

NTPC Limited

(A Government of India Enterprise)



LOT-IA PROJECTS

PART - E

TENDER DRAWINGS


SECTION – VI


FOR





















FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE

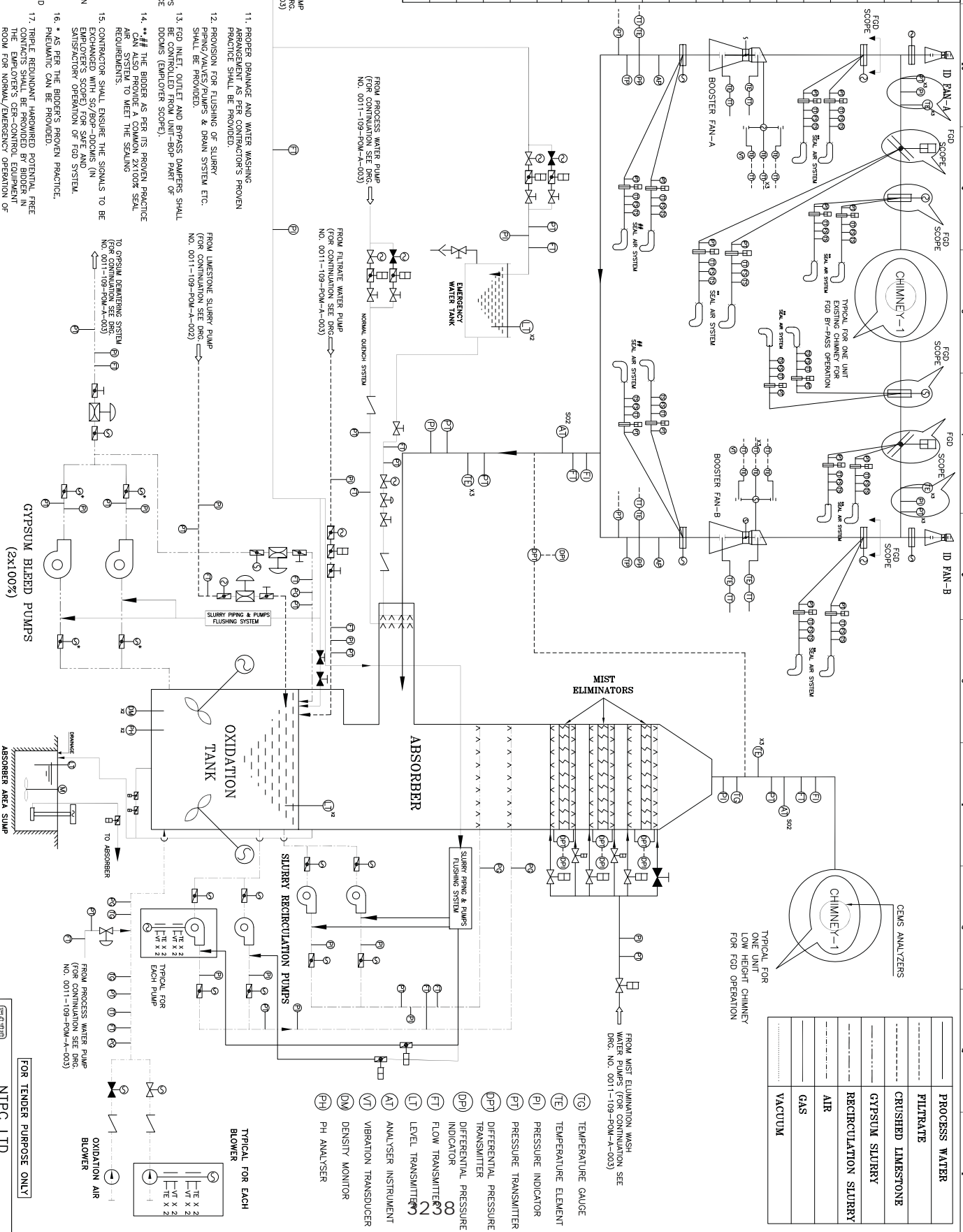
BIDDING DOCUMENT NO.: CS-0011-109(1A)-2

(This document is meant for the exclusive purpose of bidding against this Package and shall not be transferred, reproduced or otherwise used for purposes other than that for which it is specifically issued).

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				
	Sl. No	Drawings Title	Drawings No.	Rev. No.	No. of Sheets
	1)	Scheme of Absorber system	0011-109-POM-A-001	A	2
	2)	Scheme of Limestone Milling system	0011-109-POM-A-002	A	1
	3)	Scheme of Gypsum De-watering system	0011-109-POM-A-003	A	1
	4)	P&ID Diagram for ECW System of FGD	0011-109-POM-A-004	A	1
	5)	Process Flow Diagram for FGD Waste water treatment (FGD WWT) for ZLD	0011-109-POM-A-005	A	3
	(B) CONTROL & INSTRUMENTATION				
	Sl. No.	Drawings Title	Drawings No.	No. of Sheets	
	1.	Standard configuration diagram for PLC	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	
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-0011-109(1A)-2	PART-E TENDER DRAWING LIST	PAGE 1 OF 2	

CLAUSE NO.	TENDER DRAWING LIST				
	Sl. No.	Drawings Title	Drawings No.	No. of Sheets	
	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	: Drg No. 0011-109-POE-J-001/A-E		
	<p>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.</p> <p>Electrical drawings (except Electrical single line diagram) are attached with respective Electrical Chapters in Part b, Section VI.</p>				
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-0011-109(1A)-2		PART-E TENDER DRAWING LIST	PAGE 2 OF 2

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 GATE
	MOTORIZED GATE



_____	PROCESS WATER

_____	FILTRATE
_____	CRUSHED LIMESTONE
_____	GYPSUM SLURRY
_____	RECIRCULATION SLURRY

_____	AIR

_____	GAS

_____	VACUUM

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PROJECT NTPC THERMAL POWER PROJECT

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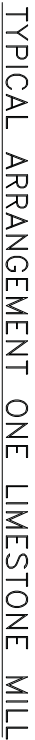
SIZE	SCALE	DWG NO.	REV.
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SINGLE UNIT

SCHEME OF PGD-ABSORBER SYSTEM

A-1	0011-109-POM-A-001(a)
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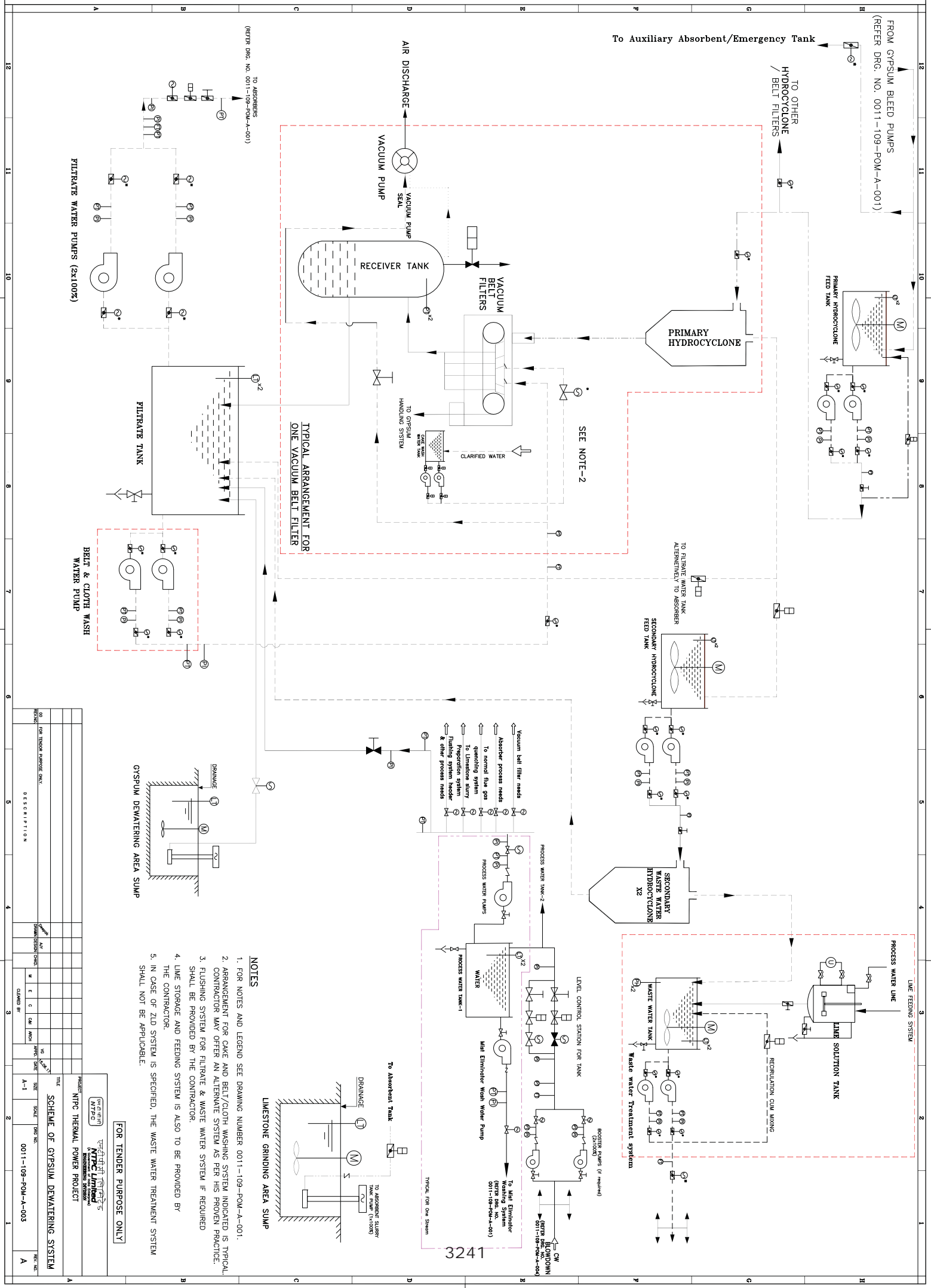




- FOR TENDER PURPOSE ONLY

FOR TENDER PURPOSE ONLY

FOR TENDER PURPOSE ONLY





1	☐	SLIDE PAINT
2	☐	NON-FLUORESCENT PAINT
3	☐	ACRYLIC PAINT
4	☐	WATER-SOLUBLE ACRYLIC PAINT
5	☐	FLUOROPOLYMER PAINT (DURABLE TYPE)
6	☐	FLUOR
7	☐	STAINLESS
8	☐	PAINT
9	☐	PRELIMINARY PAINT
10	☐	TEMPORARY PAINT
11	☐	TEMPORARY FOR SLIDE
12	☐	TEMPORARY FOR SLIDE
13	☐	PRELIMINARY PAINT
14	☐	PAINT LAMP PAINT
15	☐	PAINT PAINT
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ENGINEERING DIVISION

Subject

FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE

P&ID DIAGRAM FOR ECW SYSTEM OF FGD

TIME	SCALE	PERIOD
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0011-109-POM-A-004

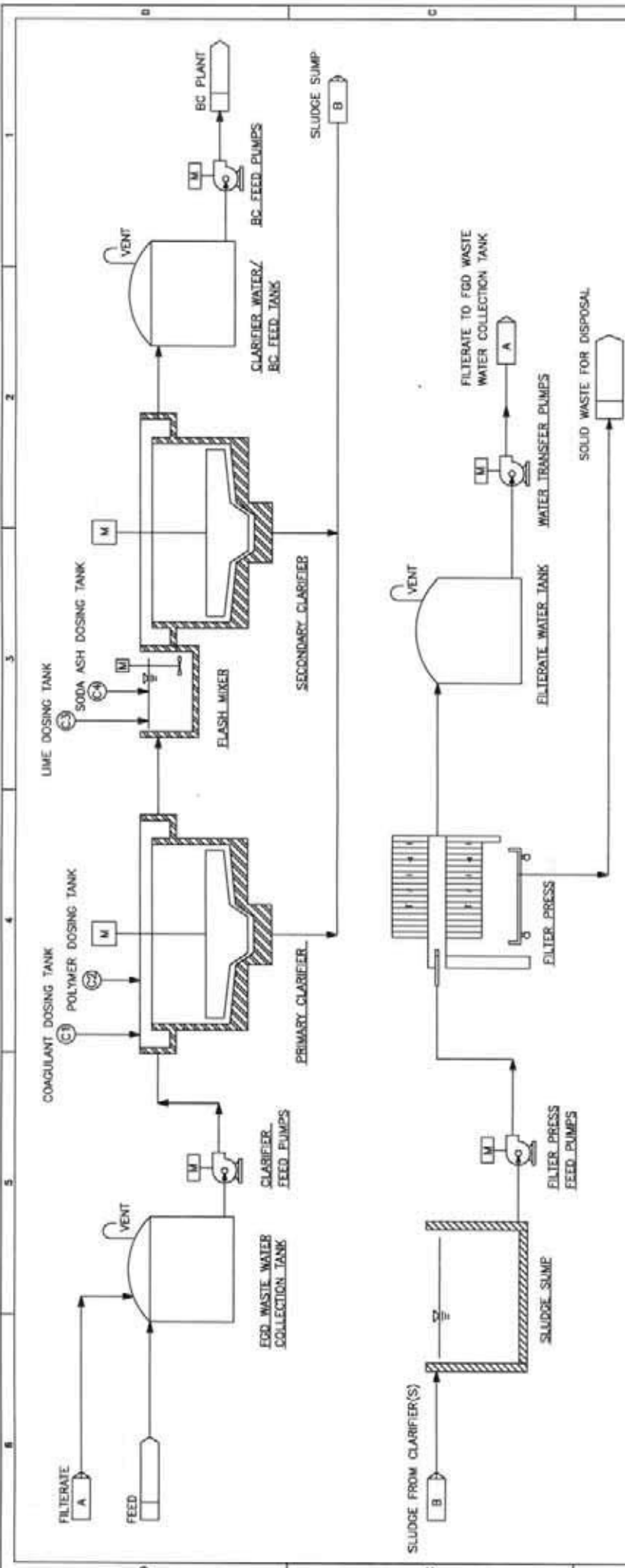
A

Author's address: Department of Psychology,
University of Illinois at Chicago, Chicago, IL
60607-7181, USA.
E-mail: jay@uic.edu

1

1

1



COMMON NOTES FOR DRAWING NO. 1.2 & 3

1. THE SCHEME SHOWN IS INDICATIVE ONLY. CONTRACTOR SHOULD FURNISH COMPLETE SCHEME & P&ID IN ALL RESPECTS DURING DETAILED ENGINEERING BASED ON TECHNICAL SPECIFICATION AND SYSTEM REQUIREMENTS INCLUDING ALL INSTRUMENTS, VALVES ETC. FOR SMOOTH, SAFE, EFFICIENT, TROUBLE FREE OPERATION OF PLANT. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR SYSTEM DESIGN, SIZING OF THE COMPLETE FGD WWT PLANT.
2. CONTRACTOR SHALL NOTE THAT ANY ADDITIONAL EQUIPMENT/SYSTEM/SUB-SYSTEM AS REQUIRED SHALL ALSO BE PROVIDED.
3. THE INSTRUMENTS FOR WHICH TECHNICAL SPECIFICATION IS NOT ATTACHED, SHALL BE SUPPLIED AS PER STANDARD AND PROVEN PRACTICE OF THE CONTRACTOR. THE SAME SHALL BE ESTABLISHED BY THE CONTRACTOR DURING DETAILED ENGINEERING BY PROVIDING DETAILED EXPLANATION/CONCEPTS, IF REQUIRED BY THE EMPLOYER OF SUCH IMPLEMENTATION ALONG WITH STANDARD DOCUMENTATION.
4. TRANSMITTER FOR LEVEL MEASUREMENT SHALL BE ULTRASONIC/RADAR TYPE, UNLESS THE SAME ARE NOT SUITABLE FOR THE PROCESS REQUIREMENT. UNDER SUCH CIRCUMSTANCES, THE TYPE OF LEVEL TRANSMITTERS SHALL BE FINALIZED DURING DETAILED ENGINEERING.

CHEMICAL DOSING TANKS			
COAGULANT DOSING TANK	POLYMER DOSING TANK	LIME DOSING TANK	SODA ASH DOSING TANK

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PROJECT

BARH SUPER THERMAL POWER PROJECT (STAGE-I) (3 X 660MW)
& NABINAGAR THERMAL POWER PROJECT (4 X 250MW)

TITLE

PROCESS FLOW DIAGRAM FOR FGD WASTE WATER TREATMENT (FGD WWT) SYSTEM FOR ZLD

SIZE

A3

SCALE

ORNL

DATE

APPROVED BY

DESIGNED BY

CHECKED BY

REV.

A

REV.

A

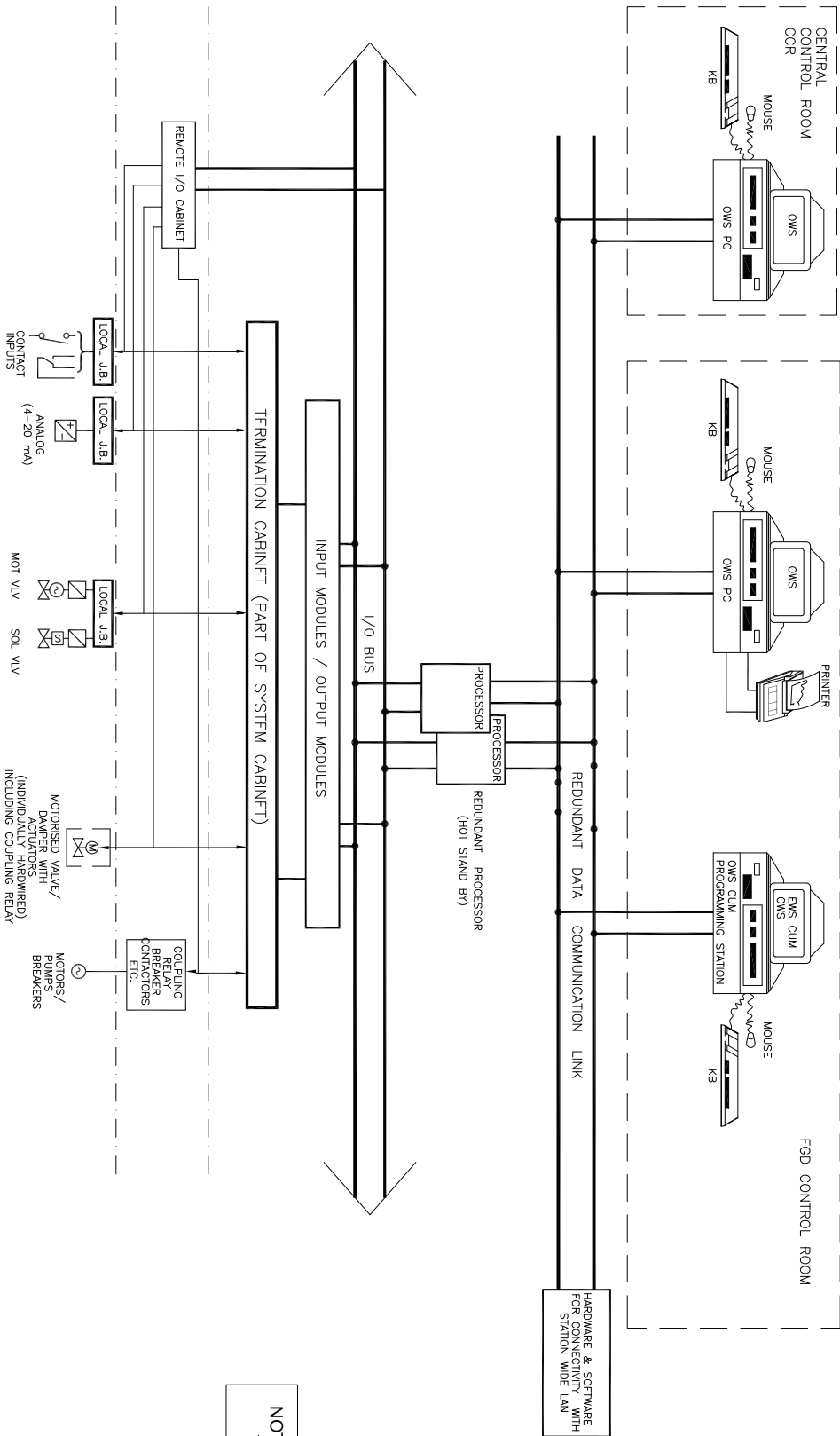
0011-109-POM-A-005 (SHT.1 OF 3)

REV.

A

DESCRIPTION

5



NOTE:-
1. GI CONDUIT SHALL BE PROVIDED FOR IO
BUS LEAVING FGD CONTROL ROOM.

3246

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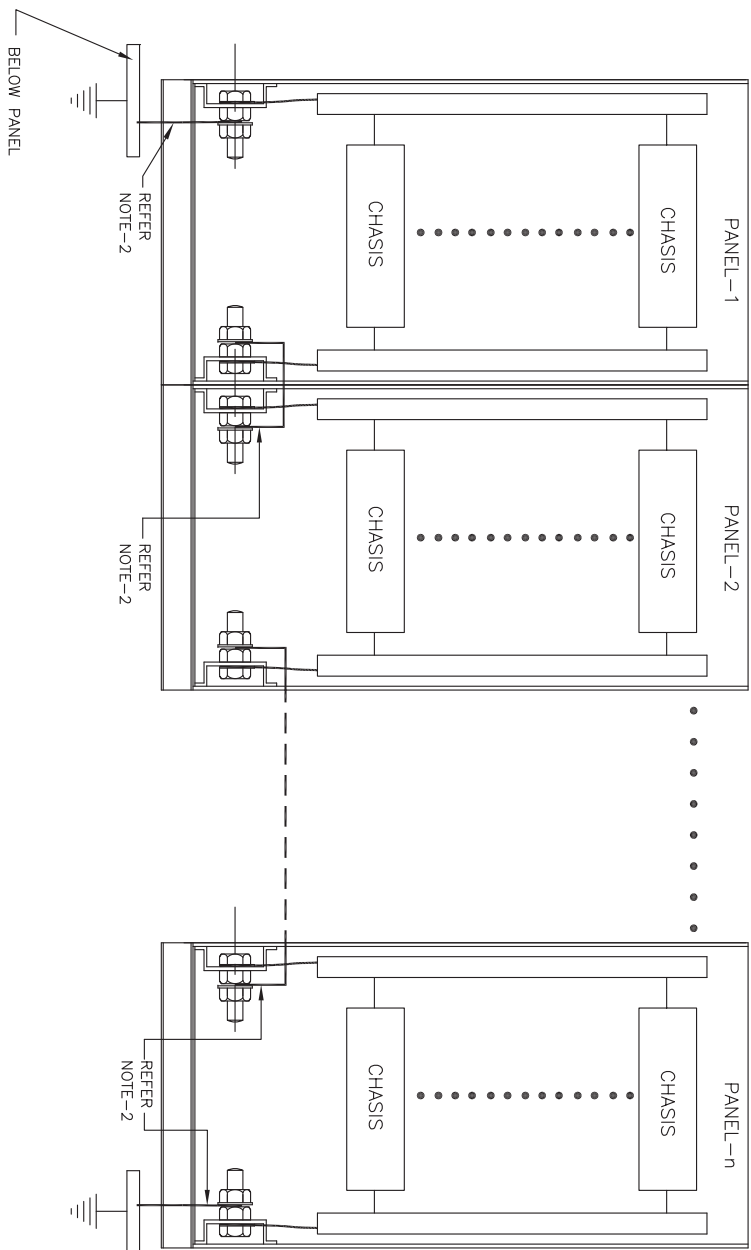
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TYPICAL THERMAL POWER PROJECT

TITLE:-
STANDARD CONFIGURATION DIAGRAM FOR
PLC BASED OFFSITE CONTROL SYSTEMS

REV.NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
												A4	N.T.S.	0000-151-POI-A-013	A

GROUNDING FOR EACH ROW OF PANELS (TYPICAL)



NOTES:-

- 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.
- CABLE IN CONTRACTOR'S SCOPE.
- TO BE LOCATED IN DCDB.
- EXACT LOCATION, ARRANGEMENTS OF FLATS ETC. SHALL BE AS FINALISED WITH CONTRACTOR. DURING DETAILED ENGINEERING.
- CABINET BODY, CABINET BOTTOM PLATE, CABINET DOORS ARE TO BE CONNECTED TO PANEL EARTH FLAT COPPER CABLE BY CONTRACTOR.

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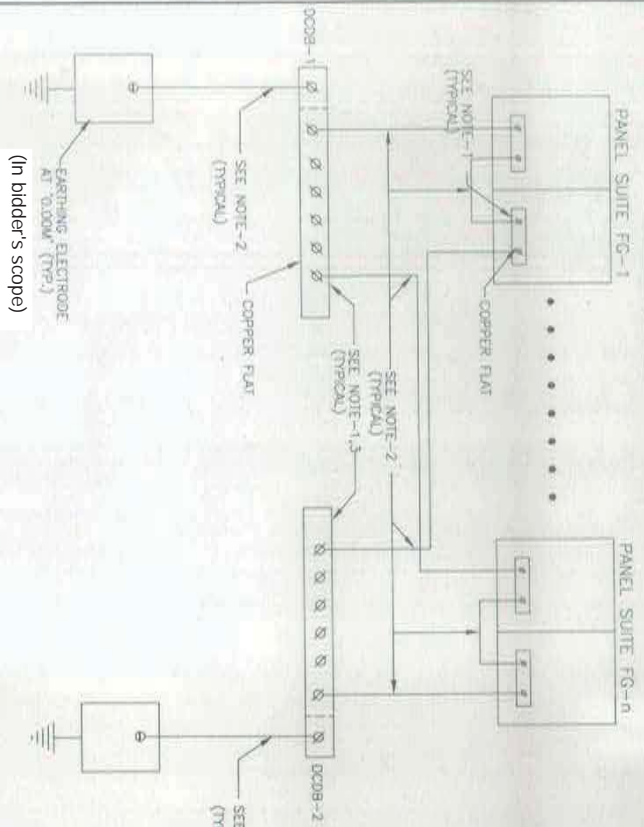
TYPICAL THERMAL POWER PROJECT

TITLE

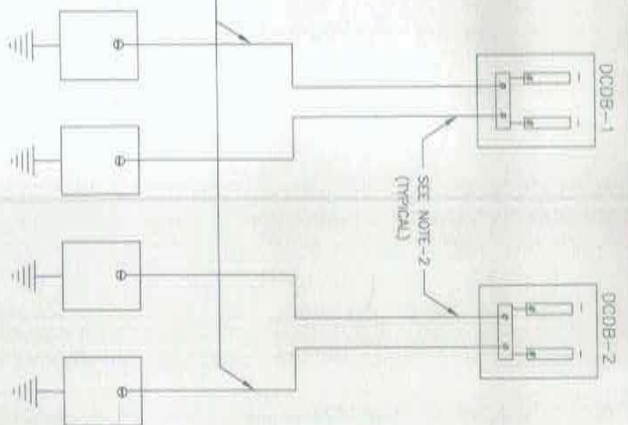
INSTRUMENTATION CABLING DIAGRAM
GROUNDING SCHEME FOR CABINETS / PANELS / POWER SUPPLY

REV.NO.	A	FIRST ISSUE	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD	DATE	21.08.12	SIZE	A3	SCALE	N.T.S.	DRG. NO.	0000-999-POI-A-019A	REV. NO.	A
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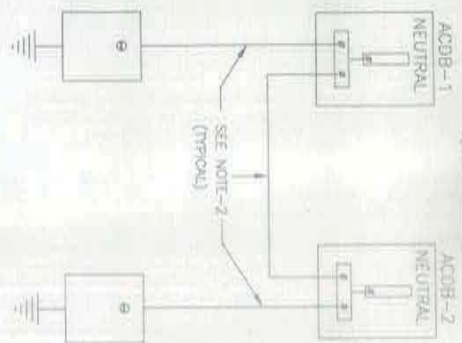
SYSTEM/SHIELD GROUNDING (TYPICAL)



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.

(In bidder's scope)

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TYPICAL THERMAL POWER PROJECT

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

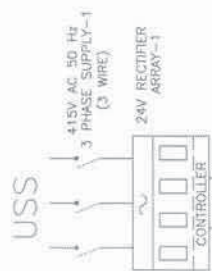
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SH-1 OF 2

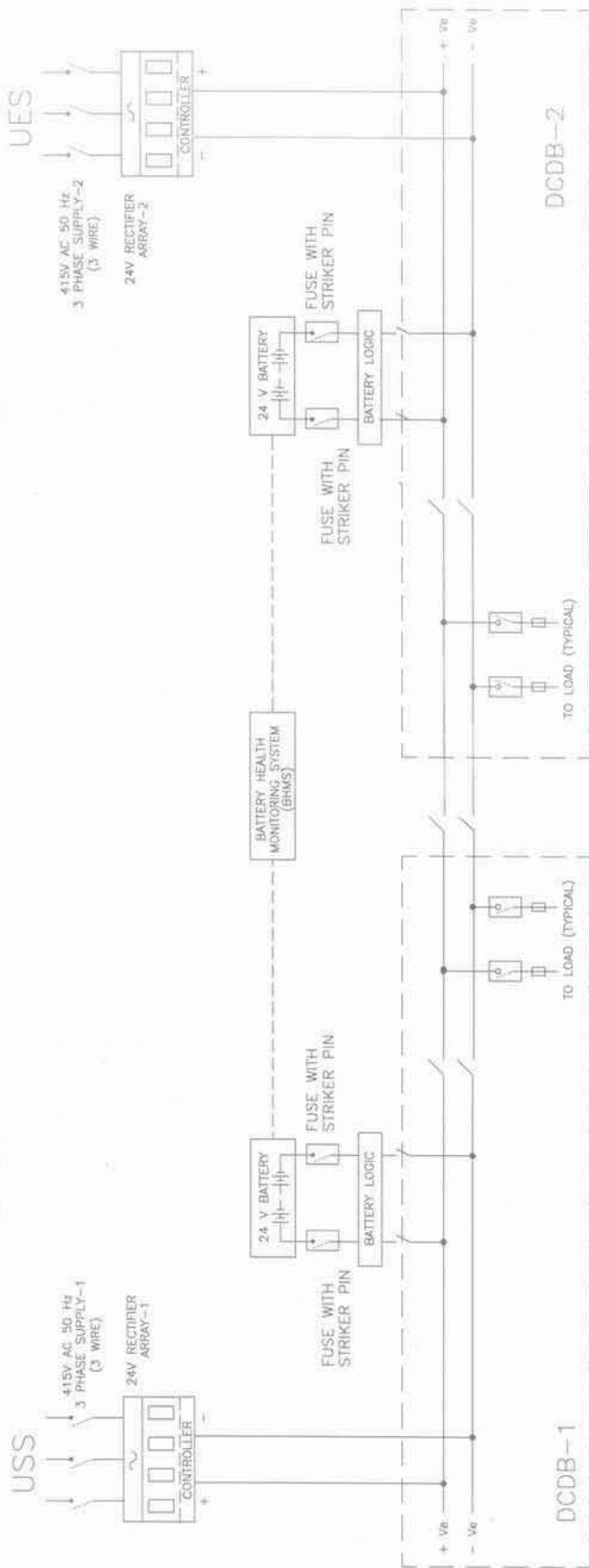
REV. NO.	A	FIRST ISSUE	DATE	28.03.15
DESCRIPTION				

DESIGNED BY	CHKD.	APPD.	CLEAR BY

SET-1



SET-2



TWO SET CONFIGURATION

NOTES:-

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

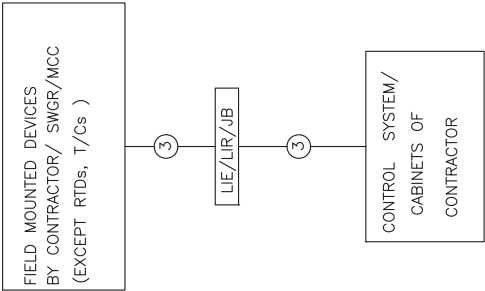
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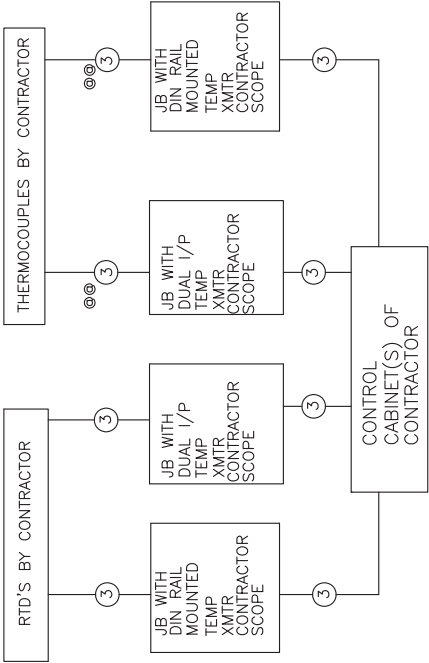
PROJECT		TYPICAL THERMAL POWER PROJECT									
TITLE		SCHEME FOR 24 V DC POWER SUPPLY SYSTEM									
REV. NO.	A	DESCRIPTION	DATE	APPD	ARCH	C&I	E	C	M	SCALE	DRG. NO.
			21.08.12							N.T.S.	0000-999-POI-A-019B
		Cleared By									
		REV. NO.									
		REV. NO.									

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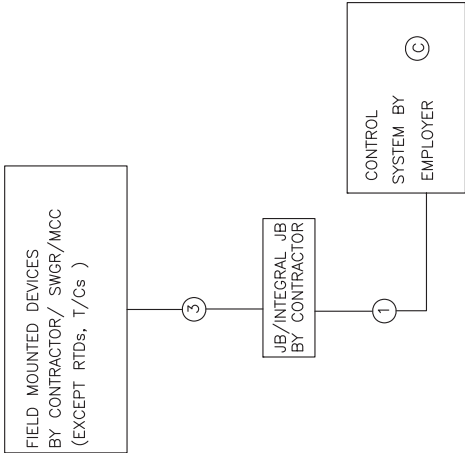
BOTH INSTRUMENTS/DEVICES AND
CONTROLS IN CONTRACTOR SCOPE



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



CONTRACTOR'S INSTRUMENTS/DEVICES
USED IN EMPLOYER'S CONTROL SYSTEM



NOTES

- (C) -- 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
PART-A OF TECHNICAL SPECIFICATION.

B	FIRST ISSUE																21.08.12
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	CA	ARCH.	APPD.	DATE						

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TYPICAL THERMAL POWER PROJECT

INSTRUMENTATION / CONTROL / POWER SUPPLY
CABLING DIAGRAM

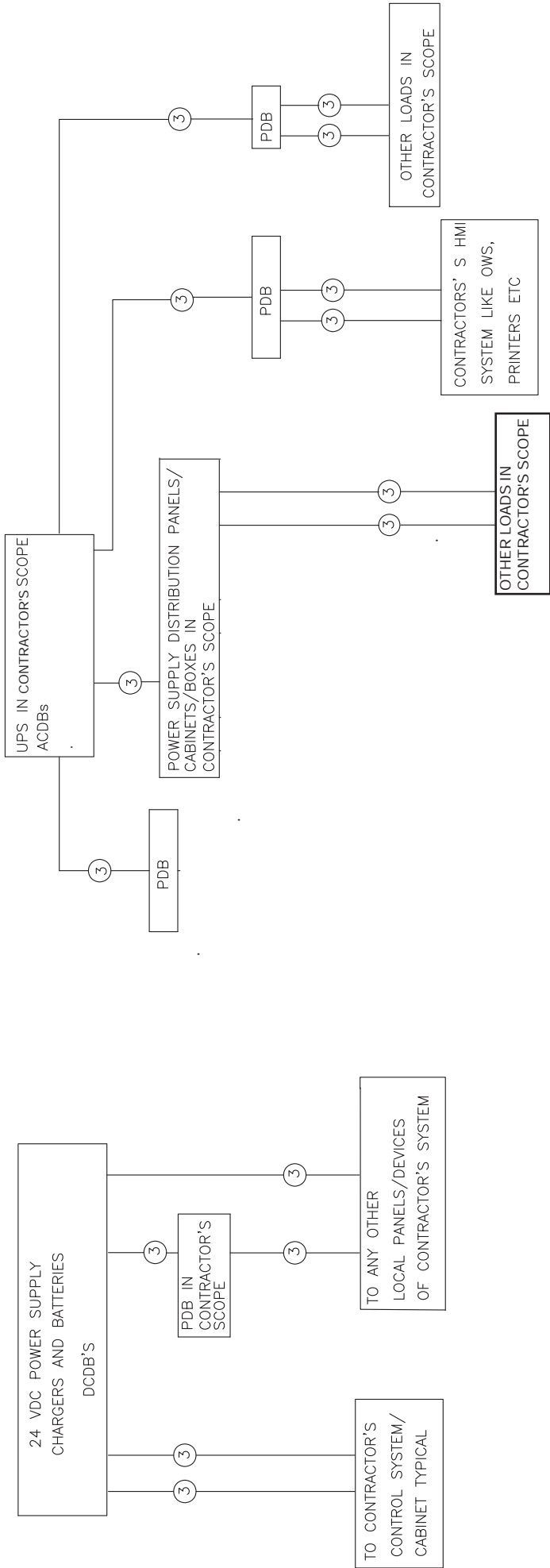
REV. NO.

0000-101/102-POI-A-021

SH 1 OF 3

B

CAD FILE NAME :



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	CA	ARCH.	APPD.	DATE	



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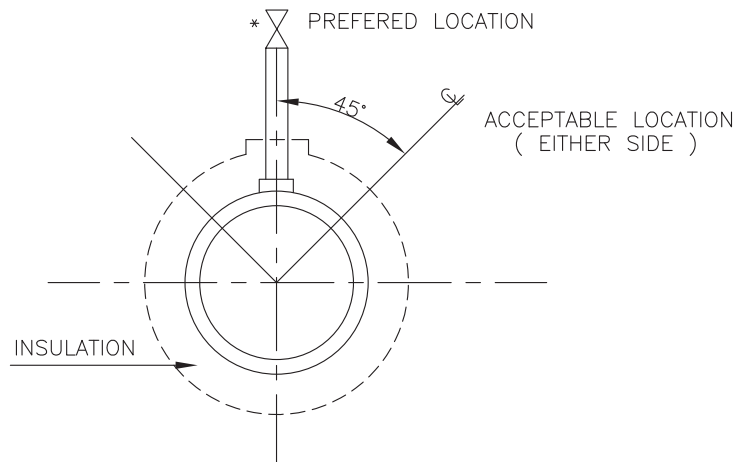
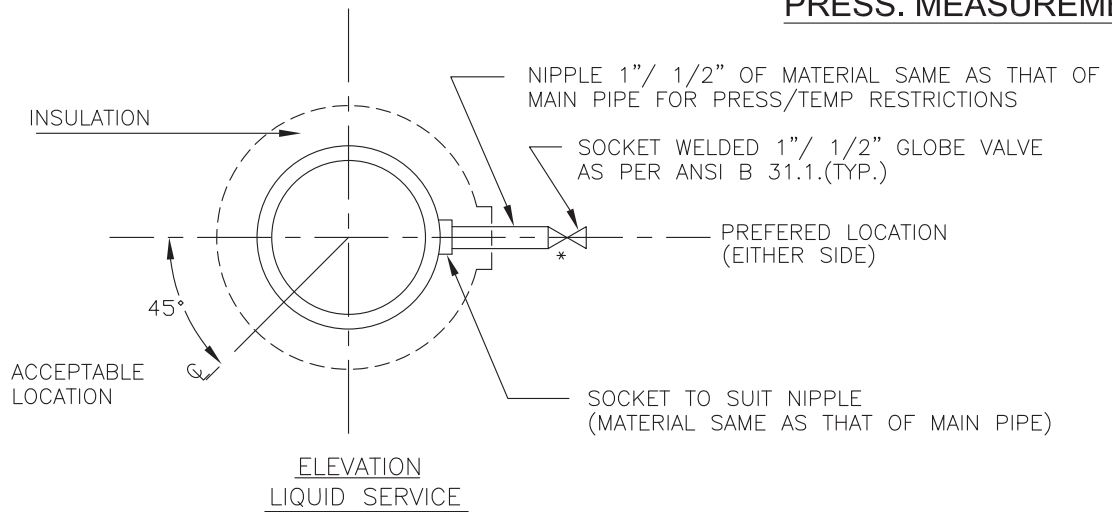
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TITLE: **INSTRUMENTATION / CONTROL / POWER SUPPLY CABLEING DIAGRAM**

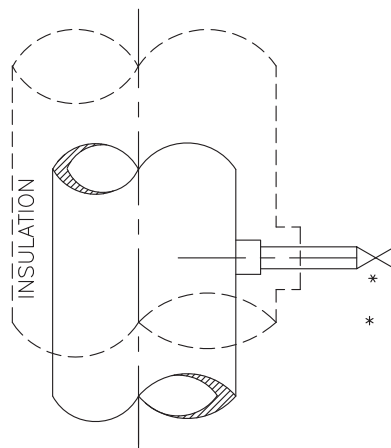
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SH 3 OF 3			

CAD FILE NAME :

PRESS. MEASUREMENT



PRESSURE CONNECTION ON HORIZONTAL PIPE



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

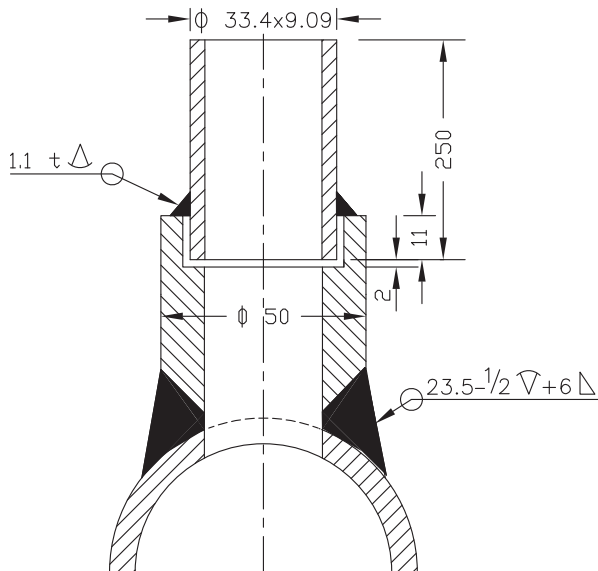
PRESSURE CONNECTIONS ON VERTICAL PIPES

FOR TENDER PURPOSE ONLY

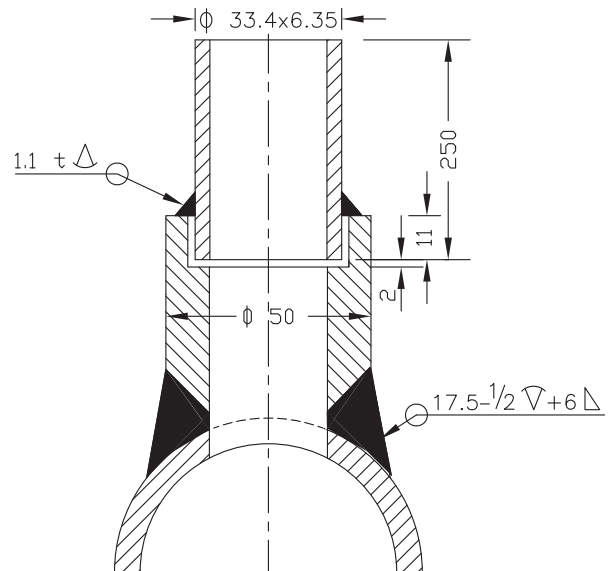
<div><div>एन टी पी सी</div><div>NTPC</div></div> <div>NTPC LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION</div>										PROJECT		TYPICAL THERMAL POWER PROJECT									
										TITLE		INSTRUMENT SOURCE CONNECTION DETAILS									
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										Sh-1 Of 14											

PRESSURE MEASUREMENT

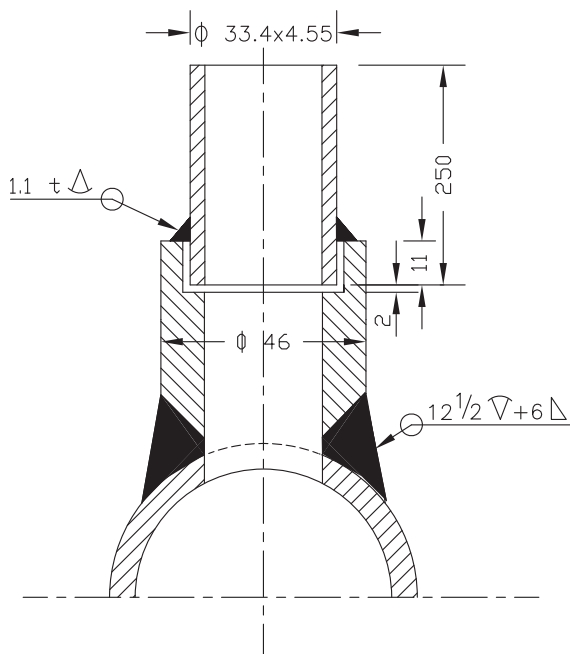
(SYSTEM PR. >40Kg/Sq Cm CL 9000)



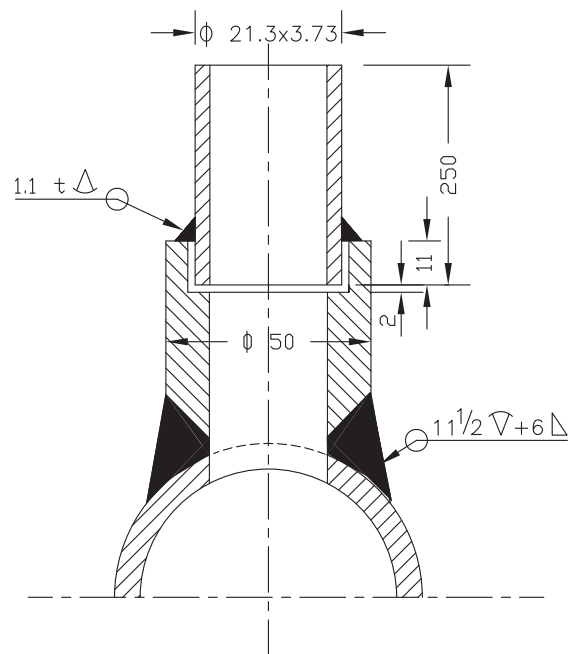
(SYSTEM PR. >40Kg/Sq Cm CL 6000)



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



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



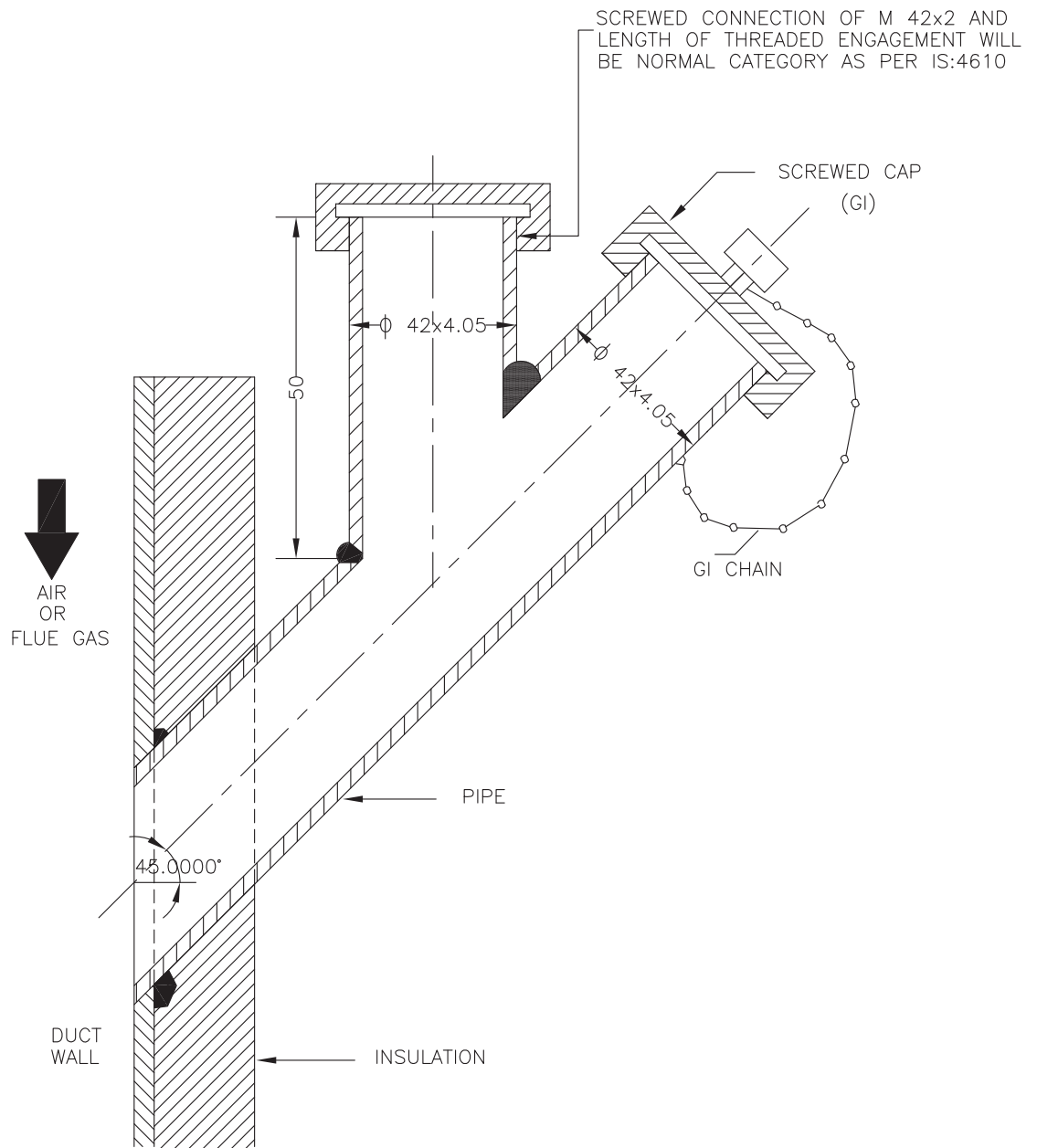
NOTES:-

1. MATERIAL OF THE BOSS AND NIPPLE SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED AND CONFORM 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.

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PRESS. MEASUREMENT



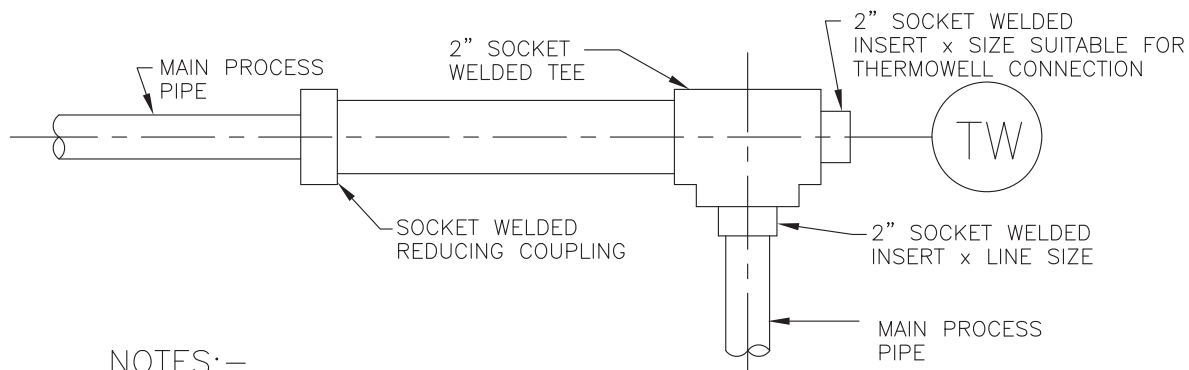
NOTES:—

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

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												PROJECT				TYPICAL THERMAL POWER PROJECT			
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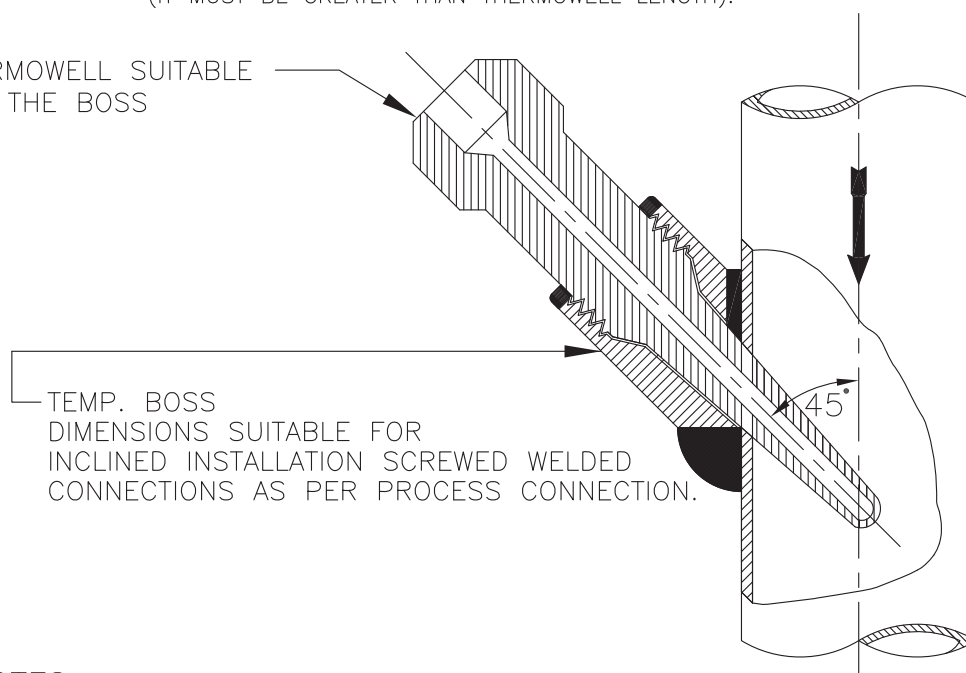
TEMP. MEASUREMENT



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).

THERMOWELL SUITABLE FOR THE BOSS



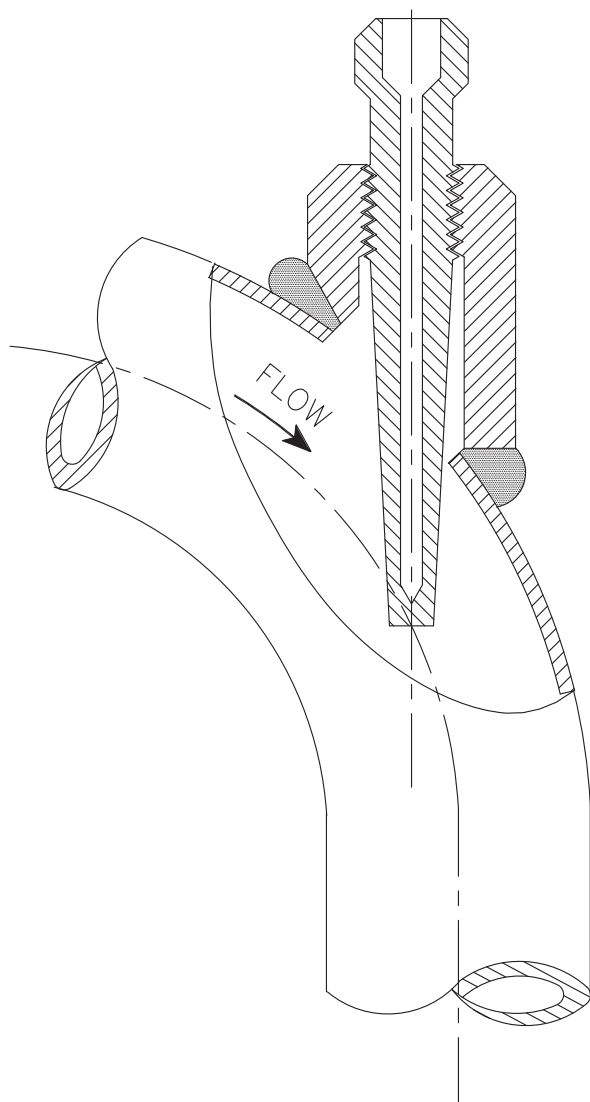
NOTES:—

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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REV. NO.	DESCRIPTION			DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE	SIZE A4	SCALE N.T.S.	DRG. NO. 0000-999/102-POI-A-035	REV. NO. A			
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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	
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A	FIRST ISSUE						T.G.			21.08.12			
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PROJECT	TYPICAL THERMAL POWER PROJECT
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TITLE	INSTRUMENT SOURCE CONNECTION DETAILS

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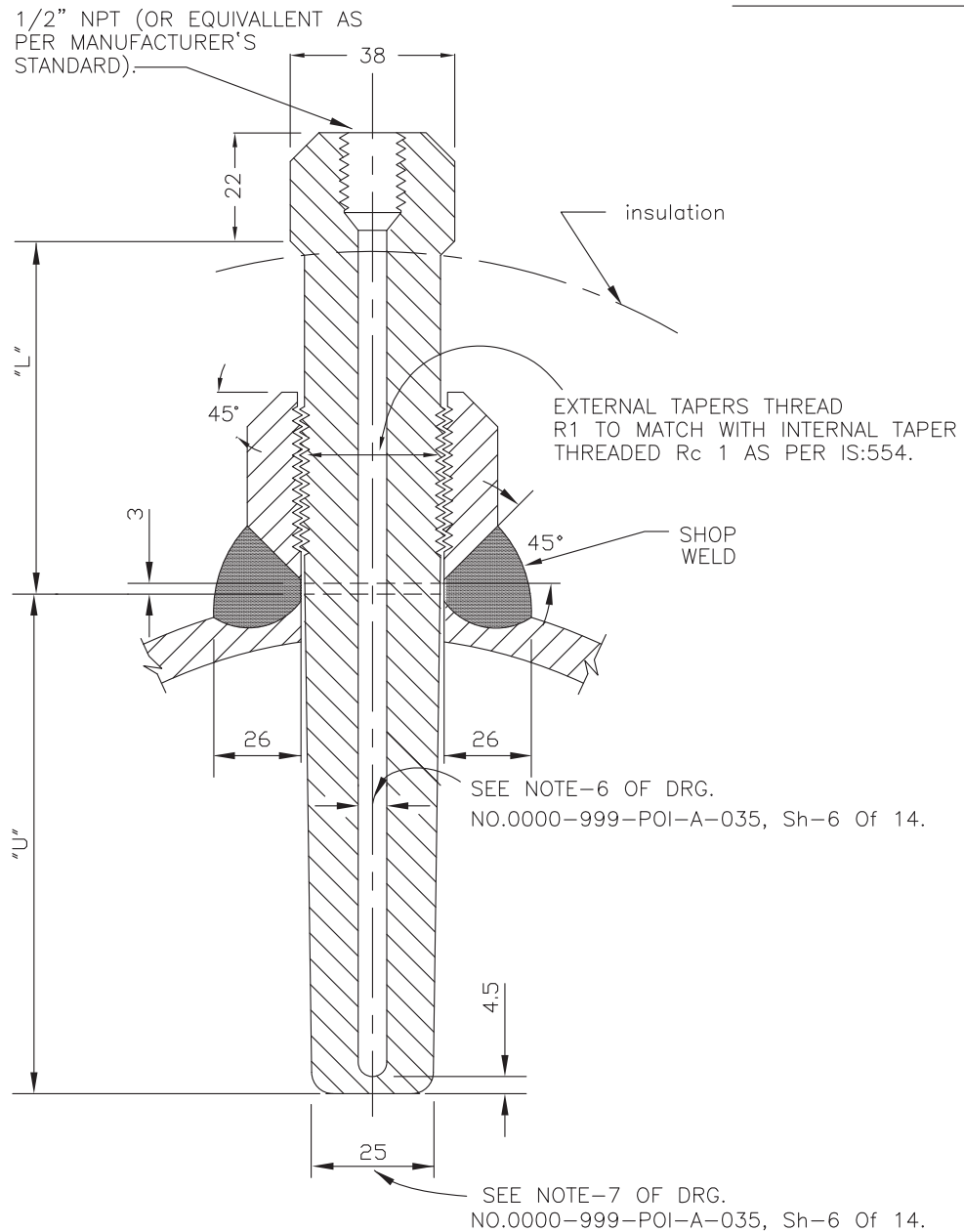
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TEMP. MEASUREMENT



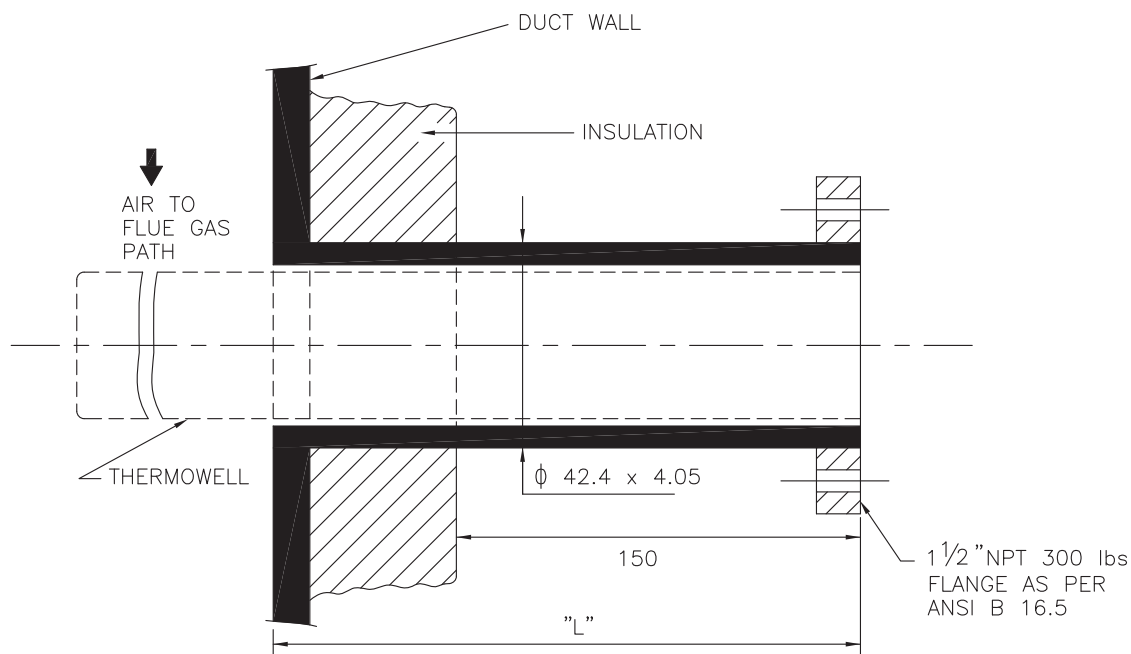
NOTES:-

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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TEMP. MEASUREMENT



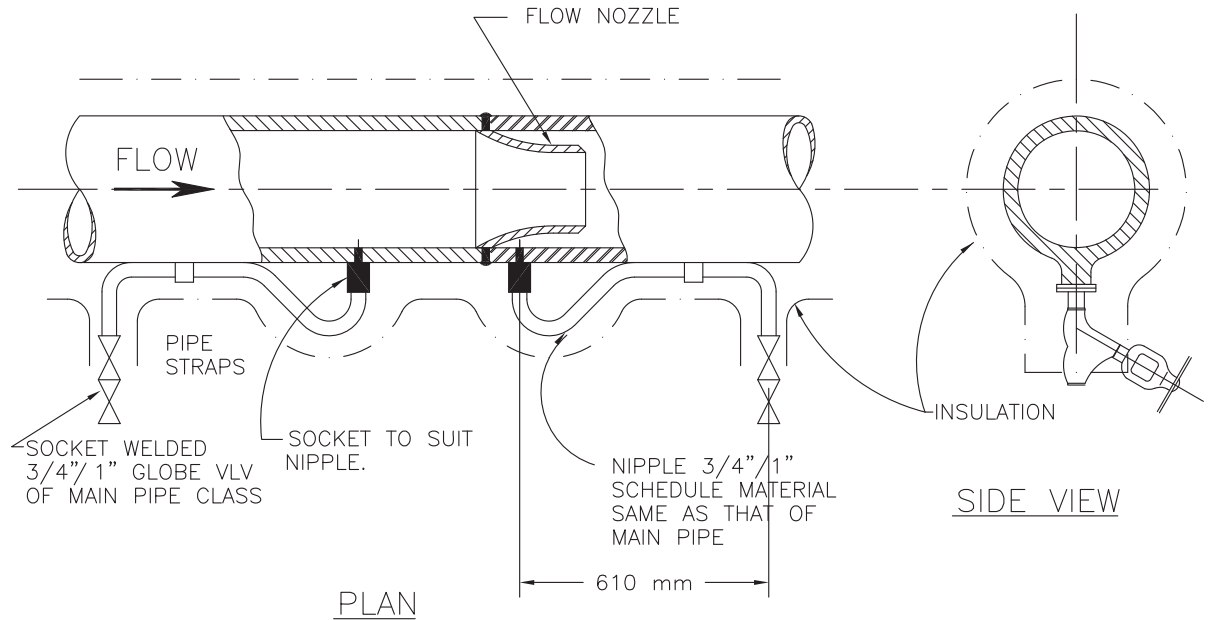
NOTES:—

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.

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FLOW MEASUREMENT



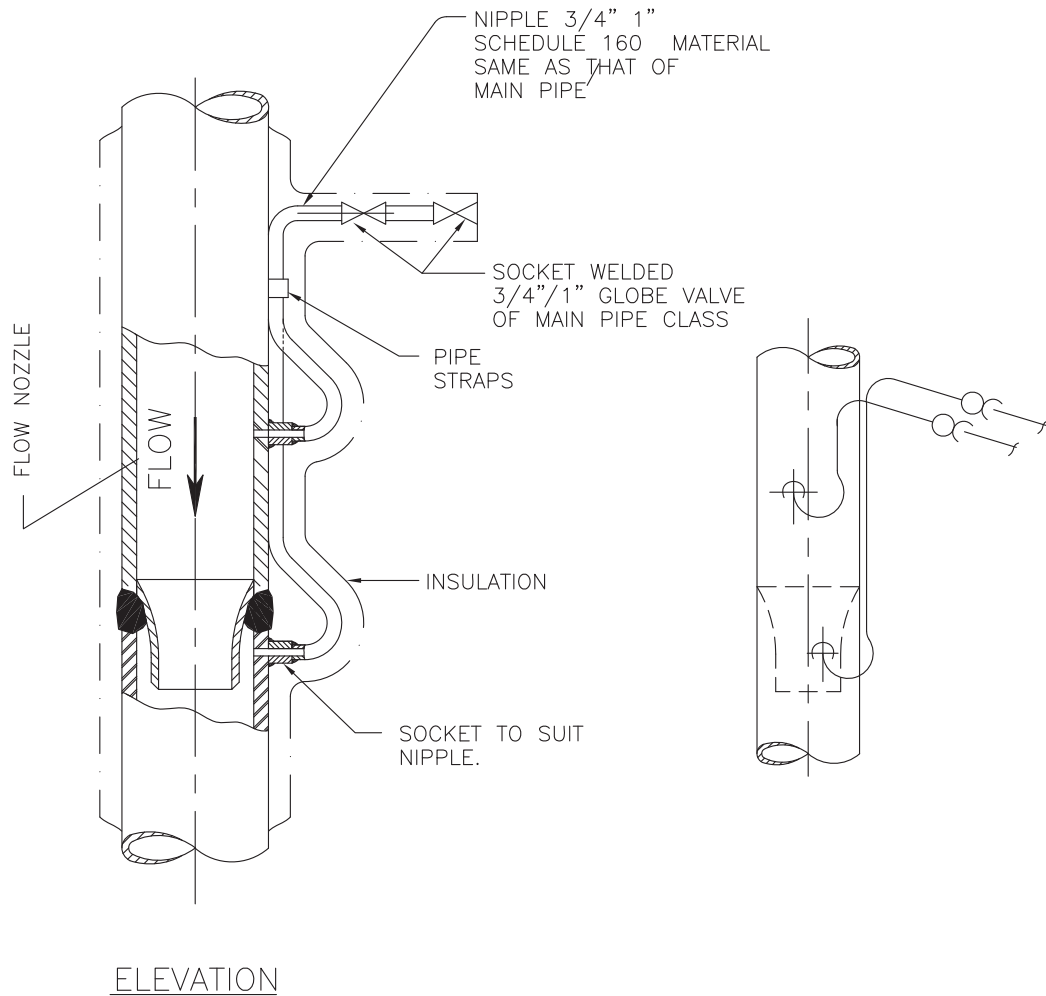
NOTES:—

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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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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FLOW MEASUREMENT

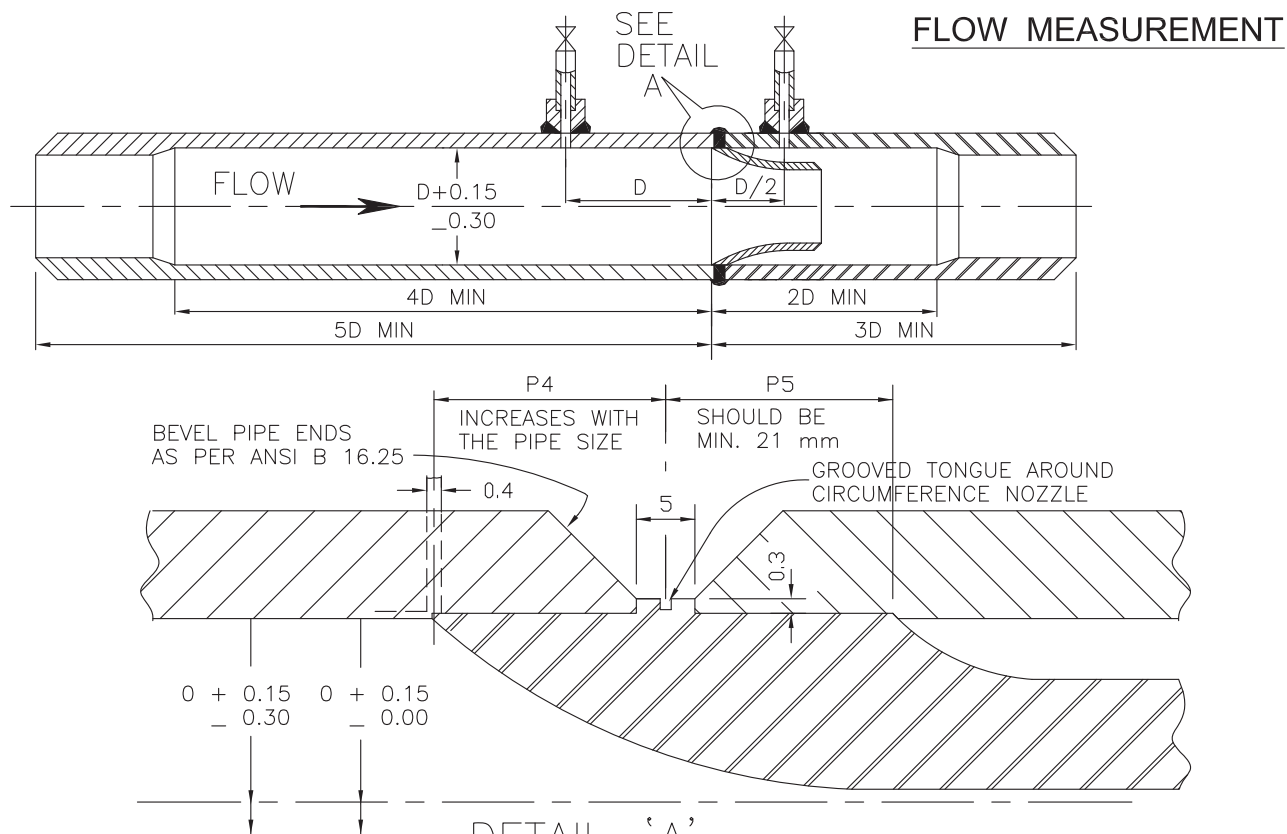


NOTES:—

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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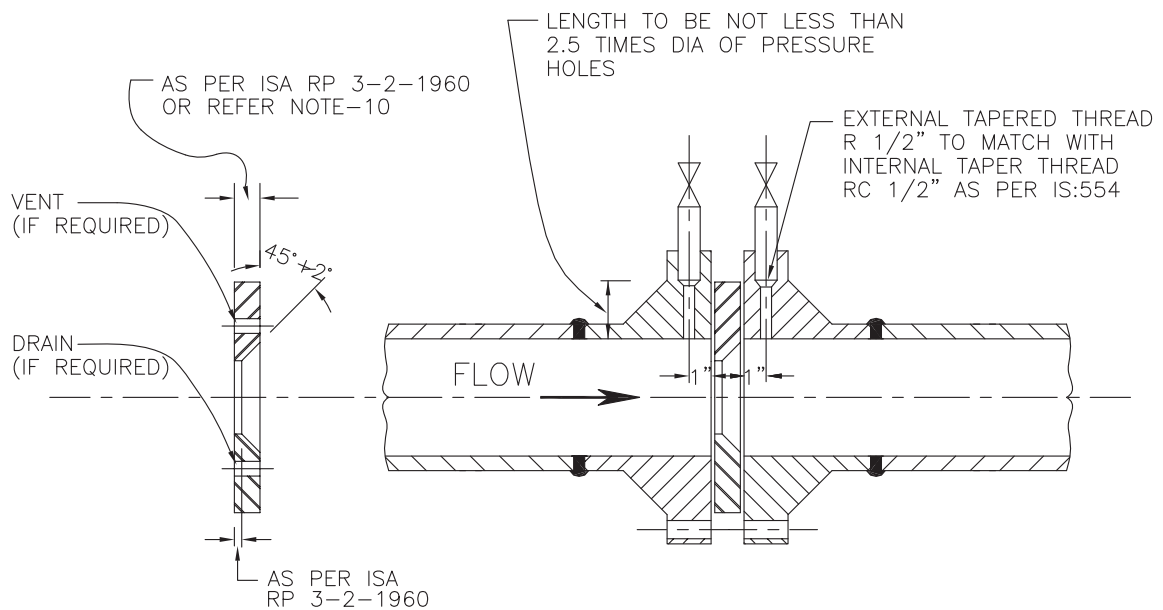
NOTES:-

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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FLOW MEASUREMENT



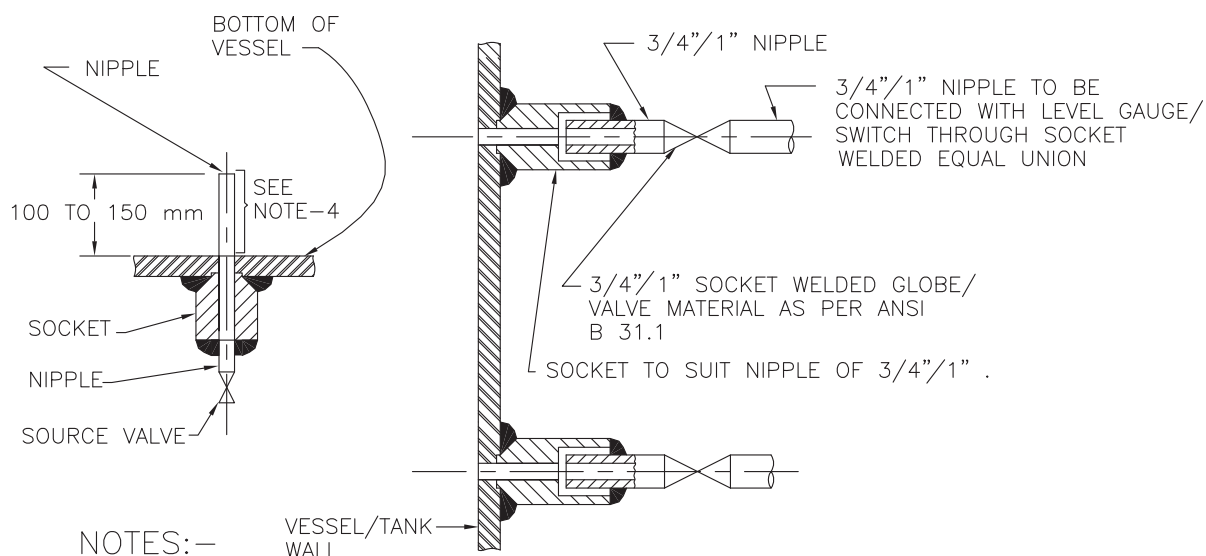
NOTES:—

- ORIFICE PLATE MOUNTED BETWEEN FLANGES WITH FLANGE TAPPING (AS SHOWN ABOVE) SHOULD BE LIMITED TO PIPE SIZES OF 2" OR LARGER.
- 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.
- 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.
- PIPING FLANGES SHALL BE ANSI WELD NECK, RAISED FACE TYPE. THE FLANGE IS TO BE ALIGNED WITH THE FACE PERPENDICULAR TO THE FLOW AXIS.
- BIDDER TO SUPPLY ORIFICE PLATE SPECIAL TYPE (HAVING PRESS. CONNECTIONS) OF FLANGES ALONG WITH GASKETS, NIPPLES AND SOURCE VALVES.
- 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.
- THE LOCATION OF PRESSURE TAPS MUST BE WITHIN 1.5 mm (1/16") OF THE DISTANCE SPECIFIED.
- 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.
- 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).
- 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.
- 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.
- ORIFICE PLATE SHOULD BE OF 316 SS (ASTM A167-54 GRADE-II).
- RECOMMENDED MINIMUM LENGTHS OF STRAIGHT PIPE PRECEDING AND FOLLOWING ORIFICES SHALL BE AS PER EN ISO 5167:2003.
- THREE PAIRS OF PRESSURE TAPS SHALL BE PROVIDED WITH NIPPLES OF REQUIRED LENGTH AND SOURCE VALVES AND THE UN-USED TAPS ARE PLUGGED.
- 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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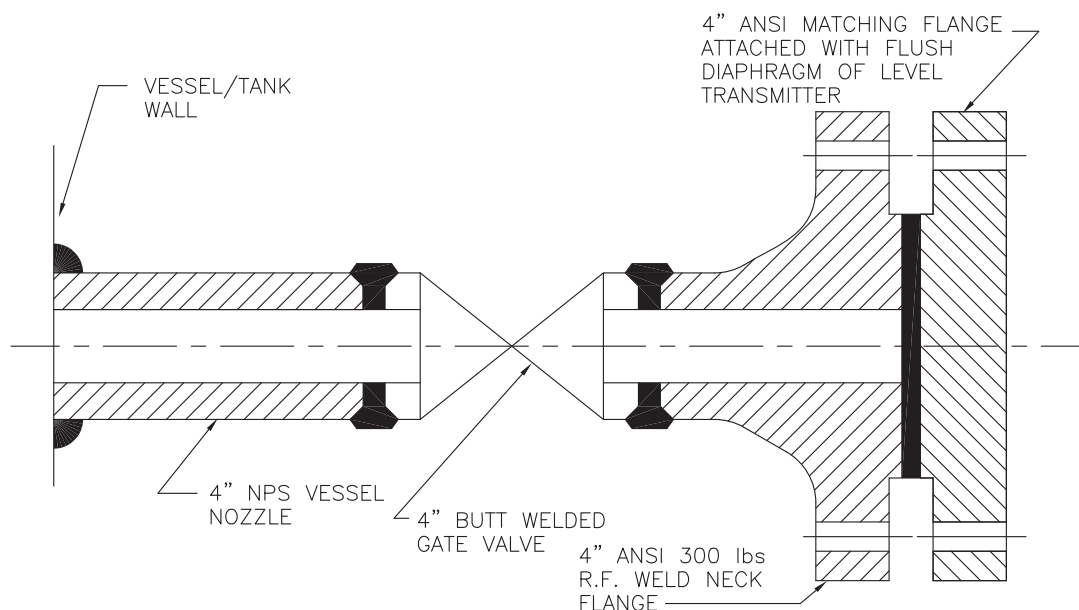
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										PROJECT		TYPICAL THERMAL POWER PROJECT		
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LEVEL MEASUREMENT



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.



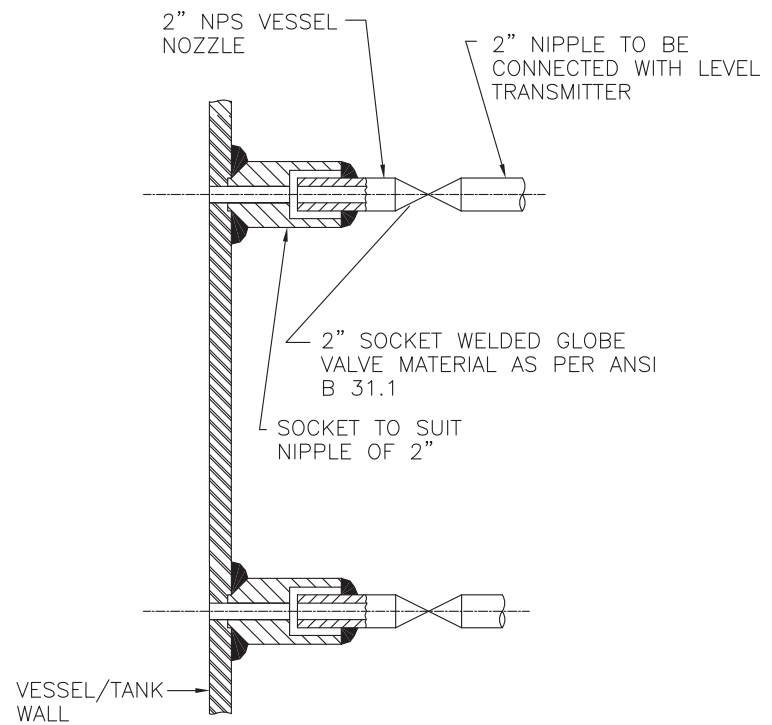
NOTES:—

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.

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PROJECT TYPICAL THERMAL POWER PROJECT													
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REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ARCH.	APPD.	DATE		
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LEVEL MEASUREMENT



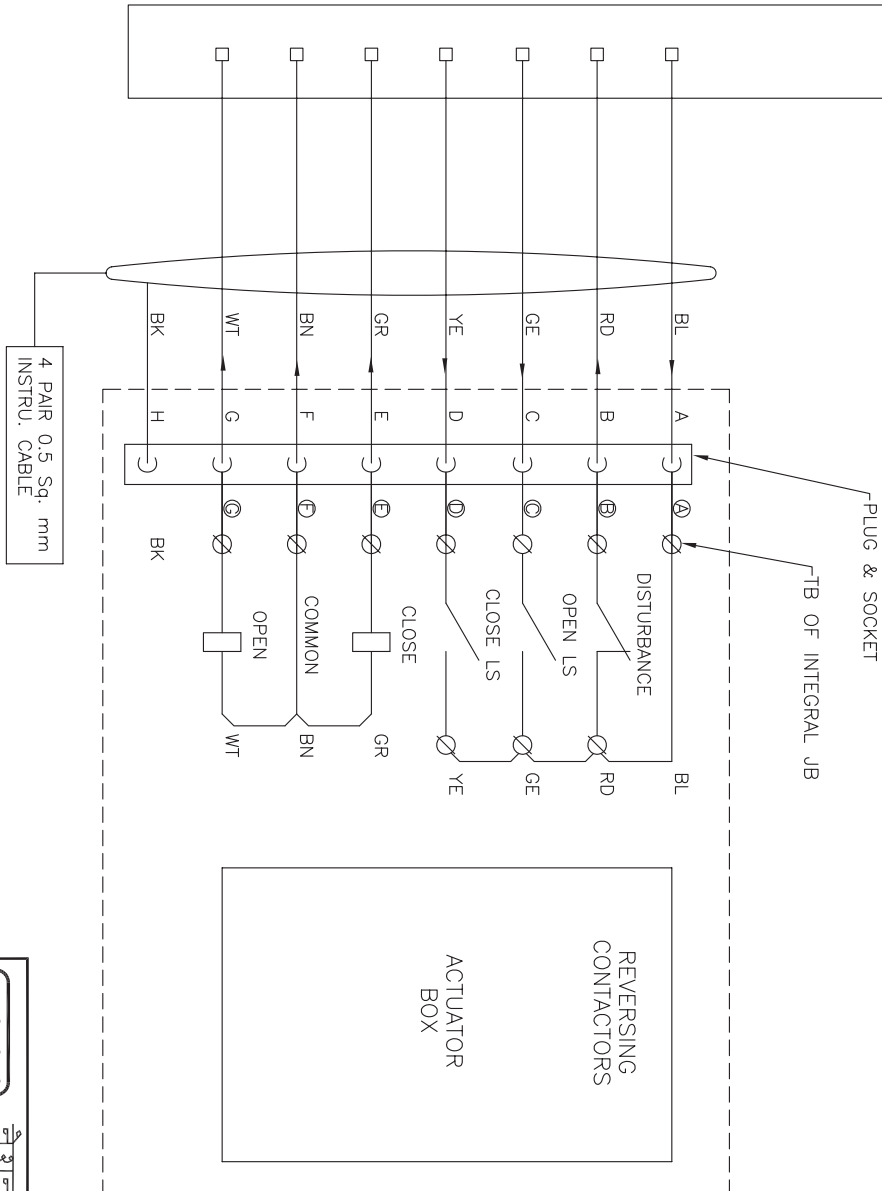
NOTES:—

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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TERMINATION AT
CONTROL SYSTEM END



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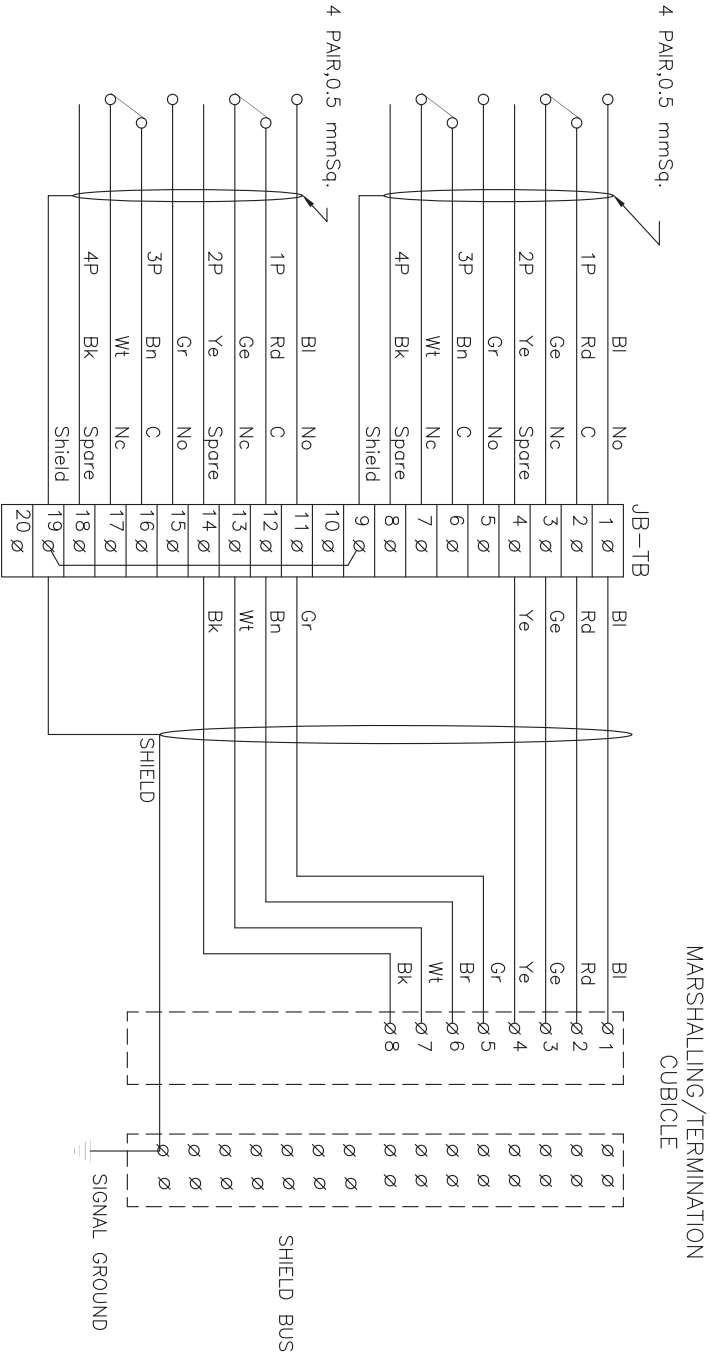
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NTPC
नेशनल थर्मल पावर कॉर्पोरेशन लिमिटेड
National Thermal Power Corporation Ltd.
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

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	SIZE	SCALE	DRG. NO.	REV. NO.
												21.08.12	A3	N.T.S.	00000-999-POI-A-063	D
DESCRIPTION																



FOR TENDER PURPOSE ONLY

एन टी पी सी
NTPC

NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT

TYPICAL THERMAL POWER PROJECT

TITLE

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

REV. NO.

A

FIRST ISSUE

21.08.12

REV. NO.

DRAWN DESIGN CHKD.

M

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C&I

ARCH.

APPD

DATE

SIZE

SCALE

DRG. NO.

0000-999-POI-A-065

REV. NO.

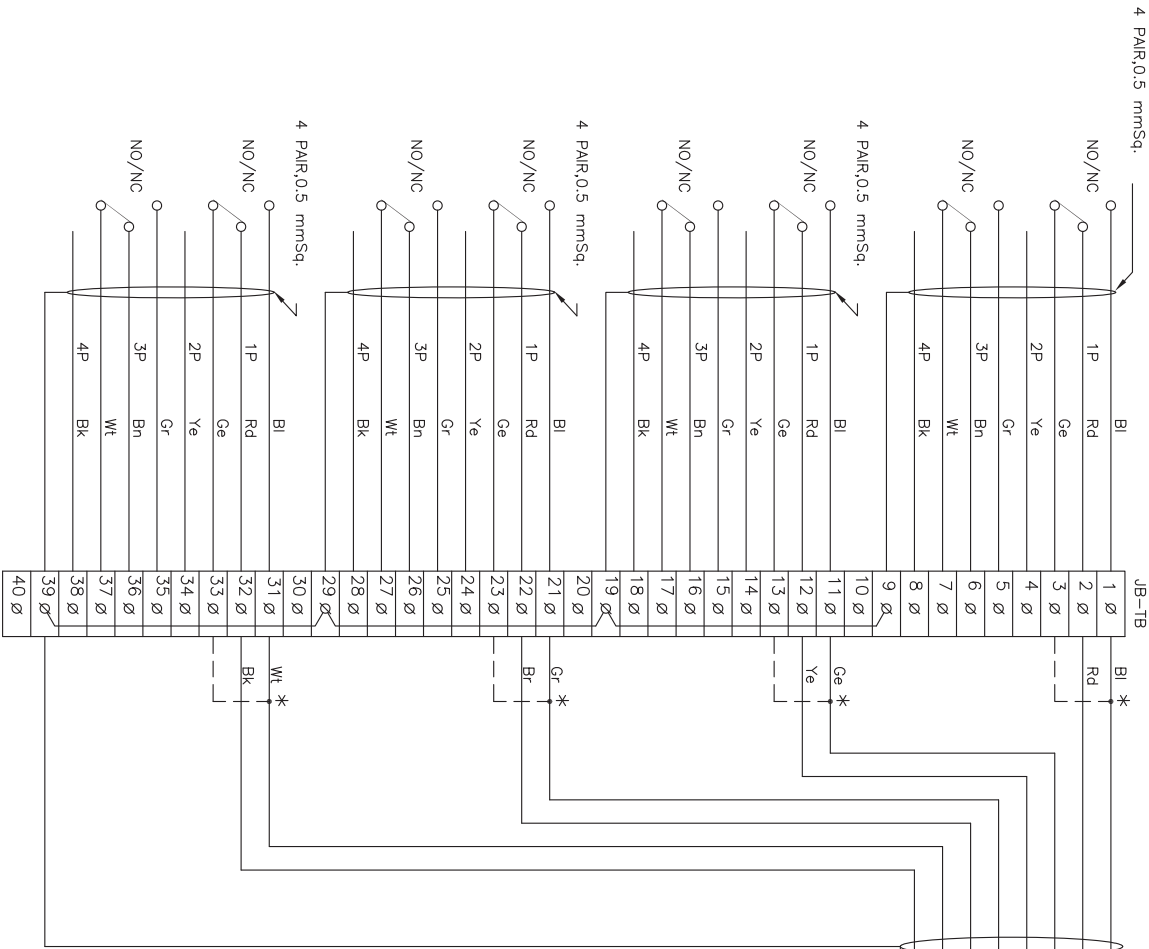
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DESCRIPTION

A3

NTS

SH 01 OF 15



* BI/Ge/Gr/Wt 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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ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PROJECT

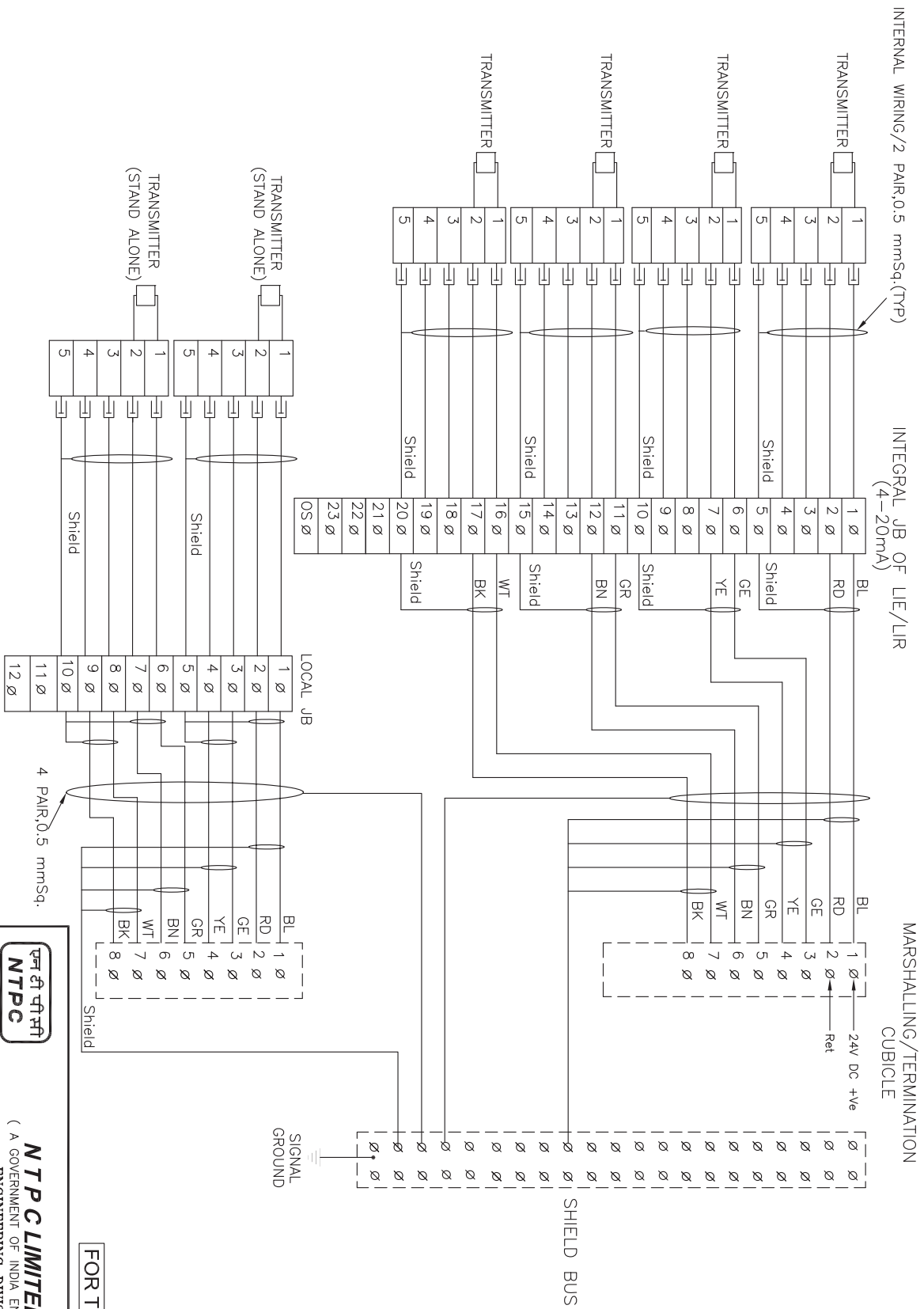
TITLE
INTERFACING OF FIELD INSTRUMENTS
SWITCH TERMINATION DETAILS
NO/NC

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REV. NO.												DRAWN										DESIGN										CHKD.										21.08.12										SIZE										SCALE										DRG. NO.										REV. NO.																																																	
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PROJECT				
TYPICAL THERMAL POWER PROJECT				
TITLE				
INTERFACING OF FIELD INSTRUMENTS CONTROL VALVE				
SIZE	SCALE	DRG. NO.	REV. NO.	
A3	NTS	0000-999-POI-A-065	A	
SH 03 OF 15				



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NTPC LIMITED
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 INCORPORATED IN INDIA

PROJECT

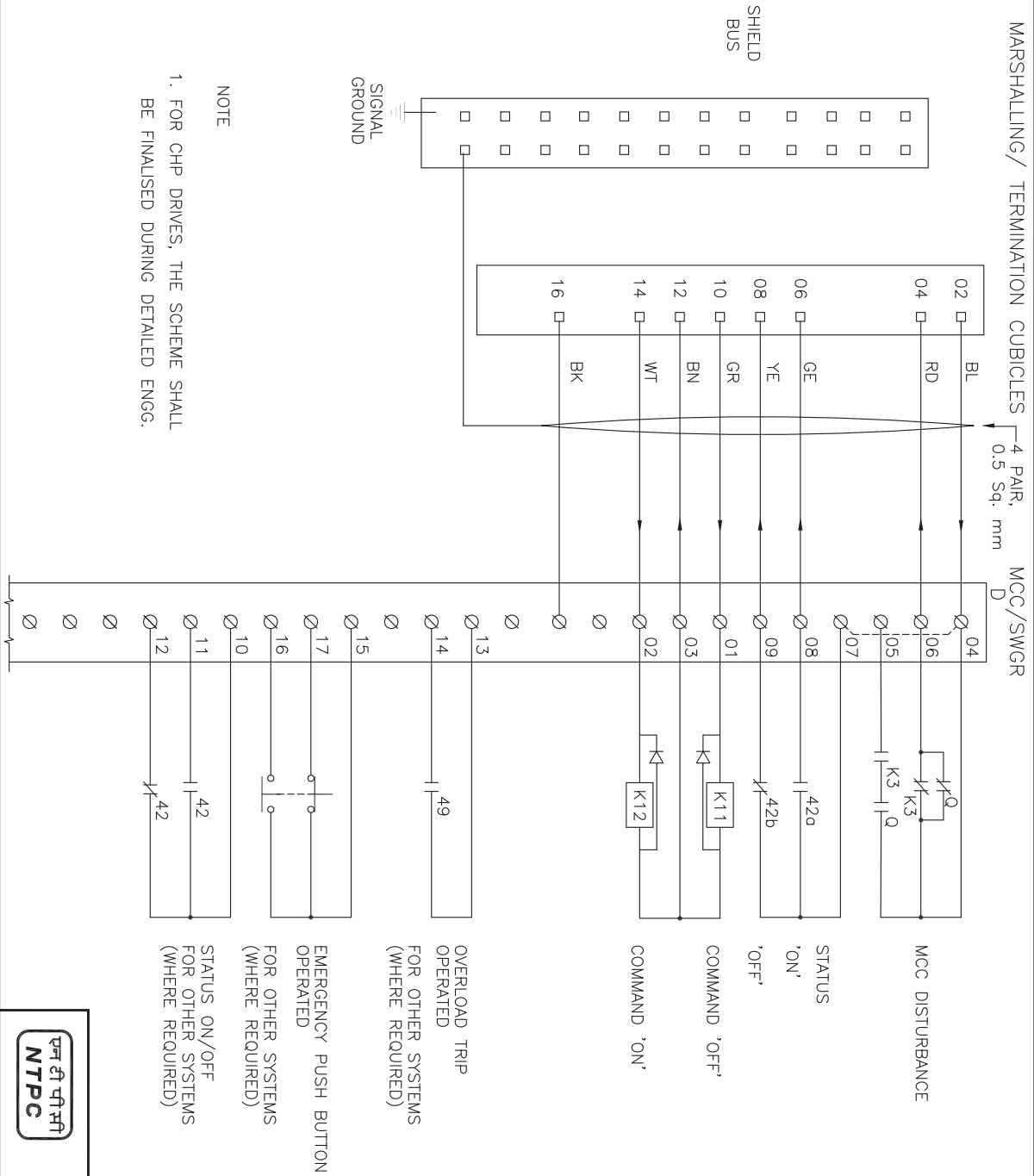
TYPICAL THERMAL POWER PROJECT

TITLE

INTERFACING OF FIELD INSTRUMENTS

4-20mA

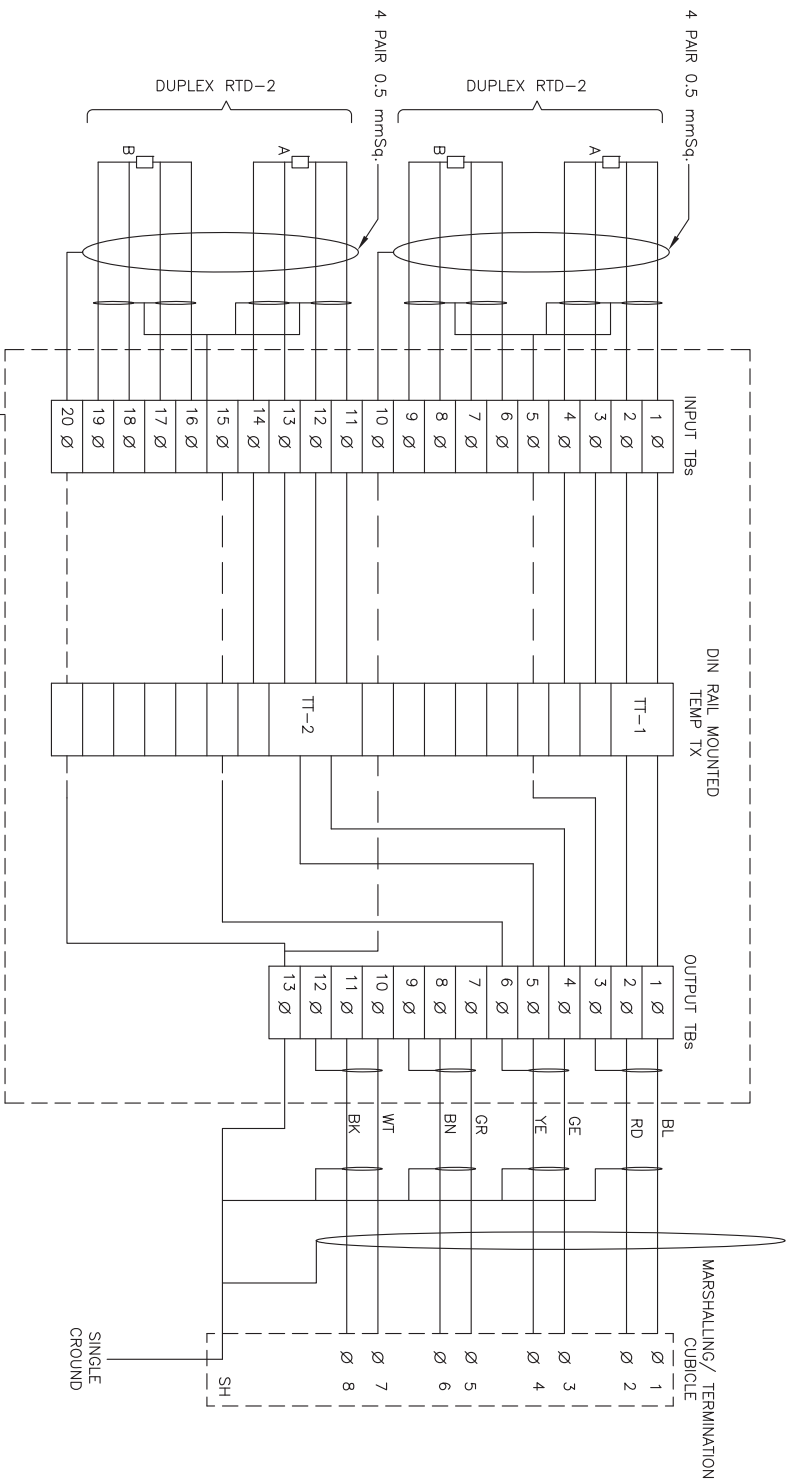
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TITLE									
B	INTERNAL WIRING FOR LIE/LIR MOUNTED SHOWN WIRING OF STAND ALONE TXIR SHOWN						21.08.12		
A	FIRST ISSUE						12.1.05		
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0000-999-POL-A-065									
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REV. NO.									
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ENGINEERING DIVISION

PROJECT												
TYPICAL THERMAL POWER PROJECT												
TITLE INTERFACING OF FIELD INSTRUMENTS INTERFACE OF DDCMIS WITH MCC/SWGR/ACTUATOR (LT MOTORS)												
REV. NO. A												
SH 05 OF 15												
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DRC. NO.												
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DATE 21.08.12												
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DESCRIPTION												
REV. NO. A												



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 ENG. 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.

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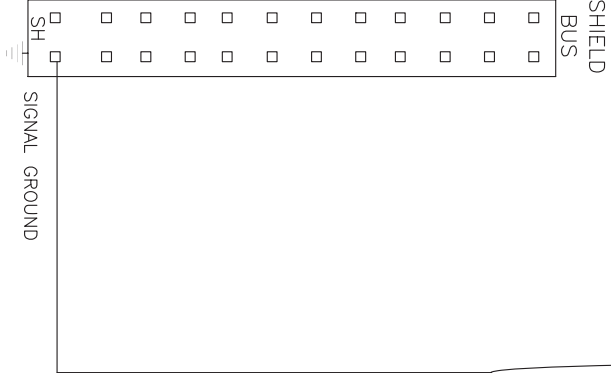
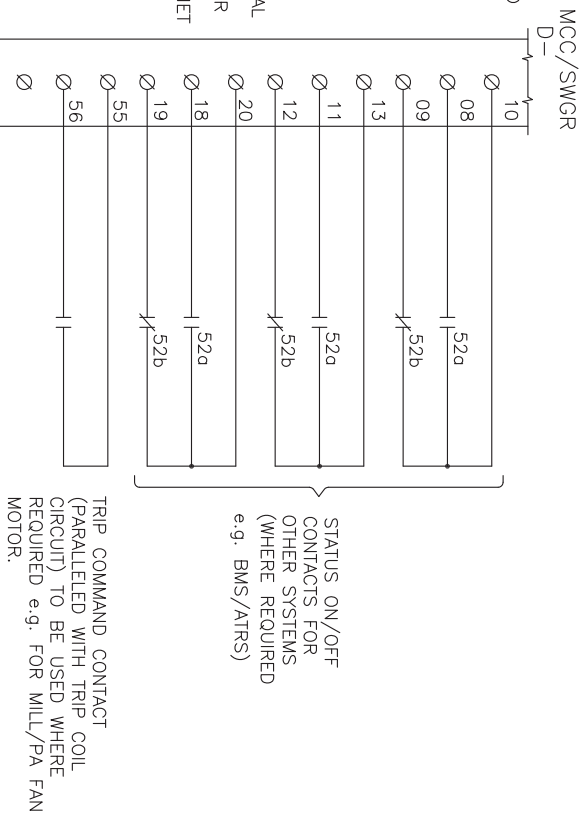
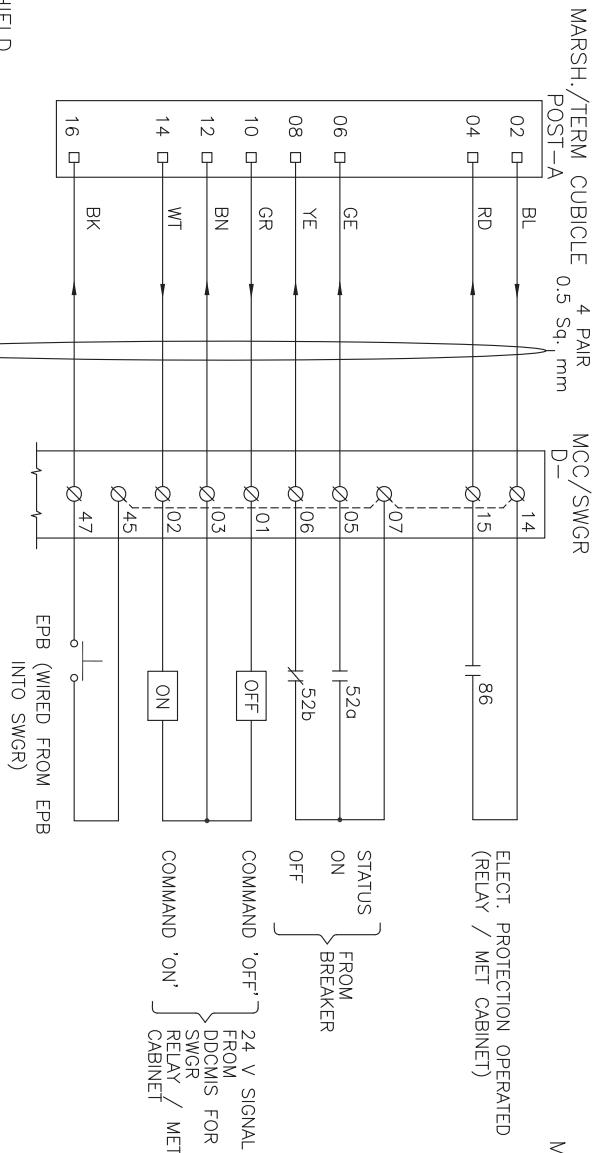
TYPICAL THERMAL POWER PROJECT

TITLE

INTERFACING OF FIELD INSTRUMENTS
TYPICAL RTD CONNECTION WITH TEMP TRANSMITTERS IN JBS

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	REV. NO.	A
DESCRIPTION																					

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PROJECT											
TYPICAL THERMAL POWER PROJECT											
TITLE											
INTERFACING OF FIELD INSTRUMENTS INTERFACE OF DDC/MS WITH MCC/SW/GR/ACTUATOR (HT MOTORS)											
DATE											
21.08.12											
REV. NO.											
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ENGINEERING DIVISION

PROJECT

TYPICAL THERMAL POWER PROJECT

TITLE

INTERFACING OF FIELD INSTRUMENTS INTERFACE OF DDCMIS WITH MCC/SWGR/ACTUATOR (HT MOTORS)

SIZE

SCALE

DRG. NO.

A3

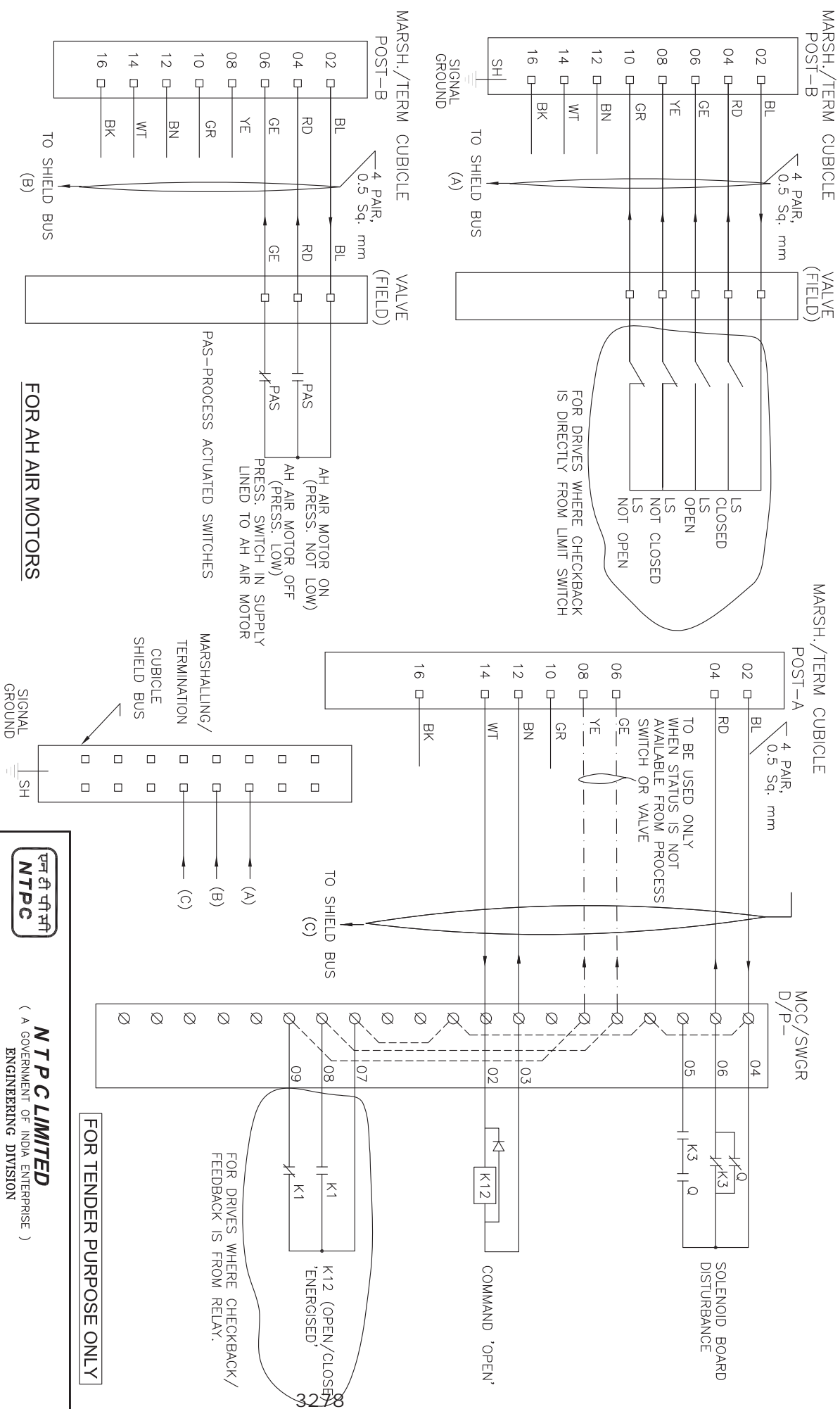
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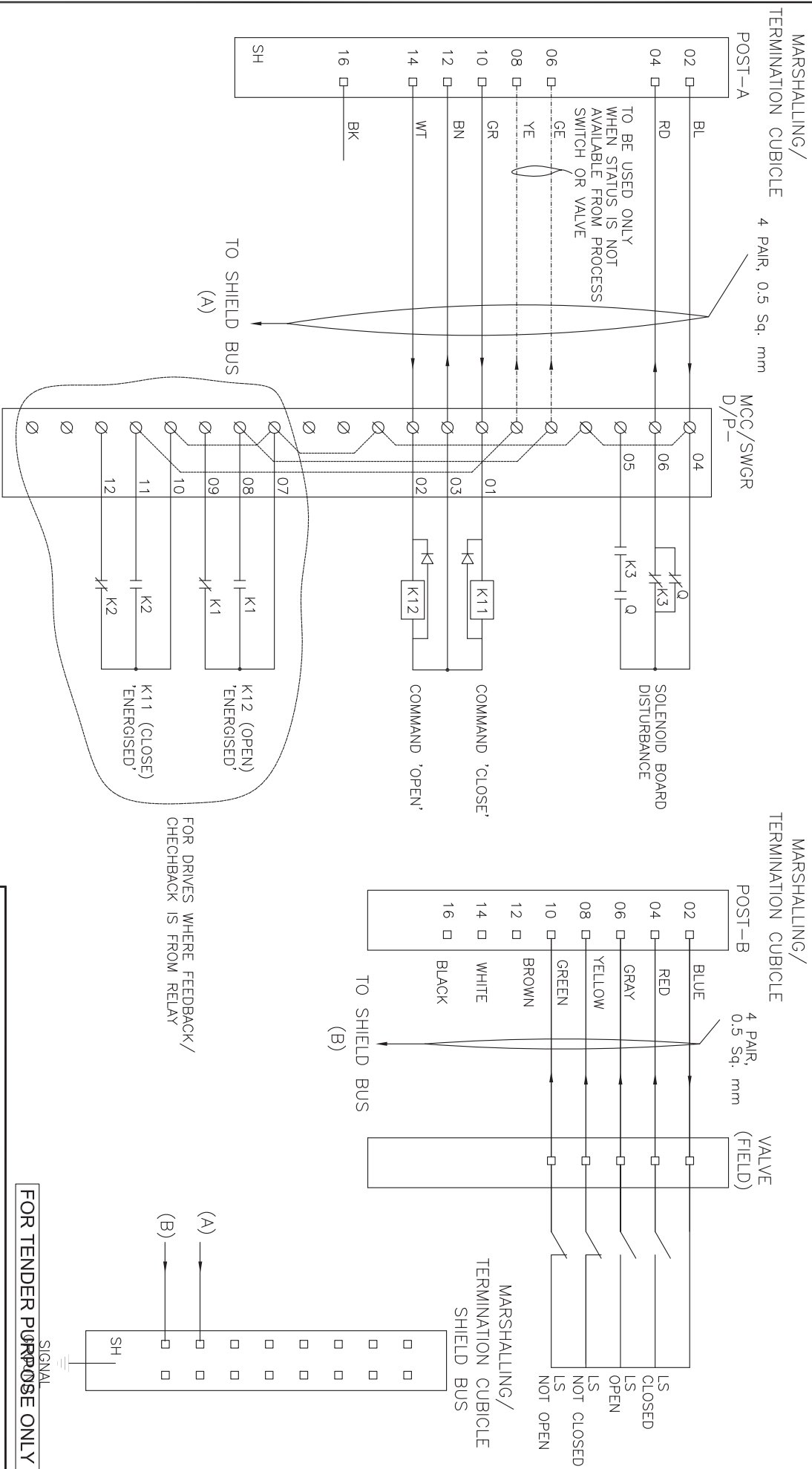
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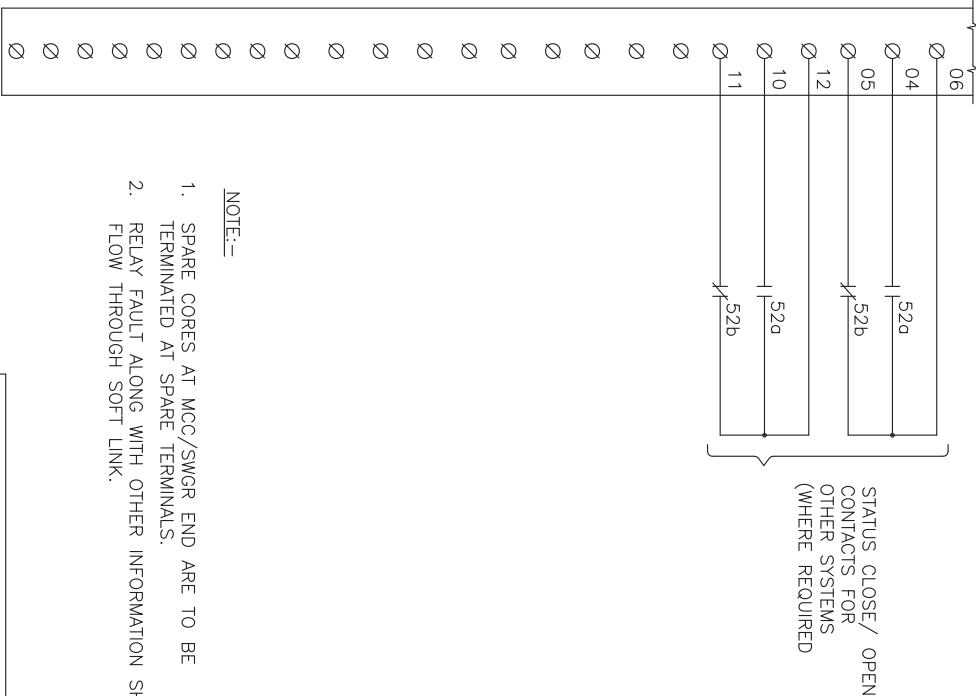
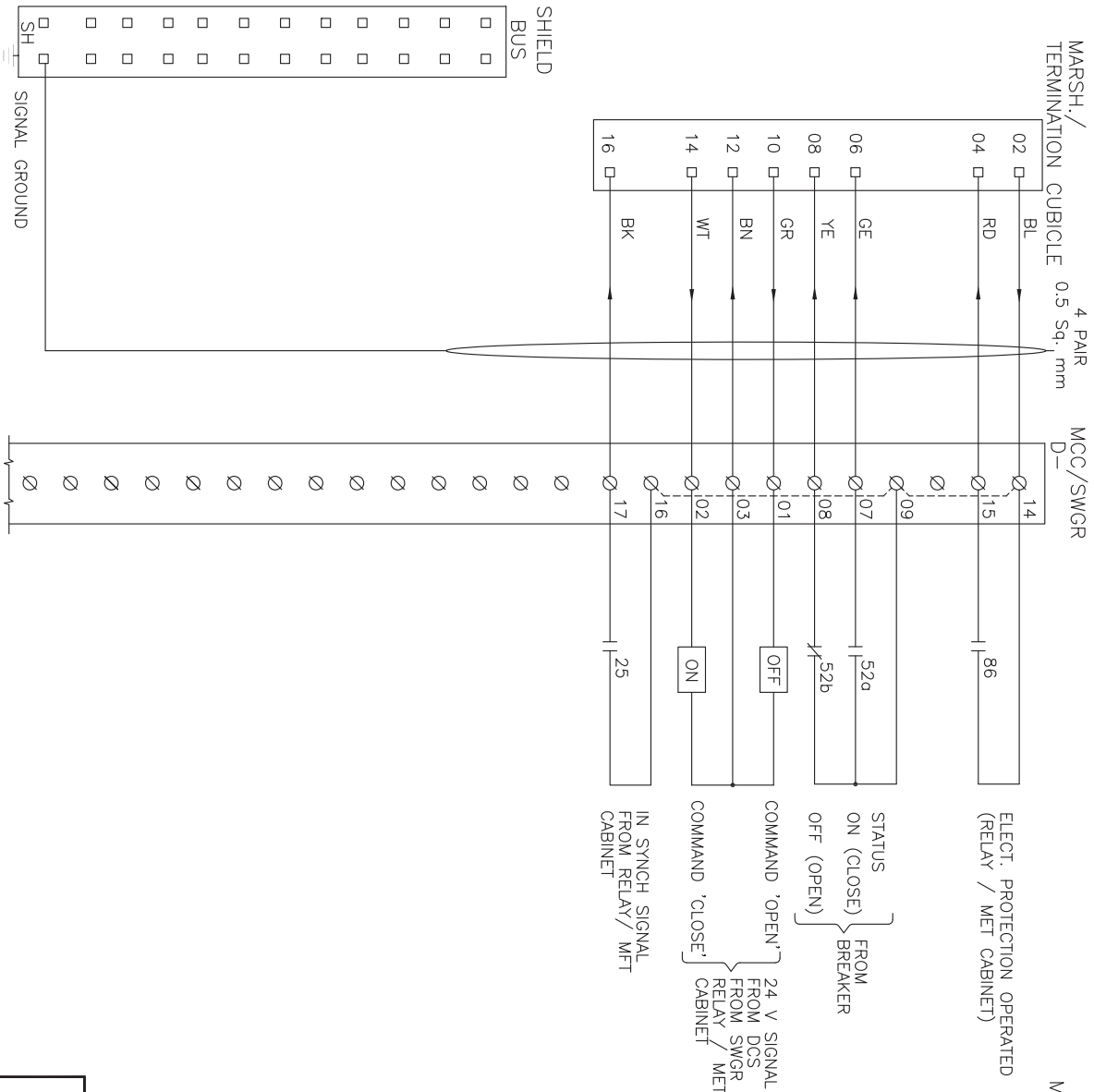
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													TITLE				INTERFACE OF FIELD INSTRUMENTS INTERFACE OF DDCMS WITH MCC/SWGR/ACTUATOR (SINGLE COIL SOLENOID)				
A	FIRST ISSUE					DRAWN	DESIGN	CHKD.						APPD	DATE	21.08.12	SIZE	SCALE	DRG. NO.	REV. NO.	
REV.NO.	D E S C R I P T I O N								M	E	C	C&I	ARCH.				A3	NTS	0000-999-P01-A-065	A	
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PROJECT												
TYPICAL THERMAL POWER PROJECT												
TITLE												
INTERFACING OF FIELD INSTRUMENTS												
INTERFACE OF DDCMIS/PLC WITH MCC/SWGR/ACTUATOR												
(DOUBLE COIL SOLENOIDS)												
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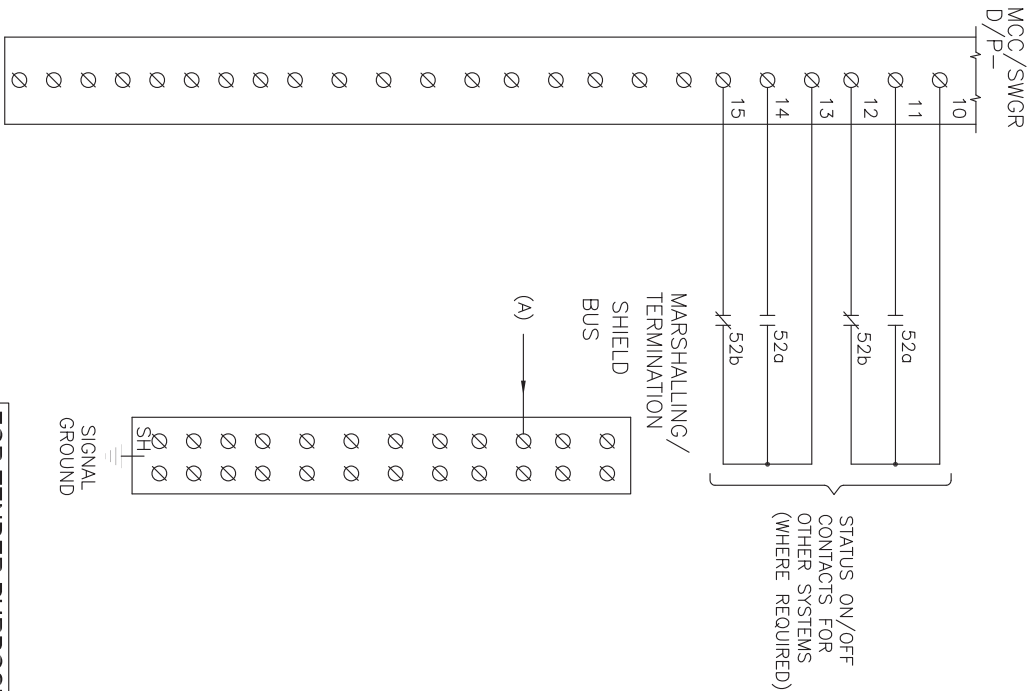
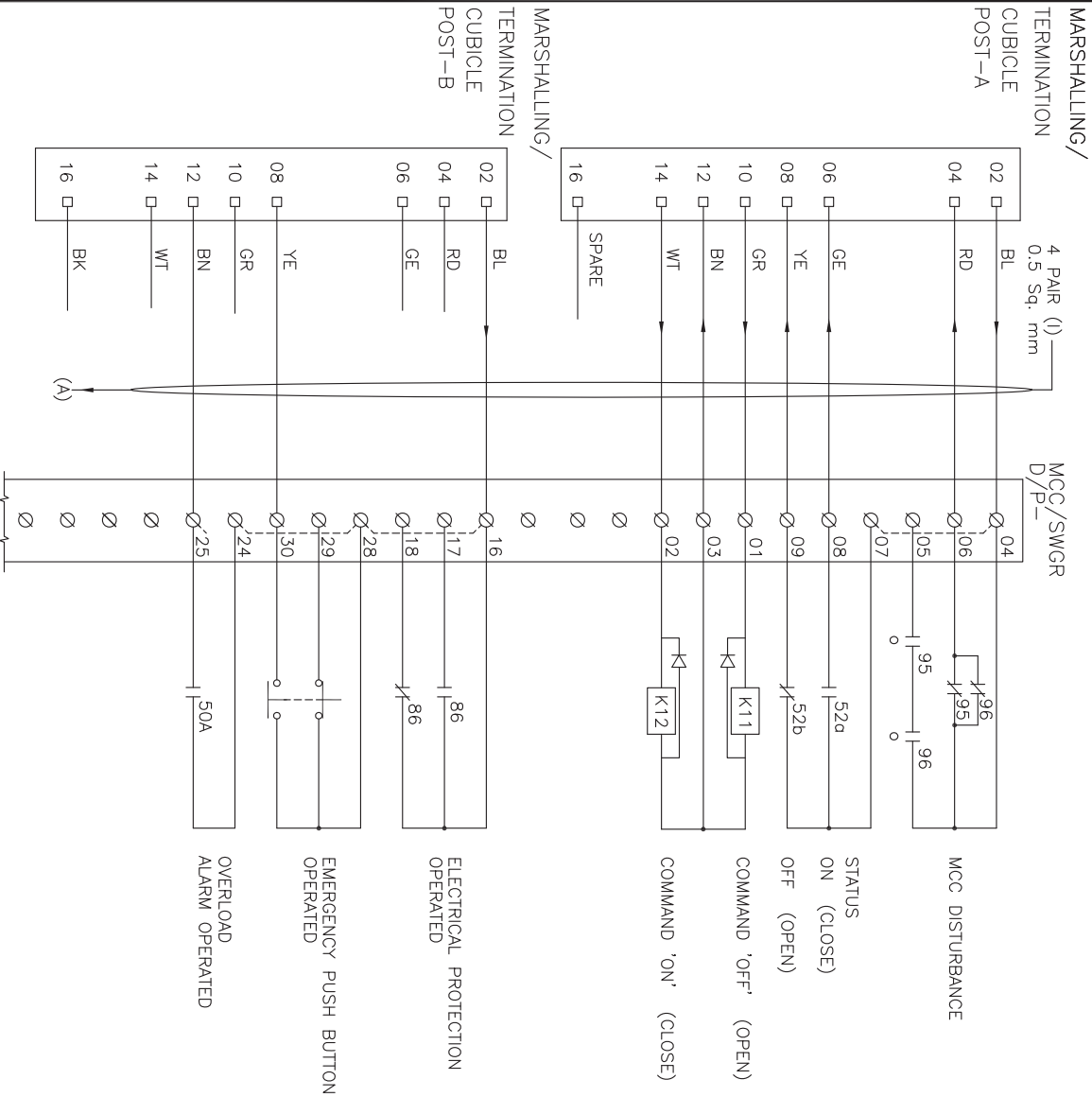
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ENGINEERING DIVISION

PROJECT
TYPICAL THERMAL POWER PROJECT

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

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

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PROJECT
TYPICAL THERMAL POWER PROJECT

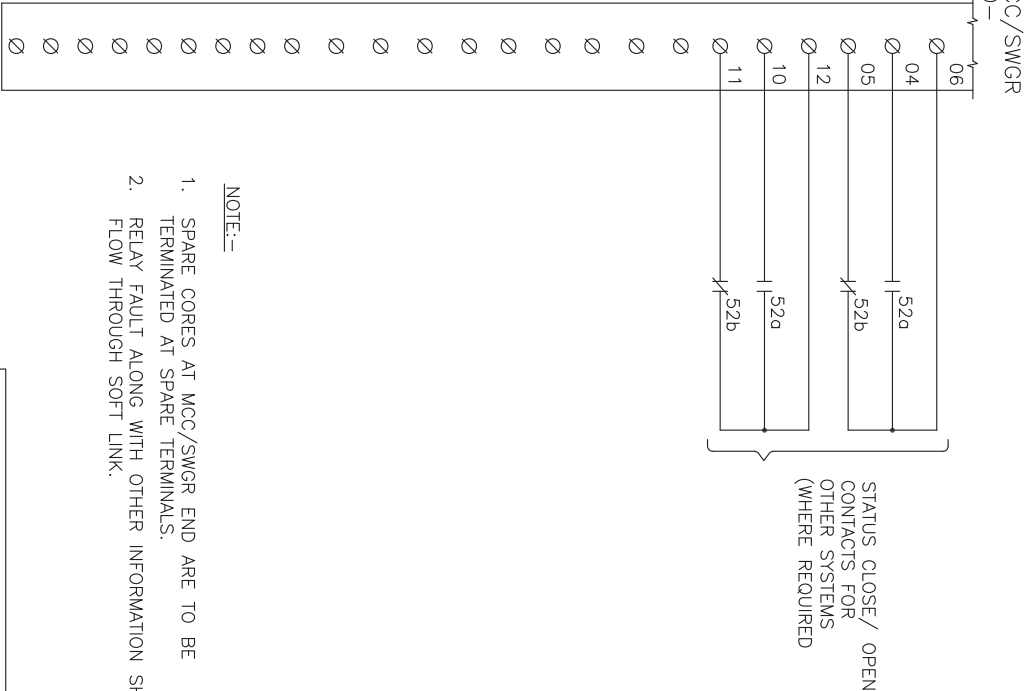
TITLE
INTERFACING OF FIELD INSTRUMENTS
INTERFACE OF DDCMIS WITH MCC/SWGR/ACTUATOR
(LT-A)

SIZE SCALE DRG. NO.
A3 NTS 0000-405-POI-A-065

SH 11 OF 15

REV. NO.
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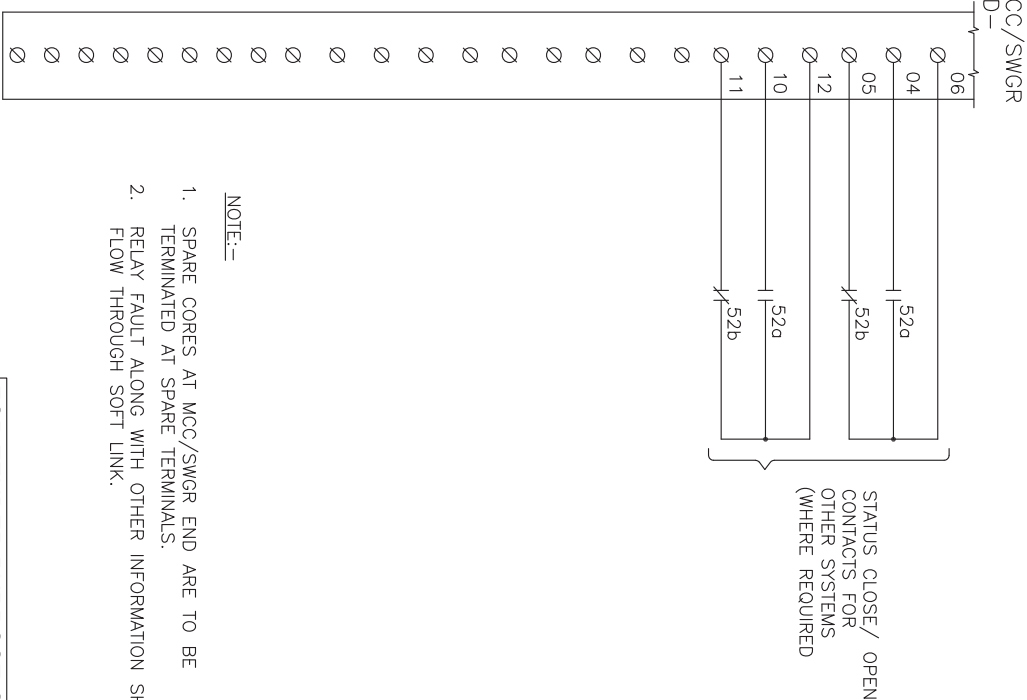
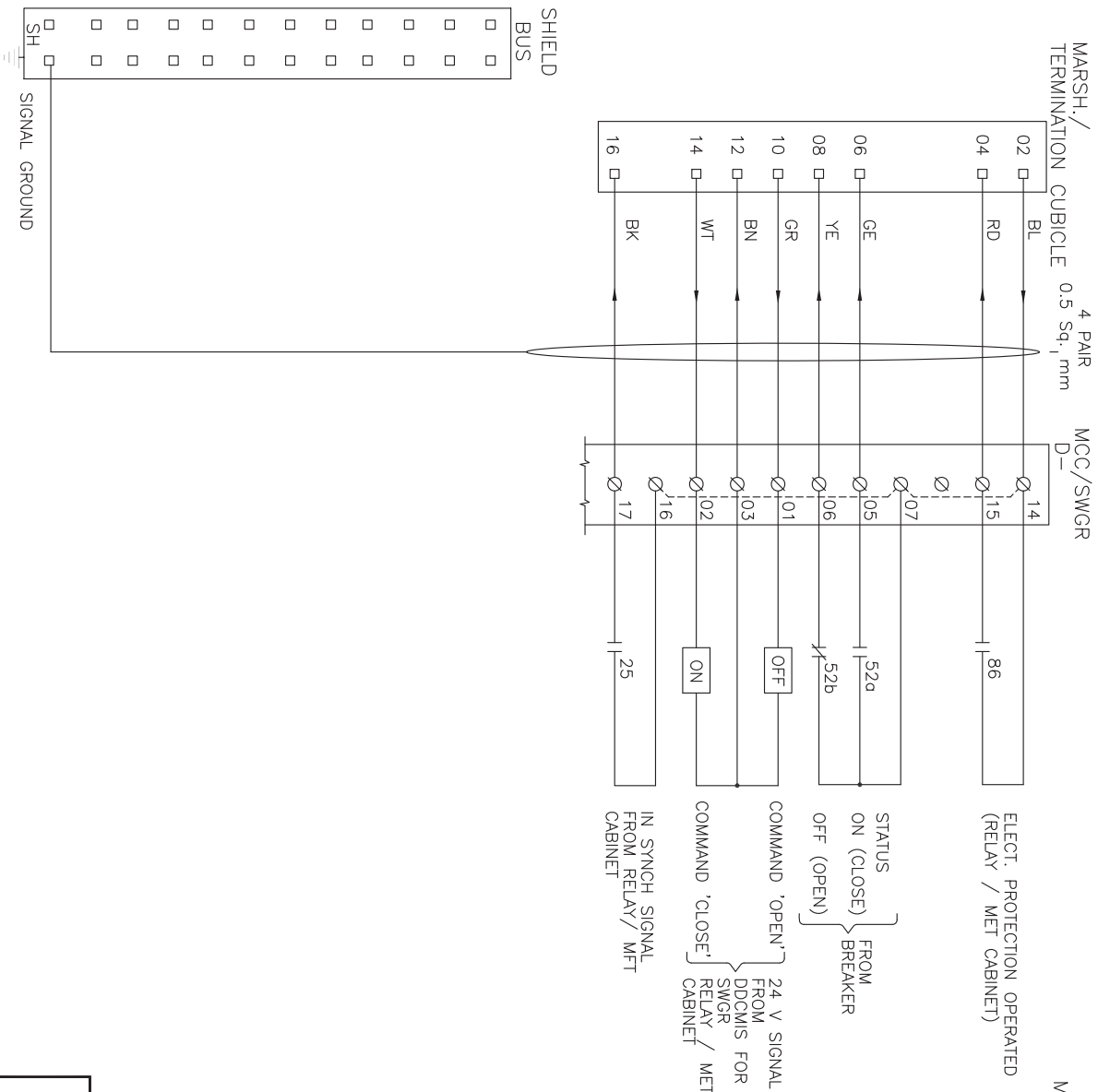


1. SPARE CORES AT MCC/SWGR END ARE TO BE TERMINATED AT SPARE TERMINALS.
2. RELAY FAULT ALONG WITH OTHER INFORMATION SHALL FLOW THROUGH SOFT LINK.

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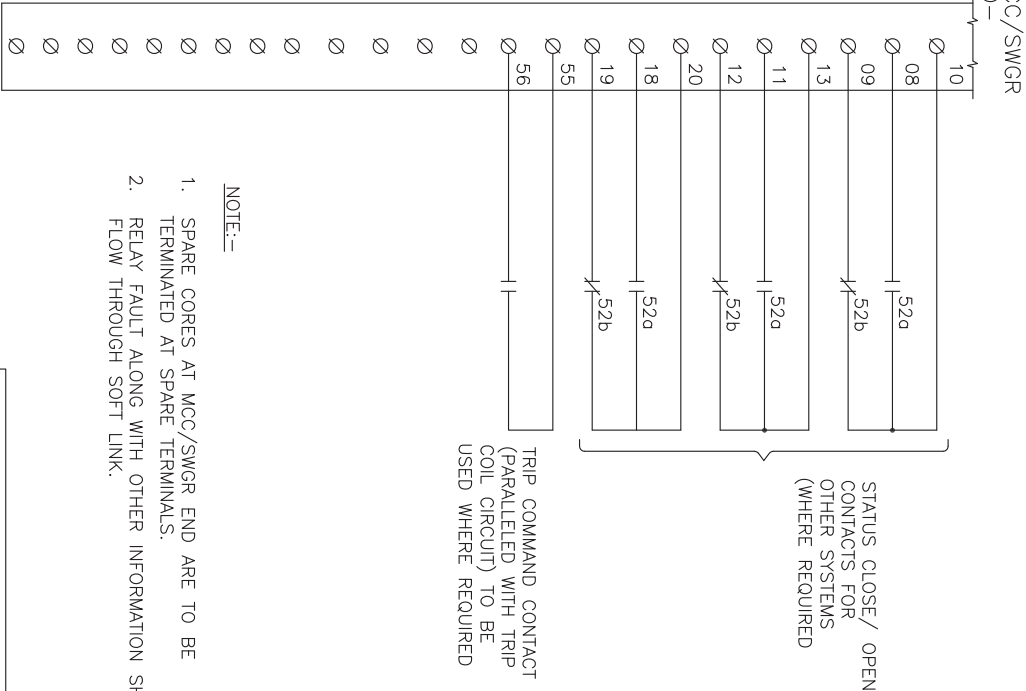
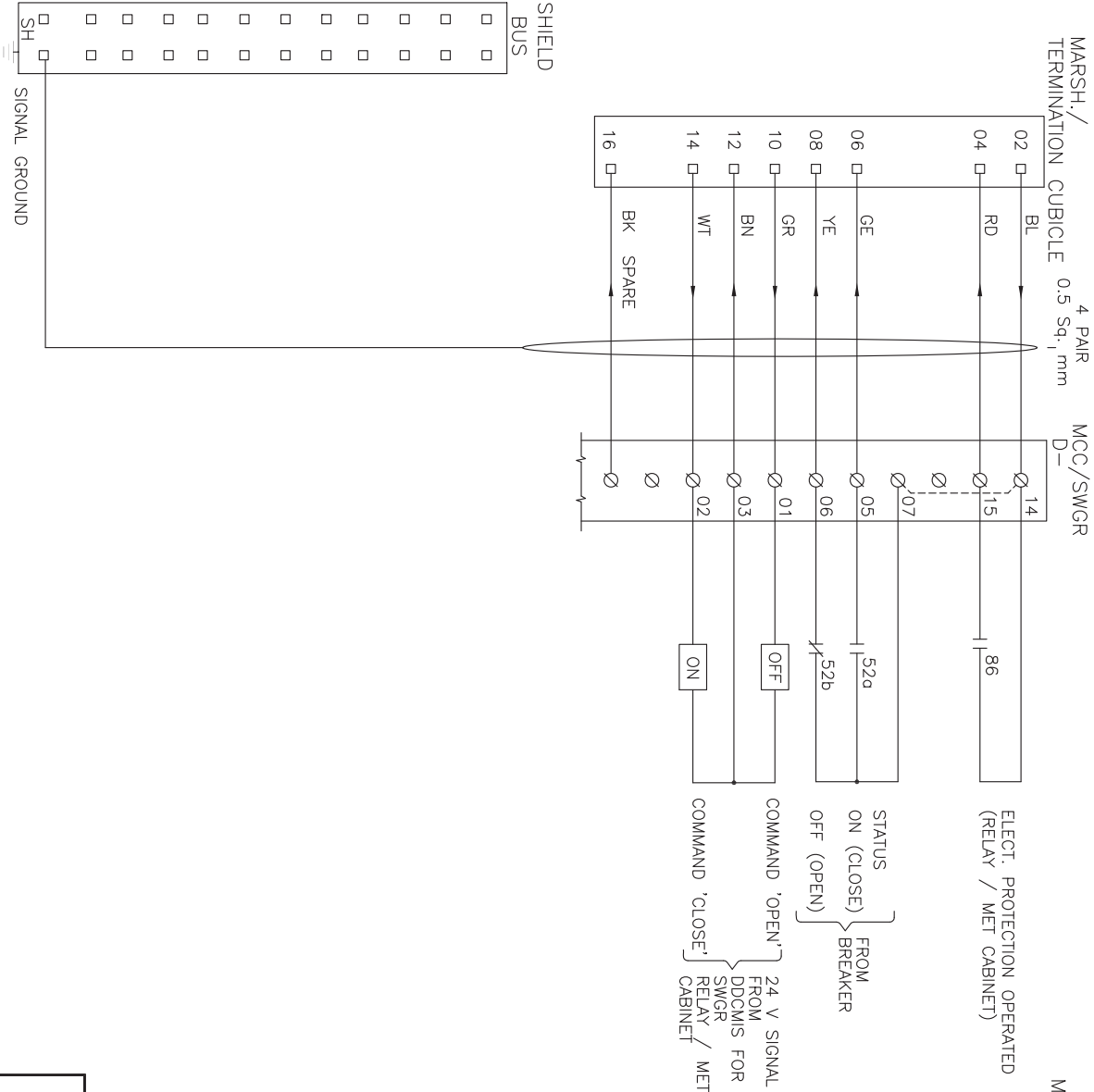
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TITLE											
INTERFACE OF DDCMIS WITH MCC/SW/GR/ACTUATOR (ELECT. BKR. SYNC-LT)											
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NOTE:-

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.

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ENGINEERING DIVISION

PROJECT

TYPICAL THERMAL POWER PROJECT

TITLE

INTERFACING OF FIELD INSTRUMENTS
INTERFACE OF DDCMIS WITH MCC/SWGR/ACTUATOR
(Elect. Bktr.- Non Sync.-HT)

SIZE

A3

SCALE

NTS

DRG. NO.

0000-999-POI-A-065

REV. NO.

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DESCRIPTION

FIRST ISSUE

REV. NO.

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21.08.12



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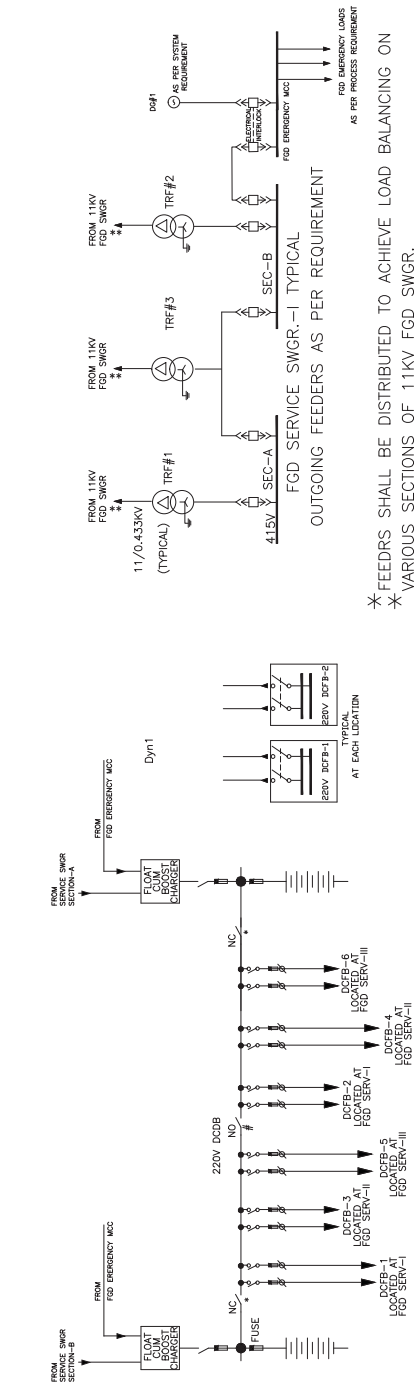
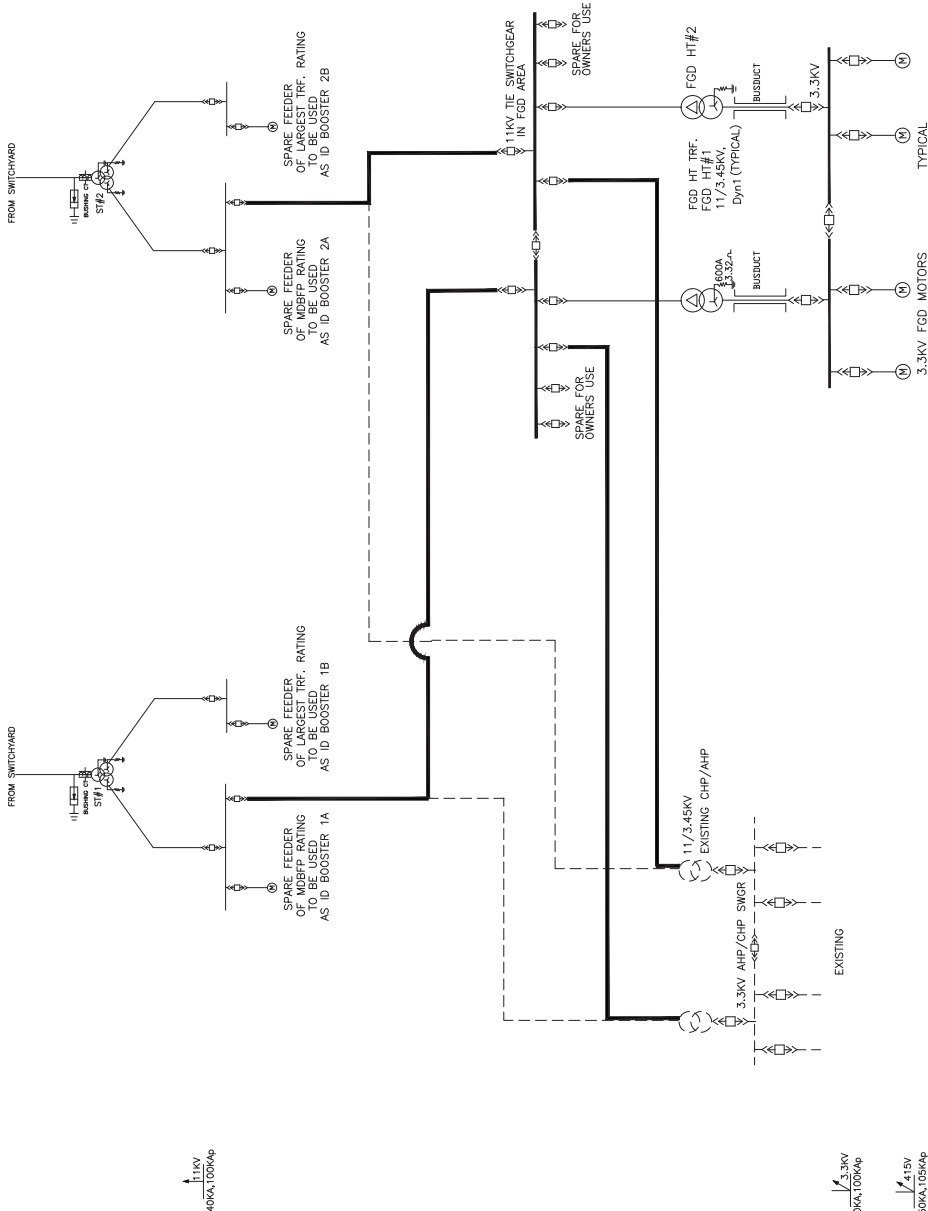
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GENERAL NOTES:


1. 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
2. CONTROL AND PROTECTION SUPPLIES FOR ALL SWITCHGEARS/ DBS/CONTROL PANELS SHALL BE FED FROM TWO DIFFERENT SOURCES/DIFFERENT SECTIONS.
3. STANDARD LT TRANSFORMER RATINGS WITH THEIR IMPEDANCES ARE AS FOLLOWS

SL NO.	TRF RATING	% IMPEDANCE (MINIMUM VALUE)
1.	2.5 MVA	12.5 %
2.	2.0 MVA	10 %
3.	1.6 MVA	8 %
4.	1.0 MVA	5 %
5.	0.63 MVA	5 %

4. WHEREVER MINIMUM RATING OR NO RATING HAS BEEN INDICATED, SIZING SHALL BE CARRIED OUT AS PER SYSTEM REQUIREMENT AND FINAL DRIVE LIST. FINAL FEEDING ARRANGEMENT TO BE DECIDED DURING DETAILED ENGINEERING AS PER SIZING CRITERIA SPECIFIED IN THE TECHNICAL SPECIFICATION.
5. 3x50% FEEDING ARRANGEMENT MAY BE USED FOR 415 VOLTS LOAD CENTERS WHERE THE TOTAL LT LOAD IS MORE THAN 2.15 MVA.
6. NUMBER OF MOTORS/FEEDERS SHOWN IN THE SLD IS TYPICAL AND FEEDING ARRANGEMENT SHOWN AT VARIOUS LOAD CENTERS IS INDICATIVE IN NATURE SHOWING THE FUNCTIONAL REQUIREMENTS.
7. BIDDER SHALL PROVIDE DC SYSTEM OF ADEQUATE CAPACITY FOR MEETING DC LOADS IN FGD AREA.
8. ONE NUMBER DG SET COMMON FOR ENTIRE FGD PLANT SHALL BE PROVIDED BY THE BIDDER FOR MEETING THE EMERGENCY PROCESS LOADS ENVISAGED FOR FGD PLANT.
9. ALL BATTERY CHARGERS SHALL HAVE 2 INPUT SUPPLIES ALONG WITH SUITABLE AUTOMATIC CHANGEOVER BETWEEN THE SOURCES.
10. TWO NUMBER 11KV MOTORS PER UNIT CAN BE FED FROM EXISTING SPARE FEEDERS IN STATION BOARDS. NECESSARY AUGMENTATION AND MODIFICATION REQUIRED IN SWITCHGEAR PANELS FOR THIS PURPOSE SHALL BE IN SCOPE OF BIDDER.
11. PANEL BEING USED FOR FEEDING OF CHP/AHP HT TRANSFORMER SHALL BE SUITABLY MODIFIED TO DO TYPE FOR FEEDING OF 11KV FGD TIE SWITCHGEAR. CHP/AHP HT TRANSFORMER SHALL THEN TURN BE FED FROM 11KV TIE SWITCHGEAR. NECESSARY CABLEING UPTO AHP/CHP TRANSFORMERS SHALL ALSO BE IN SCOPE OF BIDDER.



* FEEDRS SHALL BE DISTRIBUTED TO ACHIEVE LOAD BALANCING ON VARIOUS SECTIONS OF 11KV FGD SWGR.

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PROJECT
BULK FGD LOT-I

TITLE
ELECTRICAL SINGLE LINE DIAGRAM FOR FGD PACKAGE

REV. NO. DESCRIPTION DRAWN DESIGN CHD APD SCALE NTS DRAWING NO. REV. NO.

0011-109-POB-J-001/A-B A