

LINE SYMBOLS

SYMBOLS	NAME
	PIPE LINE
	CAPILLARY TUBING
	ELECTRIC SIGNAL
	SOFTWARE LINK
	PRESSURE LEAD
	DUCT

PIPING VALVE SYMBOLS

SYMBOLS	NAME
	GATE VALVE (NOR.CLOSED)
	GLOBE VALVE (NOR.CLOSED)
	BALL VALVE (NOR.CLOSED)
	BUTTERFLY VALVE (NOR.CLOSED)
	DIAPHRAGM VALVE (NOR.CLOSED)
	PINCH VALVE (NOR.CLOSED)
	NEEDLE VALVE (NOR.CLOSED)
	CHECK VALVE
	CHECK VALVE (WAFER)
	PRESSURE RELIEF VALVE

INSTRUMENT VALVE SYMBOLS

SYMBOLS	NAME
	ACTUATED BY AIR
	ACTUATED BY MOTOR
	AIR CONTROL VALVE
	SOLENOID ACTUATOR
	SELF REGULATING VALVE
	SELF REGULATING VALVE

TRENCH SYMBOLS

SYMBOLS	NAME
	TO ABSORBER AREA DRAIN SUMP
	TO GYPSUM AREA DRAIN SUMP
	TO LIMESTONE AREA DRAIN SUMP

SYMBOLS FOR PIPING PARTS & INSTRUMENT PARTS

SYMBOLS	NAME
	STEAM TRAP
	AIR TRAP
	Y-STRAINER
	T-STRAINER
	TEMPORARY STRAINER
	REDUCER
	EXPANSION JOINT
	DUCT EXPANSION JOINT
	FLEXIBLE HOSE
	SPOOL PIECE
	VENT
	HOSE CONNECTION
	BLIND FLANGE
	REDUCING FLANGE
	CAP (BW)
	CAP (SCR)
	TRENCH
	SIGHT GLASS
	SILENCER
	ORIFICE
	DIAPHRAGM
	MAGNETIC FLOW METER
	VORTEX FLOW METER
	PH METER
	FILTER
	MANHOLE
	PITOT TUBE
	SAMPLING POT
	SAMPLING NOZZLE

SYMBOLS FOR VALVE OPERATION

SYMBOLS	NAME
	FAILURE OPEN (THE VALVE OPENS WHEN AIR OR ELECTRICITY FOR ACTUATOR FAILS.)
	FAILURE CLOSE (THE VALVE CLOSSES WHEN AIR OR ELECTRICITY FOR ACTUATOR FAILS.)

INSULATION SYMBOLS

SYMBOLS	DESCRIPTION
H10	THERMAL INSULATION (100°C & LOWER)
H15	THERMAL INSULATION (101°C ~ 150°C)
H20	THERMAL INSULATION (151°C ~ 200°C)
H25	THERMAL INSULATION (201°C ~ 250°C)
H30	THERMAL INSULATION (251°C ~ 300°C)
H35	THERMAL INSULATION (301°C ~ 350°C)
HF	INSULATION FOR ANTI FREEZING
ET	ELECTRIC TRACE
ST	STEAM TRACE (LOW PRESSURE STEAM)
P10	PERSONAL PROTECTION (100°C & LOWER)
P15	PERSONAL PROTECTION (101°C ~ 150°C)
P20	PERSONAL PROTECTION (151°C ~ 200°C)
P25	PERSONAL PROTECTION (201°C ~ 250°C)
P30	PERSONAL PROTECTION (251°C ~ 300°C)
P35	PERSONAL PROTECTION (350°C ~ 400°C)

DELIVERY LIMITS

SYMBOLS	NAME
	BETWEEN NTPC AND CONTRACTOR
	BETWEEN SUB CONTRACTOR AND VENDOR

SYSTEM

NUMBER	NAME
1	FLUE GAS SYSTEM
2	SO <sub>2</sub> ABSORPTION OXIDATION SYSTEM
3	REHEATING SYSTEM
4	GYPSUM DEWATERING HANDLING SYSTEM
5	LIMESTONE PREPARATION SYSTEM
6	BLANK
7	SUMP SYSTEM
8	UTILITY SYSTEM

FLUID NAME

FLUID SYMBOL	FLUID NAME	FLUID SYMBOL	FLUID NAME
AC	COMPRESSED AIR	WCS	COOLING WATER SUPPLY
AF	FLUIDIZER AIR	WCR	COOLING WATER RETURN
AI	INSTRUMENT AIR	WD	DRINKING WATER
AO	OXIDATION AIR	WP	PROCESS WATER
AS	SEAL AIR	WR	RAW WATER
DD	DUCT DRAIN	WC	Ca(OH) <sub>2</sub> WATER
FS	FILTRATE SLURRY	WW	WASTE WATER
GS	GYPSUM SLURRY	VG	VACUUM PUMP VENT
LS	LIMESTONE SLURRY	VBG	BELT FILTER VENT GAS
		LD	LIME/LIMESTONE DEDUSTING
		LOL	LUBE OIL (LOW PRESSURE)
		LOH	LUBE OIL (HIGH PRESSURE)
		CW	CLARIFIED WATER

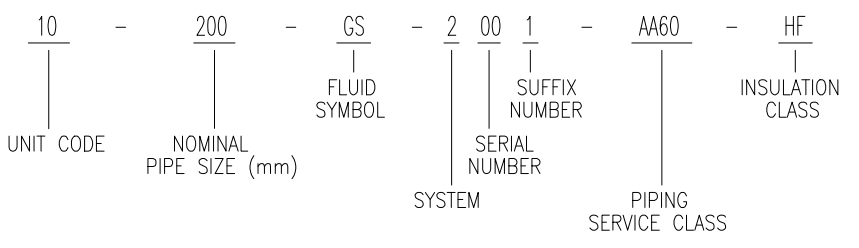
SERVICE CLASS

SERVICE CLASS	MATERIAL	FLUID SYMBOL
AA40	IIR RUBBER LINED PIPING	LS, WP, WC
AA60	IIR RUBBER LINED PIPING	GS,FS,WW,DD
BA01	Gr.304 STAINLESS STEEL PIPING	AI, LOL
BA02	Gr.304 STAINLESS STEEL PIPING	LOH
BA03	Gr.316L STAINLESS STEEL PIPING	WP, AO
CA01	CARBON STEEL GENERAL PIPING	AS,AO,AC,AF,LD
CC01	CARBON STEEL PRESSURE PIPING	WP,WR,WCS,WCR, VG, AA, CW

UNIT CODE

SYMBOLS	UNIT IDENTIFICATION
00	COMMON
10	UNIT-1 FGD SYSTEM AND AUXILIARIES
20	UNIT-2 FGD SYSTEM AND AUXILIARIES

EXPRESSION OF PIPING LINE



CUSTOMER NOS: R4R3, R4S3 & R4S4

CUSTOMER: PATRATU VIDYUT UTPADAN NIGAM LIMITED  
PROJECT: PATRATU STPS EXP PHASE-I (3X800 MW) FGD SYSTEM PACKAGE

DEPT CODE	NAME (BHEL)	DATE
DRN	R YUVARAJ	29.04.19
CHD	P NAVEEN	29.04.19
APPD	V KESAVAN	29.04.19

**MITSUBISHI HITACHI POWER SYSTEMS, LTD.**  
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - LEGENDS & NOTES (1/2) SCALE: NTS

NTPC DRG NO. 9585-001-109-PVM-F-025 SH 01 of 02

BHEL DRG NO	FILE NO	REV NO
3-FW-000-00567	B240 - 00001	00

CONFIDENTIAL & PROPRIETARY INFORMATION



**INSTRUMENT ABBREVIATION**

	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		BLANK	BLANK	BLANK
C	BLANK			CONTROL	
D	BLANK	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	BLANK		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	BLANK	MOMENTARY			MIDDLE, INTERMEDIATE
N	BLANK		BLANK	BLANK	BLANK
O	BLANK		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

**INSTRUMENT SYMBOLS**

SYMBOLS	NAME
	FIELD MOUNTED
	FOR CONTROL ROOM
	FOR LOCAL CONTROL PANEL
	FOR DCS
	INTERLOCK LOGIC

**PNEUMATIC VALVE ACTUATOR**

CODE NO.	ACTUATION
FLXXWA-D	DOUBLE SOLENOID NO LIMIT SWITCH
FLXXWA-DL	DOUBLE SOLENOID WITH LIMIT SWITCH
FLXXWA-S	SINGLE SOLENOID NO LIMIT SWITH
FLXXWA-SL	SINGLE SOLENOID WITH LIMIT SWITCH

**MACHINERY SYMBOLS**

SYMBOLS	NAME
	PUMP
	FAN / BLOWER
	AGITATOR (FLAT BLADE)
	AGITATOR (PROPELLOR)
	ROTARY VALVE
	CRUSHER
	BELT FEEDER
	BELT FILTER
	BALL MILL
	CYCLONE
	MIST ELIMINATOR

**EQUIPMENT SYMBOLS**

SYMBOLS	NAME
	BAG FILTER
	SILOS
	SLIDE GATE
	TANDEM LOUVER DAMPER (MULTIVANE)
	SINGLE STAGE LOUVER DAMPER (MULTIVANE)
	LOUVER DAMPER (SINGLE VANE)
	DISTRIBUTION BOX (3WAY)
	DISTRIBUTION BOX (2WAY)
	SUMP
	HEAT EXCHANGER
	SHELL AND TUBE HEAT EXCHANGER
	AIR DRYER
	FILTER
	SPRAY NOZZLE

**DRIVER SYMBOLS**

SYMBOLS	NAME
	AIR MOTOR
	ELECTRIC MOTOR

**OTHER SYMBOLS**

SYMBOLS	NAME
	INSERT PIPE / LANCE
	CHUTE
	TRUCK

CONFIDENTIAL & PROPRIETARY INFORMATION

CUSTOMER NOS: R4R3, R4S3 & R4S4

**CUSTOMER: PATRATU VIDYUT UTPADAN NIGAM LIMITED**  
**PROJECT: PATRATU STPS EXP PHASE-I (3X800 MW) FGD SYSTEM PACKAGE**

BHARAT HEAVY ELECTRICALS LIMITED, UNIT: BOILER AUXILIARIES PLANT, RANIPET-632 406.	DEPT	NAME (BHEL)	DATE
	DRN	R YUVARAJ	29.04.19
	CHD	P NAVEEN	29.04.19
	APPD	V KESAVAN	29.04.19

**MITSUBISHI HITACHI POWER SYSTEMS, LTD.**  
 AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

**P & ID - LEGENDS & NOTES (2/2)**

TITLE:

NTPC DRG NO. 9585-001-109-PVM-F-025 SH 02 of 02

BHEL DRG NO	FILE NO	REV NO
3-FW-000-00567	B240 - 00002	00



NOTE A004  
TO PREVENT NONFUNCTIONING OF SLURRY TANK PUMP SUCTION VALVE DUE TO SOLID SEDIMENTATION, THE SHAFT OF BUTTERFLY VALVE SHOULD BE INSTALLED HORIZONTALLY AND UPPER HALF OF THE DISC SHOULD BE TURN INTO TANK INSIDE. SUCTION VALVES SHALL BE MOUNTED ON NOZZLE DIRECTLY AS LONG AS ACTUATOR DOES NOT COLLIDE WITH TANK CASING.

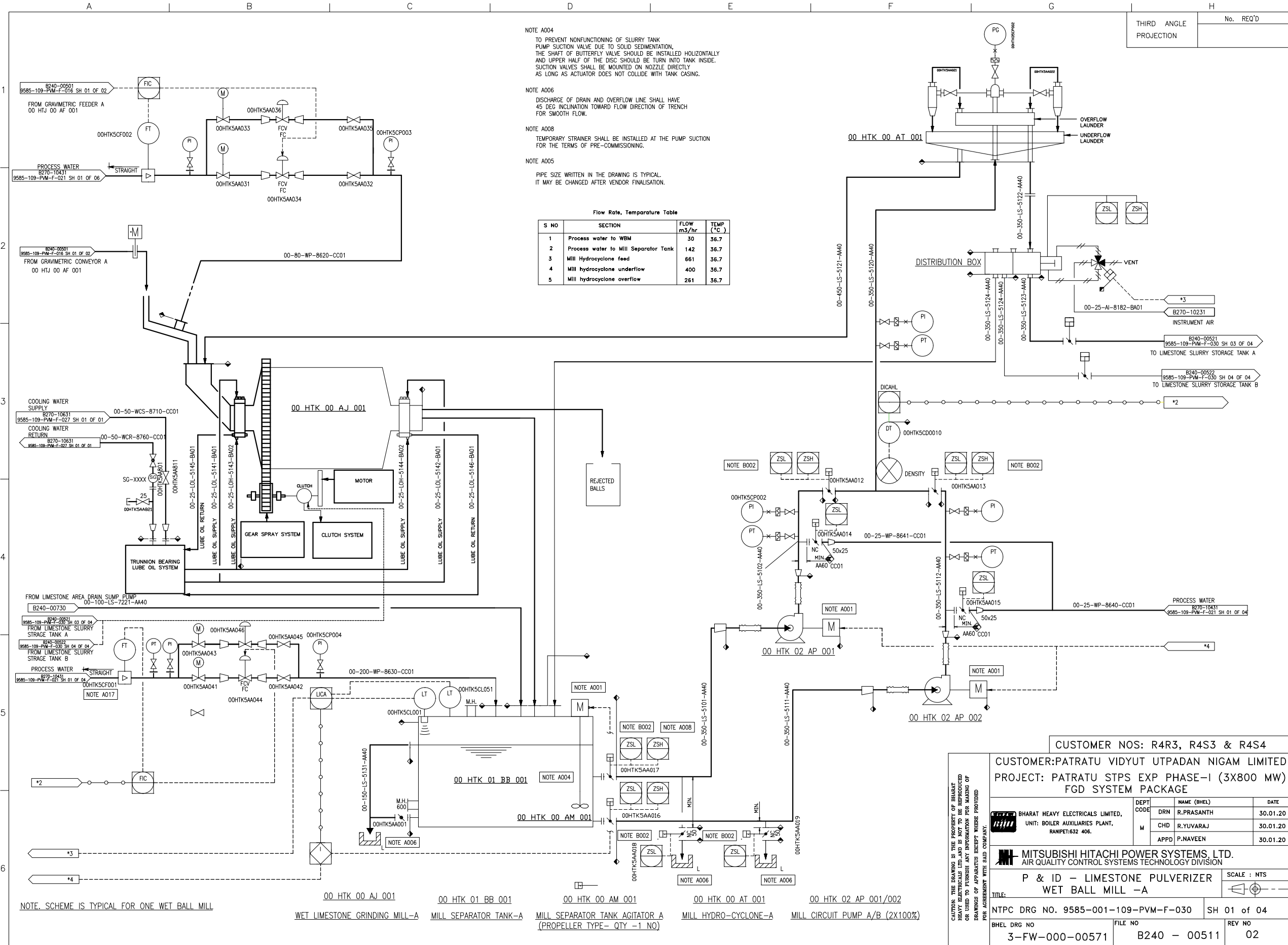
NOTE A006  
DISCHARGE OF DRAIN AND OVERFLOW LINE SHALL HAVE 45 DEG INCLINATION TOWARD FLOW DIRECTION OF TRENCH FOR SMOOTH FLOW.

NOTE A008  
TEMPORARY STRAINER SHALL BE INSTALLED AT THE PUMP SUCTION FOR THE TERMS OF PRE-COMMISSIONING.

NOTE A005  
PIPE SIZE WRITTEN IN THE DRAWING IS TYPICAL. IT MAY BE CHANGED AFTER VENDOR FINALISATION.

Flow Rate, Temperature Table

S NO	SECTION	FLOW m <sup>3</sup> /hr	TEMP (°C)
1	Process water to WBM	30	36.7
2	Process water to Mill Separator Tank	142	36.7
3	Mill Hydrocyclone feed	661	36.7
4	Mill hydrocyclone underflow	400	36.7
5	Mill hydrocyclone overflow	261	36.7



NOTE. SCHEME IS TYPICAL FOR ONE WET BALL MILL

00 HTK 00 AJ 001 WET LIMESTONE GRINDING MILL-A

00 HTK 01 BB 001 MILL SEPARATOR TANK-A

00 HTK 00 AM 001 MILL SEPARATOR TANK AGITATOR A (PROPELLER TYPE- QTY -1 NO)

00 HTK 00 AT 001 MILL HYDRO-CYCLONE-A

00 HTK 02 AP 001/002 MILL CIRCUIT PUMP A/B (2X100%)

CUSTOMER NOS: R4R3, R4S3 & R4S4

CUSTOMER: PATRATU VIDYUT UTPADAN NIGAM LIMITED

PROJECT: PATRATU STPS EXP PHASE-I (3X800 MW) FGD SYSTEM PACKAGE

DEPT	NAME (BHEL)	DATE
DRN	R.PRASANTH	30.01.20
M	CHD R.YUVARAJ	30.01.20
APPD	P.NAVEEN	30.01.20

MITSUBISHI HITACHI POWER SYSTEMS, LTD.  
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - LIMESTONE PULVERIZER WET BALL MILL -A

SCALE : NTS

NTPC DRG NO. 9585-001-109-PVM-F-030 SH 01 of 04

BHEL DRG NO. 3-FW-000-00571 FILE NO. B240 - 00511 REV NO. 02



THIRD ANGLE PROJECTION

No. REQ'D

**A3**

DRAWING No.

NOTE A004  
TO PREVENT NONFUNCTIONING OF SLURRY TANK PUMP SUCTION VALVE DUE TO SOLID SEDIMENTATION, THE SHAFT OF BUTTERFLY VALVE SHOULD BE INSTALLED HORIZONTALLY AND UPPER HALF OF THE DISC SHOULD BE TURN INTO TANK INSIDE. SUCTION VALVES SHALL BE MOUNTED ON NOZZLE DIRECTLY AS LONG AS ACTUATOR DOES NOT COLLIDE WITH TANK CASING.

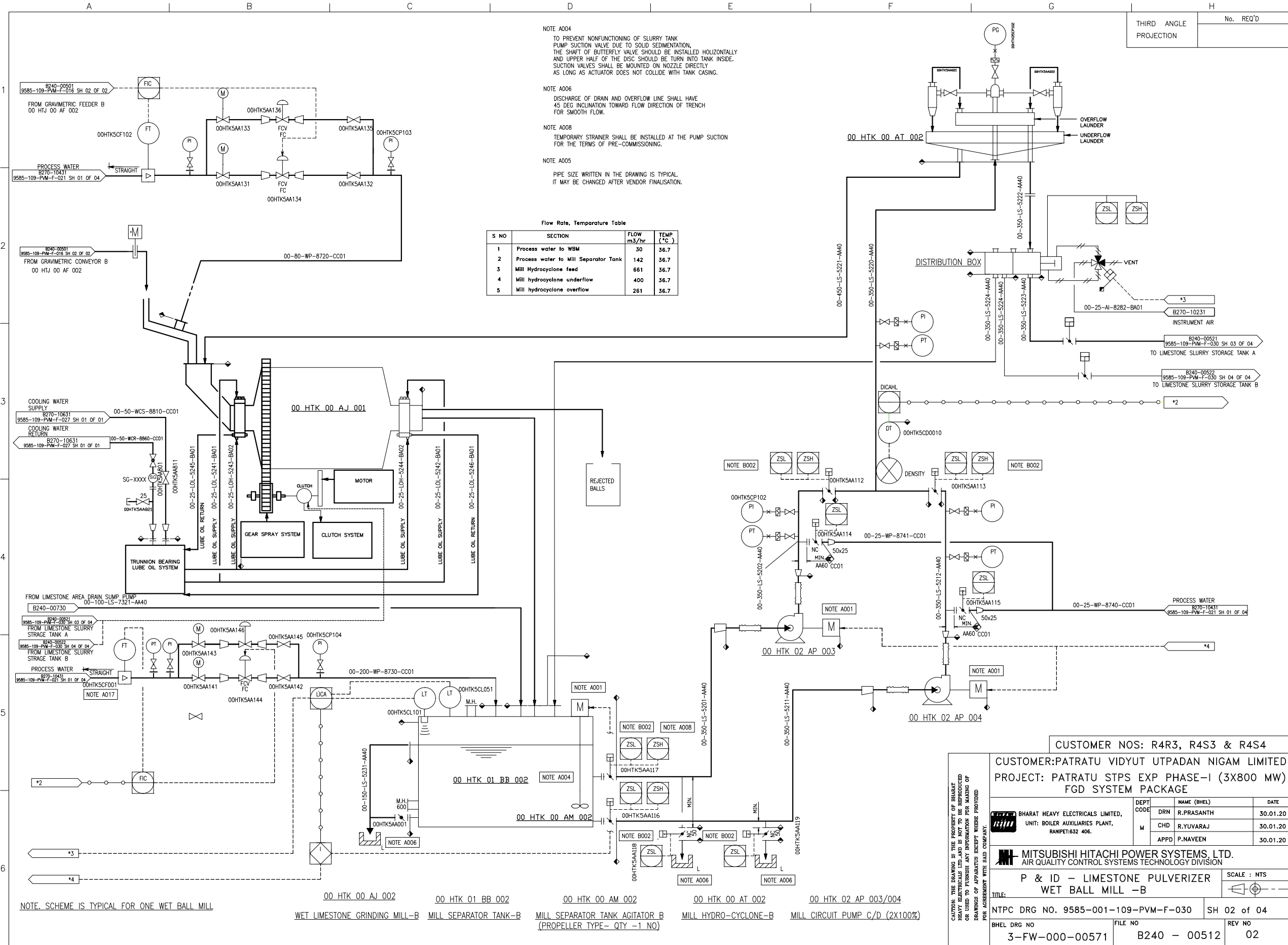
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3	Mill Hydrocyclone feed	661	36.7
4	Mill hydrocyclone underflow	400	36.7
5	Mill hydrocyclone overflow	261	36.7



NOTE. SCHEME IS TYPICAL FOR ONE WET BALL MILL

00-HTK-00-AJ-002 WET LIMESTONE GRINDING MILL-B

00-HTK-01-BB-002 MILL SEPARATOR TANK-B

00-HTK-00-AM-002 MILL SEPARATOR TANK AGITATOR B (PROPELLER TYPE- QTY -1 NO)

00-HTK-00-AT-002 MILL HYDRO-CYCLONE-B

00-HTK-02-AP-003/004 MILL CIRCUIT PUMP C/D (2X100%)

CUSTOMER NOS: R4R3, R4S3 & R4S4

CUSTOMER: PATRATU VIDYUT UTPADAN NIGAM LIMITED

PROJECT: PATRATU STPS EXP PHASE-I (3X800 MW) FGD SYSTEM PACKAGE

DEPT CODE	NAME (BHEL)	DATE
DRN	R.PRASANTH	30.01.20
M	CHD R.YUVARAJ	30.01.20
APPD	P.NAVEEN	30.01.20

**MITSUBISHI HITACHI POWER SYSTEMS, LTD.**  
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - LIMESTONE PULVERIZER WET BALL MILL -B

SCALE : NTS

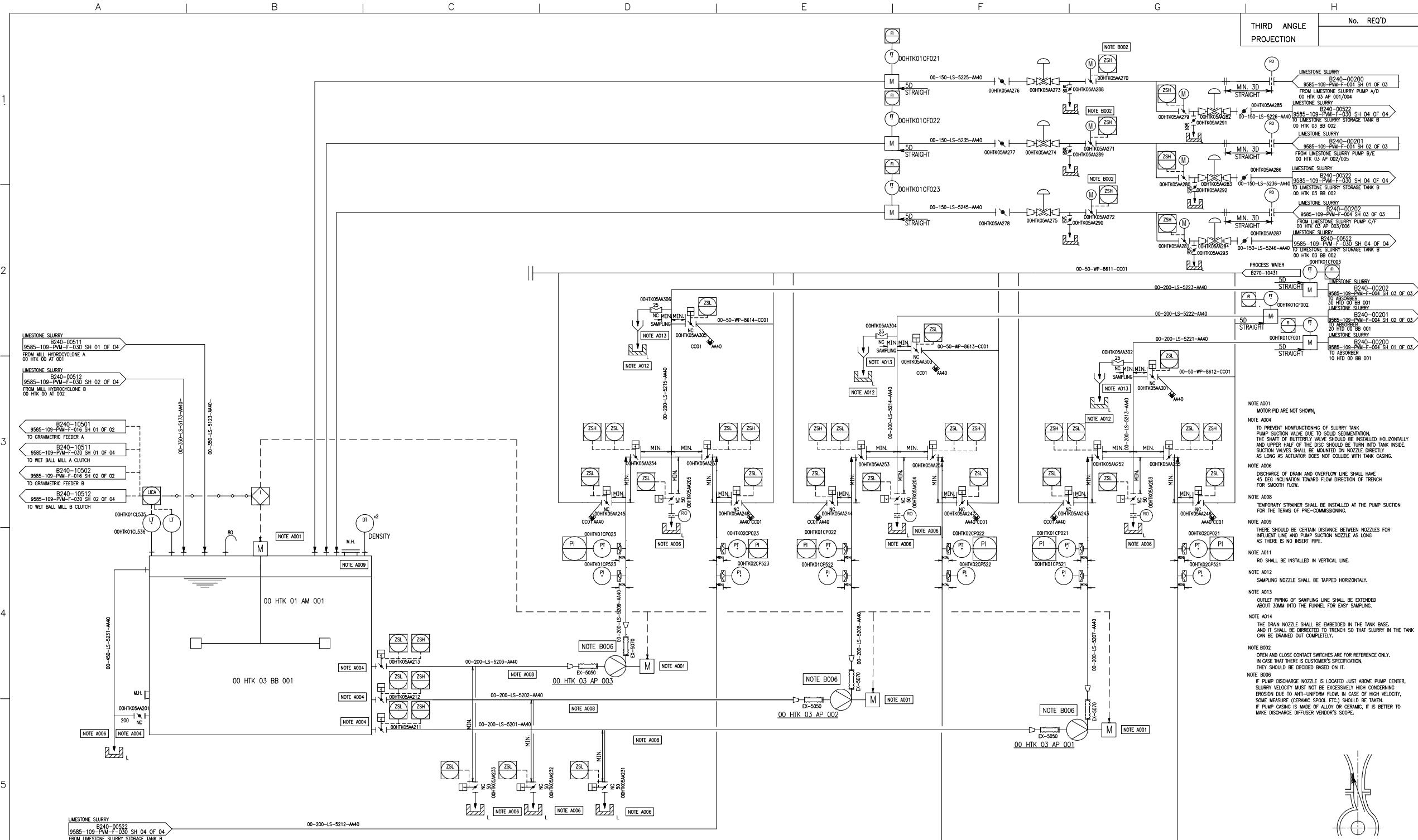
TITLE: NTPC DRG NO. 9585-001-109-PVM-F-030 SH 02 of 04

BHEL DRG NO	FILE NO	REV NO
3-FW-000-00571	B240 - 00512	02



THIRD ANGLE PROJECTION

No. REQ'D



LIMESTONE SLURRY  
B240-00511  
9585-109-PVM-F-030 SH 01 OF 04  
FROM MILL HYDROCYCLONE A  
00 HTK 00 AT 001

LIMESTONE SLURRY  
B240-00512  
9585-109-PVM-F-030 SH 02 OF 04  
FROM MILL HYDROCYCLONE B  
00 HTK 00 AT 002

B240-10501  
9585-109-PVM-F-016 SH 01 OF 02  
TO GRAMMETRIC FEEDER A

B240-10511  
9585-109-PVM-F-030 SH 01 OF 04  
TO WET BALL MILL A CLUTCH

B240-10502  
9585-109-PVM-F-016 SH 02 OF 02  
TO GRAMMETRIC FEEDER B

B240-10512  
9585-109-PVM-F-030 SH 02 OF 04  
TO WET BALL MILL B CLUTCH

LIMESTONE SLURRY  
B240-00522  
9585-109-PVM-F-030 SH 04 OF 04  
FROM LIMESTONE SLURRY STORAGE TANK B  
00 HTK 02 BB 002

LIMESTONE SLURRY  
B240-00522  
9585-109-PVM-F-030 SH 04 OF 04  
FROM LIMESTONE SLURRY STORAGE TANK B  
00 HTK 02 BB 002

LIMESTONE SLURRY  
B240-00522  
9585-109-PVM-F-030 SH 04 OF 04  
FROM LIMESTONE SLURRY STORAGE TANK B  
00 HTK 02 BB 002

00 HTK 01 AM 001  
LIMESTONE SLURRY STORAGE TANK AGITATOR A

00 HTK 03 BB 001  
LIMESTONE SLURRY STORAGE TANK A

00 HTK 03 AP 001/003  
LIMESTONE SLURRY FEED PUMP A/C

Flow Rate, Temperature, Density Table

S NO	SECTION	FLOW m3/hr	TEMP (°C)	DENSITY kg/m <sup>3</sup>
1	LS Feed Pump Suction	155	36.7	1218
2	LS Feed Pump Discharge	155	36.7	1218
3	Flow to absorber	155	36.7	1218
4	Slurry return from absorber	72.86	36.7	1218

- NOTE A001  
MOTOR PID ARE NOT SHOWN.
- NOTE A004  
TO PREVENT NONFUNCTIONING OF SLURRY TANK PUMP SUCTION VALVE DUE TO SOLID SEDIMENTATION THE SHIRT OF BUTTERFLY VALVE SHOULD BE INSTALLED HORIZONTALLY AND UPPER HALF OF THE DISC SHOULD BE TURN INTO TANK INSIDE. SUCTION VALVES SHALL BE MOUNTED ON NOZZLE DIRECTLY AS LONG AS ACTUATOR DOES NOT COLLIDE WITH TANK CASING.
- NOTE A006  
DISCHARGE OF DRAIN AND OVERFLOW LINE SHALL HAVE 45 DEG INCLINATION TOWARD FLOW DIRECTION OF TRENCH FOR SMOOTH FLOW.
- NOTE A008  
TEMPORARY STRAINER SHALL BE INSTALLED AT THE PUMP SUCTION FOR THE TERMS OF PRE-COMMISSIONING.
- NOTE A009  
THERE SHOULD BE CERTAIN DISTANCE BETWEEN NOZZLES FOR INFLENT LINE AND PUMP SUCTION NOZZLE AS LONG AS THERE IS NO INSERT PIPE.
- NOTE A011  
RO SHALL BE INSTALLED IN VERTICAL LINE.
- NOTE A012  
SAMPLING NOZZLE SHALL BE TAPPED HORIZONTALLY.
- NOTE A013  
OUTLET PIPING OF SAMPLING LINE SHALL BE EXTENDED ABOUT 300MM INTO THE FUNNEL FOR EASY SAMPLING.
- NOTE A014  
THE DRAIN NOZZLE SHALL BE EMBEDDED IN THE TANK BASE AND IT SHALL BE DIRECTED TO TRENCH SO THAT SLURRY IN THE TANK CAN BE DRAINED OUT COMPLETELY.
- NOTE B002  
OPEN AND CLOSE CONTACT SWITCHES ARE FOR REFERENCE ONLY. IN CASE THAT THERE IS CUSTOMER'S SPECIFICATION, THEY SHOULD BE DECIDED BASED ON IT.
- NOTE B006  
IF PUMP DISCHARGE NOZZLE IS LOCATED JUST ABOVE PUMP CENTER, SLURRY VELOCITY MUST NOT BE EXCESSIVELY HIGH CONCERNING EROSION DUE TO ANTI-UNIFORM FLOW. IN CASE OF HIGH VELOCITY, SOME MEASURE (CERAMIC SPOOL ETC.) SHOULD BE TAKEN. IF PUMP CASING IS MADE OF ALLOY OR C238M, IT IS BETTER TO MAKE DISCHARGE DIFFUSER VENDOR'S SCOPE.

CUSTOMER NOS: R4R3, R4S3 & R4S4

CUSTOMER: PATRATU VIDYUT UTPADAN NIGAM LIMITED  
PROJECT: PATRATU STPS EXP PHASE-I (3X800 MW)  
FGD SYSTEM PACKAGE

DEPT CODE	NAME (BHEL)	DATE
DRN	R.PRASANTH	30.01.20
M	R.YUVARAJ	30.01.20
APPO	P.NAVEEN	30.01.20

MITSUBISHI HITACHI POWER SYSTEMS, LTD.  
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - LIMESTONE SLURRY TANK-A

NTPC DRG NO. 9585-001-109-PVM-F-030 SH 03 of 04

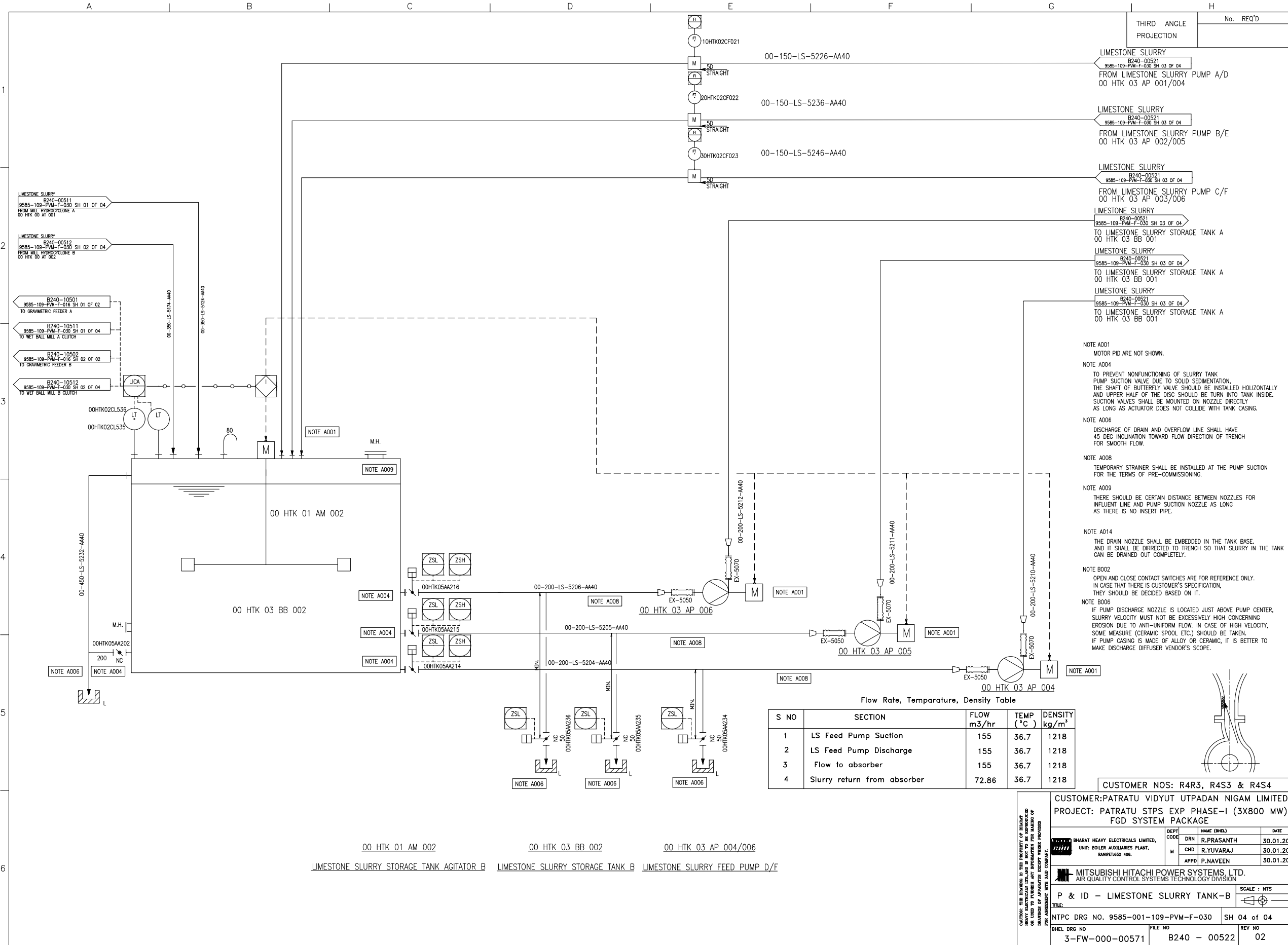
BHEL DRG NO 3-FW-000-00571 FILE NO B240 - 00521 REV NO 02



A3

DRAWING No.

THIRD ANGLE PROJECTION No. REQ'D



LIMESTONE SLURRY  
B240-00521  
9585-109-PVM-F-030 SH 03 OF 04  
FROM LIMESTONE SLURRY PUMP A/D  
00 HTK 03 AP 001/004

LIMESTONE SLURRY  
B240-00521  
9585-109-PVM-F-030 SH 03 OF 04  
FROM LIMESTONE SLURRY PUMP B/E  
00 HTK 03 AP 002/005

LIMESTONE SLURRY  
B240-00521  
9585-109-PVM-F-030 SH 03 OF 04  
FROM LIMESTONE SLURRY PUMP C/F  
00 HTK 03 AP 003/006

LIMESTONE SLURRY  
B240-00521  
9585-109-PVM-F-030 SH 03 OF 04  
TO LIMESTONE SLURRY STORAGE TANK A  
00 HTK 03 BB 001

LIMESTONE SLURRY  
B240-00521  
9585-109-PVM-F-030 SH 03 OF 04  
TO LIMESTONE SLURRY STORAGE TANK A  
00 HTK 03 BB 001

LIMESTONE SLURRY  
B240-00521  
9585-109-PVM-F-030 SH 03 OF 04  
TO LIMESTONE SLURRY STORAGE TANK A  
00 HTK 03 BB 001

NOTE A001  
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NOTE A004  
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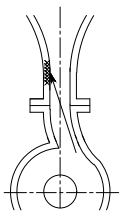
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CUSTOMER NOS: R4R3, R4S3 & R4S4

00 HTK 01 AM 002  
LIMESTONE SLURRY STORAGE TANK AGITATOR B

00 HTK 03 BB 002  
LIMESTONE SLURRY STORAGE TANK B

00 HTK 03 AP 004/006  
LIMESTONE SLURRY FEED PUMP D/F

CUSTOMER: PATRATU VIDYUT UTPADAN NIGAM LIMITED  
PROJECT: PATRATU STPS EXP PHASE-I (3X800 MW) FGD SYSTEM PACKAGE

DEPT	DRN	NAME (BHEL)	DATE
CODE	M	R.PRASANTH	30.01.20
		R.YUVARAJ	30.01.20
		P.NAVEEN	30.01.20

MITSUBISHI HITACHI POWER SYSTEMS, LTD.  
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - LIMESTONE SLURRY TANK-B

SCALE: NTS

NTPC DRG NO. 9585-001-109-PVM-F-030 SH 04 of 04

BHEL DRG NO. 3-FW-000-00571 FILE NO. B240 - 00522 REV NO. 02



## Write up on Limestone grinding system

**Purpose:** This write up describes the equipment associated with Limestone pulverize and wet ball mill system and defines the associated control system.

### **Equipment List:**

S. No.	Description	Item No.	Qty
1.	Wet Ball Mill	00 HTK 00 AJ 001/002	1W+1S
2.	Mill Hydro cyclone	00 HTK 00 AT 001/002	1W+1S
3.	Mill separator tank	00 HTK 01 BB 001/002	1W+1S
4.	Mill separator tank agitator	00 HTK 00 AM 001/002	1W+1S
5.	Mill circuit Pump	00 HTK 02 AP 001/004	2W+2S
6.	Lime stone slurry Pump	00 HTK 03 BB 001/002	1W+1S
7.	Lime Stone Slurry Pump	00 HTK 03 AP 001/006	3W+3S

### **Operation Write Up:**

Limestone is sent to Wet Ball Mill through Limestone Intermediate Silo Shut-off Gate, Dosing Bin, Belt Weigh Feeder, Belt Feeder and Crusher. The Limestone Grinding System consists of Wet Ball Mills, Wet Ball Mill oil units, Wet Mill Separator Tanks, Mill Circuit Pumps, Mill Hydro cyclones and Distribution boxes.

The Belt Weigh Feeder is installed at Dosing Bin bottom which feeds limestone to the Wet Ball Mill. The limestone feed rate is weighed by the Belt Weigh Feeder. The Wet Ball Mills are the wet horizontal type. Process water is supplied to Wet Ball Mill inlet and Mill separator Tank. Slurry from the Wet Ball Mill flows by gravity to Mill separator Tank and then is pumped up to Mill Hydro cyclone to be classified.

The Mill Hydro cyclone underflow, which contains the oversized Limestone, is recirculated to Wet Ball Mill inlet directly, while the overflow is discharged to Limestone Slurry Storage Tank via Distribution Box as a product of Limestone Grinding System. The limestone slurry is pumped from the Limestone Slurry Storage Tank and fed to the absorber tank.

### **Control:**

Limestone Feed rate is kept constant by belt weigh feeder. The limestone which is conveyed from the limestone silo by using the belt weigh feeder and the process water are supplied into a limestone ball mill system. The flow rate of process water to wet limestone grinding mill is controlled by Limestone feeding amount at belt weigh feeder. The flow rate of process water to wet mill separator tank is controlled by density signal from mill hydro cyclone feed slurry.

The slurry in wet mill separator tank is fed up to the mill hydro cyclone and separated into small particle slurry and large particle slurry. The underflow slurry (large particle size limestone) is returned to wet ball mill inlet. The overflow slurry of mill hydro cyclone (small particle size limestone) is sent to the limestone slurry storage tank. The mill separator tank level

is controlled by the position of the limestone slurry distribution box. If the wet mill separator tank level is control low, the overflow slurry of mill hydro cyclone is returned to the Mill separator Tank by recirculation position of the limestone slurry distribution box. And if Mill separator Tank level is control high, the overflow slurry of mill hydro cyclone is send to the limestone slurry storage tank discharge position of the limestone slurry distribution box.

**Fig.- Limestone Grinding System Control**

