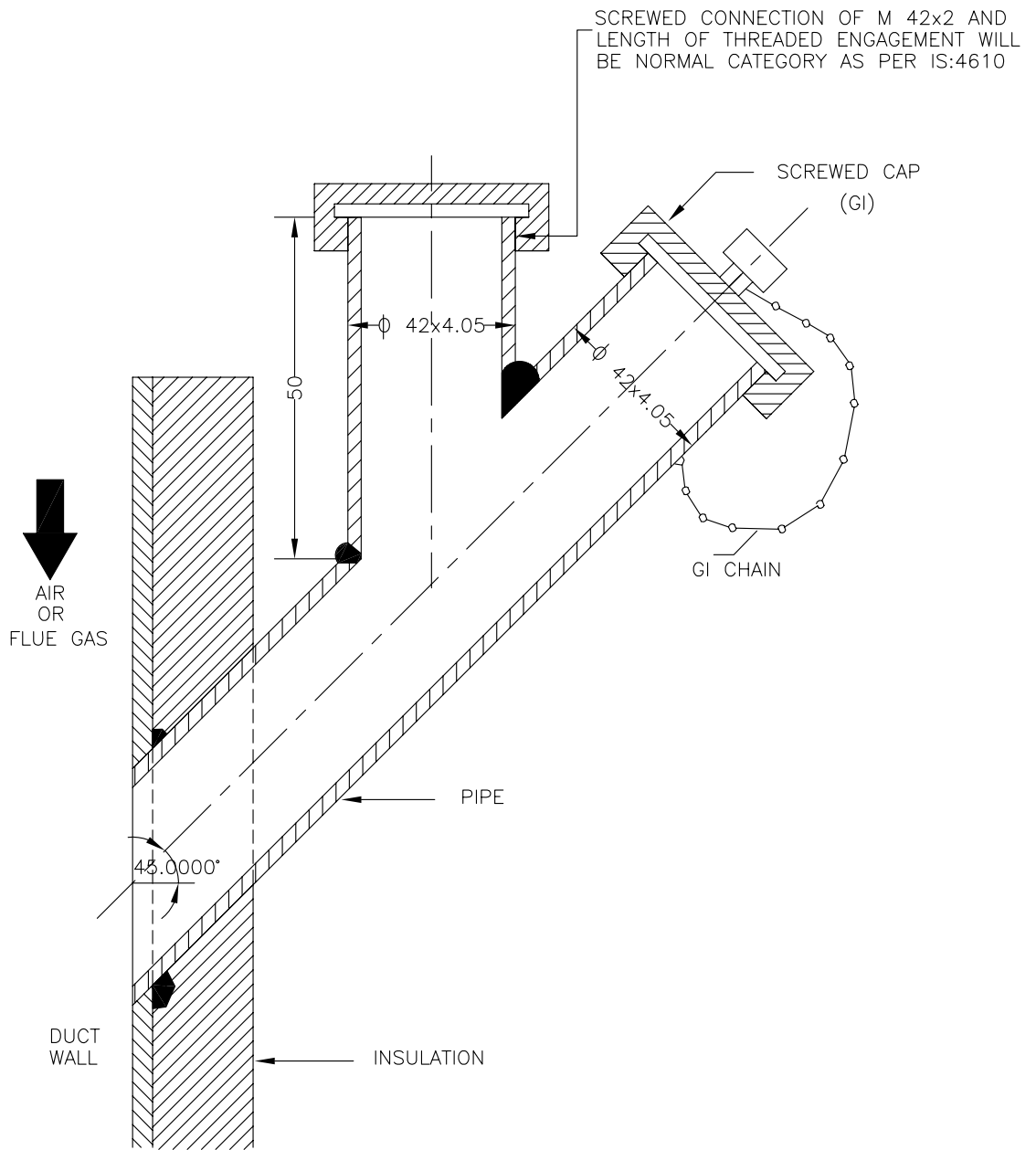
NOTES:-

1. MATERIAL OF THE BOSS AND NIPPLE SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED AND CONFIRM TO ANSI B 16.11.
2. THE LENGTH OF THE NIPPLE SHOULD BE 250mm.
3. THE OTHER END OF THE NIPPLE SHALL BE SOCKET WELDED WITH 1" GLOBE VALVE OF MATERIAL AS PER ANSI B 16.1.
4. TWO ISOLATED VALVES ARE TO BE USED FOR PRESSURE = >40 Kg/Cm2.
5. EDGE HOLE MUST BE CLEAN AND SQUARE OR ROUNDED SLIGHTLY (1/64" RADIUS) FREE FROM BURRS, WIRE EDGES OR OTHER IRREGULARITIES.
6. ORIENTATION OF TAP WILL BE VARY WITH TYPE OF PROCESS FLUID AND NATURE OF RUN OF THE PIPE.
7. ACTIVITIES TO BE COMPLETED AT THE SHOP, WELD THE COUPLING (OR BOSS) ON THE PIPE AND DRILL PRESSURE CONNECTION HOLE (SAME AS I D OF NIPPLE) IN THE PIPE IN ALIGNMENT WITH HOLE IN THE COUPLING.
8. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.

FOR TENDER PURPOSE ONLY

NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION													
PROJECT					TYPICAL THERMAL POWER PROJECT								
TITLE					INSTRUMENT SOURCE CONNECTION DETAILS								
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE		
A	FIRST ISSUE										21.08.12		
Cleared by										SIZE	SCALE	DRG. NO.	REV. NO.
										A4	N.T.S.	0000-999-POI-A-035	A
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PRESS. MEASUREMENT



NOTES:-

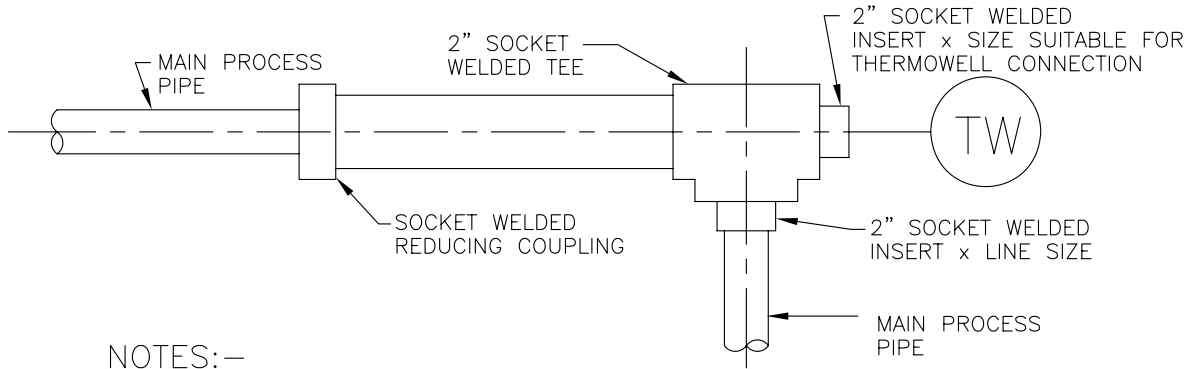
1. THIS TYPE OF PRESSURE CONNECTON SHALL BE PROVIDED FOR PRESSURE MEASUREMENTS IN AIR AND FLUE GAS DUCT/FURNACE.
2. DIMENSIONS ARE INDICATIVE ONLY.

FOR TENDER PURPOSE ONLY

										 NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION						
										PROJECT		TYPICAL THERMAL POWER PROJECT				
										TITLE		INSTRUMENT SOURCE CONNECTION DETAILS				
A	FIRST ISSUE								T.G.	21.08.12	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.	A
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE					
										Cleared by						
												Sh-3 Of 14				

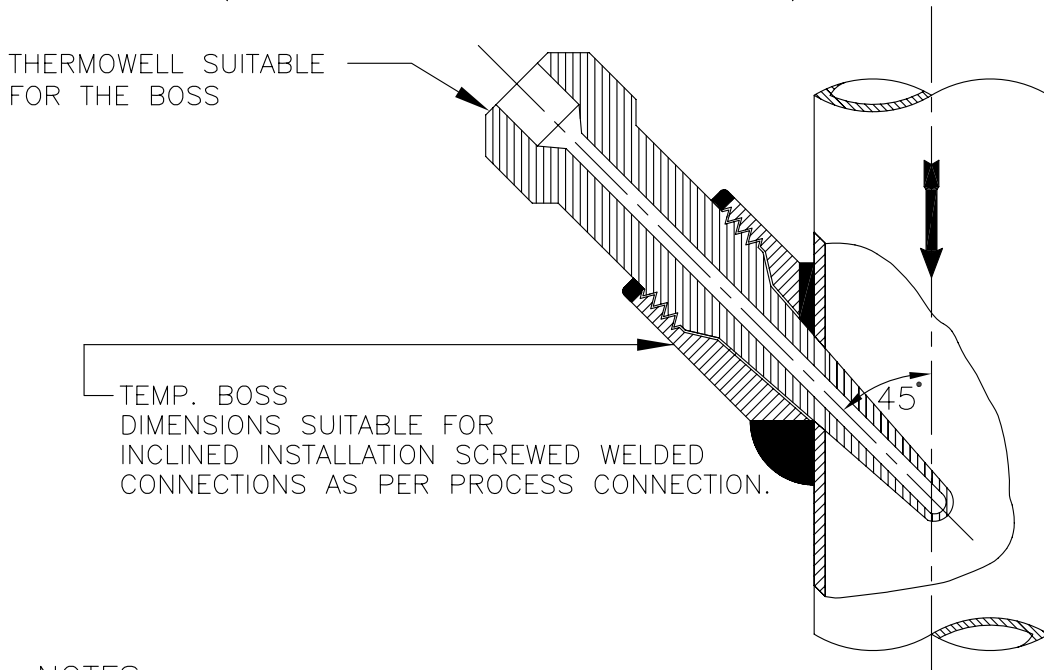
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TEMP. MEASUREMENT



NOTES:—



1. THIS TYPE OF THERMOWELL INSTALLATION IS SUITABLE FOR THE PROCESS PIPE OF 2" NPS AND SMALLER.
2. FOR STEAM SERVICE THIS TYPE OF THERMOWELL INSTALLATION 90° BEND MAY BE USED ONLY IN VERTICAL PLANE.
3. THE LENGTH OF THE LARGER PIPE SECTION SHALL BE MINIMUM 150mm (IT MUST BE GREATER THAN THERMOWELL LENGTH).



NOTES:—

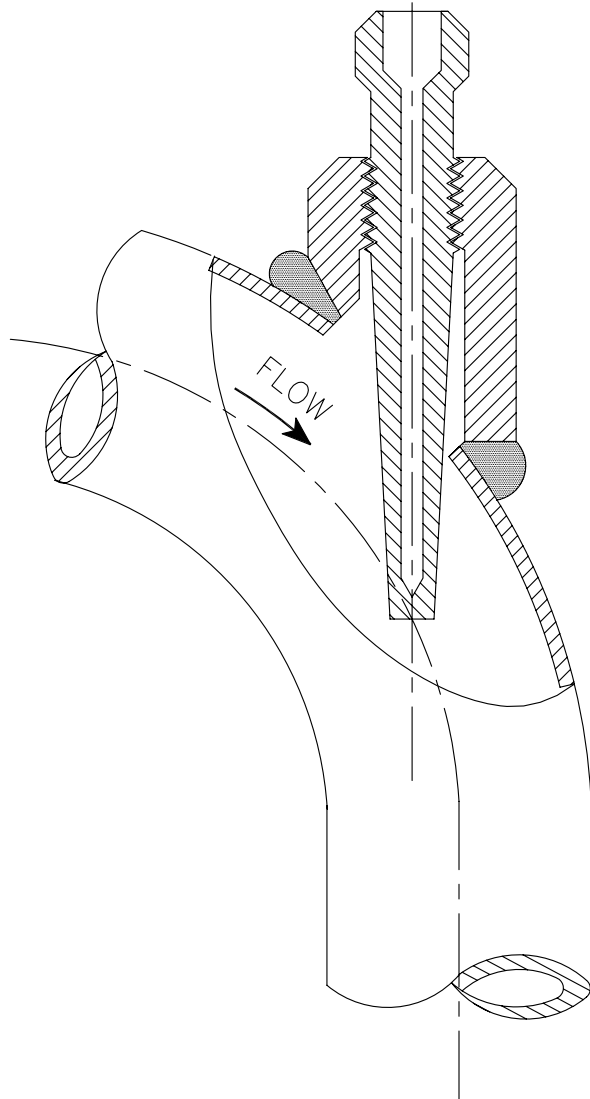
1. INCLINED INSTALLATION OF THERMOWELL SHALL BE APPLICABLE FOR 4" AND SMALLER LINE SIZE BUT LIMITED TO MIN. 3" LINE SIZE.
2. FOR 2" AND SMALLER LINE SIZE NECESSARY EXPANDER OF MIN. 3" SIZE OF MAIN PIPING SPECIFICATION SHALL BE USED.
3. THIS TYPE OF INSTALLATION IS APPLICABLE FOR HORIZONTAL AND VERTICAL PIPE SECTION.
4. FOR STEAM SERVICES EXPANDER SECTION MAY BE USED ONLY IN VERTICAL RUN.
5. THE EXPANDER SECTION SHALL BE OF ADEQUATE LENGTH (ATLEAST 3-4 TIMES DIA OF THE MAIN PROCESS PIPE AT BOTH SIDE OF THE INSTALLED THERMOWELL).

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 NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION												
PROJECT TYPICAL THERMAL POWER PROJECT (SG PACKAGE)												
TITLE INSTRUMENT SOURCE CONNECTION DETAILS												
A	FIRST ISSUE		T.G.	21.08.12								
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	
CLEARED BY												
SIZE	SCALE	DRG. NO.	0000-999/102-POI-A-035						REV. NO.			
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Sh-4 Of 14												

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TEMP. MEASUREMENT



NOTES:—

1. FLOW INSTALLATION OF THERMOWELL SHALL BE APPLICABLE FOR 4" AND SMALLER LINE SIZE BUT LIMITED TO MINIMUM 3" LINE SIZE.
2. FOR 2" AND SMALLER LINE SIZE NECESSARY EXPANDER OF ELBOW FORM (AS SHOWN) OF MINIMUM 3" SIZE SHALL BE USED.
3. ELBOW EXPANDER SECTION IN HORIZONTAL PLANE MAY BE USED FOR LIQUID SERVICES. ONLY STEAM SERVICES EXPANDER SECTION MAY BE USED IN VERTICAL PLAN.

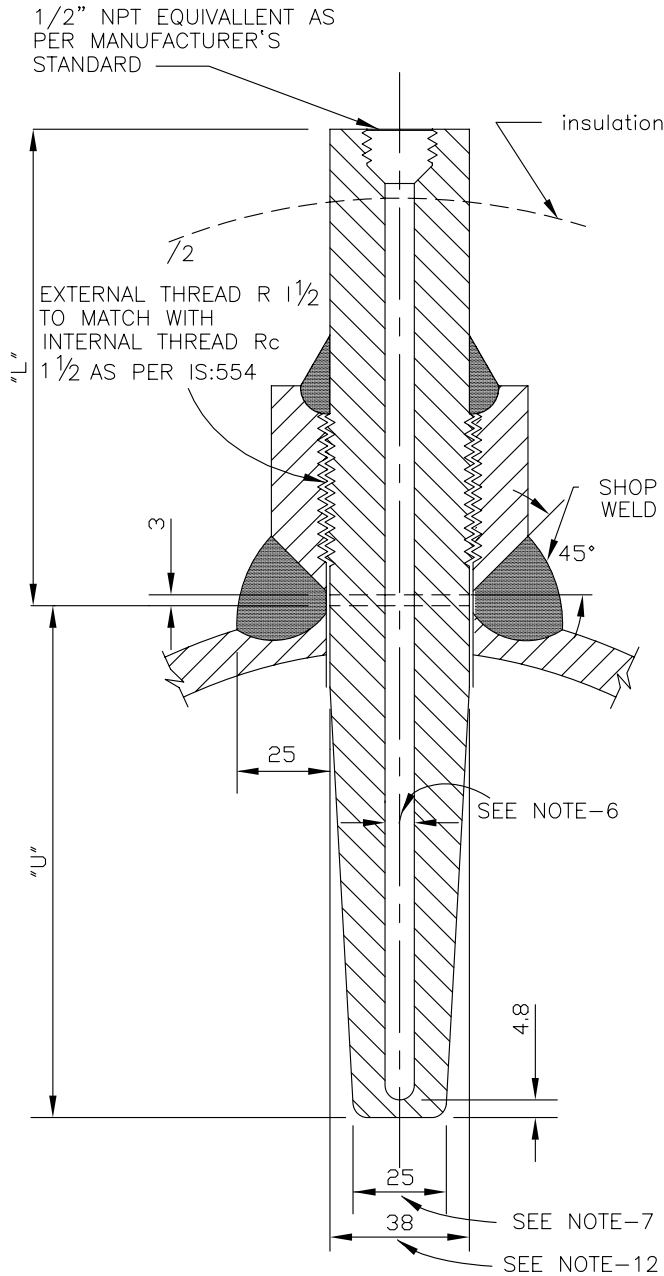
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										PROJECT		TYPICAL THERMAL POWER PROJECT					
										TITLE		INSTRUMENT SOURCE CONNECTION DETAILS					
A	FIRST ISSUE		DRAWN		DESIGN		CHKD.		T.G.		21.08.12						
REV. NO.	DESCRIPTION		DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.
			CLEARED BY									A4	N.T.S.			A	
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TEMP. MEASUREMENT



NOTES:-

1. THIS TYPE OF TEMPERATURE BOSS SHALL BE USED FOR THE PROCESS PRESS EQUAL/ABOVE 40 Kg/Cm2(g).
2. THE MATERIAL OF THE BOSS SHOULD BE SIMILAR TO THAT OF PIPING MATERIAL OF SPECIFICATION.
3. ALL WELD TO BE TESTED IN ACCORDANCE WITH APPLICABLE CODES BY MANUFACTURER.
4. MATERIAL OF THE THERMOWELL SHALL BE OF 316SS.
5. THERMOWELL SHALL BE DRILLED BARSTOCK TYPE.
6. INTERNAL BORE OF THE THERMOWELL SHOULD BE SELECTED BASED ON THE NORMAL SIZE OF THE SENSING ELEMENT AS PER ASME,PTC-19.3.
7. THE BOTTOM DIAMETER OF THE THERMOWELL TYPICALLY SHOWN HERE SHALL BE SUBJECT TO VARIATION BASED ON THE INTERNAL BORE OF THERMOWELL AND THICKNESS OF THERMOWELL MATERIAL TO WITHSTAND THE PROCESS PRESS.AND TEMP.,AS PER ASME,PTC-19.3.
8. THE TYPE OF TAPERED THERMOWELL SHALL BE USED FOR LIQUID VELOCITIES UP TO 92M.P.S.(300F.T.P.S.).
9. THERMOWELL WITH THE INSULATION LAG EXTENSIONS SHALL BE USED WHEREVER APPLICABLE.
10. ACTIVITIES TO BE COMPLETED AT THE SHOP. WELD THE BOSS ON THE PIPE AND DRILL THE HOLE IN THE PIPE IN ALLIGNMENT WITH HOLE IN THE BOSS. PROVIDE INTERNAL THREAD AS PER IS:554 TO MATCH WITH THE THERMOWELL EXTERNAL THREAD.
11. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED.
12. WILL BE SUITABLE TO MATCH THE STUB DIMENSIONS AS PER RC 1 1/2
13. THE "U" & "L" DIMENSIONS SHALL BE BE SELECTED BASED ON PARTICULAR APPLICATION AND THE SAME SHALL BE SUBJECT TO OWNER'S APPROVAL DURING DETAILED ENGINEERING.
14. ALL DIMENSIONS ARE INDICATIVE ONLY.

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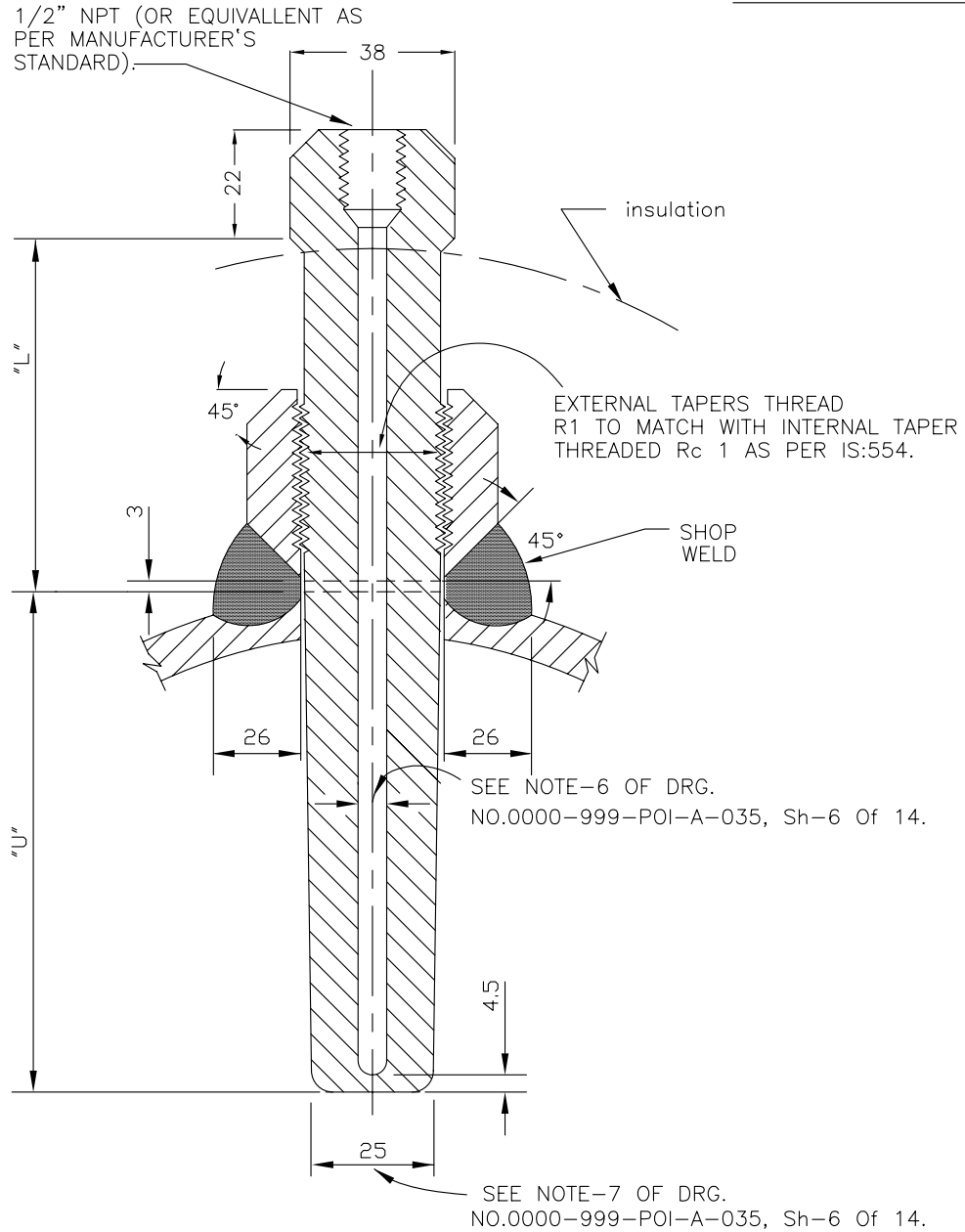


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ENGINEERING DIVISION

PROJECT												TYPICAL THERMAL POWER PROJECT					
TITLE												INSTRUMENT SOURCE CONNECTION DETAILS					
A	FIRST ISSUE								T.G.		21.08.12	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.	A
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.	A
CLEARED BY												A4	N.T.S.			Sh-6 Of 14	

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TEMP. MEASUREMENT



NOTES:-

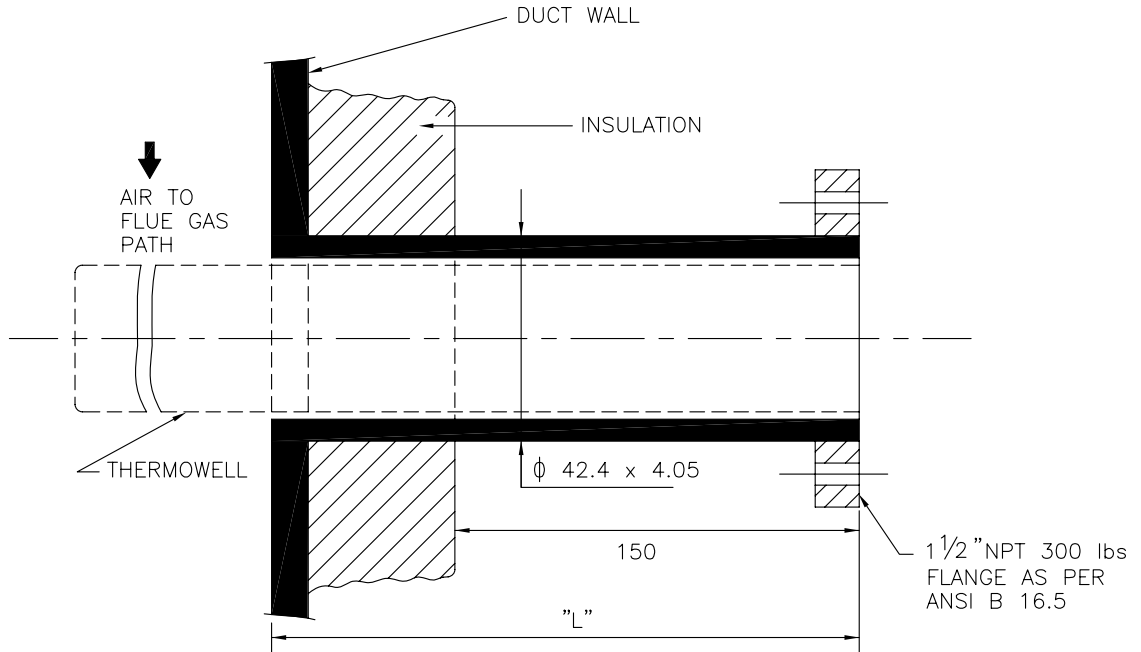
1. THIS TYPE OF TEMPERATURE BOSS IS APPLICABLE FOR THE PROCESS PRESSURE/TEMPERATURE BELOW 40 Kg/Cm2(g)/400°C
2. FOR PRESSURE TIGHT JOINTS THE BOSS SHOULD HAVE INTERNAL TAPERED PIPE THREAD Rc 1 AS PER IS:554. THE LENGTH OF THREAD ENGAGEMENT SHOULD BE AS PER ABOVE STANDARD.
3. PIPES HAVING PROBABILITY OF PROLONGED VIBRATION SEAL WELDING MAY BE DONE ALL AROUND AFTER TIGHTENING THERMOWELL WITHIN THE BOSS.
4. SEE NOTES-2 TO 14 OF DRG. NO. 0000-999-POI-A-035, Sh-6 Of 14.

FOR TENDER PURPOSE ONLY

NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION											
PROJECT TYPICAL THERMAL POWER PROJECT											
TITLE INSTRUMENT SOURCE CONNECTION DETAILS											
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE
A	FIRST ISSUE										21.08.12
CLEARED BY											
		SIZE A4		SCALE N.T.S.		DRG. NO. 0000-999-POI-A-035				REV. NO. A	
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TEMP. MEASUREMENT



NOTES:—

1. THIS TYPE OF TEMPERATURE CONNECTIONS SHALL BE PROVIDED FOR TEMPERATURE MEASUREMENT IN AIR AND FLUE GAS DUCT.
2. MATERIAL OF THERMOWELL SHALL BE OF 316SS.
3. EXTERNAL CONNECTION SHALL BE OF SLIP ON FLANGED TYPE AND THERMOWELL DESIGN SHALL BE AS PER ASME.PTC-19.3 (REFER NOTES 9&10 OF DRG.NO. 0000-999-POI-A-035, Sh-6 Of 14).
4. BIDDER TO SUPPLY AND INSTALL THE COUNTER FLANGED AND THERMOWELL (ALONG WITH TEMP. ELEMENT).
5. ALL DIMENSIONS ARE INDICATIVE ONLY.

FOR TENDER PURPOSE ONLY

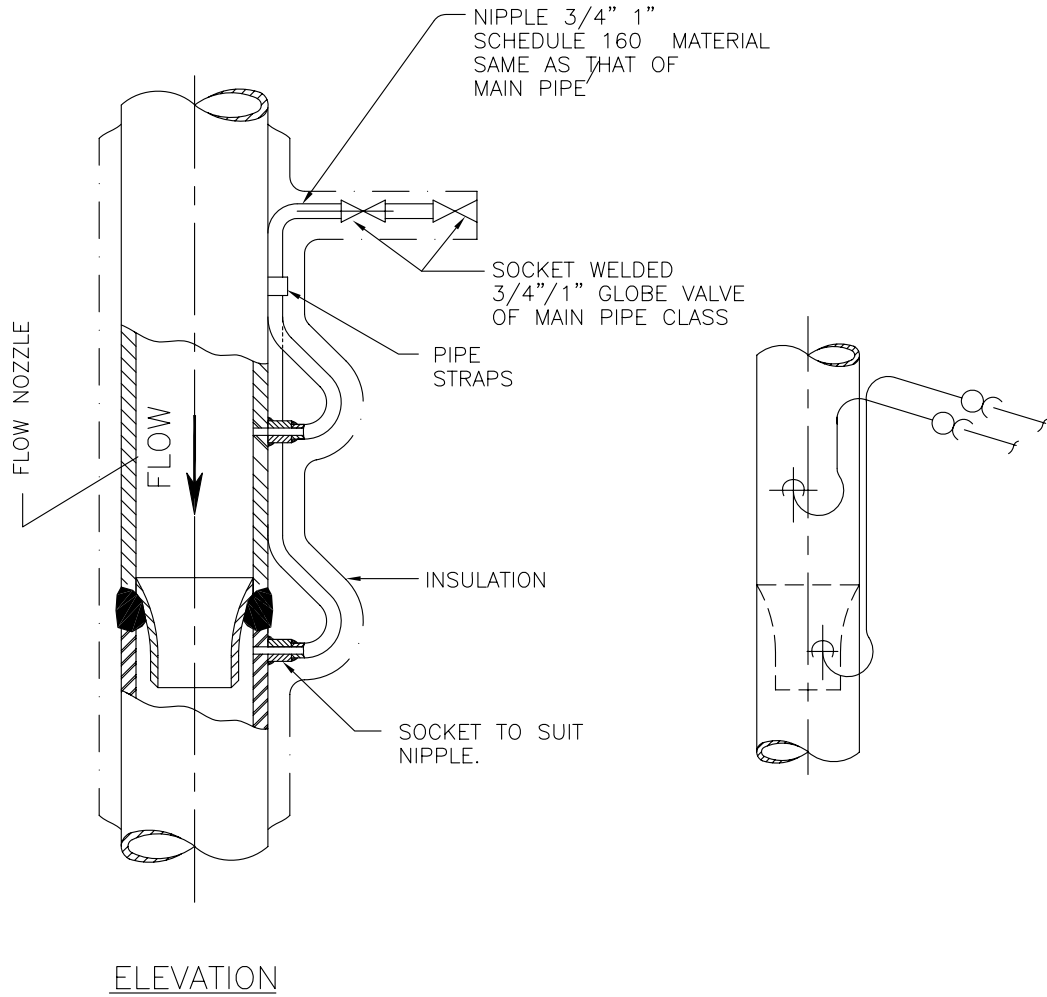


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										PROJECT		TYPICAL THERMAL POWER PROJECT			
										TITLE		INSTRUMENT SOURCE CONNECTION DETAILS			
A	FIRST ISSUE							T.G.	21.08.12	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.	A
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	CLEARED BY		Sh-8 Of 14	

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FLOW MEASUREMENT




ELEVATION

NOTES:—

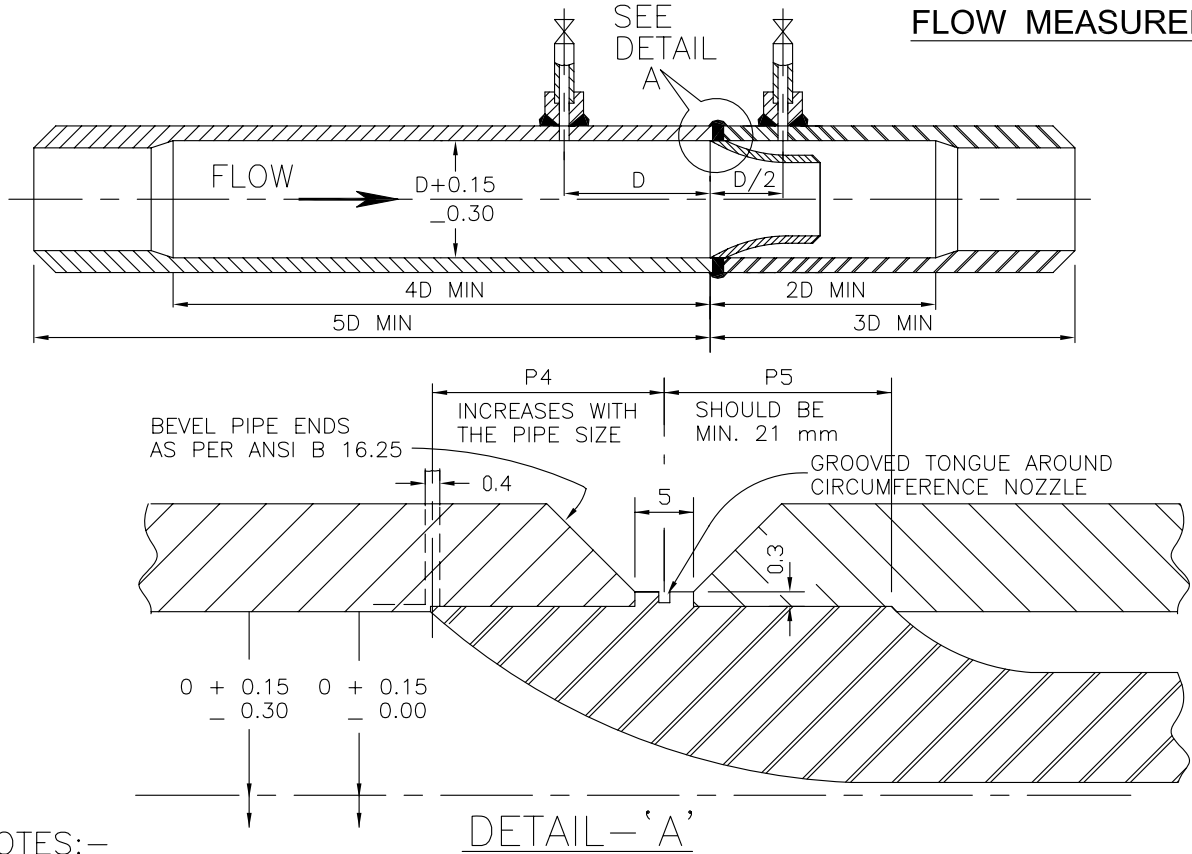
1. THIS METHOD OF CONNECTING NIPPLES AND VALVES ON THE VERTICAL STEAM PIPE IS APPLICABLE FOR MEASUREMENT OF STEAM AT TEMP. ABOVE 455°C
2. THE ENTIRE LENGTH OF THESE NIPPLES AS WELL AS SHUT OFF VALVES SHOULD BE LAGGED IN WITH STEAM LINE AS SHOWN IN THE DRAWING.
3. ON VERTICAL STEAM PIPE BOTH HIGH TEMPERATURE (SPECIAL VENTS) NIPPLES WILL BE LONG ENOUGH SO THAT HIGH AND LOW PRESSURE CONNECTION NIPPLES WILL BE AT SAME LEVEL.
4. UP STREAM AND DOWN STREAM PRESSURE CONNECTIONS MUST BE INSTALLED IN DIFFERENT PLANES PASSING THROUGH THE CENTRE OF THE PIPE.
5. FLOW ELEMENTS SHALL BE PROVIDED WITH 3 PAIRS OF TAPPING POINTS.

FOR TENDER PURPOSE ONLY

												NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION					
										PROJECT				TYPICAL THERMAL POWER PROJECT			
										TITLE				INSTRUMENT SOURCE CONNECTION DETAILS			
A	FIRST ISSUE		M	E	C	T.G.	21.08.12			SIZE	SCALE	DRG. NO.	0000-999-POI-A-035		REV. NO.		
REV. NO.	DESCRIPTION		DRAWN	DESIGN	CHKD.	M	E	C	T.G.	21.08.12	A4	N.T.S.			A		
										CLEARED BY							
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FLOW MEASUREMENT



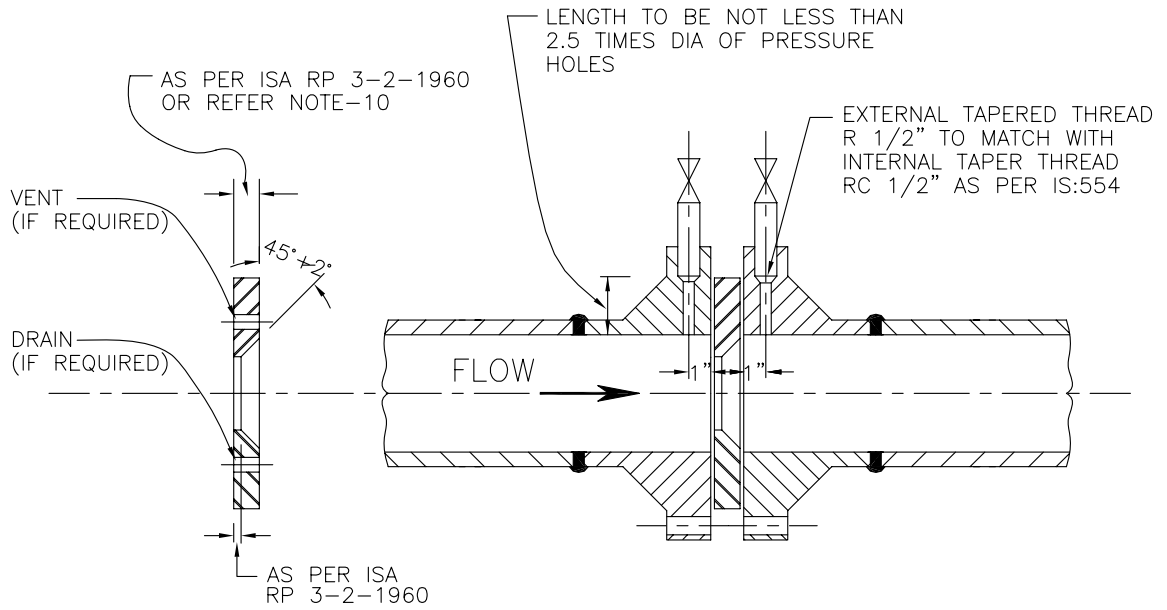
NOTES:-

1. COMPLETE FLOW NOZZLE BRANCH ASSEMBLY ALONG WITH NIPPLES AND SOURCE ISOLATION VALVES SHALL BE SUPPLIED BY THE BIDDER. THE BIDDER ALSO TO INSTALL FLOW NOZZLE WITHIN THE MACHINED BRANCH, PRESSURE STUBS ON THE BRANCH PIPE (FOR ORIENTATION OF PRESSURE TAP REF. NOTE-3) ALONG WITH NIPPLE AND SOURCE ISOLATION VALVES.
2. THE MACHINING OF BRANCH PIPE SHOULD BE DONE AFTER PRESSURE CONNECTIONS HAVE BEEN WELDED TO PIPE AND ALSO EXTEND FOR ATLEAST 4D IN THE INLET SECTION, 2D IN THE OUTLET SECTION, MEASURED FROM THE INLET FACE OF FLOW NOZZLE. TOTAL BRANCH PIPE ASSEMBLY SHOULD BE ATLEAST A LENGTH OF 8D/5D IN THE INLET SECTION AND 3D IN THE OUTLET SECTION, MEASURED FROM THE INLET FACE OF THE FLOW NOZZLE AS SHOWN ABOVE.
3. ON HORIZONTAL PIPE RUN PRESSURE CONNECTIONS ARE TO BE LOCATED ON SIDES OF THE PIPE FOR LIQUID AND STEAM SERVICE AND ON THE TOP FOR DRY GAS SERVICE FOR PROCESS LIQUIDS, INSTALLATION OF PRESS. TAPS MAY BE ALLOWED WITHIN AN ANGLE OF 45° ELBOW HORIZONTAL FOR SPECIAL CASES BUT NO BOTTOM CONNECTIONS ARE ALLOWED.
4. THE LOCATION OF PRESSURE TAPS MUST BE WITHIN 1.5 mm(1/16") OF DISTANCE SPECIFIED AND NUMBER OF PAIRS OF PRESSURE TAPS TO BE PROVIDED WILL BE AS PER FLOW MEASUREMENT DATA SHEET.
5. PRESSURE TAPS SHOULD BE DRILLED RADIALLY WITH RESPECT TO PIPE AND THIS DRILLING SHOULD BE DONE AFTER ANY COUPLING FOR ATTACHING THE PRESSURE TUBING HAS BEEN WELDED TO THE PIPE. THE HOLE WHERE IT BREAKS THROUGH THE INNER SURFACE OF THE PIPE MUST BE FREE OF BURRS OR WIRE EDGE AND CORNER OF EDGE HOLE LEFT ROUNDED VERY SLIGHTLY (1/64" RADIUS).
6. RECOMMENDED MAXIMUM DIAMETERS OF PRESSURE TAP HOLES IN THE BRANCH PIPES WILL BE AS PER EN ISO 5167:2003. THE DIAMETER FOR HOLE SHOULD REMAIN SAME FOR DISTANCE NOT LESS THAN 2.5 TIME OF DIA FROM THE INNER SURFACE OF THE PIPE.
7. FLOW NOZZLE SHALL BE CENTRED IN THE PIPE WITHIN 0.8 mm (1/32") OF THE PIPE AXIS. INSIDE DIAMETER MEASURED AT FOUR POINTS AT ANY CROSS SECTION SHALL NOT DIFFER BY MORE THAN 1%.
8. BRANCH PIPE SHALL BE AS PER MAIN PIPING MATERIAL SPECIFICATION. INTERNAL SURFACE OF BORED SECTIONS MUST BE SMOOTH AND STRAIGHT, FREE FROM SCALES, PITS, BURRS OR ANY IRREGULARITIES.
9. FLOW NOZZLE MATERIAL SHALL BE 316 SS AND THE DESIGN AS PER ASME.
10. MAXIMUM UPSTREAM AND DOWN STREAM STRAIGHT LENGTH REQUIRED FROM INLET FACE OF FLOW NOZZLE SHALL BE AS PER EN ISO 5167:2003.

FOR TENDER PURPOSE ONLY

NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION															
PROJECT TYPICAL THERMAL POWER PROJECT															
TITLE INSTRUMENT SOURCE CONNECTION DETAILS															
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A	FIRST ISSUE										21.08.12	A4	N.T.S.	0000-999-POI-A-035	A
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FLOW MEASUREMENT



NOTES:-

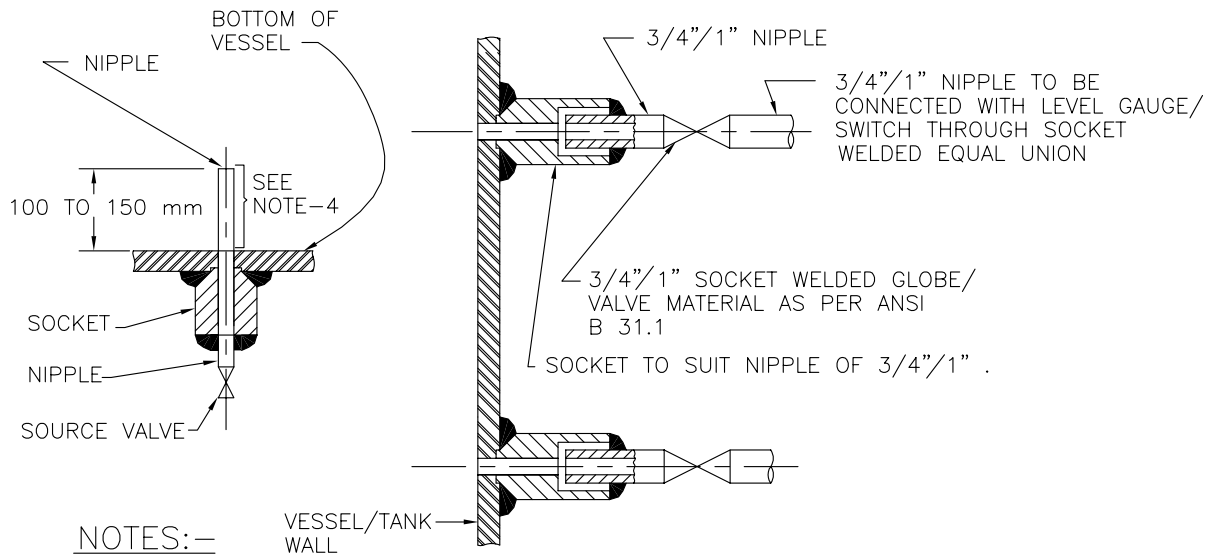
1. ORIFICE PLATE MOUNTED BETWEEN FLANGES WITH FLANGE TAPPING (AS SHOWN ABOVE) SHOULD BE LIMITED TO PIPE SIZES OF 2" OR LARGER.
2. ORIFICE PLATE SHALL BE MOUNTED BETWEEN PIPING FLANGES WITH THE SHARP EDGE FACING UPSTREAM SUCH THAT CENTRE OF THE CONCENTRIC ORIFICE SHOULD BE WITHIN 0.79 mm (1/32") OF THE AXIS OF THE PIPE.
3. TWO GASKETS SHALL BE INSERTED BETWEEN THE PLATE AND THE FLANGES AND INSIDE DIAMETER OF THE GASKETS SHOULD BE ATLEAST 1.5 mm (1/16") GREATER THAN THE INSIDE DIAMETER OF THE PIPE SO THAT THEY DO NOT PROTRUDE INTO THE PIPE.
4. PIPING FLANGES SHALL BE ANSI WELD NECK, RAISED FACE TYPE. THE FLANGE IS TO BE ALIGNED WITH THE FACE PERPENDICULAR TO THE FLOW AXIS.
5. BIDDER TO SUPPLY ORIFICE PLATE SPECIAL TYPE (HAVING PRESS. CONNECTIONS) OF FLANGES ALONG WITH GASKETS, NIPPLES AND SOURCE VALVES.
6. ON HORIZONTAL PIPE RUN PRESSURE CONNECTIONS ARE TO BE TAKEN FROM SIDES FOR LIQUID AND STEAM SERVICE AND FROM TOP FOR DRY GAS SERVICE. FOR PROCESS LIQUIDS INSTALLATION OF PRESSURE TAPS MAY BE ALLOWED WITHIN AN ANGLE OF 45° ELBOW THE HORIZONTAL IN SPECIAL CASES BUT NO BOTTOM CONNECTIONS ARE ALLOWED.
7. THE LOCATION OF PRESSURE TAPS MUST BE WITHIN 1.5 mm (1/16") OF THE DISTANCE SPECIFIED.
8. MAXIMUM DIAMETER OF PRESS. CONNECTION HOLES SHALL BE AS PER RECOMMENDATIONS OF ASME PTC 19.5. THE DIAMETER OF THE HOLE SHOULD REMAIN THE SAME FOR A DISTANCE NOT LESS THAN 2.5 TIMES OF THE DIAMETER BEFORE EXPANDING INTO THE PRESSURE PIPE.
9. THERE MUST BE NO BURRS WIRE EDGES OR OTHER IRREGULARITIES ALONG THE EDGE OF THE HOLE AND IT MUST BE SQUARE AND ROUNDED SLIGHTLY (1/64" RADIUS).
10. ORIFICE PLATE SHOULD BE FLAT WITHIN 0.02 mm (0.001") AND THE SURFACE ROUGHNESS SHOULD NOT EXCEED 20 MICRO INCH. THE THICKNESS OF THE ORIFICE PLATE SHOULD BE AS PER EN ISO 5167:2003.
11. FOR HORIZONTAL PIPE RUN DRAIN HOLES IN ORIFICE PLATES ARE AT THE BOTTOM (APPROX. TANGENT TO INSIDE DIA OF PIPE) FOR STEAM OR GAS SERVICE. VENT HOLES SHOULD BE LOCATED ON UPPER SIDE FOR INCOMPRESSIBLE FLUID.
12. ORIFICE PLATE SHOULD BE OF 316 SS (ASTM A167-54 GRADE-II).
13. RECOMMENDED MINIMUM LENGTHS OF STRAIGHT PIPE PRECEDING AND FOLLOWING ORIFICES SHALL BE AS PER EN ISO 5167:2003.
14. THREE PAIRS OF PRESSURE TAPS SHALL BE PROVIDED WITH NIPPLES OF REQUIRED LENGTH AND SOURCE VALVES AND THE UN-USED TAPS ARE PLUGGED.
15. THE INTERNAL TAPERED CONNECTION WITHIN THE FLANGE FOR PRESSURE TAPS SHOULD BE RC 1/2" AND THE NIPPLE SHOULD ALSO OF EXTERNAL THREADED R 1/2" AS PER IS:554. THE LENGTH OF THREADED ENGAGEMENT SHALL BE AS PER ABOVE STANDARD.

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										PROJECT				TYPICAL THERMAL POWER PROJECT							
										TITLE				INSTRUMENT SOURCE CONNECTION DETAILS							
										T.G.		21.08.12		SIZE		SCALE		DRG. NO.		REV. NO.	
										A4		N.T.S.		0000-999-POI-A-035		A					
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REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE										
A	FIRST ISSUE																				

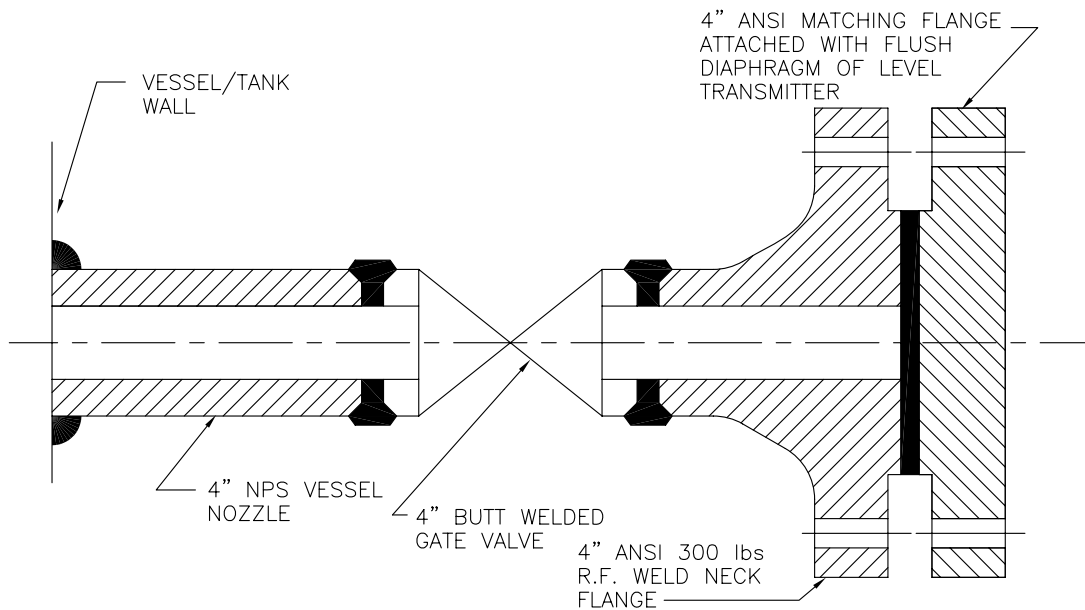
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LEVEL MEASUREMENT



NOTES:—

1. THIS TYPE OF PROCESS CONNECTION SHALL BE USED FOR LEVEL GAUGE AND EXTERNAL CAGE TYPE FLOAT OR DISPLACER OPERATED LEVEL SWITCH.
2. FOR GAUGES 3/4" NIPPLE ALONG WITH 3/4" SW SOURCE VALVE AND FOR SWITCHES 1" NIPPLE ALONG WITH 1" SW SOURCE VALVE SHALL BE PROVIDED AS PROCESS CONNECTION.
3. SOURCE CONNECTION ON VESSEL SHOULD NOT BE LOCATED AT PLACES SUBJECTED TO INTERFACE AND TURBULENCE FROM INLETS AND OUTLETS.
4. IF LOWER CONNECTION IS TAKEN FROM BOTTOM OF THE VESSEL THEN THE NIPPLE MUST BE 100 mm TO 150 mm ABOVE THE BOTTOM OF THE VESSEL.



NOTES:—

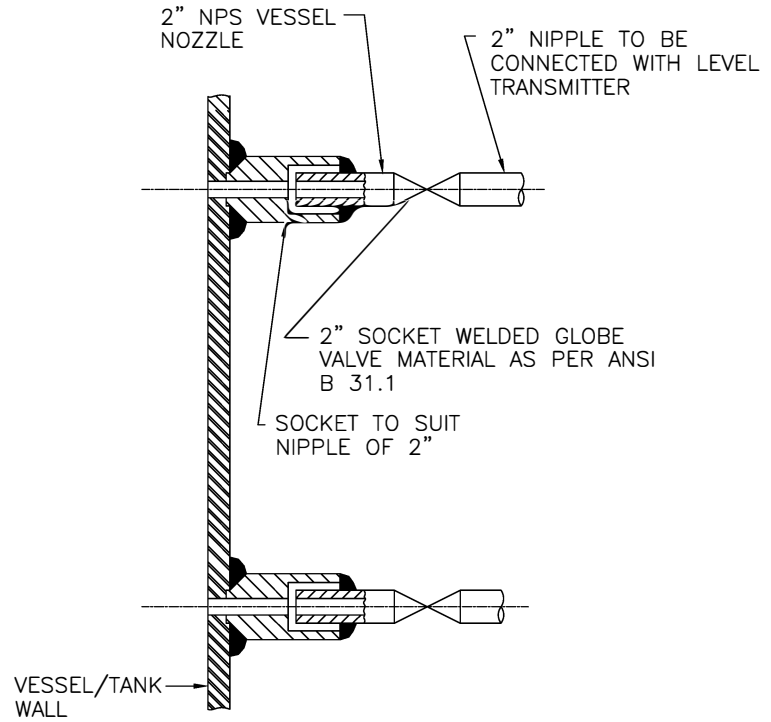
1. THIS TYPE OF PROCESS CONNECTION SHALL BE PROVIDED FOR TANK LEVEL MEASUREMENT OF VISCOUS OR CORROSIVE LIQUID USING FLUSH DIAPHRAGM/WAFER TYPE LEVEL TRANSMITTER.
2. WELDING OF MATCHING FLANGE TO GATE VALVE SHALL BE DONE BY BIDDER.

FOR TENDER PURPOSE ONLY

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PROJECT					TYPICAL THERMAL POWER PROJECT										
TITLE					INSTRUMENT SOURCE CONNECTION DETAILS										
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A	FIRST ISSUE											A4	N.T.S.	0000-999-POI-A-035	A
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LEVEL MEASUREMENT



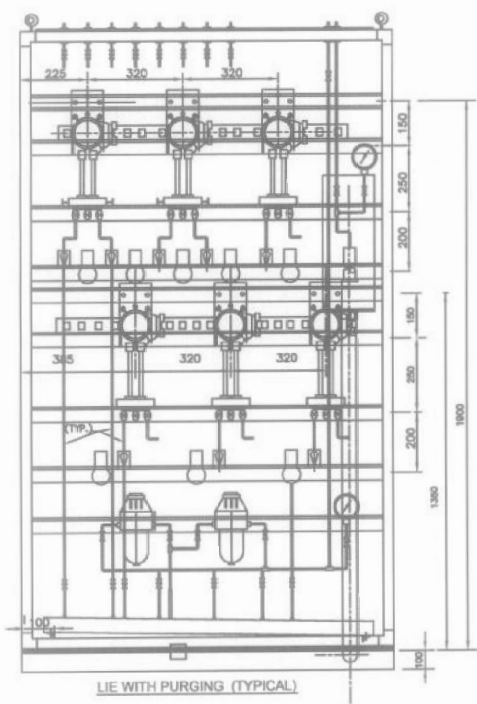
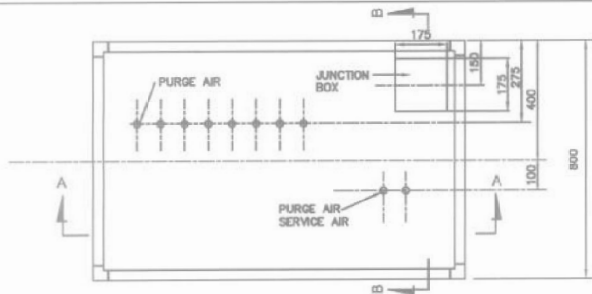
NOTES:—

1. THIS TYPE OF PROCESS CONNECTION SHALL BE USED FOR DISPLACER TYPE LEVEL TRANSMITTER.
2. SOURCE CONNECTION ON VESSEL SHOULD NOT BE LOCATED AT PLACES SUBJECTED TO INTERFACE AND TURBULENCE FROM INLETS AND OUTLETS.
3. IF LOWER CONNECTION IS TAKEN FROM BOTTOM OF THE VESSEL THEN THE NIPPLE MUST BE 100 mm TO 150 mm ABOVE THE BOTTOM OF THE VESSEL.

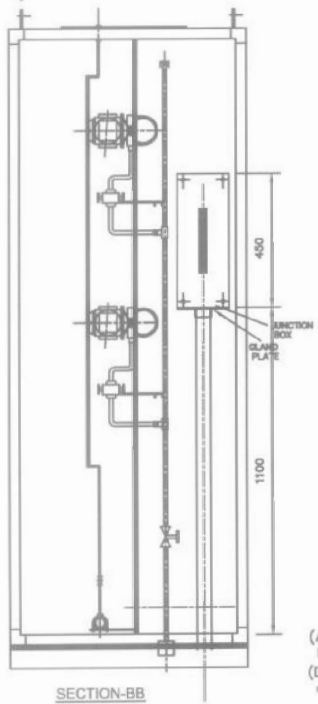
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PROJECT TYPICAL THERMAL POWER PROJECT																
TITLE INSTRUMENT SOURCE CONNECTION DETAILS																
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.	
A	FIRST ISSUE										T.G.	21.08.12	A4	N.T.S.	0000-999-POI-A-035	A
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LIE WITH PURGING (TYPICAL)



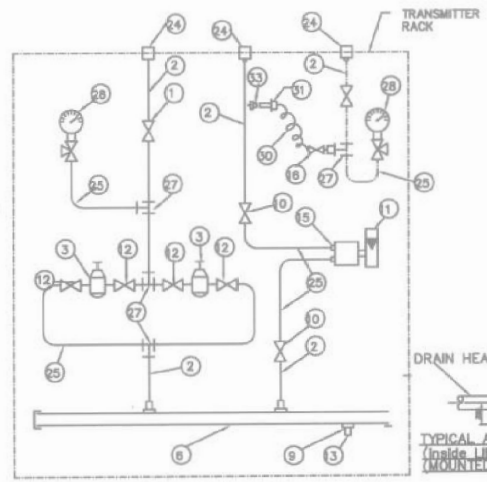
SECTION-BB

LIST OF MATERIALS

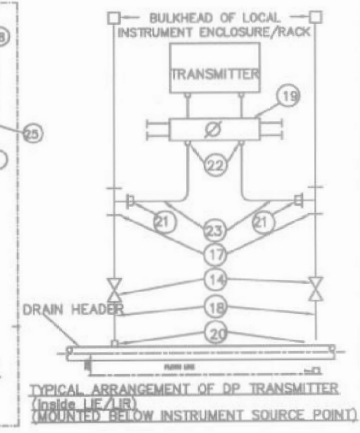
ITEM NO.	DESCRIPTION
1.	ISOLATION VALVE(gate/globe). SS.
2.	SEAMLESS SS PIPE.
3.	AIR FILTER REGULATOR.
6.	INST. AIR HEADER SS.
10.	COMP. NEEDLE VALVE SS.
11.	AIR PURGE SET.
12.	COMP VALVE SS.
13.	PLUG SS.
15.	TUBE SS CONNECTOR.
16.	TUBE COMP. EQUAL TEE UNION.
24.	BULKHEAD-SS SUITABLE FOR GI PIPE CONNECTION
25.	SEAMLESS TUBE SS.
27.	BRANCH TEE SS.
28.	PR. GAUGE.
30.	NYLON FLEX. HOSE BRAIDED WITH SS WRE.
31.	HOSE BARBED CONN. SS.
33.	QUICK DISCONNECT SS (PURGE AIR CONNECTION TO INSTRUMENT SOURCE END).

LIST OF MATERIALS

ITEM NO.	DESCRIPTION
14.	SW GLOBE VALVE.
17.	SW EQUAL TEE
18.	S.S. NIPPLE
19.	5 VALVE MANIFOLD
20.	SW HALF COUPLER CS
21.	PIPE x TUBE UNION
22.	SUITABLE ADAPTER
23.	SS TUBE



TYPICAL PURGE AIR CONNECTION INSIDE THE INST. ENCLOSURE
(APPLICABLE FOR MILL, AIR & FLUE GAS SERVICE INSTRUMENTS REQUIRING PURGE AIR)
(Drain Header of each LIE/LIR shall be connected to nearest plant drain)



TYPICAL ARRANGEMENT OF DP TRANSMITTER
(Inside LIE/LIR)
(MOUNTED BELOW INSTRUMENT SOURCE POINT)

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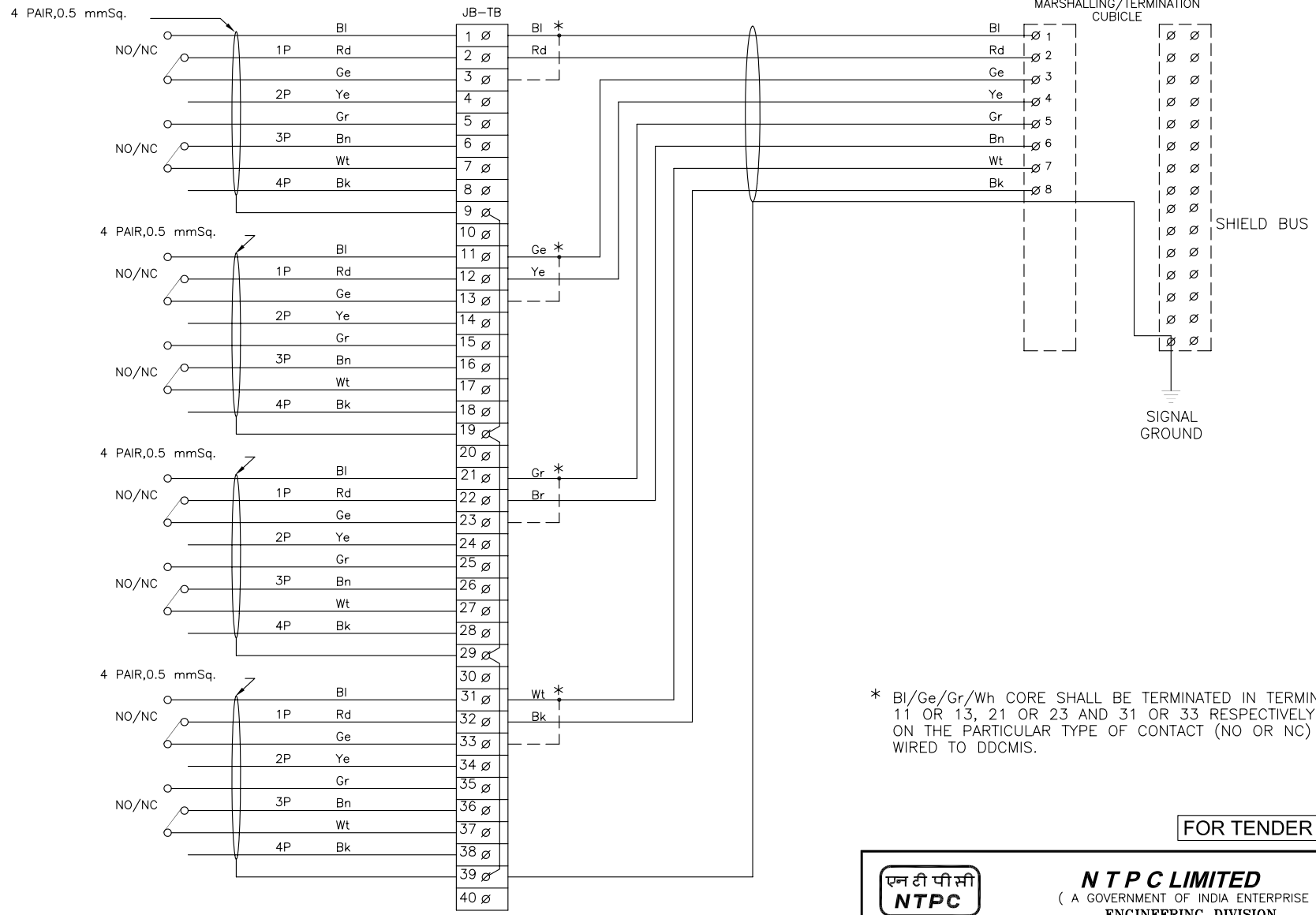
PROJECT TYPICAL THERMAL POWER PROJECT (TURNKEY EPC PACKAGE)

TITLE TYPICAL GA OF LOCAL INSTRUMENT ENCLOSURE, PURGING SCHEME, DP TRANSMITTER

A	FIRST ISSUE	DR	DES	CHKD.	APPR.	DATE	02.02.11
REV/NO	DESCRIPTION	DR	DES	CHKD.	APPR.	DATE	
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SIZE	SCALE	DRG. NO.	REV. NO.
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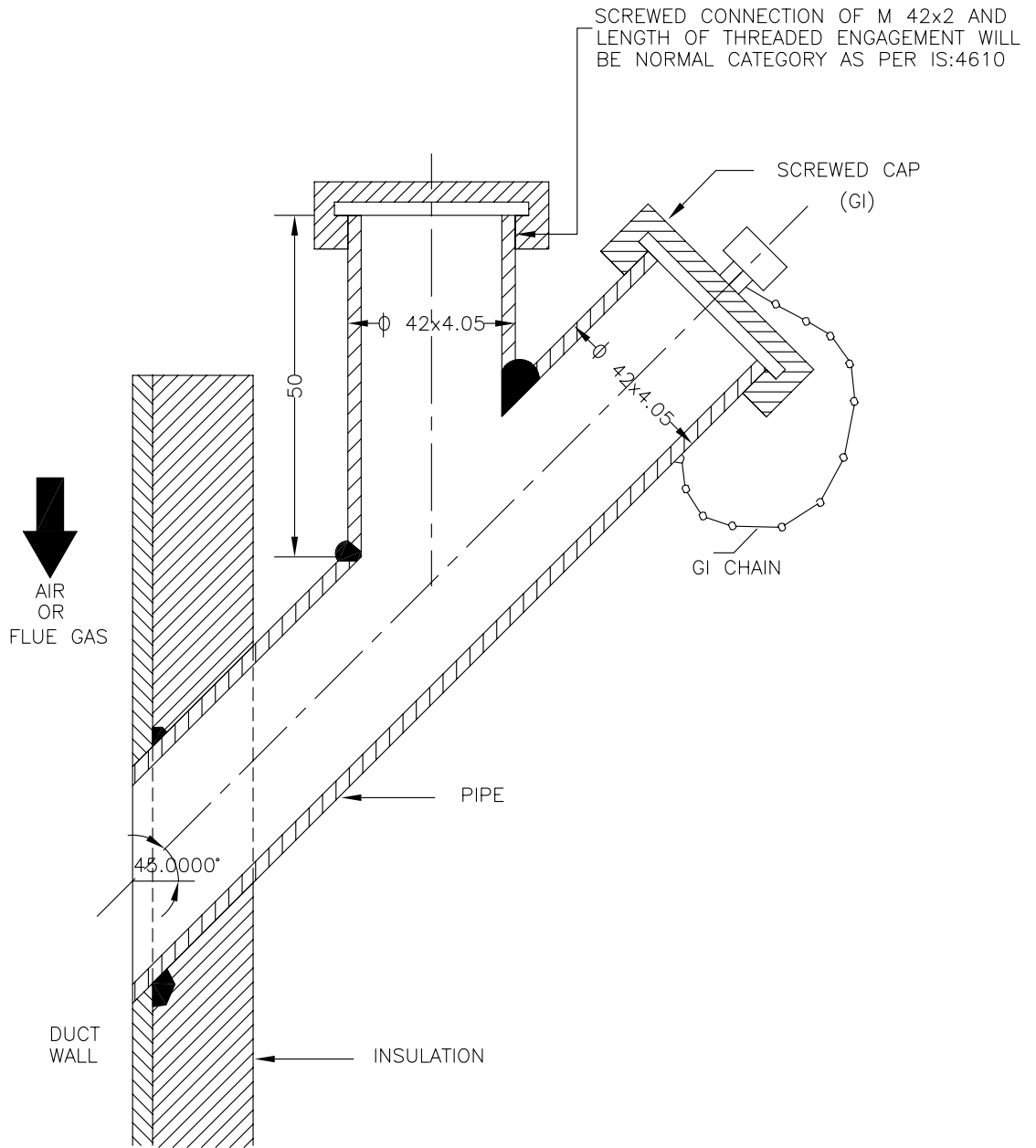


* Bl/Ge/Gr/Wh CORE SHALL BE TERMINATED IN TERMINAL 1 OR 3, 11 OR 13, 21 OR 23 AND 31 OR 33 RESPECTIVELY DEPENDING ON THE PARTICULAR TYPE OF CONTACT (NO OR NC) IS TO BE WIRED TO DDCMIS.

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 NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION		PROJECT		TYPICAL THERMAL POWER PROJECT	
		TITLE		INTERFACING OF FIELD INSTRUMENTS SWITCH TERMINATION DETAILS NO/NC	
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	DATE
A	FIRST ISSUE				21.08.12
SIZE	SCALE	DRG. NO.		REV. NO.	
A3	NTS	0000-999-POI-A-065		A	
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PRESS. MEASUREMENT



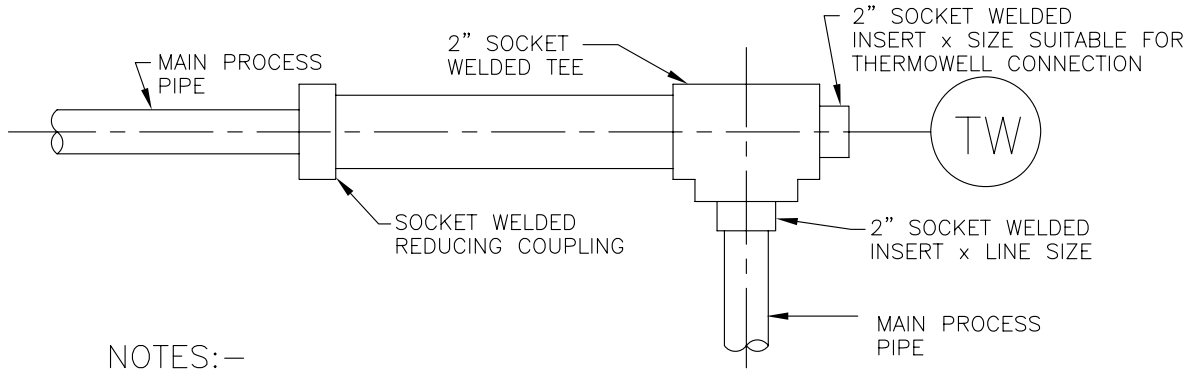
NOTES:-

1. THIS TYPE OF PRESSURE CONNECTON SHALL BE PROVIDED FOR PRESSURE MEASUREMENTS IN AIR AND FLUE GAS DUCT/FURNACE.
2. DIMENSIONS ARE INDICATIVE ONLY.

FOR TENDER PURPOSE ONLY

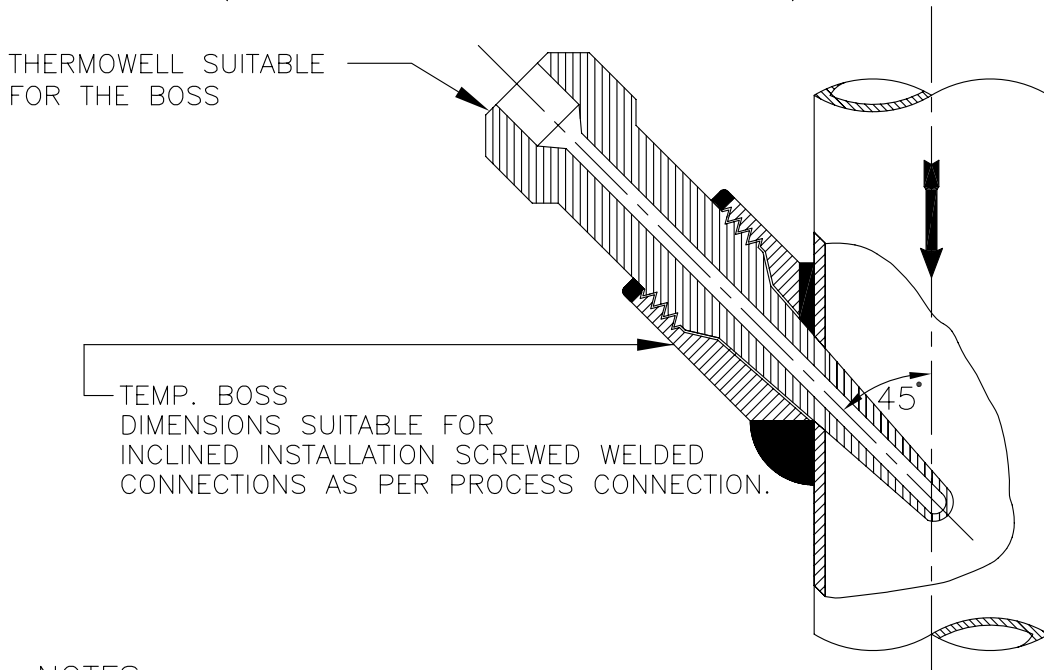
										 NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION						
										PROJECT		TYPICAL THERMAL POWER PROJECT				
										TITLE		INSTRUMENT SOURCE CONNECTION DETAILS				
A	FIRST ISSUE								T.G.	21.08.12	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.	A
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TEMP. MEASUREMENT



NOTES:—


1. THIS TYPE OF THERMOWELL INSTALLATION IS SUITABLE FOR THE PROCESS PIPE OF 2" NPS AND SMALLER.
2. FOR STEAM SERVICE THIS TYPE OF THERMOWELL INSTALLATION 90° BEND MAY BE USED ONLY IN VERTICAL PLANE.
3. THE LENGTH OF THE LARGER PIPE SECTION SHALL BE MINIMUM 150mm (IT MUST BE GREATER THAN THERMOWELL LENGTH).



NOTES:—

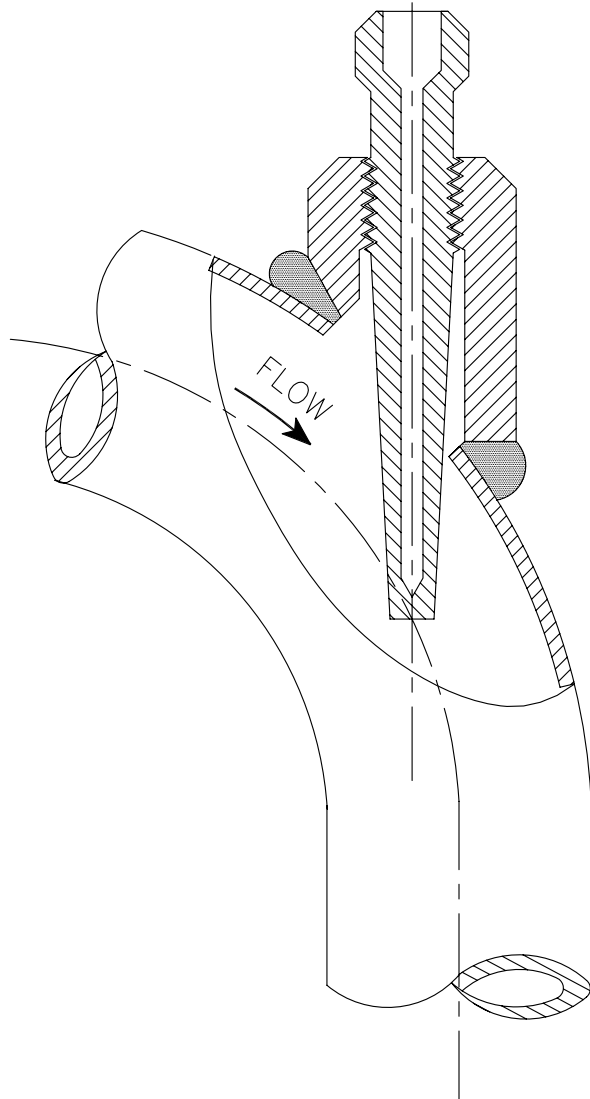
1. INCLINED INSTALLATION OF THERMOWELL SHALL BE APPLICABLE FOR 4" AND SMALLER LINE SIZE BUT LIMITED TO MIN. 3" LINE SIZE.
2. FOR 2" AND SMALLER LINE SIZE NECESSARY EXPANDER OF MIN. 3" SIZE OF MAIN PIPING SPECIFICATION SHALL BE USED.
3. THIS TYPE OF INSTALLATION IS APPLICABLE FOR HORIZONTAL AND VERTICAL PIPE SECTION.
4. FOR STEAM SERVICES EXPANDER SECTION MAY BE USED ONLY IN VERTICAL RUN.
5. THE EXPANDER SECTION SHALL BE OF ADEQUATE LENGTH (ATLEAST 3-4 TIMES DIA OF THE MAIN PROCESS PIPE AT BOTH SIDE OF THE INSTALLED THERMOWELL).

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										PROJECT				TYPICAL THERMAL POWER PROJECT (SG PACKAGE)											
										TITLE				INSTRUMENT SOURCE CONNECTION DETAILS											
A	FIRST ISSUE								T.G.		21.08.12														
REV. NO.	DESCRIPTION		DRAWN		DESIGN		CHKD.		M		E		C		C&I		ARCH.		APPD.		DATE				
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TEMP. MEASUREMENT



NOTES:—

1. FLOW INSTALLATION OF THERMOWELL SHALL BE APPLICABLE FOR 4" AND SMALLER LINE SIZE BUT LIMITED TO MINIMUM 3" LINE SIZE.
2. FOR 2" AND SMALLER LINE SIZE NECESSARY EXPANDER OF ELBOW FORM (AS SHOWN) OF MINIMUM 3" SIZE SHALL BE USED.
3. ELBOW EXPANDER SECTION IN HORIZONTAL PLANE MAY BE USED FOR LIQUID SERVICES. ONLY STEAM SERVICES EXPANDER SECTION MAY BE USED IN VERTICAL PLAN.

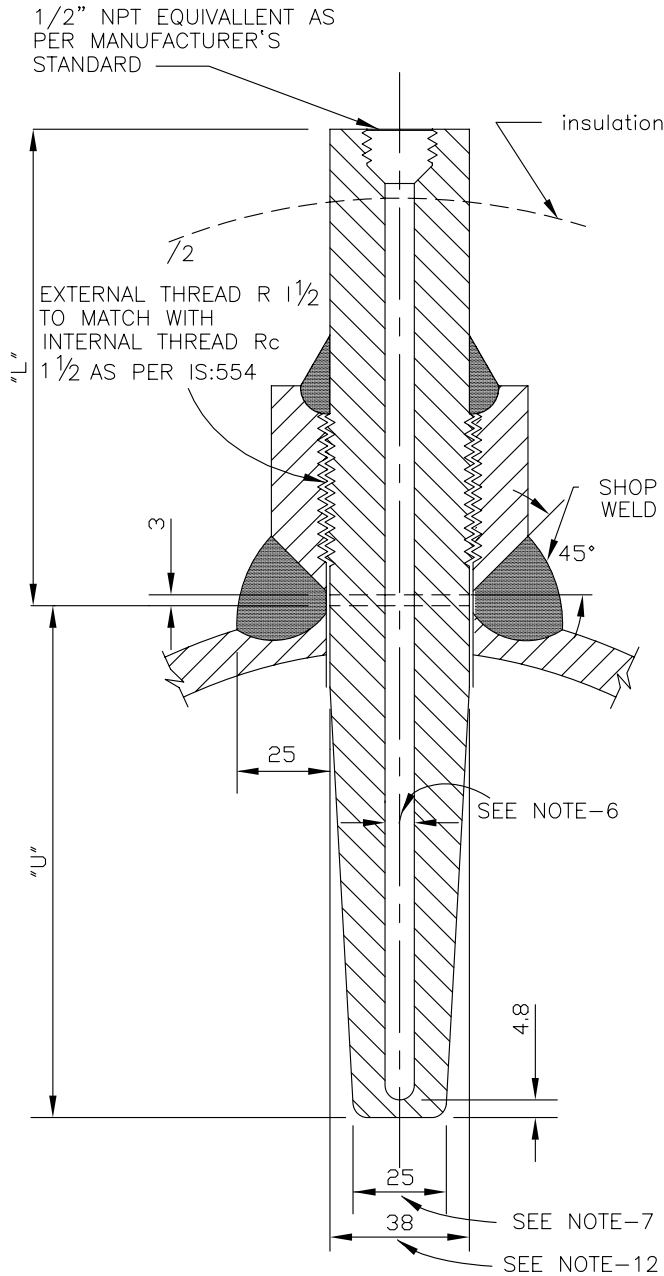
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										PROJECT		TYPICAL THERMAL POWER PROJECT					
										TITLE		INSTRUMENT SOURCE CONNECTION DETAILS					
A	FIRST ISSUE		DRAWN		DESIGN		CHKD.		T.G.		21.08.12						
REV. NO.	DESCRIPTION		DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.
			CLEARED BY									A4	N.T.S.			A	
Sh-5 Of 14																	

TEMP. MEASUREMENT



NOTES:-

1. THIS TYPE OF TEMPERATURE BOSS SHALL BE USED FOR THE PROCESS PRESS EQUAL/ABOVE 40 Kg/Cm2(g).
2. THE MATERIAL OF THE BOSS SHOULD BE SIMILAR TO THAT OF PIPING MATERIAL OF SPECIFICATION.
3. ALL WELD TO BE TESTED IN ACCORDANCE WITH APPLICABLE CODES BY MANUFACTURER.
4. MATERIAL OF THE THERMOWELL SHALL BE OF 316SS.
5. THERMOWELL SHALL BE DRILLED BARSTOCK TYPE.
6. INTERNAL BORE OF THE THERMOWELL SHOULD BE SELECTED BASED ON THE NORMAL SIZE OF THE SENSING ELEMENT AS PER ASME,PTC-19.3.
7. THE BOTTOM DIAMETER OF THE THERMOWELL TYPICALLY SHOWN HERE SHALL BE SUBJECT TO VARIATION BASED ON THE INTERNAL BORE OF THERMOWELL AND THICKNESS OF THERMOWELL MATERIAL TO WITHSTAND THE PROCESS PRESS.AND TEMP.,AS PER ASME,PTC-19.3.
8. THE TYPE OF TAPERED THERMOWELL SHALL BE USED FOR LIQUID VELOCITIES UP TO 92M.P.S.(300F.T.P.S.).
9. THERMOWELL WITH THE INSULATION LAG EXTENSIONS SHALL BE USED WHEREVER APPLICABLE.
10. ACTIVITIES TO BE COMPLETED AT THE SHOP. WELD THE BOSS ON THE PIPE AND DRILL THE HOLE IN THE PIPE IN ALLIGNMENT WITH HOLE IN THE BOSS. PROVIDE INTERNAL THREAD AS PER IS:554 TO MATCH WITH THE THERMOWELL EXTERNAL THREAD.
11. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED.
12. WILL BE SUITABLE TO MATCH THE STUB DIMENSIONS AS PER RC 1 1/2
13. THE "U" & "L" DIMENSIONS SHALL BE BE SELECTED BASED ON PARTICULAR APPLICATION AND THE SAME SHALL BE SUBJECT TO OWNER'S APPROVAL DURING DETAILED ENGINEERING.
14. ALL DIMENSIONS ARE INDICATIVE ONLY.

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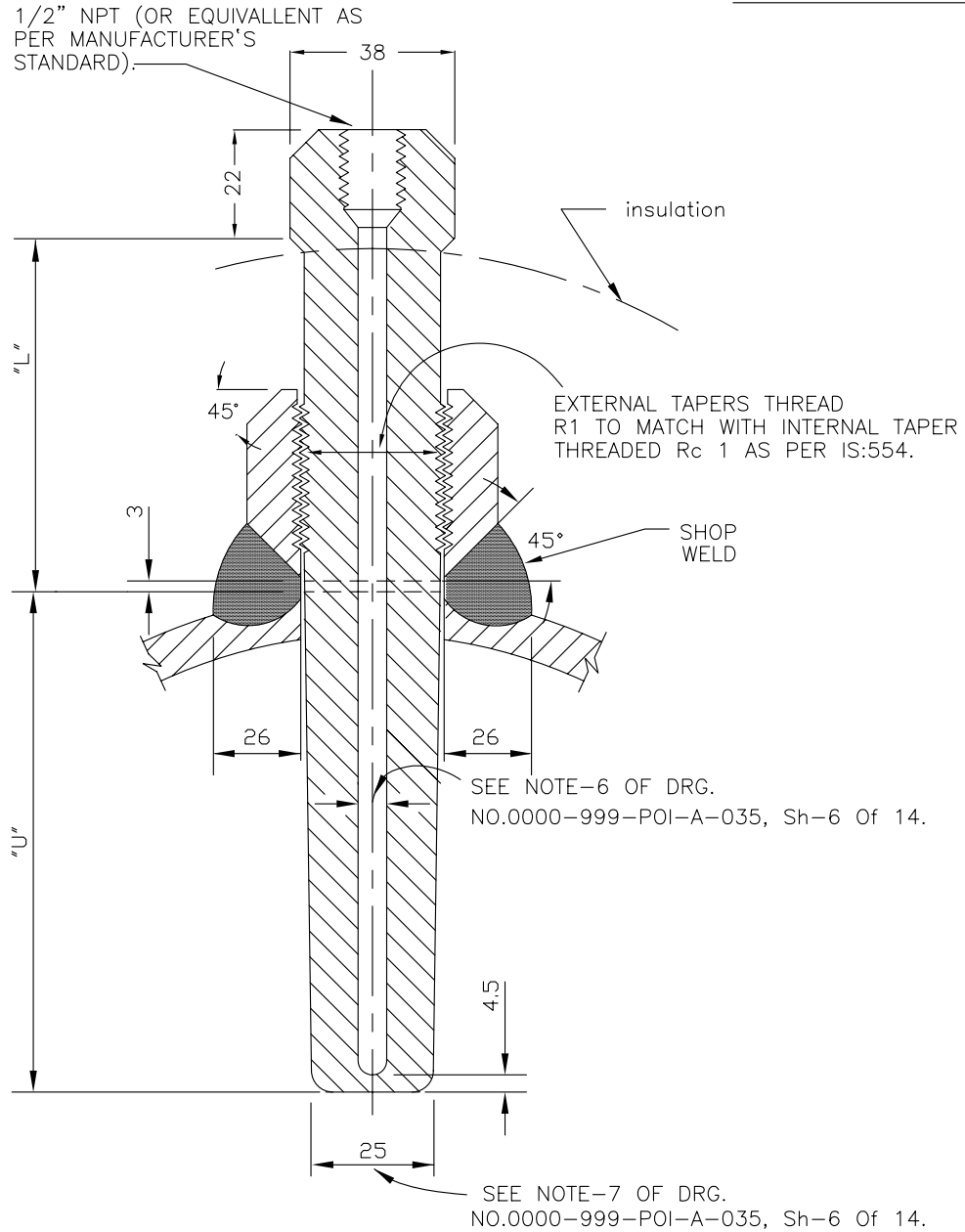


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PROJECT										TYPICAL THERMAL POWER PROJECT					
TITLE										INSTRUMENT SOURCE CONNECTION DETAILS					
A	FIRST ISSUE							T.G.	21.08.12	SIZE	SCALE	DRG. NO.	0000-999-POI-A-035	REV. NO.	A
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	A4	SCALE	N.T.S.
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										Sh-6 Of 14					

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TEMP. MEASUREMENT



NOTES:-

1. THIS TYPE OF TEMPERATURE BOSS IS APPLICABLE FOR THE PROCESS PRESSURE/TEMPERATURE BELOW 40 Kg/Cm2(g)/400°C
2. FOR PRESSURE TIGHT JOINTS THE BOSS SHOULD HAVE INTERNAL TAPERED PIPE THREAD Rc 1 AS PER IS:554. THE LENGTH OF THREAD ENGAGEMENT SHOULD BE AS PER ABOVE STANDARD.
3. PIPES HAVING PROBABILITY OF PROLONGED VIBRATION SEAL WELDING MAY BE DONE ALL AROUND AFTER TIGHTENING THERMOWELL WITHIN THE BOSS.
4. SEE NOTES-2 TO 14 OF DRG. NO. 0000-999-POI-A-035, Sh-6 Of 14.

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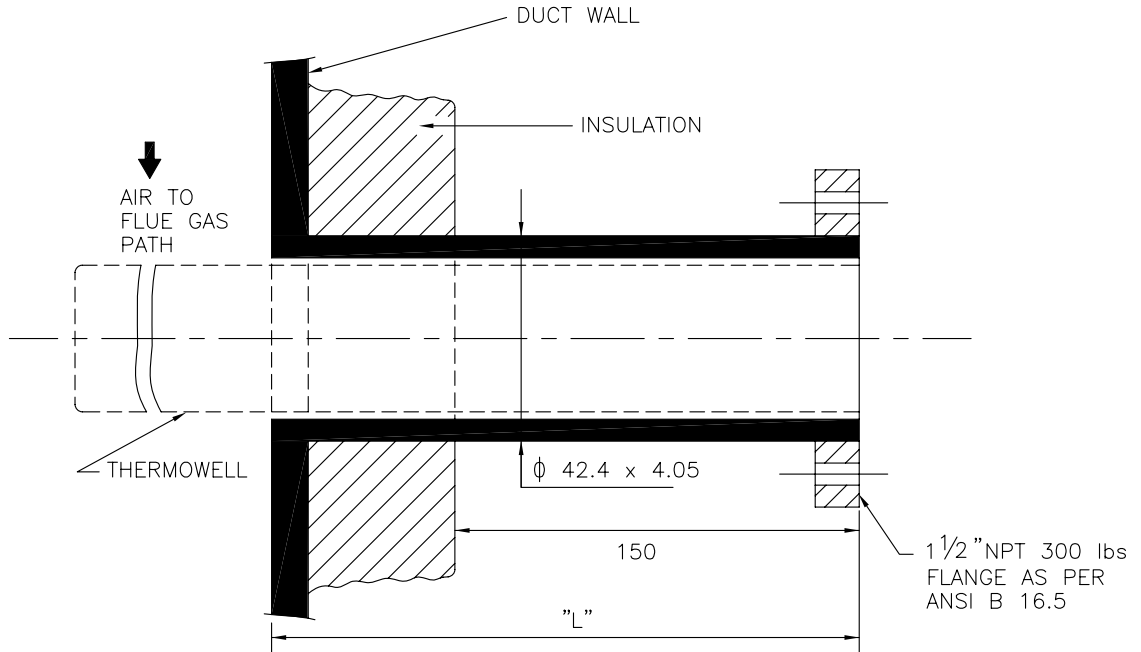


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										PROJECT		TYPICAL THERMAL POWER PROJECT			
										TITLE		INSTRUMENT SOURCE CONNECTION DETAILS			
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										Sh-7 Of 14					

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TEMP. MEASUREMENT



NOTES:—

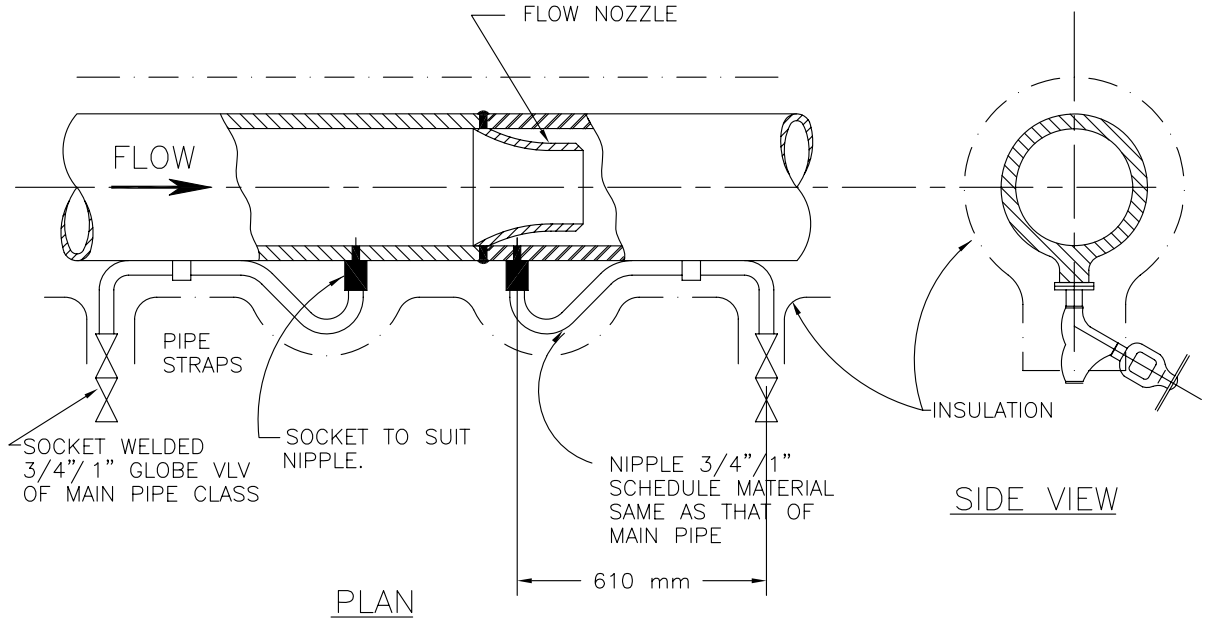
1. THIS TYPE OF TEMPERATURE CONNECTIONS SHALL BE PROVIDED FOR TEMPERATURE MEASUREMENT IN AIR AND FLUE GAS DUCT.
2. MATERIAL OF THERMOWELL SHALL BE OF 316SS.
3. EXTERNAL CONNECTION SHALL BE OF SLIP ON FLANGED TYPE AND THERMOWELL DESIGN SHALL BE AS PER ASME.PTC-19.3 (REFER NOTES 9&10 OF DRG.NO. 0000-999-POI-A-035, Sh-6 Of 14).
4. BIDDER TO SUPPLY AND INSTALL THE COUNTER FLANGED AND THERMOWELL (ALONG WITH TEMP. ELEMENT).
5. ALL DIMENSIONS ARE INDICATIVE ONLY.

FOR TENDER PURPOSE ONLY

												NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION																											
										PROJECT				TYPICAL THERMAL POWER PROJECT																									
										TITLE				INSTRUMENT SOURCE CONNECTION DETAILS																									
										REV. NO.		A		DESCRIPTION		DRAWN		DESIGN		CHKD.		M		E		C		C&I		ARCH.		APPD.		DATE		21.08.12		T.G.	
										Cleared by				SIZE		A4		SCALE		N.T.S.		DRG. NO.		0000-999-POI-A-035				REV. NO.		A									

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FLOW MEASUREMENT



NOTES:-

1. THIS METHOD OF CONNECTING NIPPLES AND VALVES ON THE HORIZONTAL PIPE IS APPLICABLE FOR MEASUREMENT OF STEAM AT TEMP. ABOVE 455°C .
2. FOR STEAM SERVICE IN HORIZONTAL PIPE THE PRESSURE HOLES AND CONNECTING NIPPLES SHOULD BE IN THE HORIZONTAL PLANE OF THE PIPE CENTRE LINE.
3. THE ENTIRE LENGTH OF THESE NIPPLES AS WELL AS SHUT OFF VALVES SHOULD BE LAGGED IN WITH STEAM LINE AS SHOWN IN THE DRAWING.
4. FLOW ELEMENTS SHALL BE PROVIDED WITH 3 PAIRS OF TAPPING POINTS.

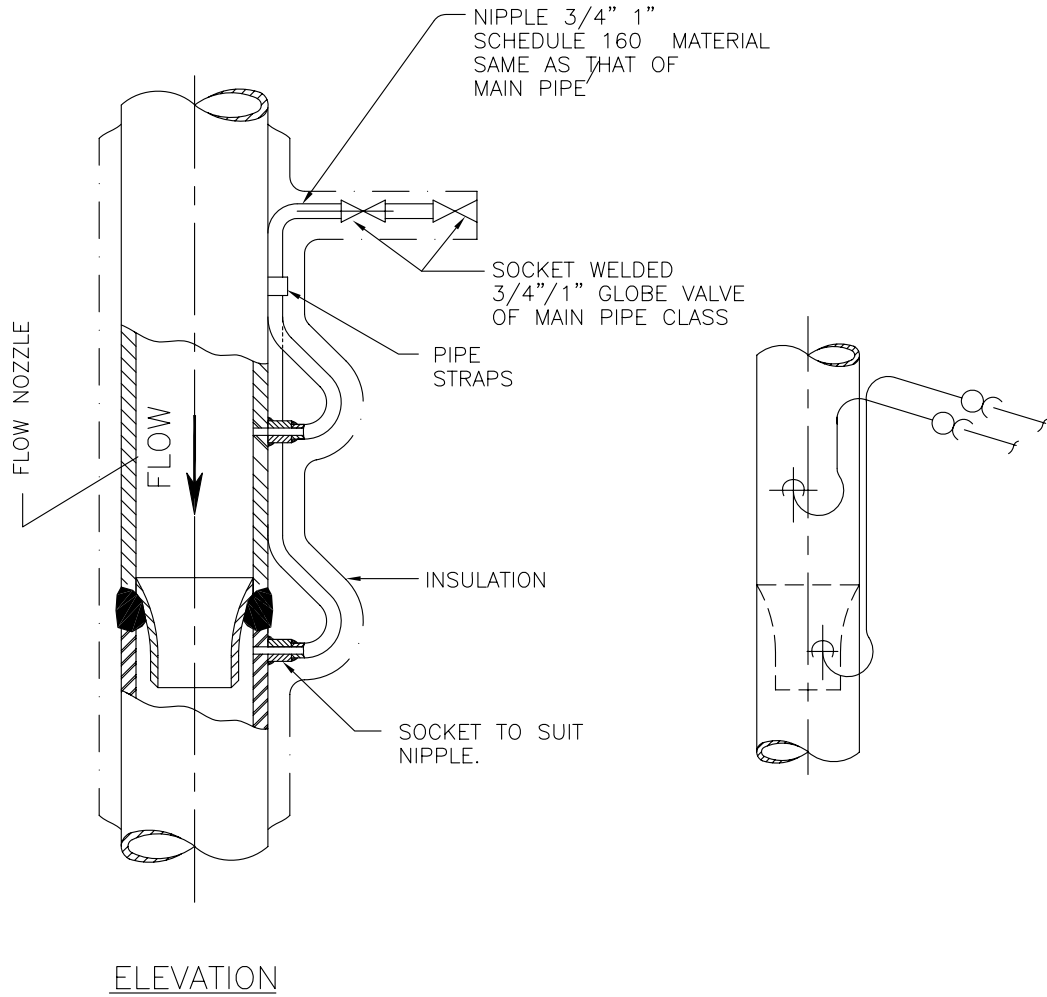
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PROJECT												TYPICAL THERMAL POWER PROJECT																																			
TITLE												INSTRUMENT SOURCE CONNECTION DETAILS																																			
REV. NO.												DESCRIPTION												DRAWN DESIGN CHKD. M E C C&I ARCH. APPD. DATE																							
A												FIRST ISSUE												T.G. 21.08.12																							
SIZE												SCALE												DRG. NO.												REV. NO.											
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CLEARED BY																								Sh-9 Of 14																							

FLOW MEASUREMENT




ELEVATION

NOTES:—

1. THIS METHOD OF CONNECTING NIPPLES AND VALVES ON THE VERTICAL STEAM PIPE IS APPLICABLE FOR MEASUREMENT OF STEAM AT TEMP. ABOVE 455°C
2. THE ENTIRE LENGTH OF THESE NIPPLES AS WELL AS SHUT OFF VALVES SHOULD BE LAGGED IN WITH STEAM LINE AS SHOWN IN THE DRAWING.
3. ON VERTICAL STEAM PIPE BOTH HIGH TEMPERATURE (SPECIAL VENTS) NIPPLES WILL BE LONG ENOUGH SO THAT HIGH AND LOW PRESSURE CONNECTION NIPPLES WILL BE AT SAME LEVEL.
4. UP STREAM AND DOWN STREAM PRESSURE CONNECTIONS MUST BE INSTALLED IN DIFFERENT PLANES PASSING THROUGH THE CENTRE OF THE PIPE.
5. FLOW ELEMENTS SHALL BE PROVIDED WITH 3 PAIRS OF TAPPING POINTS.

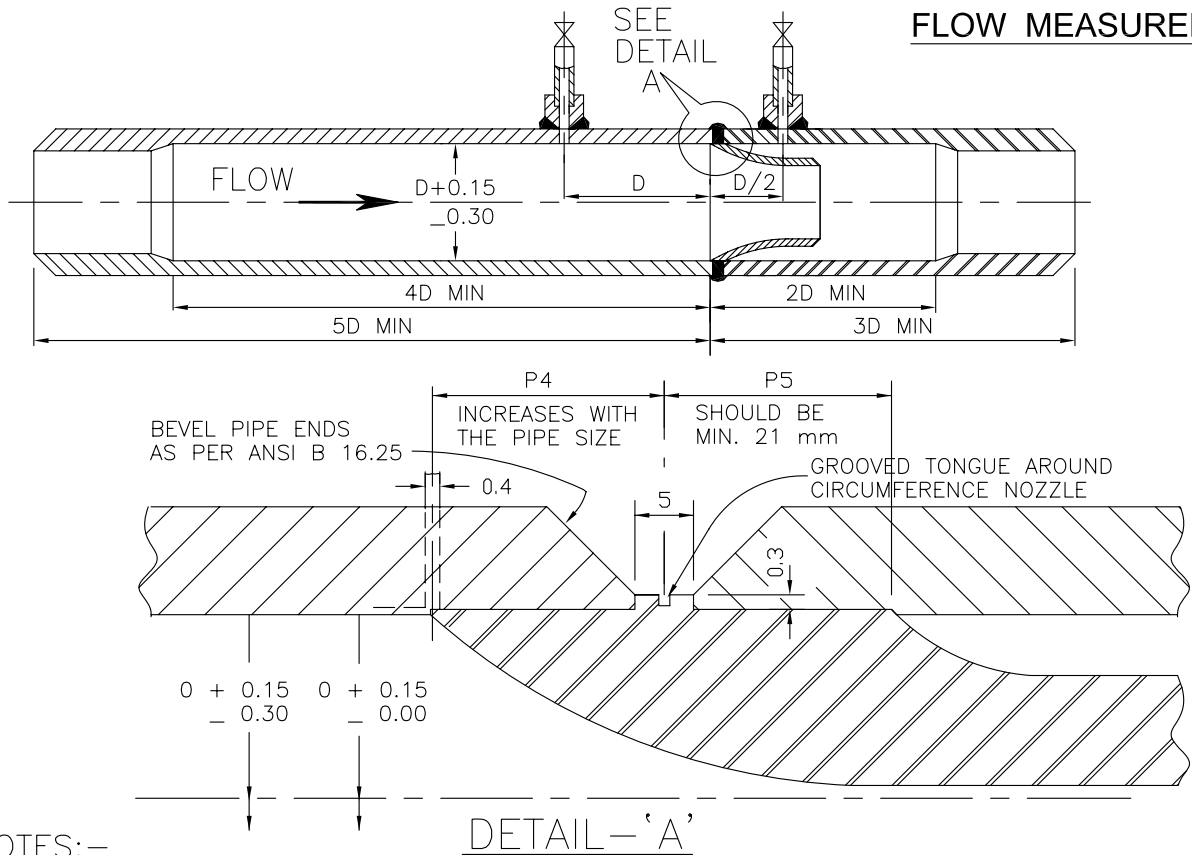
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										PROJECT				TYPICAL THERMAL POWER PROJECT											
										TITLE				INSTRUMENT SOURCE CONNECTION DETAILS											
A	FIRST ISSUE										T.G.		21.08.12												
REV. NO.	DESCRIPTION		DRAWN		DESIGN		CHKD.		M		E		C		C&I		ARCH.		APPD.		DATE				
										CLEARED BY				SIZE		SCALE		DRG. NO.		0000-999-POI-A-035		REV. NO.		A	
										A4		N.T.S.													
										Sh-10 Of 14															

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FLOW MEASUREMENT



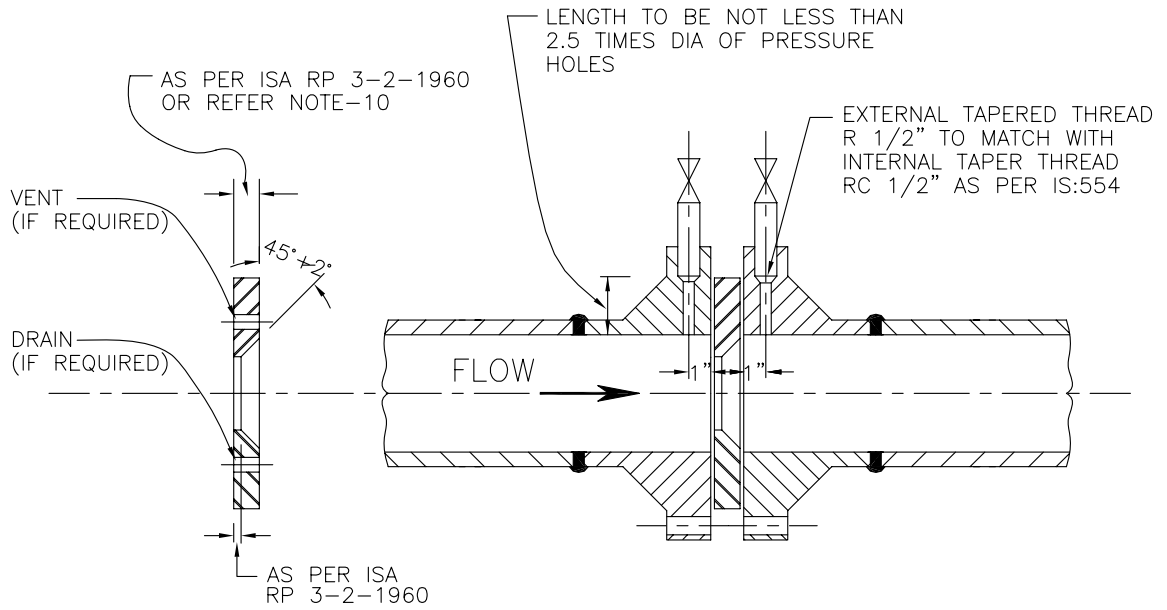
NOTES: -

1. COMPLETE FLOW NOZZLE BRANCH ASSEMBLY ALONG WITH NIPPLES AND SOURCE ISOLATION VALVES SHALL BE SUPPLIED BY THE BIDDER. THE BIDDER ALSO TO INSTALL FLOW NOZZLE WITHIN THE MACHINED BRANCH, PRESSURE STUBS ON THE BRANCH PIPE (FOR ORIENTATION OF PRESSURE TAP REF. NOTE-3) ALONG WITH NIPPLE AND SOURCE ISOLATION VALVES.
2. THE MACHINING OF BRANCH PIPE SHOULD BE DONE AFTER PRESSURE CONNECTIONS HAVE BEEN WELDED TO PIPE AND ALSO EXTEND FOR ATLEAST 4D IN THE INLET SECTION, 2D IN THE OUTLET SECTION, MEASURED FROM THE INLET FACE OF FLOW NOZZLE. TOTAL BRANCH PIPE ASSEMBLY SHOULD BE ATLEAST A LENGTH OF 8D/5D IN THE INLET SECTION AND 3D IN THE OUTLET SECTION, MEASURED FROM THE INLET FACE OF THE FLOW NOZZLE AS SHOWN ABOVE.
3. ON HORIZONTAL PIPE RUN PRESSURE CONNECTIONS ARE TO BE LOCATED ON SIDES OF THE PIPE FOR LIQUID AND STEAM SERVICE AND ON THE TOP FOR DRY GAS SERVICE FOR PROCESS LIQUIDS, INSTALLATION OF PRESS. TAPS MAY BE ALLOWED WITHIN AN ANGLE OF 45° ELBOW HORIZONTAL FOR SPECIAL CASES BUT NO BOTTOM CONNECTIONS ARE ALLOWED.
4. THE LOCATION OF PRESSURE TAPS MUST BE WITHIN 1.5 mm(1/16") OF DISTANCE SPECIFIED AND NUMBER OF PAIRS OF PRESSURE TAPS TO BE PROVIDED WILL BE AS PER FLOW MEASUREMENT DATA SHEET.
5. PRESSURE TAPS SHOULD BE DRILLED RADIALLY WITH RESPECT TO PIPE AND THIS DRILLING SHOULD BE DONE AFTER ANY COUPLING FOR ATTACHING THE PRESSURE TUBING HAS BEEN WELDED TO THE PIPE. THE HOLE WHERE IT BREAKS THROUGH THE INNER SURFACE OF THE PIPE MUST BE FREE OF BURRS OR WIRE EDGE AND CORNER OF EDGE HOLE LEFT ROUNDED VERY SLIGHTLY (1/64" RADIUS).
6. RECOMMENDED MAXIMUM DIAMETERS OF PRESSURE TAP HOLES IN THE BRANCH PIPES WILL BE AS PER EN ISO 5167:2003. THE DIAMETER FOR HOLE SHOULD REMAIN SAME FOR DISTANCE NOT LESS THAN 2.5 TIME OF DIA FROM THE INNER SURFACE OF THE PIPE.
7. FLOW NOZZLE SHALL BE CENTRED IN THE PIPE WITHIN 0.8 mm (1/32") OF THE PIPE AXIS. INSIDE DIAMETER MEASURED AT FOUR POINTS AT ANY CROSS SECTION SHALL NOT DIFFER BY MORE THAN 1%.
8. BRANCH PIPE SHALL BE AS PER MAIN PIPING MATERIAL SPECIFICATION. INTERNAL SURFACE OF BORED SECTIONS MUST BE SMOOTH AND STRAIGHT, FREE FROM SCALES, PITS, BURRS OR ANY IRREGULARITIES.
9. FLOW NOZZLE MATERIAL SHALL BE 316 SS AND THE DESIGN AS PER ASME.
10. MAXIMUM UPSTREAM AND DOWN STREAM STRAIGHT LENGTH REQUIRED FROM INLET FACE OF FLOW NOZZLE SHALL BE AS PER EN ISO 5167:2003.

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NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION															
PROJECT TYPICAL THERMAL POWER PROJECT															
TITLE INSTRUMENT SOURCE CONNECTION DETAILS															
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A	FIRST ISSUE										21.08.12	A4	N.T.S.	0000-999-POI-A-035	A
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FLOW MEASUREMENT



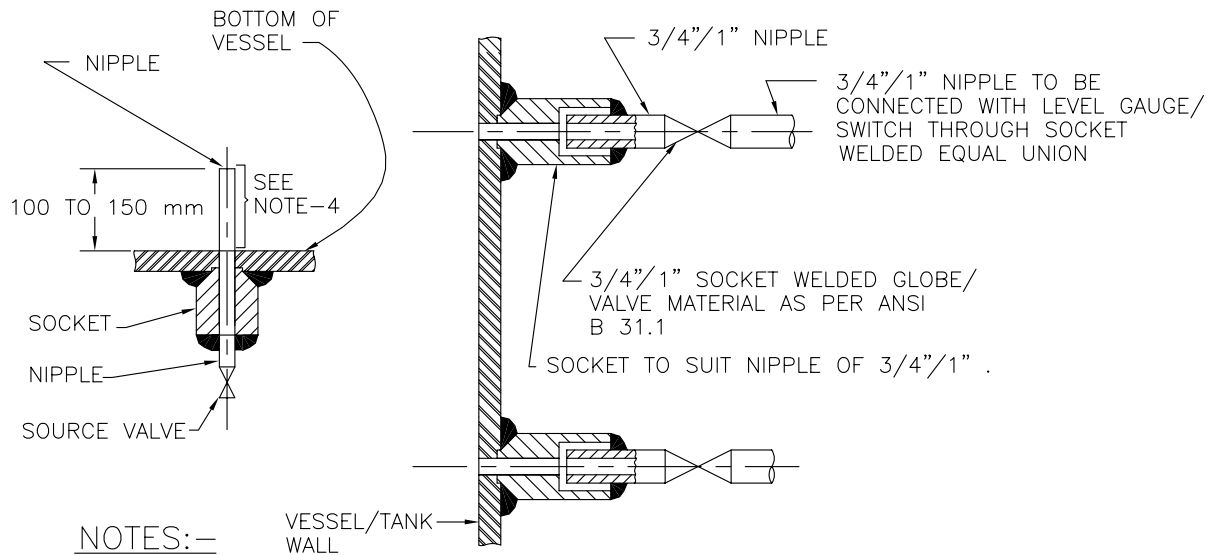
NOTES:-

1. ORIFICE PLATE MOUNTED BETWEEN FLANGES WITH FLANGE TAPPING (AS SHOWN ABOVE) SHOULD BE LIMITED TO PIPE SIZES OF 2" OR LARGER.
2. ORIFICE PLATE SHALL BE MOUNTED BETWEEN PIPING FLANGES WITH THE SHARP EDGE FACING UPSTREAM SUCH THAT CENTRE OF THE CONCENTRIC ORIFICE SHOULD BE WITHIN 0.79 mm (1/32") OF THE AXIS OF THE PIPE.
3. TWO GASKETS SHALL BE INSERTED BETWEEN THE PLATE AND THE FLANGES AND INSIDE DIAMETER OF THE GASKETS SHOULD BE ATLEAST 1.5 mm (1/16") GREATER THAN THE INSIDE DIAMETER OF THE PIPE SO THAT THEY DO NOT PROTRUDE INTO THE PIPE.
4. PIPING FLANGES SHALL BE ANSI WELD NECK, RAISED FACE TYPE. THE FLANGE IS TO BE ALIGNED WITH THE FACE PERPENDICULAR TO THE FLOW AXIS.
5. BIDDER TO SUPPLY ORIFICE PLATE SPECIAL TYPE (HAVING PRESS. CONNECTIONS) OF FLANGES ALONG WITH GASKETS, NIPPLES AND SOURCE VALVES.
6. ON HORIZONTAL PIPE RUN PRESSURE CONNECTIONS ARE TO BE TAKEN FROM SIDES FOR LIQUID AND STEAM SERVICE AND FROM TOP FOR DRY GAS SERVICE. FOR PROCESS LIQUIDS INSTALLATION OF PRESSURE TAPS MAY BE ALLOWED WITHIN AN ANGLE OF 45° ELBOW THE HORIZONTAL IN SPECIAL CASES BUT NO BOTTOM CONNECTIONS ARE ALLOWED.
7. THE LOCATION OF PRESSURE TAPS MUST BE WITHIN 1.5 mm (1/16") OF THE DISTANCE SPECIFIED.
8. MAXIMUM DIAMETER OF PRESS. CONNECTION HOLES SHALL BE AS PER RECOMMENDATIONS OF ASME PTC 19.5. THE DIAMETER OF THE HOLE SHOULD REMAIN THE SAME FOR A DISTANCE NOT LESS THAN 2.5 TIMES OF THE DIAMETER BEFORE EXPANDING INTO THE PRESSURE PIPE.
9. THERE MUST BE NO BURRS WIRE EDGES OR OTHER IRREGULARITIES ALONG THE EDGE OF THE HOLE AND IT MUST BE SQUARE AND ROUNDED SLIGHTLY (1/64" RADIUS).
10. ORIFICE PLATE SHOULD BE FLAT WITHIN 0.02 mm (0.001") AND THE SURFACE ROUGHNESS SHOULD NOT EXCEED 20 MICRO INCH. THE THICKNESS OF THE ORIFICE PLATE SHOULD BE AS PER EN ISO 5167:2003.
11. FOR HORIZONTAL PIPE RUN DRAIN HOLES IN ORIFICE PLATES ARE AT THE BOTTOM (APPROX. TANGENT TO INSIDE DIA OF PIPE) FOR STEAM OR GAS SERVICE. VENT HOLES SHOULD BE LOCATED ON UPPER SIDE FOR INCOMPRESSIBLE FLUID.
12. ORIFICE PLATE SHOULD BE OF 316 SS (ASTM A167-54 GRADE-II).
13. RECOMMENDED MINIMUM LENGTHS OF STRAIGHT PIPE PRECEDING AND FOLLOWING ORIFICES SHALL BE AS PER EN ISO 5167:2003.
14. THREE PAIRS OF PRESSURE TAPS SHALL BE PROVIDED WITH NIPPLES OF REQUIRED LENGTH AND SOURCE VALVES AND THE UN-USED TAPS ARE PLUGGED.
15. THE INTERNAL TAPERED CONNECTION WITHIN THE FLANGE FOR PRESSURE TAPS SHOULD BE RC 1/2" AND THE NIPPLE SHOULD ALSO OF EXTERNAL THREADED R 1/2" AS PER IS:554. THE LENGTH OF THREADED ENGAGEMENT SHALL BE AS PER ABOVE STANDARD.

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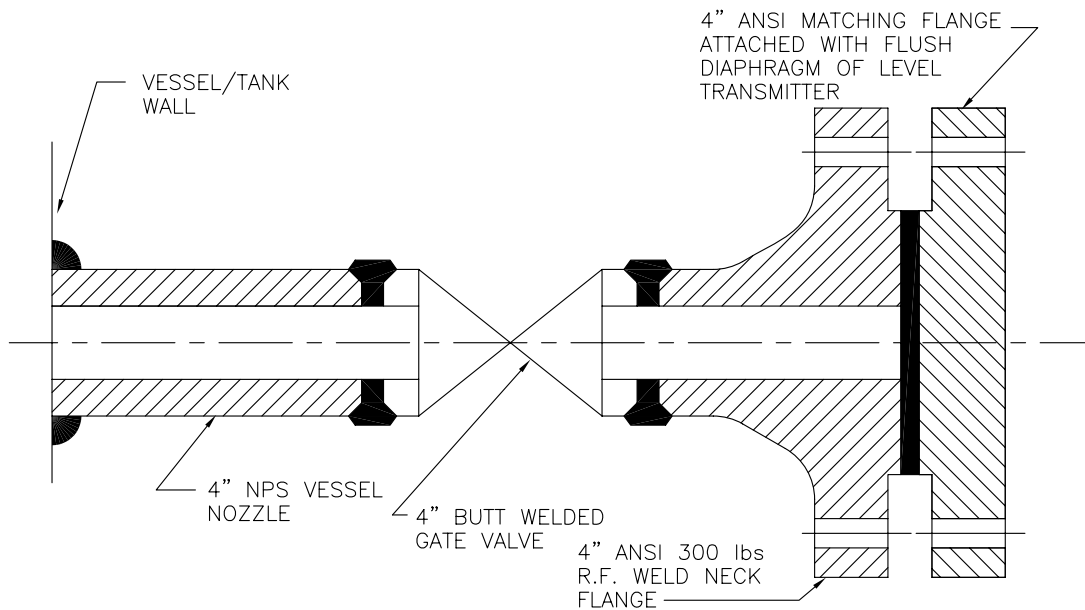
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										PROJECT				TYPICAL THERMAL POWER PROJECT																			
										TITLE				INSTRUMENT SOURCE CONNECTION DETAILS																			
										T.G.		21.08.12		SIZE		SCALE		DRG. NO.		REV. NO.													
										A		FIRST ISSUE		A4		N.T.S.		0000-999-POI-A-035		A													
										REV. NO.		DESCRIPTION		DRAWN		DESIGN		CHKD.		M		E		C		C&I		ARCH.		APPD.		DATE	
										CLEARED BY										Sh-12 Of 14													

LEVEL MEASUREMENT



NOTES:-

1. THIS TYPE OF PROCESS CONNECTION SHALL BE USED FOR LEVEL GAUGE AND EXTERNAL CAGE TYPE FLOAT OR DISPLACER OPERATED LEVEL SWITCH.
2. FOR GAUGES 3/4" NIPPLE ALONG WITH 3/4" SW SOURCE VALVE AND FOR SWITCHES 1" NIPPLE ALONG WITH 1" SW SOURCE VALVE SHALL BE PROVIDED AS PROCESS CONNECTION.
3. SOURCE CONNECTION ON VESSEL SHOULD NOT BE LOCATED AT PLACES SUBJECTED TO INTERFACE AND TURBULENCE FROM INLETS AND OUTLETS.
4. IF LOWER CONNECTION IS TAKEN FROM BOTTOM OF THE VESSEL THEN THE NIPPLE MUST BE 100 mm TO 150 mm ABOVE THE BOTTOM OF THE VESSEL.



NOTES:-

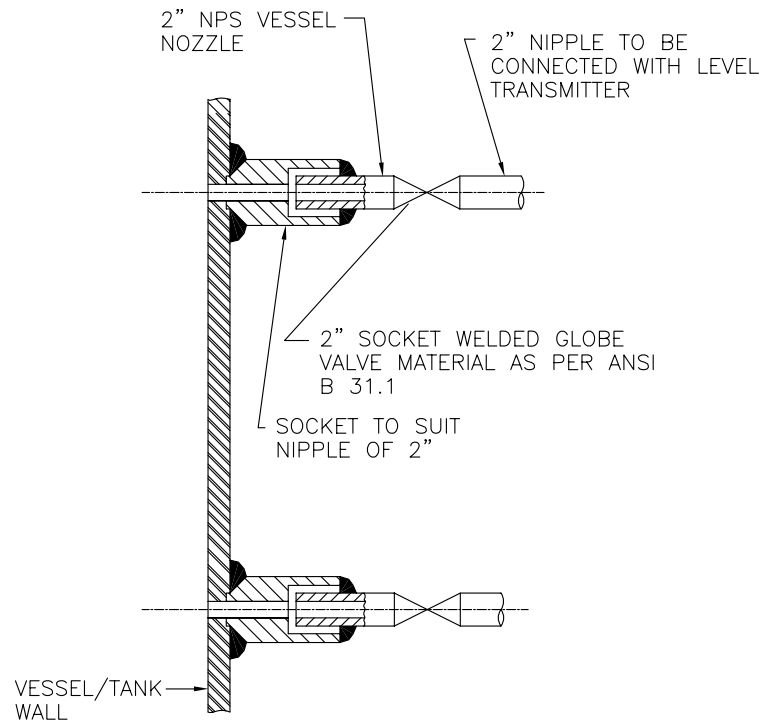
1. THIS TYPE OF PROCESS CONNECTION SHALL BE PROVIDED FOR TANK LEVEL MEASUREMENT OF VISCOUS OR CORROSIVE LIQUID USING FLUSH DIAPHRAGM/WAFER TYPE LEVEL TRANSMITTER.
2. WELDING OF MATCHING FLANGE TO GATE VALVE SHALL BE DONE BY BIDDER.

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NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION															
PROJECT					TYPICAL THERMAL POWER PROJECT										
TITLE					INSTRUMENT SOURCE CONNECTION DETAILS										
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A	FIRST ISSUE										21.08.12	A4	N.T.S.	0000-999-POI-A-035	A
CLEARED BY												Sh-13 Of 14			

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LEVEL MEASUREMENT

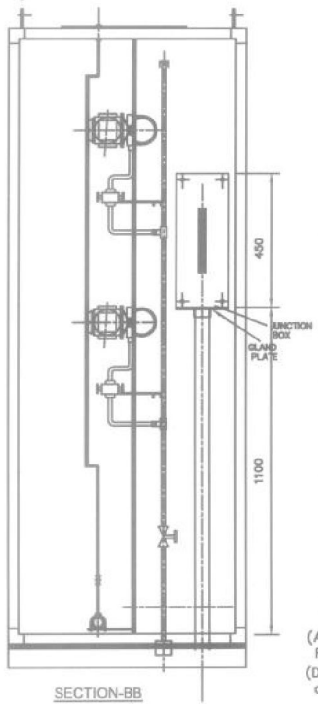
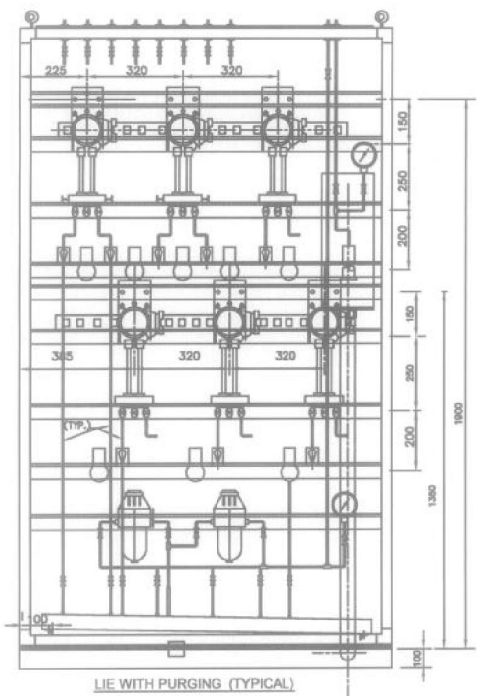
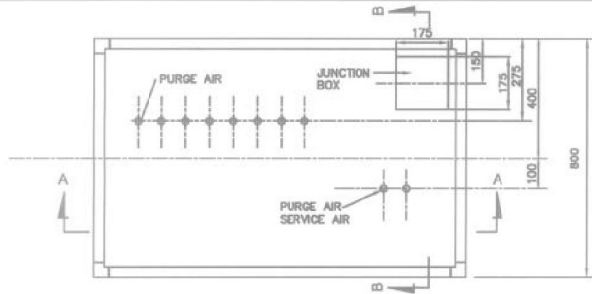


NOTES:—

1. THIS TYPE OF PROCESS CONNECTION SHALL BE USED FOR DISPLACER TYPE LEVEL TRANSMITTER.
2. SOURCE CONNECTION ON VESSEL SHOULD NOT BE LOCATED AT PLACES SUBJECTED TO INTERFACE AND TURBULENCE FROM INLETS AND OUTLETS.
3. IF LOWER CONNECTION IS TAKEN FROM BOTTOM OF THE VESSEL THEN THE NIPPLE MUST BE 100 mm TO 150 mm ABOVE THE BOTTOM OF THE VESSEL.

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PROJECT TYPICAL THERMAL POWER PROJECT															
TITLE INSTRUMENT SOURCE CONNECTION DETAILS															
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE	SCALE	DRG. NO. 0000-999-POI-A-035	REV. NO.
A	FIRST ISSUE										T.G.	21.08.12	A4	N.T.S.	A
CLEARED BY										Sh-14 Of 14					

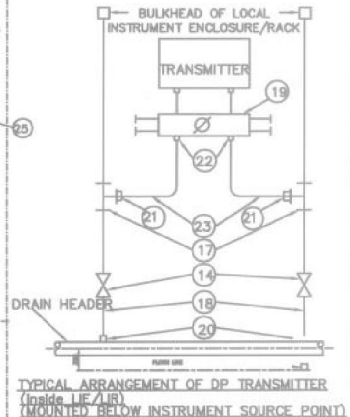
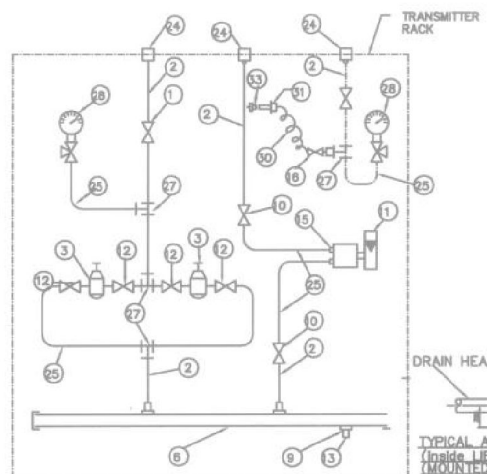


LIST OF MATERIALS

ITEM NO.	DESCRIPTION
1.	ISOLATION VALVE(gate/globe). SS.
2.	SEAMLESS SS PIPE.
3.	AIR FILTER REGULATOR.
6.	INST. AIR HEADER SS.
10.	COMP. NEEDLE VALVE SS.
11.	AIR PURGE SET.
12.	COMP VALVE SS.
13.	PLUG SS.
15.	TUBE SS CONNECTOR.
16.	TUBE COMP. EQUAL TEE UNION.
24.	BULKHEAD-SS SUITABLE FOR GI PIPE CONNECTION
25.	SEAMLESS TUBE SS.
27.	BRANCH TEE SS.
28.	PR. GAUGE.
30.	NYLON FLEX. HOSE BRAIDED WITH SS WIRE.
31.	HOSE BARBED CONN. SS.
33.	QUICK DISCONNECT SS (PURGE AIR CONNECTION TO INSTRUMENT SOURCE END).

LIST OF MATERIALS

ITEM NO.	DESCRIPTION
14.	SW GLOBE VALVE.
17.	SW EQUAL TEE
18.	S.S. NIPPLE
19.	5 VALVE MANIFOLD
20.	SW HALF COUPLER CS
21.	PIPE x TUBE UNION
22.	SUITABLE ADAPTER
23.	SS TUBE



TYPICAL PURGE AIR CONNECTION INSIDE THE INST. ENCLOSURE
 (APPLICABLE FOR MILL, AIR & FLUE GAS SERVICE INSTRUMENTS REQUIRING PURGE AIR)
 (Drain Header of each LIE/LIR shall be connected to nearest plant drain)

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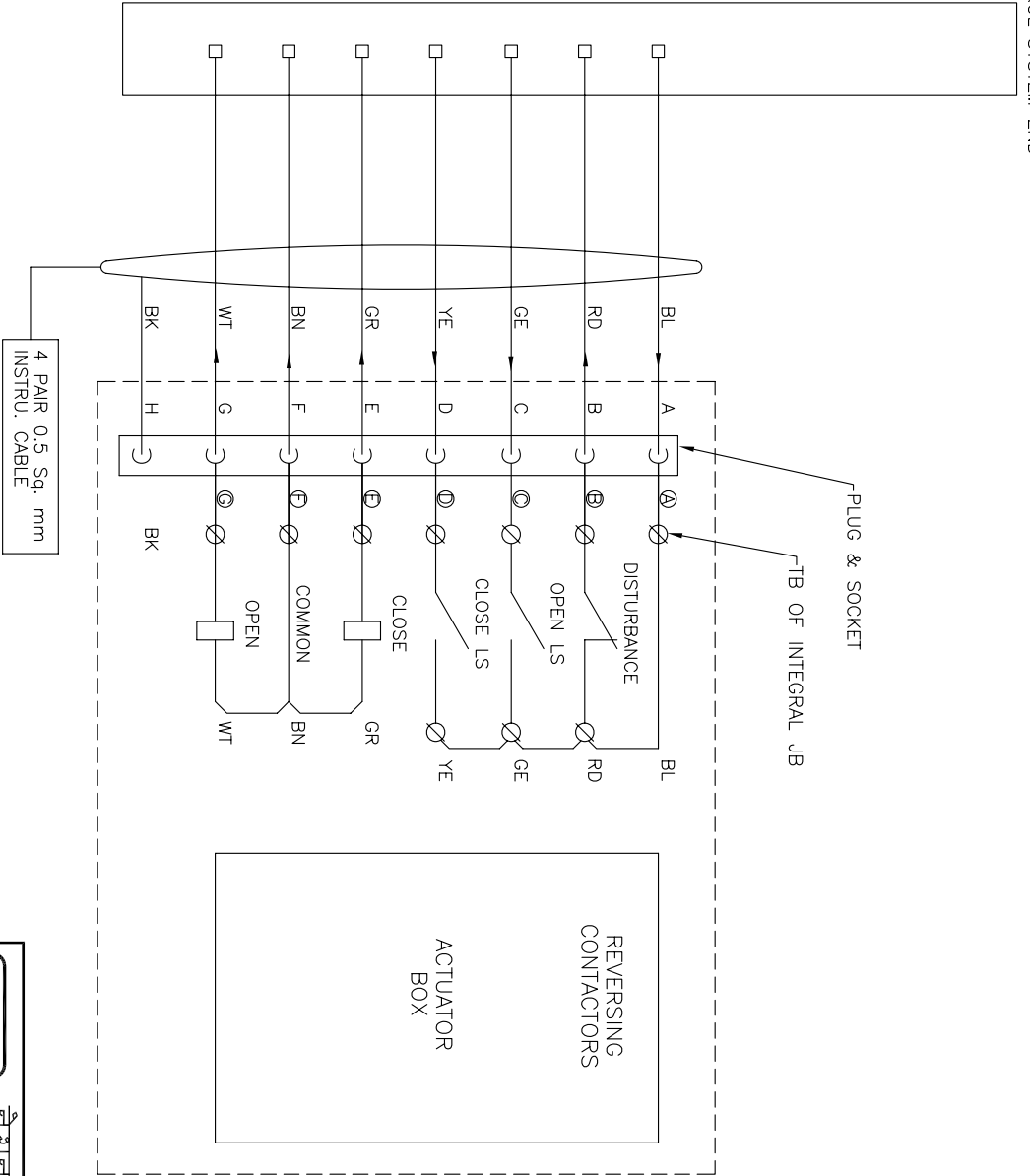
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 ENGINEERING DIVISION

PROJECT: TYPICAL THERMAL POWER PROJECT (TURNKEY EPC PACKAGE)
 TITLE: TYPICAL GA OF LOCAL INSTRUMENT ENCLOSURE, PURGING SCHEME, DP TRANSMITTER

REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	CM	ARCH.	APPRO	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A	FIRST ISSUE										02.02.11	A3	N.T.S.	0000-999-POI-A-036	A
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TERMINATION AT
CONTROL SYSTEM END



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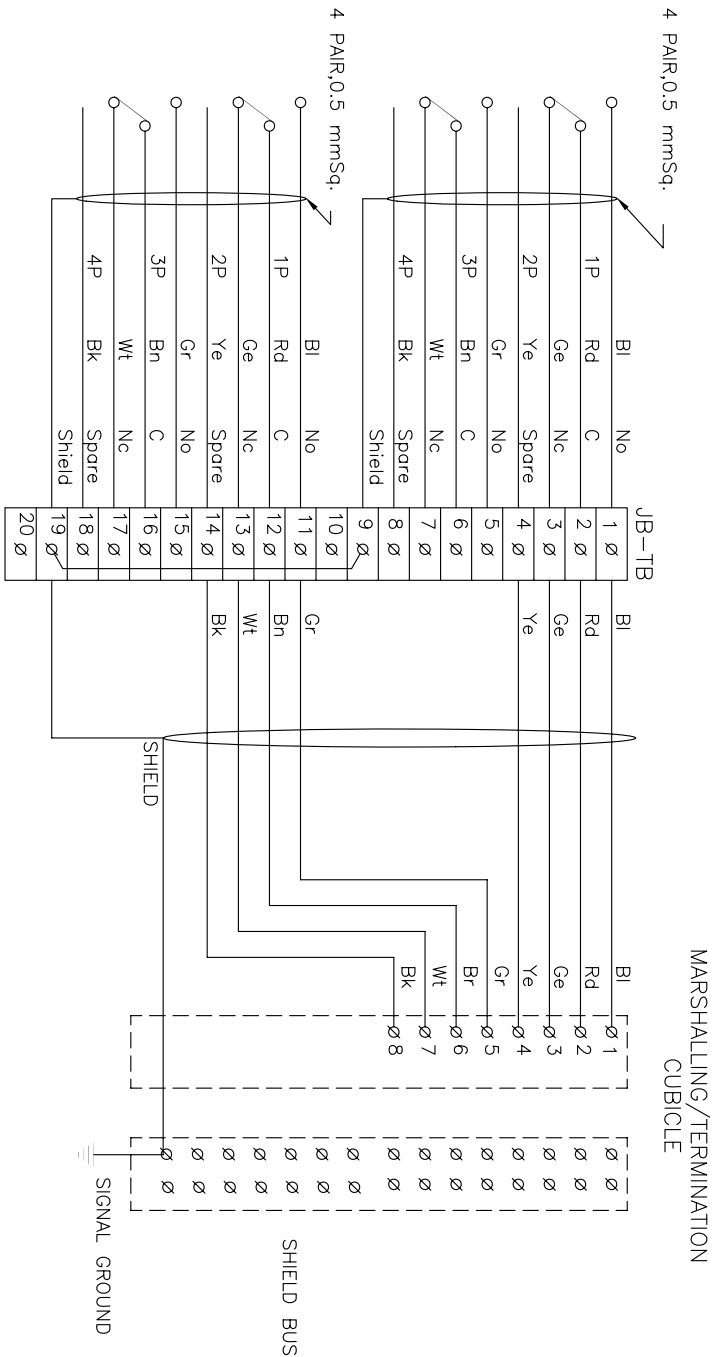
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NTPC
 नेशनल थर्मल पावर कॉर्पोरेशन लिमिटेड
National Thermal Power Corporation Ltd.
 (A GOVERNMENT OF INDIA ENTERPRISE)
 ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PROJECT

TITLE
INTERFACING OF ACTUATORS

REV. NO.	D	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	21.08.12	SIZE	A3	SCALE	N.T.S.	DRG. NO.	0000-999-POI-A-063	REV. NO.	D
DESCRIPTION																					

PROJECT	TYPICAL THERMAL POWER PROJECT																			
TITLE	INTERFACING OF ACTUATORS																			
SIZE	A3	SCALE	N.T.S.	DRG. NO.	0000-999-POI-A-063	REV. NO.	D													



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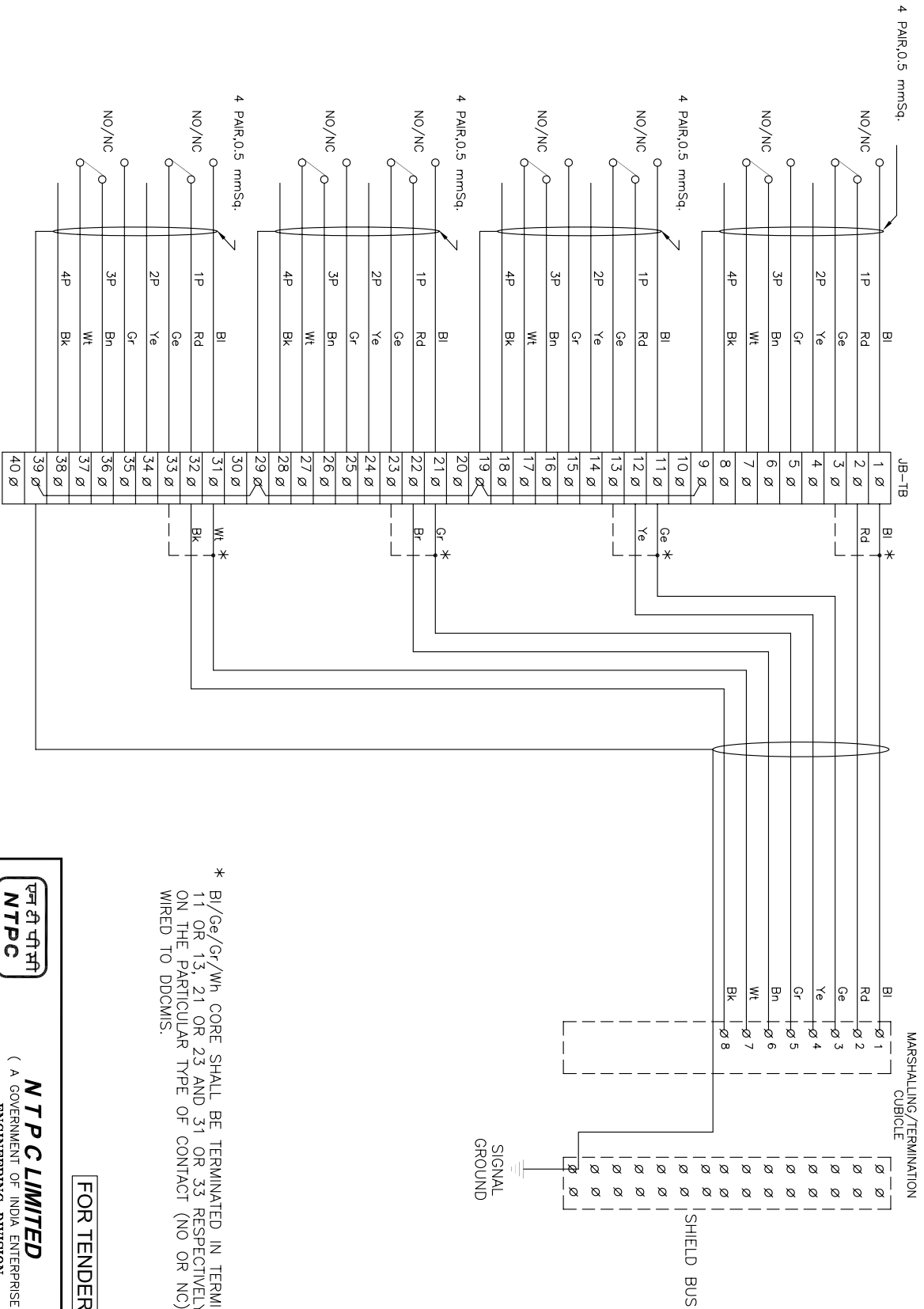


PROJECT
 TYPICAL THERMAL POWER PROJECT

TITLE
 INTERFACING OF FIELD INSTRUMENTS/
 SWGR SWITCH (COC) TERMINATION DETAILS

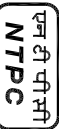
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DESCRIPTION													

SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-PO1-A-065	REV. NO.	A
SH 01 OF 15							



* BI/Ge/Gr/Wt CORE SHALL BE TERMINATED IN TERMINAL 1 OR 3, 11 OR 21 OR 23 AND 31 OR 33 RESPECTIVELY DEPENDING ON THE PARTICULAR TYPE OF CONTACT (NO OR NC) IS TO BE WIRED TO DDCMIS.

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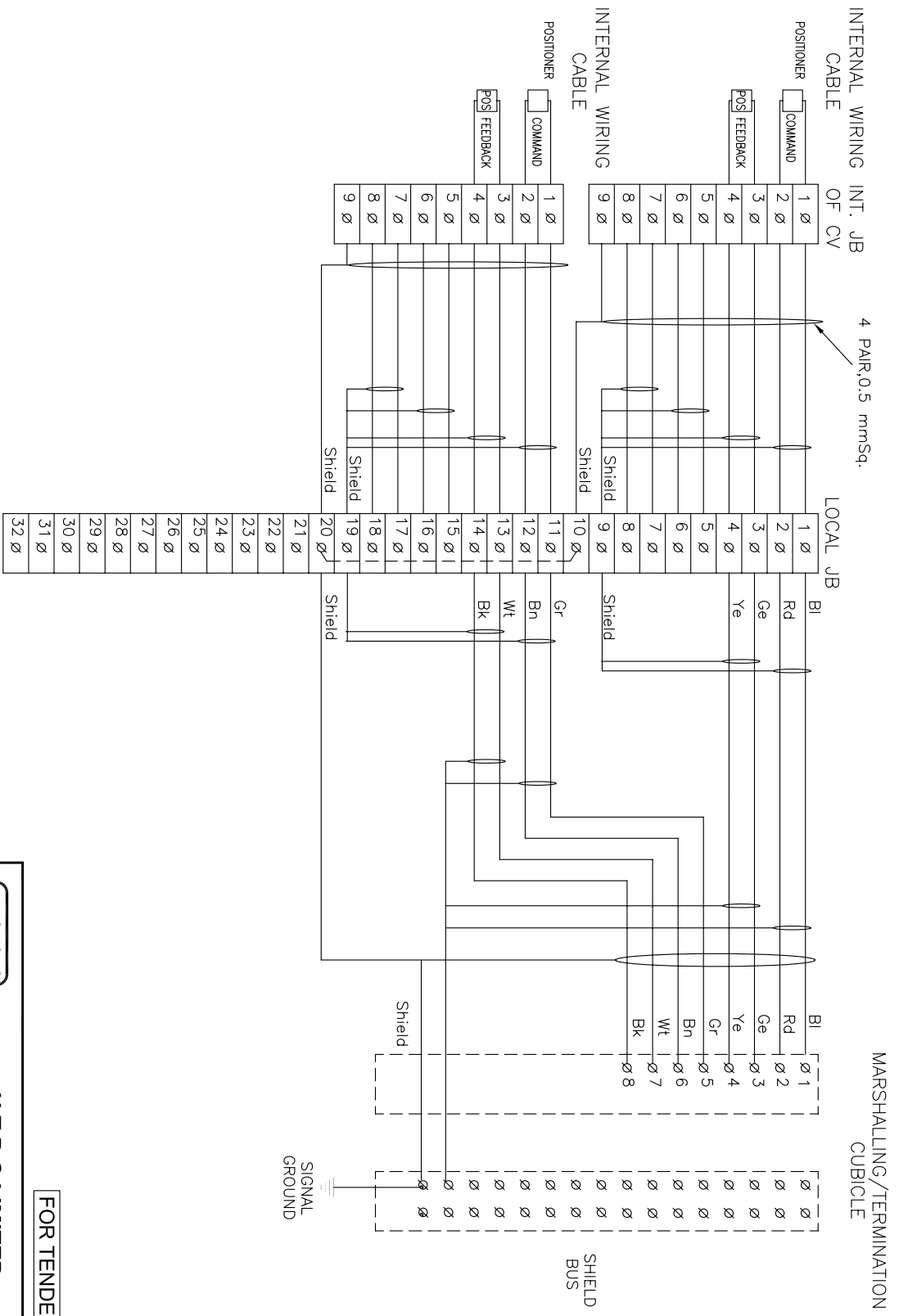


NTPC LIMITED
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 ENGINEERING DIVISION

PROJECT: **TYPICAL THERMAL POWER PROJECT**

TITLE: **INTERFACING OF FIELD INSTRUMENTS SWITCH TERMINATION DETAILS**
 NO/NC

REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	21.08.12	SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-POI-A-065	SH. 02 OF 15	REV. NO.	A
DESCRIPTION																						



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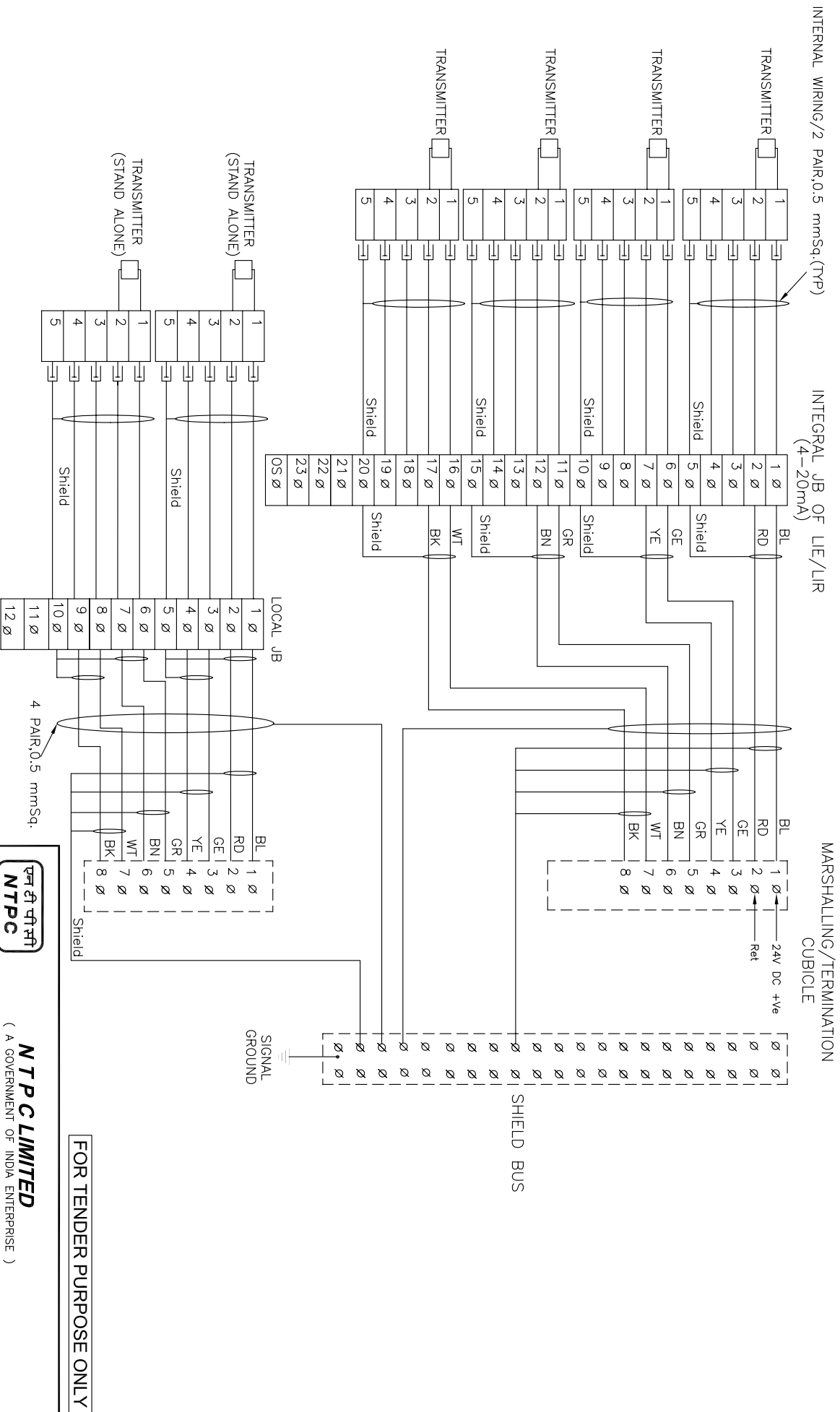
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NTPC
 (A GOVERNMENT OF INDIA ENTERPRISE)
NTPC LIMITED
 ENGINEERING DIVISION

PROJECT
 TYPICAL THERMAL POWER PROJECT

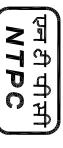
TITLE
 INTERFACING OF FIELD INSTRUMENTS
 CONTROL VALVE

REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	21.08.12
DESCRIPTION													
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SH 03 OF 15							



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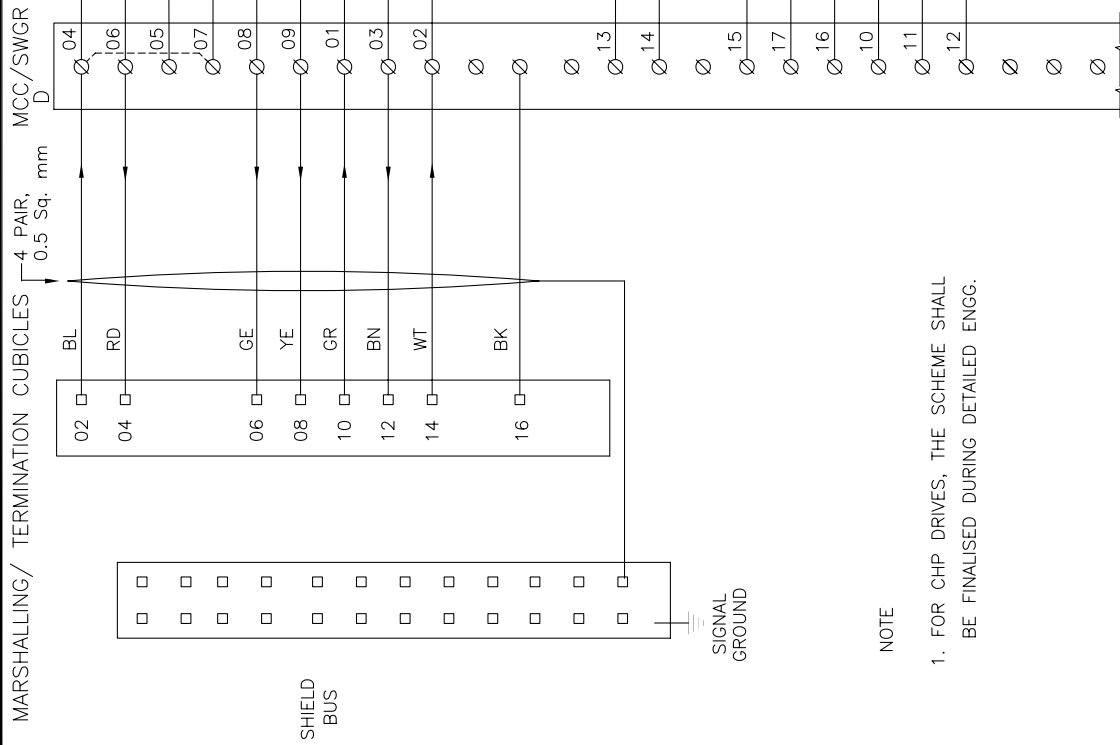


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 (A GOVERNMENT OF INDIA ENTERPRISE)
 ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PROJECT

TITLE
INTERFACING OF FIELD INSTRUMENTS
 4-20mA

REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
A	FIRST ISSUE										12.1.05	A3	NTS	0000-999-POI-A-065	B
B	INTERNAL WIRING FOR LIE/LIR MOUNTED SHOWN WIRING OF STAND ALONE TXIR SHOWN										21.08.12				

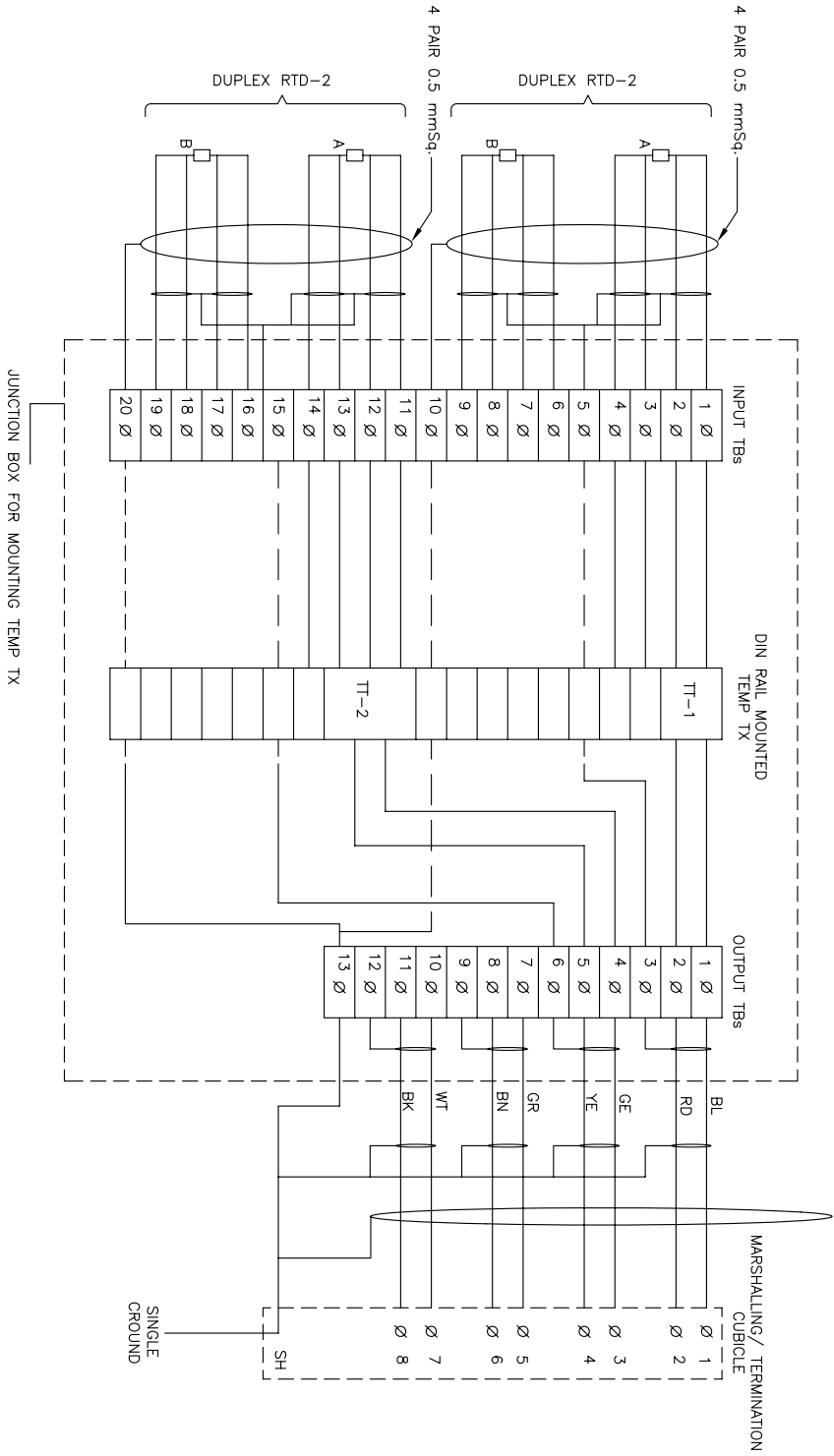


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ENGINEERING DIVISION

PROJECT		TYPICAL THERMAL POWER PROJECT	
TITLE		INTERFACE OF PLC WITH MCC/SWGR/ACTUATOR (LT MOTORS)	
REV. NO.	A	SCALE	NTS
DATE	21.08.12	DRG. NO.	0000-999-POI-A-065
APPD		REV. NO.	A
ARCH.		SH. 05 OF 15	
C&I			
E			
M			
CHKD.			
DRAWN			
DESIGN			
BY			
CLEARED BY			
DESCRIPTION			
FIRST ISSUE			



- NOTE :-
- 1) ABOVE IS THE TYP. DRG. MOUNTED TEMP TRANSMITTER FRO T/C APPLICATION. EXACT TYPE OF TEMP TRANSMITTERS SHALL BE AS PER PART-A OF SPECIFICATION.
 - 2) THE EXACT GROUPING OF TEMP TXs SHALL BE FINISHED DURING DERAILED ENGG. STAGE.
 - 3) PLEASE NOTE THAT THIS CONFIGURATION IS SHOWN FOR SINGLE INPUT DIN MOUNTED TT. FOR DUAL INPUT TT BOTH THE ELEMENTS OF RTD SHALL BE CONNECTED TO TT THROUGH INPUT TBS.

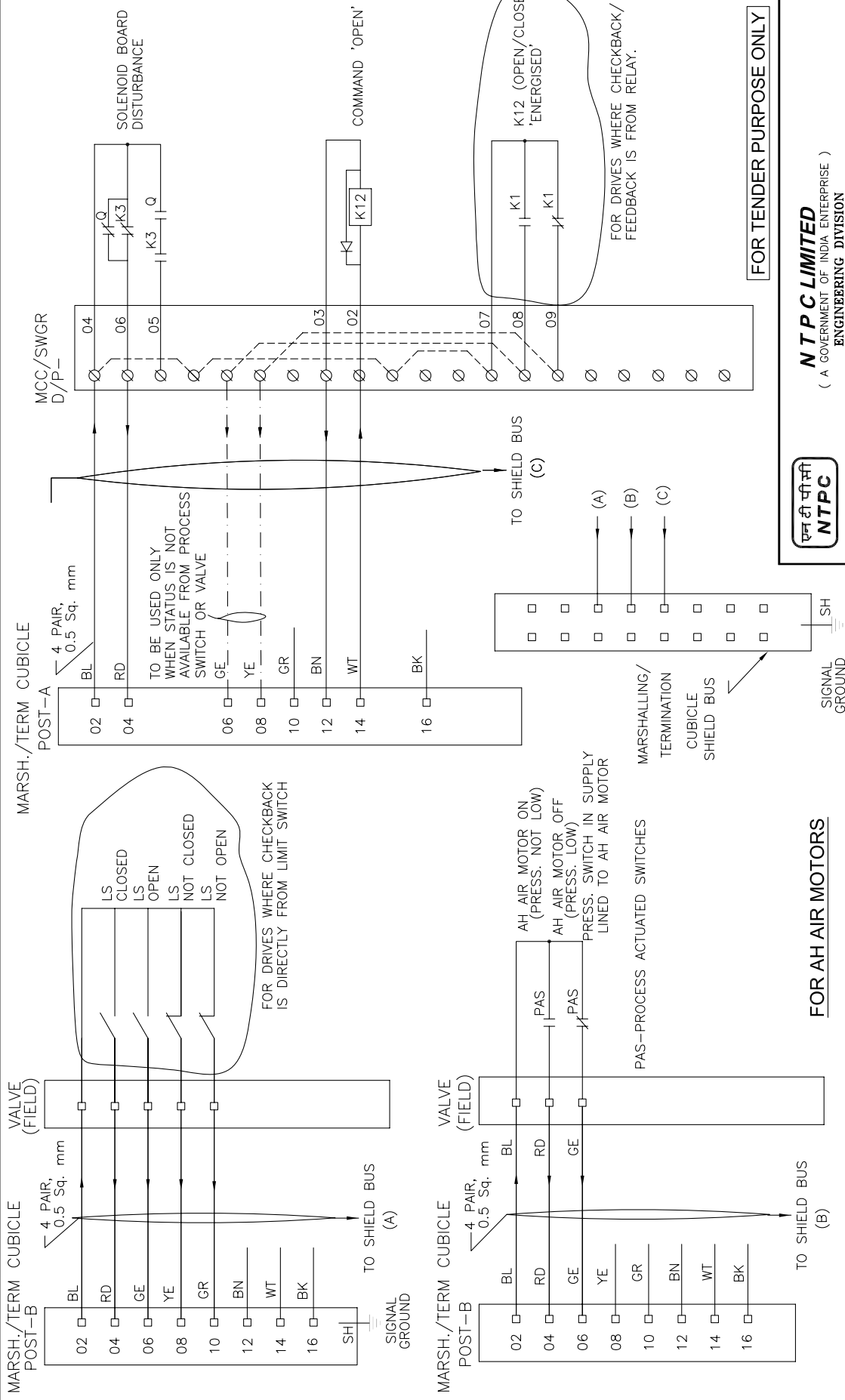
REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE
												21.08.12
DESCRIPTION												



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FOR TENDER PURPOSE ONLY

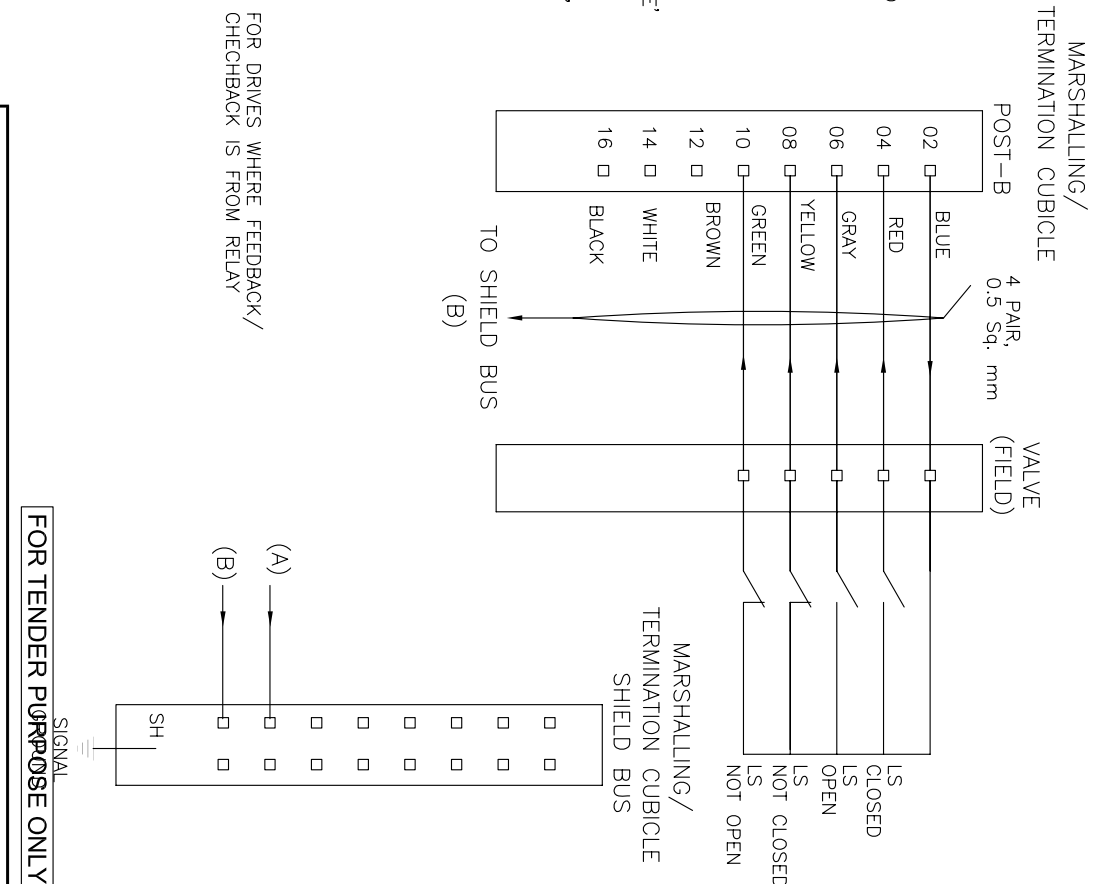
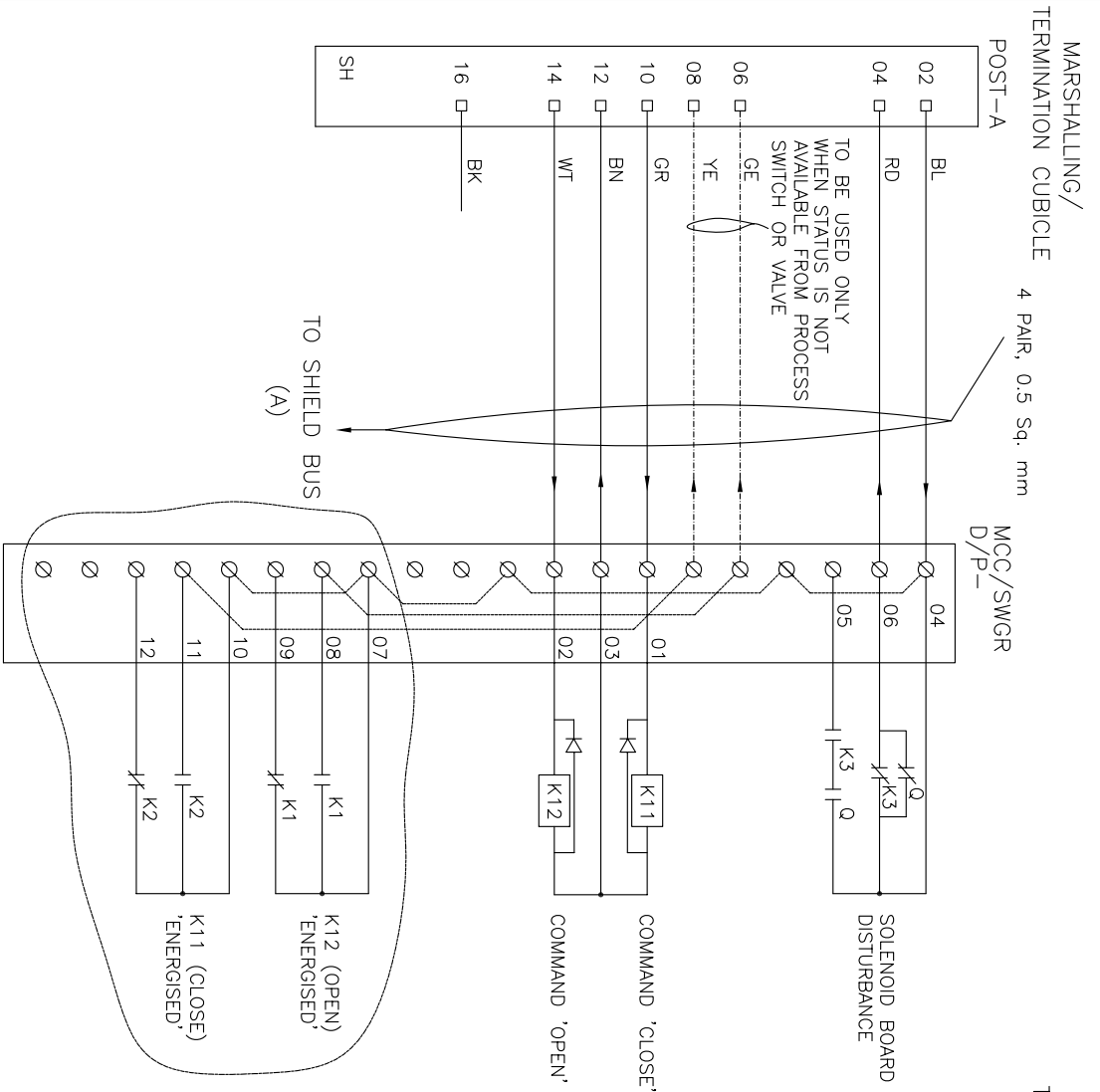
PROJECT	TYPICAL THERMAL POWER PROJECT													
TITLE	INTERFACING OF FIELD INSTRUMENTS TYPICAL RTD CONNECTION WITH TEMP TRANSMITTERS IN JBS													
SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-POI-A-065								REV. NO.	A
													SH 06 OF 15	



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PROJECT		TYPICAL THERMAL POWER PROJECT	
TITLE		INTERFACING OF FIELD INSTRUMENTS INTERFACE OF PLC WITH MCC/SWGR/ACTUATOR (SINGLE COIL SOLENOID)	
REV. NO.	SCALE	DRG. NO.	REV. NO.
A	NTS	0000-999-POI-A-065	A
DATE	APPD	C&I	ARCH.
21.08.12		E	C
Cleared by		M	
DESCRIPTION		DESIGN	CHKD.



FOR TENDER PURPOSE ONLY

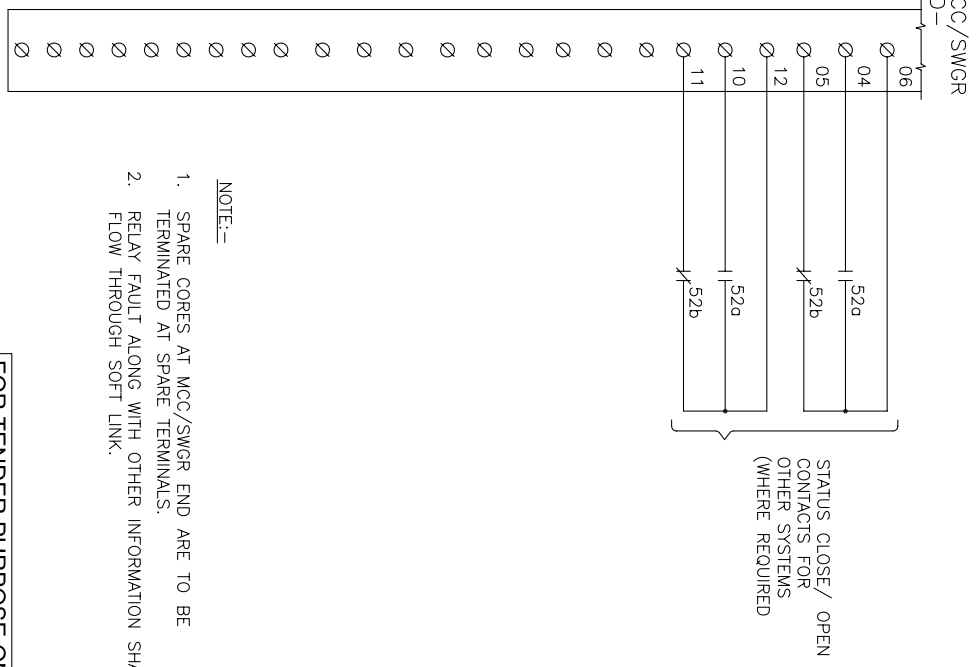
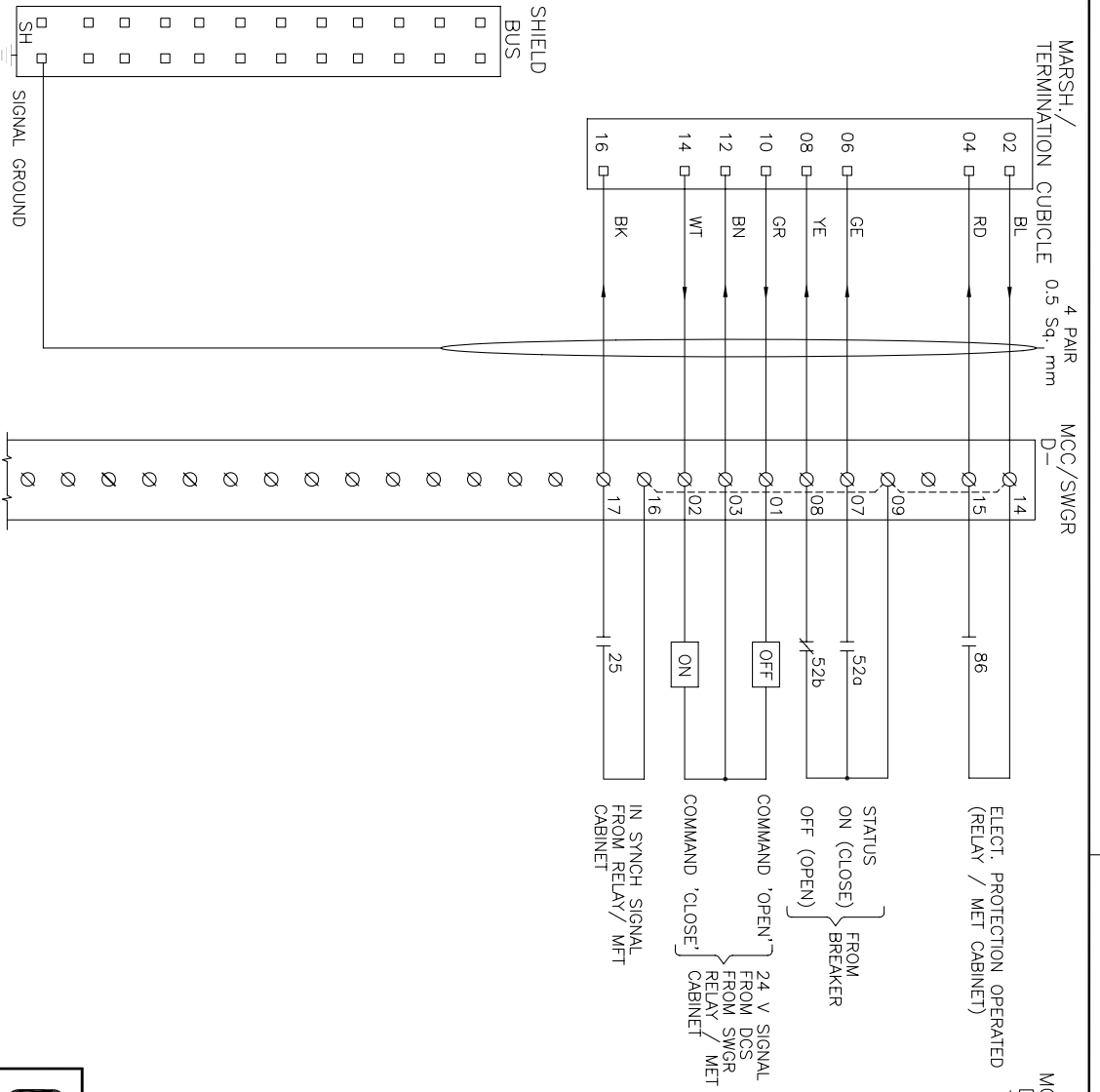
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 (A GOVERNMENT OF INDIA ENTERPRISE)
NTPC LIMITED
 ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PROJECT

TITLE
**INTERFACING OF FIELD INSTRUMENTS
 INTERFACE OF DDCMIS/PLC WITH MCC/SWGR/ACTUATOR
 (DOUBLE COIL SOLENOIDS)**

REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	21.08.12
DESCRIPTION													

SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-POI-A-065	REV. NO.	A
SH 09 OF 15							



- NOTE:-**
1. SPARE CORES AT MCC/SWGR END ARE TO BE TERMINATED AT SPARE TERMINALS.
 2. RELAY FAULT ALONG WITH OTHER INFORMATION SHALL FLOW THROUGH SOFT LINK.

FOR TENDER PURPOSE ONLY

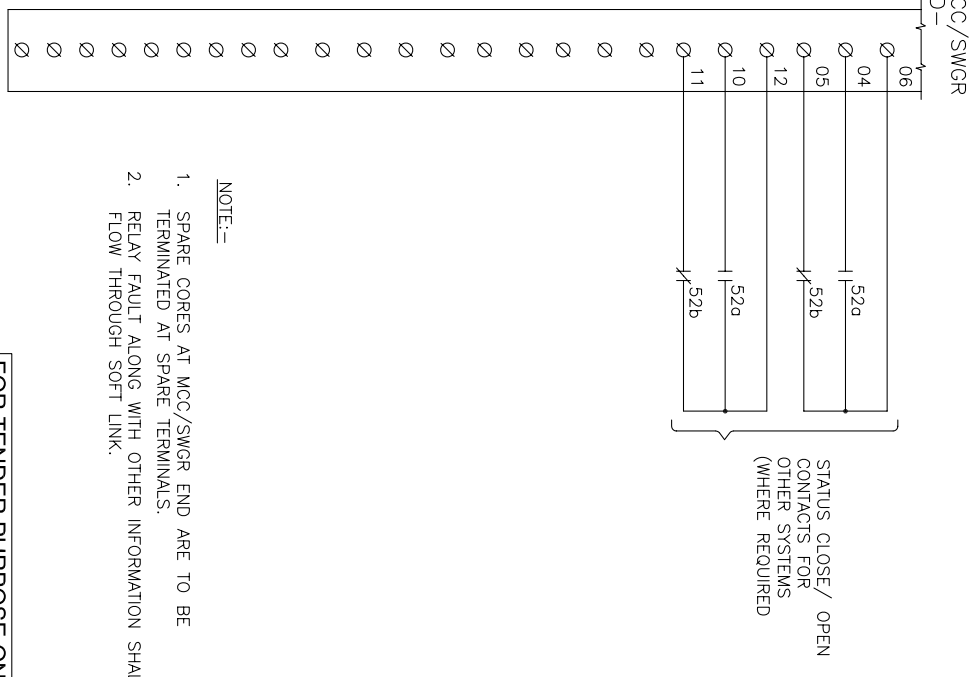
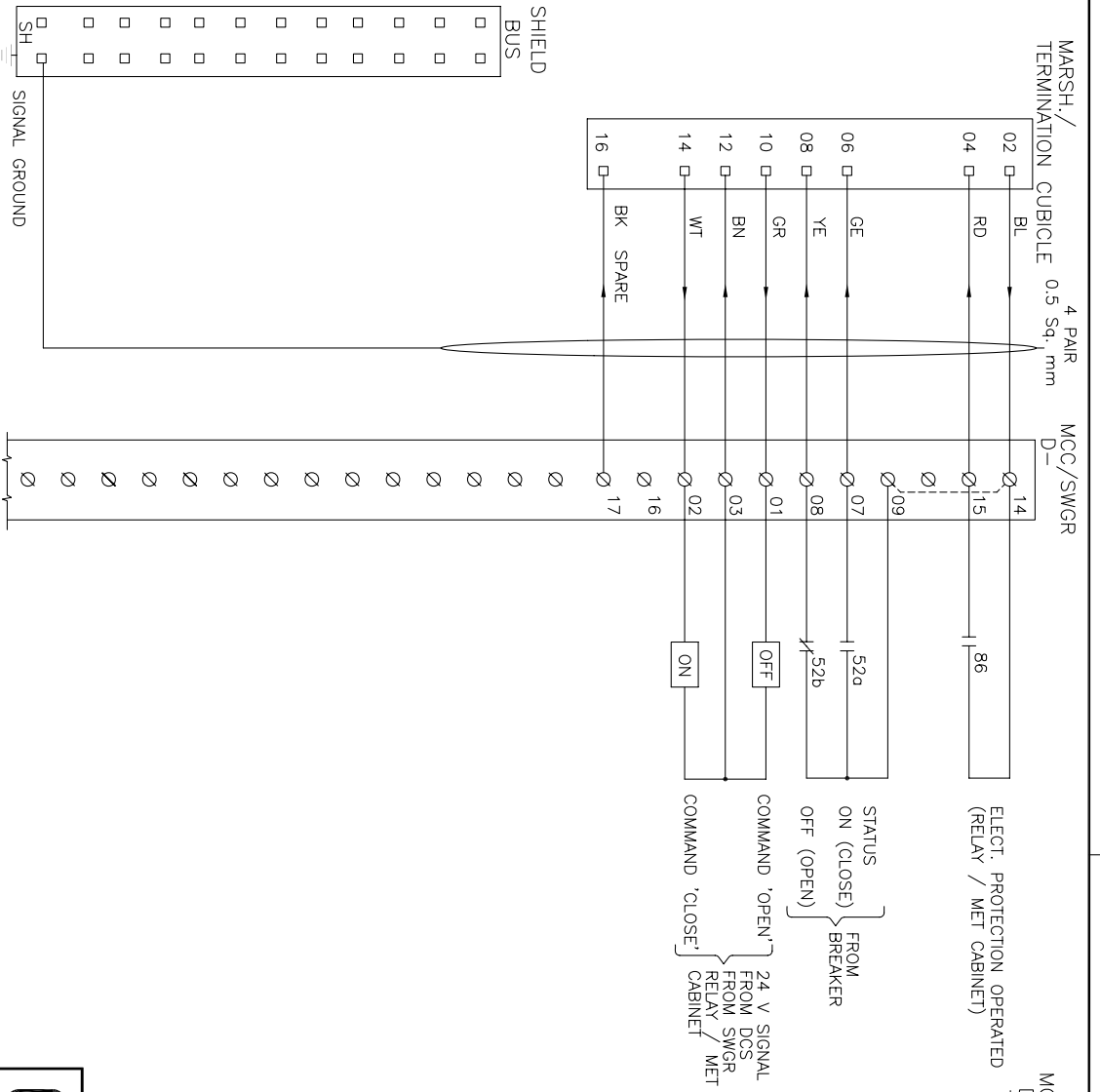
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TYPICAL THERMAL POWER PROJECT

TITLE
 INTERFACING OF FIELD INSTRUMENTS
 INTERFACE OF PLC WITH MCC/SWGR/ACTUATOR
 (ELECT. BKR. SYNC.-LT)

REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	21.08.12
DESCRIPTION	D E S C R I P T I O N												
CLEARED BY													

PROJECT	TYPICAL THERMAL POWER PROJECT												
SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-POI-A-065					REV. NO.	B		
					SH 10 OF 15								



- NOTE:-**
1. SPARE CORES AT MCC/SWGR END ARE TO BE TERMINATED AT SPARE TERMINALS.
 2. RELAY FAULT ALONG WITH OTHER INFORMATION SHALL FLOW THROUGH SOFT LINK.

FOR TENDER PURPOSE ONLY

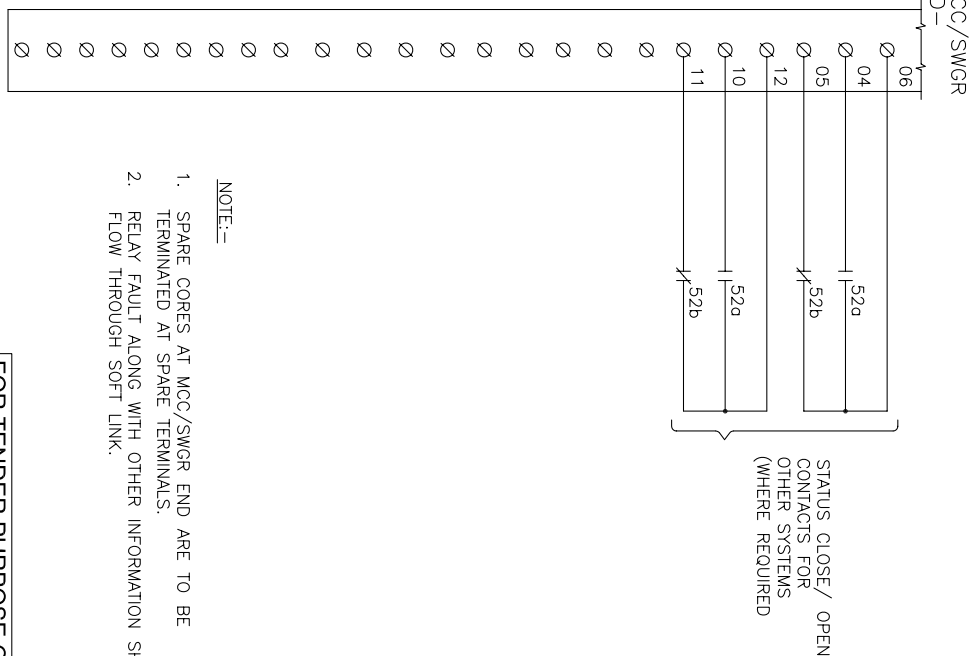
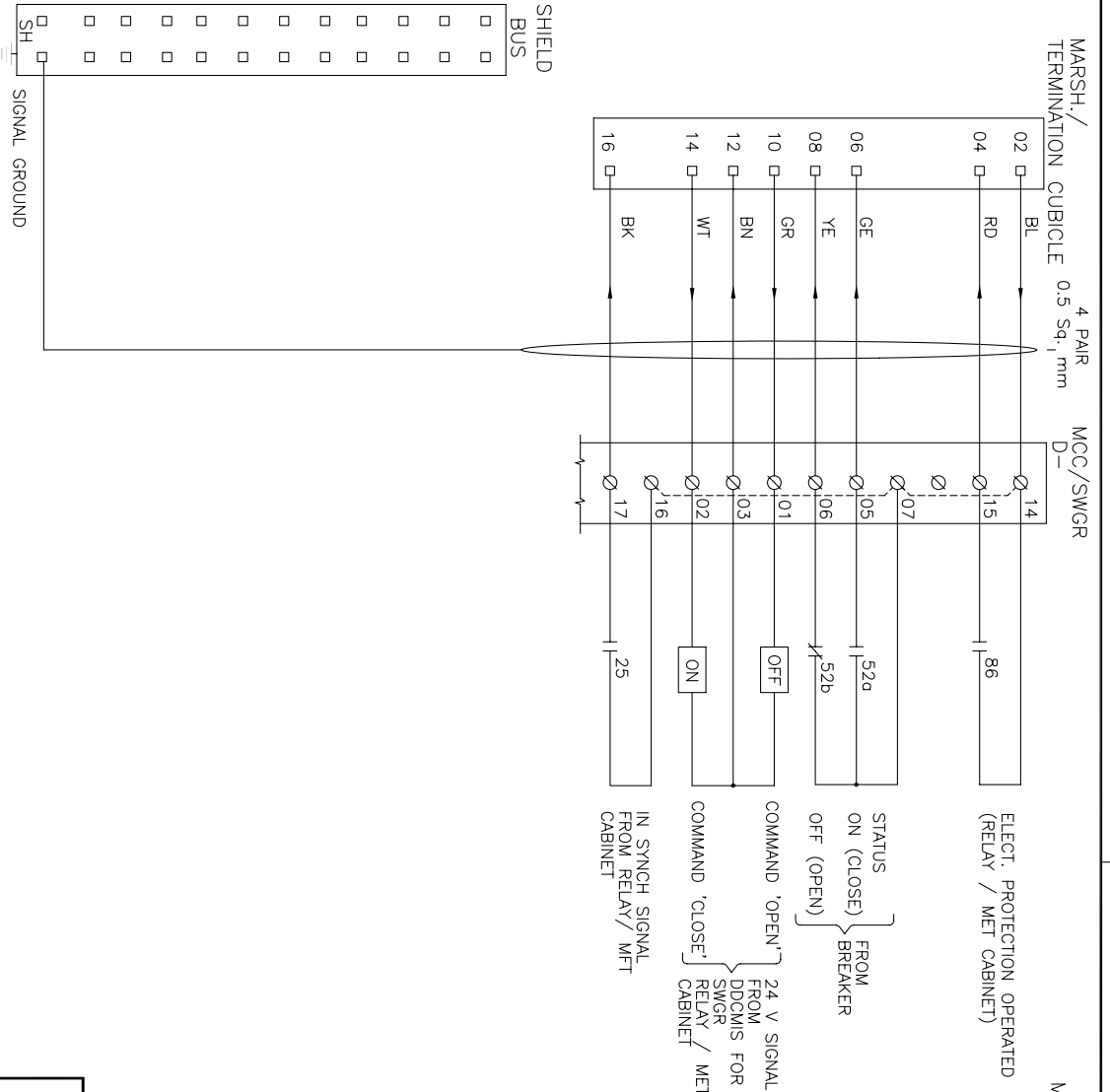
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ENGINEERING DIVISION

TYPICAL THERMAL POWER PROJECT

TITLE
INTERFACING OF FIELD INSTRUMENTS
INTERFACE OF PLC WITH MCC/SWGR/ACTUATOR
(ELECT. BKR. SYNC-LT)

REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	CAI	ARCH.	APPD	DATE	21.08.12
DESCRIPTION	D E S C R I P T I O N												
C L E A R E D B Y													

PROJECT	TYPICAL THERMAL POWER PROJECT														
SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-POI-A-065									REV. NO.	B
S H 12 O F 15															



- NOTE:-**
1. SPARE CORES AT MCC/SWGR END ARE TO BE TERMINATED AT SPARE TERMINALS.
 2. RELAY FAULT ALONG WITH OTHER INFORMATION SHALL FLOW THROUGH SOFT LINK.

FOR TENDER PURPOSE ONLY



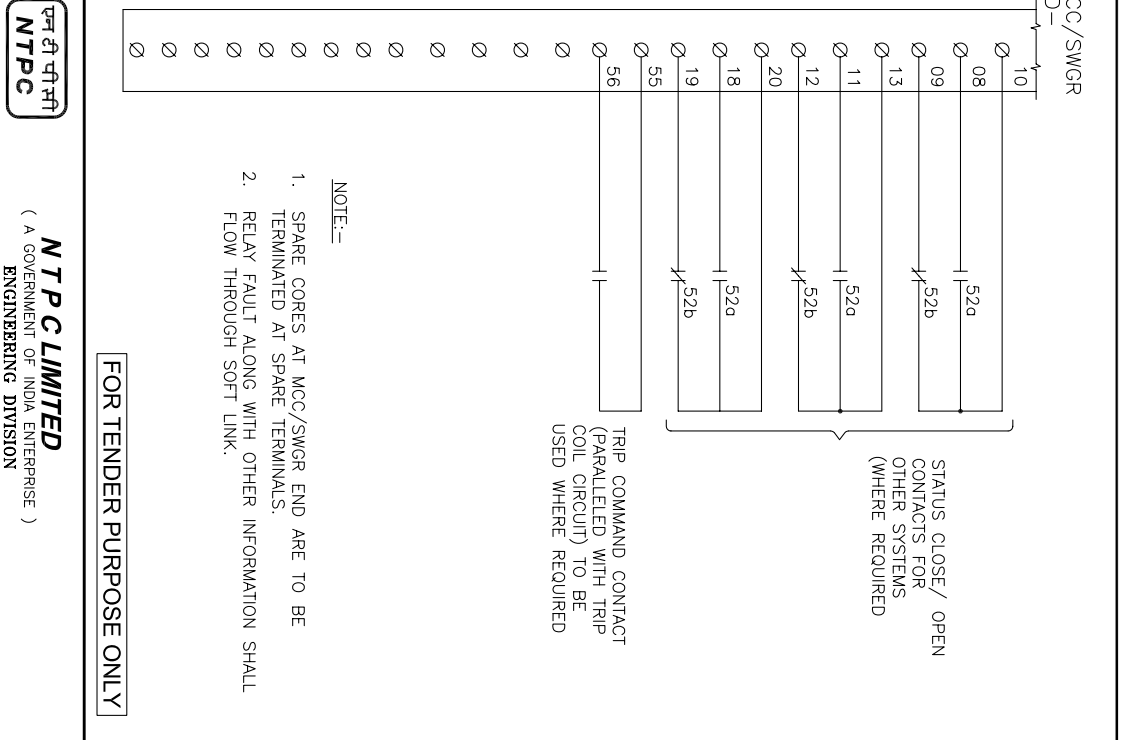
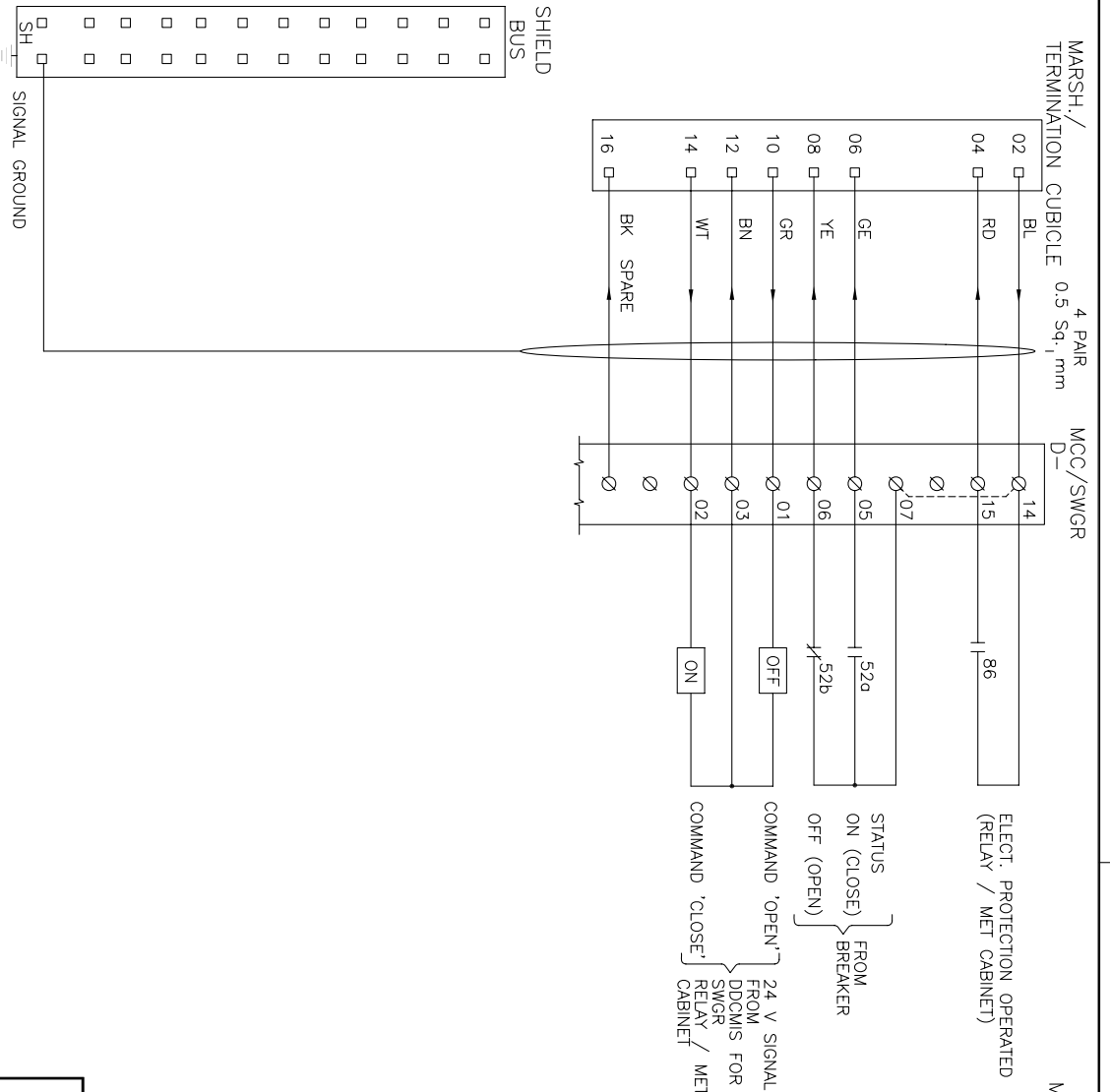
NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

TYPICAL THERMAL POWER PROJECT

TITLE
INTERFACING OF FIELD INSTRUMENTS
INTERFACE OF PLC WITH MCC/SWGR/ACTUATOR
(Elect. Bkr.- Sync.-HT)

REV. NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	CLEARED BY				APPD	DATE	
						M	E	C	C&I	ARCH.		21.08.12
DESCRIPTION												

PROJECT	TYPICAL THERMAL POWER PROJECT										
SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-POI-A-065				REV. NO.	B	
					SH 13 OF 15						



- NOTE:-**
1. SPARE CORES AT MCC/SWGR END ARE TO BE TERMINATED AT SPARE TERMINALS.
 2. RELAY FAULT ALONG WITH OTHER INFORMATION SHALL FLOW THROUGH SOFT LINK.

FOR TENDER PURPOSE ONLY



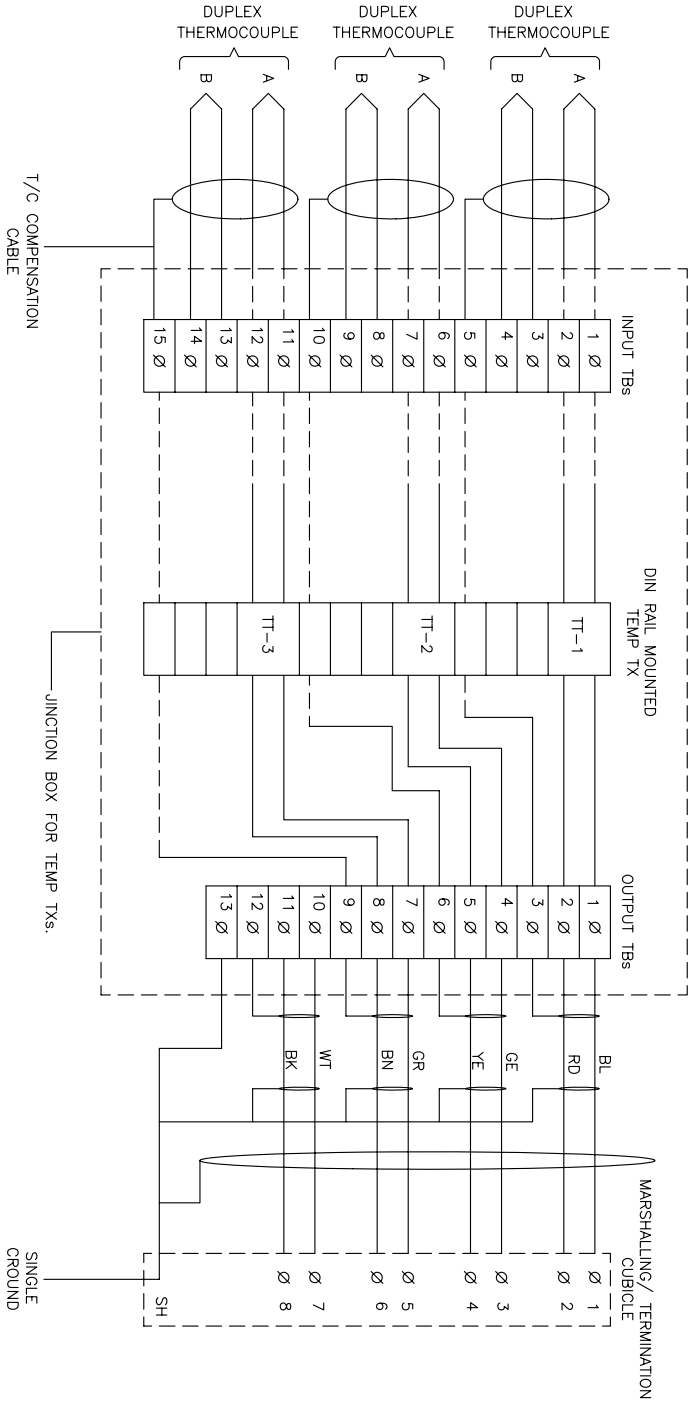
NTPC LIMITED
 (A GOVERNMENT OF INDIA ENTERPRISE)
 ENGINEERING DIVISION

TYPICAL THERMAL POWER PROJECT

TITLE
 INTERFACING OF FIELD INSTRUMENTS
 INTERFACE OF PLC WITH MCC/SWGR/ACTUATOR
 (Elect. Brkr.- Non Sync.-HT)

PROJECT	SIZE	SCALE	DRG. NO.	REV. NO.
	A3	NTS	0000-999-POI-A-065	B

REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	CLEARED BY	APPD	DATE
A	FIRST ISSUE						21.08.12



- NOTE :-
- 1) ABOVE IS THE TYP. DRG. MOUNTED TEMP TRANSMITTER FRO T/C APPLICATION. EXACT TYPE OF TEMP TRANSMITTERS SHALL BE AS PER PART-A OF SPECIFICATION.
 - 2) THE EXACT GROUPING OF TEMP TXs SHALL BE FINISHED DURING DERAILED ENGG. STAGE.
 - 3) AFTER GLADDING OF T/C CABLES ON JB. THE CABLE PAIR OF FIRST ELEMENT WILL BE DIRECTLY CONNECTED TO TT AND THE CABLE PAIR OF SECOND ELEMENT SHALL BE WIRED TO INPUT TBS FOR FUTURE USE.
 - 4) PLEASE NOTE THAT THIS CONFIGURATION IS SHOWN FOR SINGLE INPUT DIN RAIL MOUNTED TT. FOR DUAL INPUT TT BOTH THE ELEMENT OF T/C SHALL BE CONNECTED DIRECTLY TO TT WITHOUT INPUT TBS. HOWEVER 5 NOS OF INPUTS TBS ARE TO PROVIDED FOR EACH T/C FOR FUTURE USE.

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 ENGINEERING DIVISION

PROJECT TYPICAL THERMAL POWER PROJECT

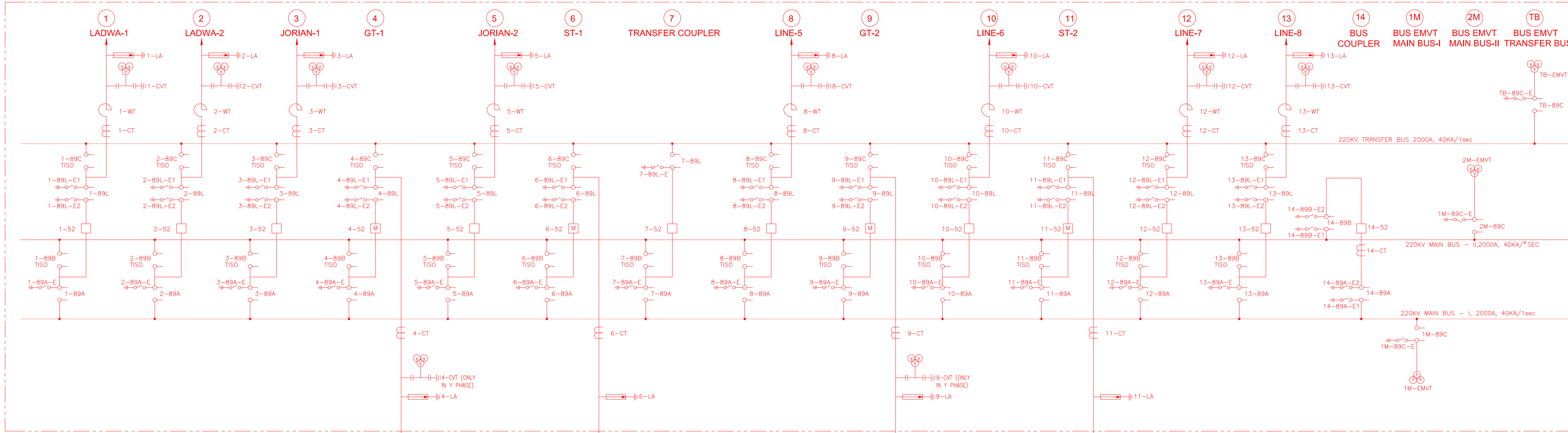
TITLE INTERFACING OF FIELD INSTRUMENTS
 TYPICAL T/C CONNECTION WITH TEMP TXs IN JBS

REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE
B	CABLING OF 2ND RTD CHANGED TO MATCH COLOR CODE	<i>[Signature]</i>									21.08.12
A	FIRST ISSUE	<i>[Signature]</i>									29.04.06

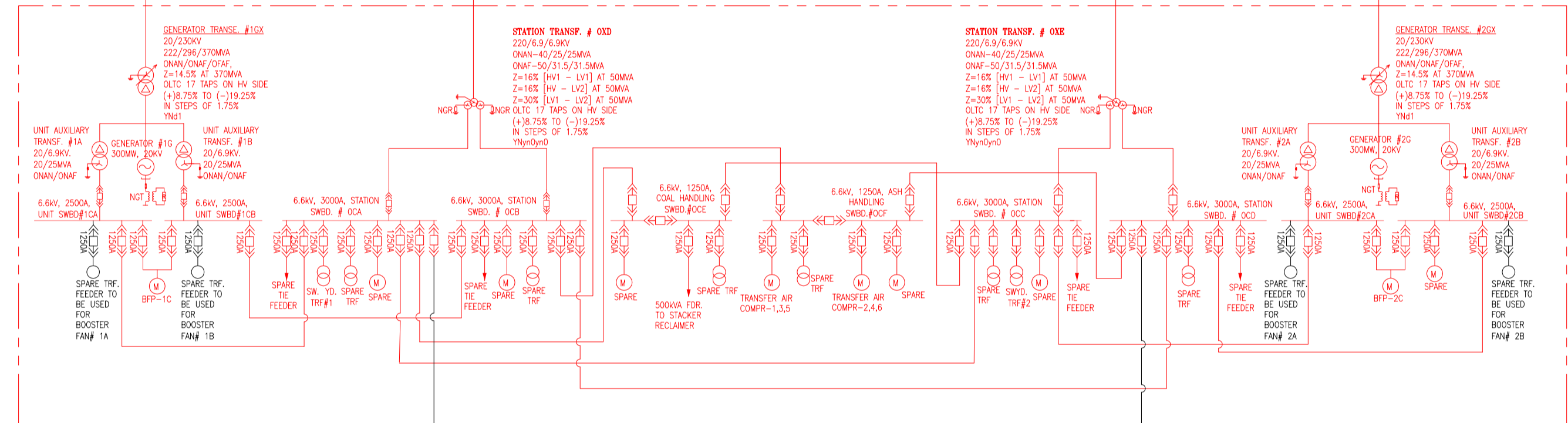
SIZE	A3	SCALE	NTS	DRG. NO.	0000-999-POI-A-065	REV. NO.	B
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EXISTING 1 TO 14 NOs 220 kv SWITCHYARD BAY



● EXISTING SLD
● PROPOSED SLD FOR FGD



LEGEND:-

Sl.NO	SYMBOL	DESCRIPTION
1.	⏏	6.6KV VCB(IN DOOR) CABLE
2.	⏏	ACB
3.	⏏	TRANSFORMER
4.	⏏	FUSE
5.	⏏	DG SET
6.	⏏	MCCB
7.	⏏	CURRENT TRANSFORMER
8.	⏏	BUS DUCT
9.	⏏	MOTOR
10.	⏏	MULTI FUNCTION METER
11.	⏏	LIGHTNING ARRESTER
12.	⏏	ISOLATOR MECHANICALLY GANGED (WITH OUT EARTH SWITCH)
13.	⏏	ISOLATOR MECHANICALLY GANGED (WITH EARTH SWITCH)
14.	⏏	ISOLATOR MECHANICALLY GANGED (WITH 2 EARTH SWITCH)
15.	⏏	CAPACITOR VOLTAGE TRANSFORMER
16.	⏏	WAVE TRAP
17.	⏏	TRANSFORMER
18.	⏏	ELECTRICAL INTERLOCK : ONE OUT OF TWO CAN BE CLOSED

- NOTE:-**
- THE SELECTION OF LT OUTGOING FEEDERS(DRAW OUT TYPE) SHALL BE AS INDICATED HEREUNDER.
(i) BELOW 100 A - SFU
(ii) 100 A-400 A - MCCB
(iii) ABOVE 400 A - BREAKER
 - CONTROL AND PROTECTION SUPPLIES FOR ALL SWITCHGEARS/DBS/CONTROL PANELS SHALL BE FED FROM TWO DIFFERENT SOURCES/DIFFERENT SECTIONS.
 - STANDARD LT TRANSFORMER RATINGS WITH THEIR IMPEDANCES ARE AS FOLLOWS.
- | SL NO. | TRF RATING | % IMPEDANCE |
|--------|------------|-------------------------------------|
| 1. | 1.6 MVA | To match with existing Transformers |
| 2. | 1.0 MVA | |
| 3. | 0.63 MVA | |
| 4. | 100 KVA | |
| 5. | 50 KVA | |
- 3x50% FEEDING ARRANGEMENT MAY BE USED FOR 415 VOLTS LOAD CENTERS WHERE THE TOTAL LT LOAD IS MORE THAN 2.15 MVA.
 - NUMBER OF MOTORS/FEEDERS/LT MCC SHOWN IN THE SLD IS TYPICAL AND FEEDING ARRANGEMENT SHOWN AT VARIOUS LOAD CENTERS IS INDICATIVE IN NATURE SHOWING THE FUNCTIONAL REQUIREMENTS.
 - BIDDER SHALL PROVIDE DC SYSTEM OF ADEQUATE CAPACITY FOR MEETING DC LOADS IN FGD AREA.
 - ONE NUMBER DC SET COMMON FOR ENTIRE FGD PLANT SHALL BE PROVIDED BY THE BIDDER FOR MEETING THE EMERGENCY PROCESS LOADS ENVOYED FOR FGD PLANT.
 - ALL BATTERY CHARGERS SHALL HAVE 2 INPUT SUPPLIES ALONG WITH SUITABLE AUTOMATIC CHANGEOVER BETWEEN THE SOURCES.
 - 6.6/0.433KV SERVICE TRF SHALL BE OUTDOOR OIL FILLED.
 - FEEDERS FOR FGD FROM STATION BOARDS OF UNIT #1&2 SHALL BE FINALIZED DURING DETAIL ENGINEERING.
 - HT LOADS WILL BE DISTRIBUTED UNIFORMLY IN ALL THE HT SWITCHGEARS.
 - ENERGY METER SHALL ALSO BE PROVIDED IN OUTGOING OF STATION BOARD FEEDING POWER TO HT FGD SWITCHGEAR.
 - RATING OF ALL THE FEEDERS, BUSBAR, SWITCHGEAR SHOWN ARE MINIMUM RATING ACTUAL RATING FINALIZED DURING DETAIL ENGINEERING.

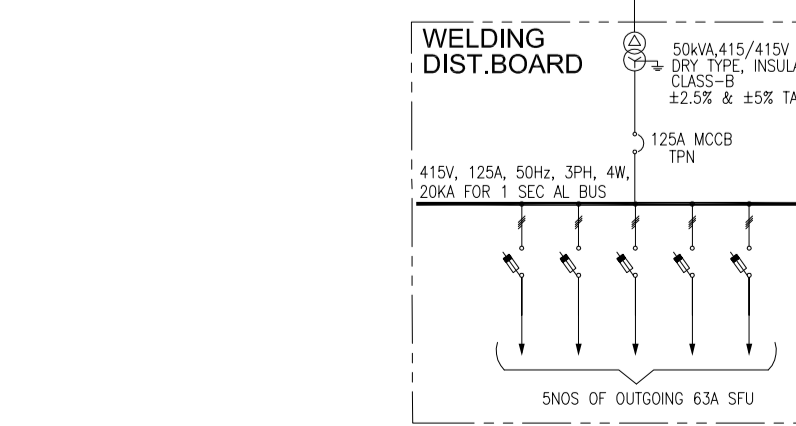
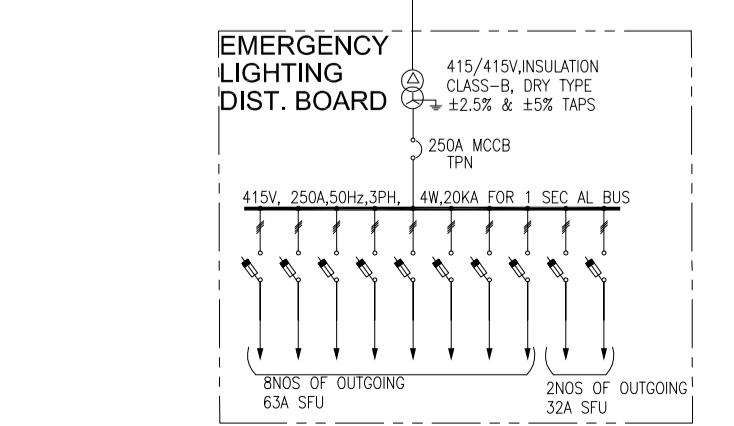
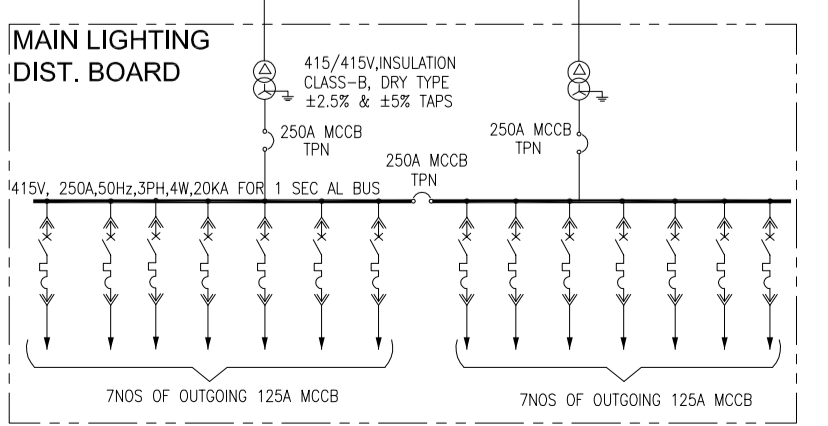
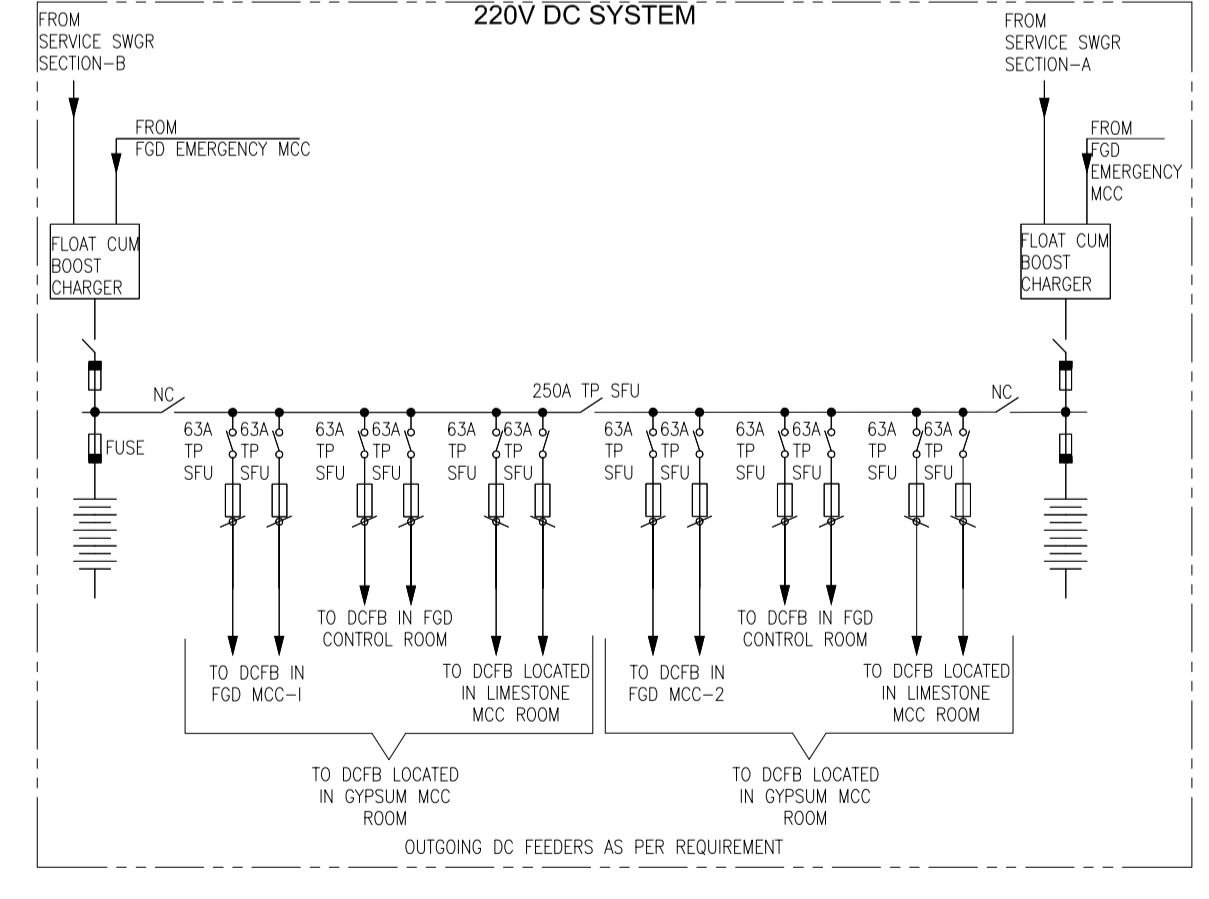
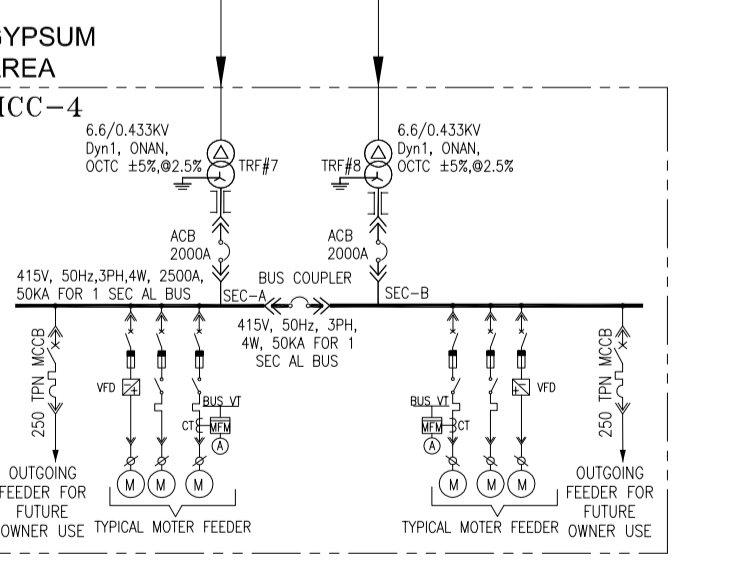
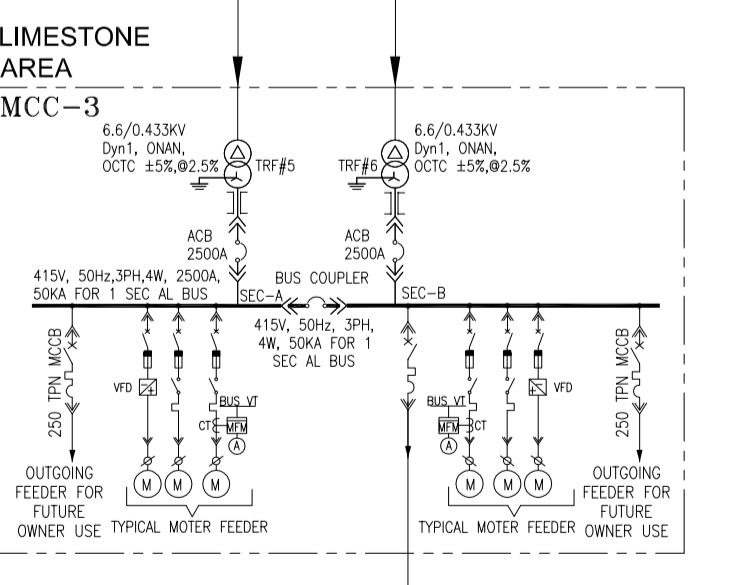
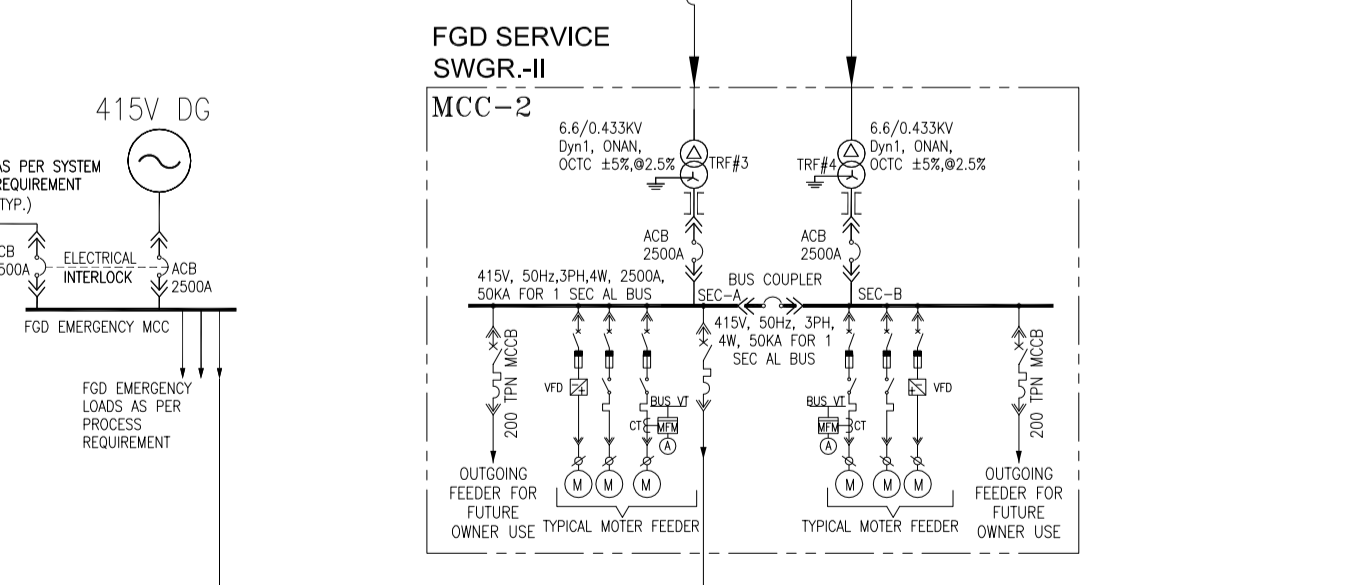
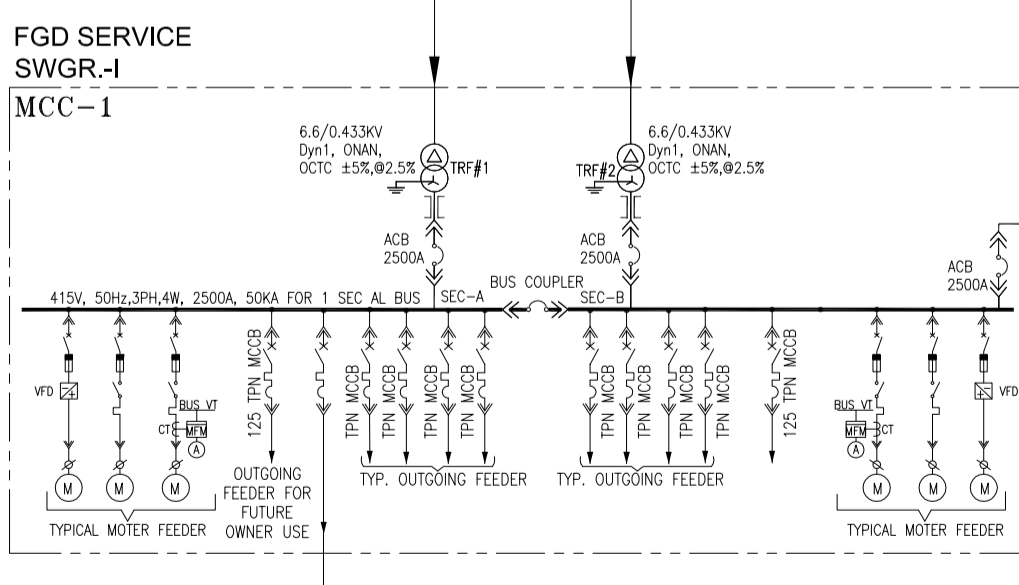
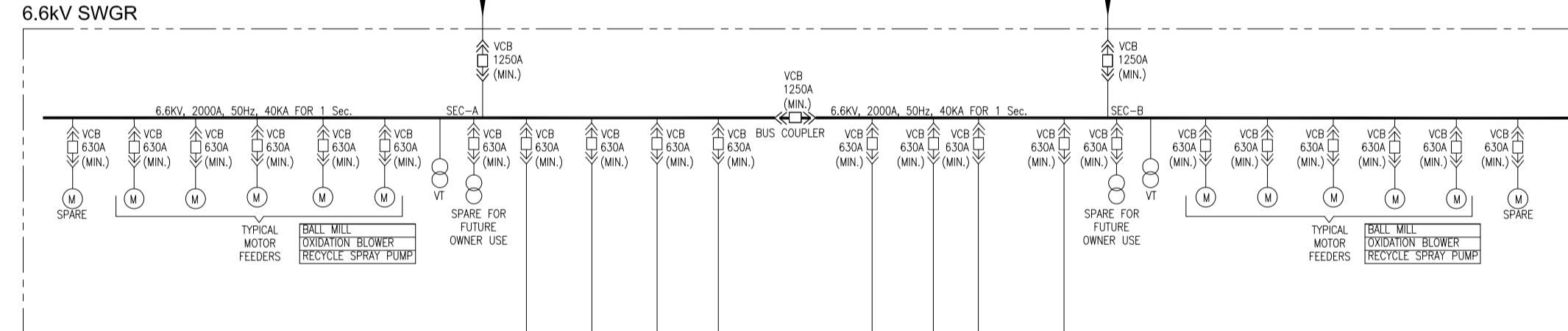


EXHIBIT-E1

OWNER HARYANA POWER GENERATION CORPORATION PUNCHKULA HARYANA.
CONSULTANT एन टी पी सी लिमिटेड NTPC LIMITED (A Government of India Enterprise) (CONSULTANCY WING)
PROJECT 2X300 MW DCR THERMAL POWER PROJECT YAMUNA NAGAR HARYANA

REV.	DESCRIPTION	DESIGN.	CHKD.	APPD.	DATE
1					15.05.19
0					17.08.18

TITLE	SIZE	DRG NO.	REV. NO.
ELECTRICAL SINGLE LINE DIAGRAM FOR FGD AUXILIARY POWER DISTRIBUTION	A2	9944-000-POE-J-001	1