

NTPC		PROJECT : Patana STPS Phase-I (3 X 60MW)				LIST OF ITEMS REQUIRING OP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY				REVISION NO : 03 DATE : 28.04.2017		
PACKAGE : EPC PACKAGE		CONTRACTOR : BHEL Ltd				CONTRACT NO : CS-9355-001-2						
No.	Major Equipment	Inspection Category	QP No. 001-QVR	QP No. 001-QVR	QP No. 001-QVR	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark
		III				Levoch	Kolkata	A				
		III				DK Instrument	Kolkata	A				
		III				Khrona Marshall	Pune	A				
		III				Chemind	India	DR				
		III				V Automal	NewDelhi	DR				
		III				Gaugas Bourbin	Parvel	A				
		III				Wagnier	Belgium	A				
		III				Ashcroft	Germany	A				
		III				Auxinol	UK	A				
		III				Mercoid	USA	A				
		III				Delta Control	UK	A				
		III				Mercum	USA	A				
		•				Suning Corporation		DR				
33	Condensing Pids	III				Main Contractor approved Suppliers		A				
34	Electric to Pneumatics converter	III				IMR NORGEN	India	A			Sub QR	Make : WATSON SMITH
		III				Fairchild	USA	A				Subject to meeting the NTPC specification requirement
		•				ABB	India	A				
		•				SMC Pneumatics	India	DR				
		•				P & F	Bangalore	DR				
		•				Fairchild India Pvt. Ltd.	India	DR				
		•				FESTO	Bangalore	DR				
		•				Pfizer	Chennai	A				Main contractor can propose additional vendor for this item
35	Conduits lead coated (Flexible)	III				Bansal laboratories	BHOPAL	A				Modules from EMERSON
		III				Chabbi Electricals	Jalgaon	A			Sub QR	Modules from ELTEK
30	Intelligent Battery charger 24V DC & DCDB/BHMS	II				Eltech	Gurgaon	A				Modules from ELTEK
		II				Was Tech	Jalgaon	A				Modules from ELTEK
		II				Emerson	India	A				
		II				Max Tech (Solek Modules)	Jalgaon	A				
		•				HBL Power Systems	India	DR				BHMS from Mts USV, Germany
		•				Dubai	India	DR				
		•				Chabbi Electricals (Chabbi Modules)	Jalgaon	DR				
		•				Hitachi 18 Ref	Gurgaon	DR				
		•				Station Power Controls Pvt. Ltd.	Noida	DR				
		•				Chiyoko Power Systems (patyoka)	India	DR				
		•				Amaravala	Tirupati	DR				
		•				Kobron Power Electronics	Tiruvandram	DR				



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NTPC		PROJECT : Mirau STPS Phase-I (3 X800MW)				LIST OF ITEMS REQUIRING OP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY				REVISION NO : 00 DATE : 28.04.2017	
No.	Major Equipment	Q.P. No. 9555-001-QM	Q.P. No. 9555-001-QM	Q.P. No. 9555-001-QM	Q.P. No. 9555-001-QM	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval Sub OR	Remark
		Y				Finlex Cable Incab	Pune	DR *			
		I				Gupta Power Infrastructure Ltd.	Kharidha India	DR			
		.				Light cable	Pune	DR			
		.				RR Kabel	Shasta	DR			
		.				KEC International	Mysore	DR			
		.				Advance cable Technologies	Bangalore	DR			
		.				Sonyo Electricals Ltd.	Vadodra	DR			
		.				Special Cable	India	DR			
		.				CAI	Faridabad	DR			
		.				Coaxial Cables	Kolkata	DR			
		.				Assoate Cables	Mumbai	DR			
		.				Radian RSCC Specialty	Hydrabad	DR			
		.				APAR Industries	Banglore	DR			
		.				Yemstena Cable	Udaipur	DR			
		.				Manstena cables co. Ltd.	Hydrabad	DR			
		.				Suryal India Pvt. Ltd.	Nasrarna	DR			
		.				TC Communication Pvt. Ltd.	Gharabed	DR			
48	Electrical indicator	II				Alma	Germany	A			
		II				Uemorge	USA	A			
		II				Relong	UK	A			
		II				Limarique	Fardabad	A			
		II				Robok	Chennai/ Bangalore	A			
		II				Nippon gear	Japan	A			
		II				Aumh	Itanglore	A			
		II				Harold Herck	USA	A			
		II				Drethmo	Germany	A			
		II				Antrieb	Chennai	A			
		I						A			
		.				Linbo	USA	DR			
		.				Siemens	Germany	DR			
		III				Harold Herck	USA	A			
		III				SIFOS Alurink GmbH	Germany	A			
		.				ABB	Germany	DR			
		II				Microprecision	Fardabad	A			
		II				SEIKO	Austria	A			
		II				TECHNOMATIC	Italy	A			
		II				Intelligence Limited	Paigat	A			
		I				Stamoch	Pune	A			
		II				WISE Control	Korea	A			

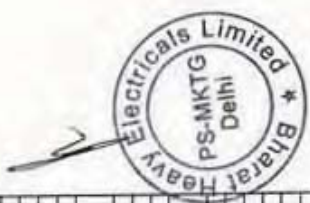
M's BHTEL will forward only two proposals after details review of NTPC Technical specification requirements.

For Low torque application such as SHR111 vest, circulation isolation

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NTPC		PROJECT : Patraur STPS Phase-I (3 X100MW)				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY				REVISION NO. : 00 DATE : 28.04.2017							
PACKAGE : EPC PACKAGE		CONTRACTOR : BHEL LM		CONTRACT NO : CS-1983-891-2		Proposed Sub Supplier		Country		SS Approval Status		SS Detail Sub-SCH		SS Approval Sub QR		Remark	
No.	Major Equipment	QP No. on Category	QP No. 9855-001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q	QP No. 001-QVI-Q
49	HIGH Temp. cable (PTFE/PEP)	I							MINICO India Flow Elements Pvt. Ltd.	GOA	A						
									SAMEL	Korea	DR						
									MINICO	GOA	DR						
									Eleg. Specialties	Kolkata	DR						
									Pyrotech	Mumbai	DR						
									Hydrosummica	Mumbai / Goa	DR						
									ASIAN INDUSTRIAL VALVES	Chennai	DR						
									Dynaloid valves Pvt. Ltd.	Belgium	DR						
									Habia cables	Sweden	A						
									Lapp cables	Germany	A						
									Kanpan cables	Germany	A						
									TEW & C	USA	A						
									Thermo-Electra Bv	Netherlands	A						
									Habia cables	China	A						
									Thermocables	Hyderabad	A						
									Tempants	Udaipur	A						
									Delton Cables	Fardabadi	DR						
									RJ Cables	Roorkee	DR						
									HFCL	Goa	A						
									REMI	Switzerland	A						
									Aksh Fibre	Bhivad	A						
									Fenolax	Pune/Goa	A						
									Birta Ericson	Rava	A						
									Molax	UK	A						
									Comdig	USA	A						
									Schneider	GOA	A						
									RPG Cables	India	DR						
									Unilax Cables	India	DR						
									Terraco	India	DR						
									Dong Woa Valve Control Co. LTD	Korea	A						
									Shin Hwa Engineering Co. LTD	Polynat	A						
									Instrumentation Limited	Cochin(Malapp)	A						
									Kolon	Mold	A						
									SMS Pneumatica	Mumbai	A						
									Rotax	Chennai	DR						
									Emerson Process Management	Alway	DR						
									MIL Controls	Bangalore	DR						
									Festa	Noida	DR						
									IWI Norman	Aurangabad	A						
									ENDRESS & HOUSER	BEIJING	A						
									MAGNETROL	PUNE	A						
									SBEA	PUNE	A						
									PUNE TECHTROL	PUNE	A						



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PROJECT : Patraia STPS Phase-I (3 x800MW) PACKAGE : EPC PACKAGE CONTRACTOR : BHEL Ltd CONTRACT NO : CS-1995-001-2		LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY				REVISION NO : 00 DATE : 26.04.2017				
No.	Major Equipment	QP Inspecti on Categor	QP No. SSSS- 001-QP SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval Sub QR	Remark
		Y			LEVCOR	KOLKATA	A			
		II			Nivo Controls	Indore	A			
		II			V AUTOMAT	Hans Delhi	DR			
		*			D K Instrument	Kolkata	DR			
		*			Siemens	Germany	DR			
		*			ABB	Korea	DR			
		*			Rosemount	Korea	DR			
		II			AE	Mumbai	A			
		II			Southern Transducer	Chennai	A			
		E			Eisler	Mumbai	A			
		II			Camille Bauer	Germany	A			
		II			Metzner	Germany	A			
		II			Rishab	India	A			
		*			Pyrotech	Udaipur	DR			
		*			Maribus	Gandhinagar	DR			
		*			SIEMENS	Germany	DR			
		III			EMERSON	Mumbai	A			
		III			EMERSON	Pune	A			
		III			Hiada Hi-Rol	Gandhinagar	A			
		III			APC	Bangalore	A			
		III			APLAJ	Mumbai	A			
		III			Delta	Gurgaon	A			
		*			Powerteknix	Bangalore	DR			
		*			DUBAS ENGG PVT.LTD., BANGALORE		DR			
		*			Grid power conversion Pvt Ltd.	Bangalore	DR			
		III			Schneider	UK	DR			
		III			EMERSON (Solartron motor)	Kolkata	A			
		III			Hi Tech	USA	A			
		III			Vareby	USA	A			
		II			LEVELSTATE	UK	A			
		II			Stamco Instruments	Delhi	A			
		*			BI-REL	Trichy	DR			
		*			KGEMA	Germany	DR			
		III			ENDRESS & HOUSER	AURANGABAD	A			
		III			MAGNETROL	BELGIUM	A			
		III			LEVCOR	KOLKATA	A			
		III			SSEM	PUNE	A			
		III			Chambers samal	Madurai	A			
		III			NAKATIYA	JAPAN	A			
		III			Shima industries	Mumbai	A			
		III			D K Instrument	KOLKATA	A			
		III			PURE TECHTROL	PUNE	A			
		III			V AUTOMAT	NEW DELHI	A			
		*			WAREE	WAPI	DR			
		III			LEVELSTATE	UK	A			



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NTPC		PROJECT : Patrau STPS Phase-I (3 X800MW)		LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY		REVISION NO 1.00 DATE : 28.04.2017				
		PACKAGE : EPC PACKAGE CONTRACTOR : BHEL Ltd		CONTRACT NO : CS-8882-001-3						
No.	Major Equipment	QP No. 9945-001-QV1	QP Submittal No. SCH	QP Approval Status	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
57	Air filter regulator				Proposed Sub Supplier					
					Gauguin Bourdon (GIC)					
					Nican Scientific Process					
					Fritchid					
					Sharo Horgin					
					SMC Pneumatics					
					Emerson (Asia)					
					Festo					
					Flacka					
					Dhpa Control Elements					
					Main Contractor approved Sources					
58	Copper tubing/Brass connectors									
					PARAMOUNT					
					OMRON					
					OEN					
					Jholi					
					ELSTA					
					Schneider					
					Siemens					
					Phoenix					
					Fedex					
					Riccas					
					Avcon					
					Heron					
					IMI NORGREN					
					Zuffenhan					
					Asco					
					Festo					
					SMC					
					Paucker					
					Schneider					
					Nuccon Industries Pvt. Ltd.					
61	Lube oil control valve - Self Regulating				NUOVO PIONONE					
					EMERSON					
					SAUMSON					
					Forbes Marshall area Pvt. Ltd.					
					Magnetrol					
					Endress & Hauser					
					Emerson Process Management					
					ABB(Tech)					
					Suprema Technology					
					Yokogawa					
					ABB					
					P & F					
62	Guided wave Radar type level transmitter									
					Forbes Marshall area Pvt. Ltd.					
					Magnetrol					
					Endress & Hauser					
					Emerson Process Management					
					ABB(Tech)					
					Suprema Technology					
					Yokogawa					
					ABB					
					P & F					



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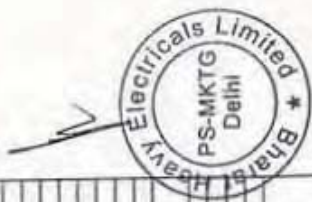
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PROJECT : Palattu STPS Phase-I (3 X800MW) PACKAGE : EPC PACKAGE CONTRACTOR : BHEL Ltd CONTRACT NO : CS-3543-091-3		LIST OF ITEMS REQUIRING OP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY			REVISION NO : 00 DATE : 28.04.2017							
No.	Major Equipment	QIP Inspect on Category	QIP No. 8695-001-QV	QIP Submittal Q SCH	QIP Approval val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub OR	Remark
70	ROTAMETER	II				Matsushita Sigmastar Yokogawa EMERSON (Fisher Rossmount) METSO Yamatake Moore	HYDRABAD HYDRABAD CHENNAI PUNE MUMBAI MUMBAI FARIDABAD JAPAN Vadodra MUMBAI Pune Thane	A A A A A A A A A A A A A			Sub OR	UP TO 300 HB
71	SINGLE AND MULTI POINT TEMPERATURE RECORDER (Microprocessor based)	III				Terna Equipment Pvt. Ltd. YOKOGAWA INDIA CHINDI CORPORATION EUROTHERM EUROTHERM YOKOGAWA ABB FUJI HONEYWELL	BANGALORE JAPAN UK INDIA JAPAN UK/GERMANY JAPAN USA NETHERLAND	A A A A A A A A A A A			Sub OR	Maka Yokogawa, Japan
72	Reverse Rotation Indicator (RRI)	III				GE BENTLY NEVEDA SHIKAWA P & F Main contractor approved sources	USA JAPAN Bangalore	A A A A			Sub OR	ALL ISI VENDORS ARE ALSO ACCEPTABLE
73	Insulation Test Fmaga (As)	III				HACH	Switzerland / USA	A				
74	51F Conductivity Analyzer	III				YOKOGAWA ABB EMERSON	Bangalore / Japan UK / USA Pune	A A A			Sub OR	Maka Yokogawa-Japan
75	PADO	III				Thermo online Fonbe Maralid	Pune	A				
76	DEW Point Sensor / meter / Moisture Measuring System	III				Main Contractor will propose the vendors during detail Engineering. GE Sensing Mettler Instrument Shaw	USA / India UK UK	A A A				Propagative brand



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PROJECT : Patraha STPS Phase-I (3 X800MW)		LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY				REVISION NO : 00				
PACKAGE : EPC PACKAGE		CONTRACTOR : BHEL Ltd				DATE : 28.04.2017				
CONTRACT NO : CS 0955-001-2		QP No. (091-QM) Q SCH	QP No. (091-QM) Q SCH	QP No. (091-QM) Q SCH	QP No. (091-QM) Q SCH	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
No.	Major Equipment	Category	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark	
		II	COSA XENTAUR	USA	A					through Spectrum automation toolbar
		II	VAISHALA	Sweden / Japan	DR					
		II	DWYER	USA	DR					
		II	Endevco	Mumbai	DR					
		II	Nivo Controls	Indore	DR					
		II	Baslec GMBH	Germany	DR					
		III	Fluval	Bangalore	A					
		III	Hofmann	BANGALORE	A					
		III	Pyrotech	Udaipur	A					
		III	BHEL	Bangalore	A					
		III	Schneller	Bangalore	DR					
		II	Sony	Japan	DR					
		II	Siemens	Pondicherry	DR					
		II	Dv Tel	USA	DR					
		II	Henry Weil	Guangdong	DR					
		II	Bosch	Bangalore	A					With Bosch Software
		II	Axis	Sweden	A					With Bosch Software
		II	Palco	USA	DR					
		II	Axis	Sweden	A					With Milestone Software
		I	Pyrotech works space	Udaipur	A					
		I	Cosmes	India	A					
		I	Adash Control	Bangalore	A					
		II	Chem Controls	Pondichery	DR					
		III	Harmony Systems	New Delhi	DR					
		III	Mastbus	Gandhi Nagar	A					For Non mosaic mounting
		III	ABB	Germany	A					
		III	Feibocop	UK	A					
		III	Yokogawa	Japan	A					
		III	Gossen / Meltrawl / Camille Bauer	Germany	A					
		III	Siemens	Germany	A					
		III	China	Germany	A					
		III	Weigel Messgeräte	Germany	A					
		II	Pyrotech	Udaipur	A					
		II	China Corporation	Mumbai	DR					
		II	Yokogawa	Bangalore	DR					
		II	Leitrolak	Pune	DR					
		II	Telsham	Chennai	DR					
		III	Land Instrument International	UK	A					For Non mosaic mounting
		III	Durg	Germany	A					
		III	Sick Mithak	Germany	A					
		III	Emerson Process Management	Ireland	A					
		III	Codal	UK	A					



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NTPC		PROJECT : Patratu STPS Phase-I (33300MW)				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR AS APPROVED BY				REVISION NO : 03 DATE : 28.04.2017		
PACKAGE : EPC PACKAGE		CONTRACTOR : BHEL, Ltd				CONTRACT NO : GS-1111-011-2						
No.	Major Equipment	QP No. on Category	QP No. 9585-001-QVI	QP Submis on SCH	QP Appro val SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub-SCH	SS Approval SCH	Sub QR	Remark
82	Electrical Indicating Instruments (Mosaic Computer)	II				Forbes Marshall	France	A				Main kit from M/s Codel, UK
		III				Siemens	Germany	A				
		III				Gesain / Motreval / Comble Bauer	Germany	A				
		III				Gatz	Germany	A				
63	Flue Gas Analyser (CO)	III				Wulgit Messgeräte Codel	Germany	A				
		III				Emerson Process Management	France	A				Analysar from M/s Emerson, Germany / USA.
		III				Lead Instrument International	UK	A				Lead Collaboration Div.
		III				Sick Mahat	Germany	A				
		III				Siemens	Germany	A				
84	Flue Gas Analyser (CO2)	*				Codel	UK	DR				
		*				Sick Mahat	Germany	DR				
		*				Kiwaas Procal Ltd.	Germany	DR				
85	Flue Gas Analyser (SO2 and NOx)	III				Sick Mahat	Germany	A				
		III				Emerson Process Management	France	A				Analysar from M/s Emerson, Germany / USA.
		III				Siemens	Germany	A				
		III				Fuj Electric	Japan	A				
		*				Yokogawa	Japan	DR				
		*				Codel	UK	DR				
		*				ABB	Gloucestershire	DR				
86	Flue Gas Analyser (O2 Analyser (H1))	II				SECO	Chennai	A				Main Contractor Can propose additional vendor for this item
		III				Maharath Monitor	USA	A				
87	Flue Gas Analyser (O2 Analyser (S,T))	III				Emerson (Rasensant)	France	A				Make EMERSON, USA
		III				Forbes Marshall	France	A				Make Envelec, Germany ; Model Deltec 5000 series
		III				ICE	Mumbai	A				Make Amstel, USA
		III				Yokogawa	Bangalore	A				Make Yokogawa, Japan
		III				ABB	Bangalore	A				Make ABB, UK
		*				AMETEK (P and A) division	Singapore	DR				
		*				ENVIRO	Germany	DR				
		*				Fuj Electric	Japan	DR				
		*				Teledyne	USA	DR				
88	Flue Gas Analyser Panel	I				Chemtrol	USA	A				
		I				Emerson Process Management	India Mumbai	A				
		I				Pyrotech	Udaipur	A				
		I				Analytical Instrument Company	Kota	A				Analysar from M/s Fuk, Japan
		I				Yokogawa	Bangalore	DR				
		I				Adapp	Mumbai	A				
		-				Marvel Enriga Company	Chennai	DR				



Handwritten signature and initials: P.M.M., C & G Deptt., A. Adarsh

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SUB VENDOR LIST (PERMANENT CATEGORY) AS ON 12/19/2019 2:58:38 PM

Sl No	Package Name	Supplier Name	Supplier Communication Address	Supplier Works Address
1	Cold Junction Compensation Box (CJCB)	CREATIVE INSTRUMENTS & CONTROLS	NO-17/1, 1ST FLOOR, 11TH CROSS 1ST K BLOCK, RAJAJINAGAR, BANGALORE-560010 Phone- Pincode : Email : crinstruments@gmail.com	
2	CONTROL VALVE	Valvitalia S.P.A. ,	Mr. Salvatore Ruggeri Via Tortona 69, Rivanazzano (Pavia) Phone- +39-03839459875 Pincode : 27055 Email : dario.torluccio@valvitalia.com	Works-1->Mr. Salvatore Ruggeri Via Tortona 69,Rivanazzano (Pavia) - Italy Phone- +39-03839459875 FAX : Pincode : 27055 Email : dario.torluccio@valvitalia.com; diego.poletti@valvitalia.com; sales@bhgassociates.com
		R.K.CONTROL INSTRUMENTS PVT. LTD.	PLOT NO.A-250, OPP.POLICE STATION, WAGLE INDUSTRIAL ESTATE, THANE Phone- 25820943/2331 Pincode : 400604 Email : rkcipl@vsnl.com ; rkcinpvt@bol.net.in	Works-1->SAVITH KUMAR PLOT NO. A-250, OPP.POLICE STATION,WAGLE INDUSTRIAL ESTATE, THANE -THANE- MAHARASHTRA INDIA Phone- 022-66060942 FAX : 022-25820801 Pincode : 400 604 Email : rkadmin@rkcipl.co.in
		Mascot Valves Pvt. Ltd.	166-167 GIDC Naroda Ahmedabad Phone- 0792282 1619 Pincode : 382330 Email : dom.sales@mascotvalves.com	Works-1->Varun Patel Dir 166-167 ,GIDC Naroda -Ahmedabad- GUJARAT India Phone- 0792282 1619 / 3369 FAX : Pincode : 382330 Email : dom.sales@mascotvalves.com
		EMERSON PROCESS MANAGEMENT CHENNAI LIMITED	147, KARAPAKKAM VILLAGE, CHENNAI Phone- 23722184, 23716242 Pincode : 600096 Email : jatinder.singh@emerson.com	Works-1->Mr. Rangarajan (Head - Lean and Manufact 147,Karapakkam Village, -Chennai-TAMIL NADU India Phone- 0444903 4395 FAX : Pincode : 600097 Email : Rangarajan.M@emerson.com
		Severn Glocon India Pvt. Ltd.	F96 & F97, Sipcot Industrial Park, Irungattukottai, Chennai, Phone- 044-47104200, Pincode : 602117, Email : info@severnglocon.co.in,	Works-1->Mr. K.Kaushik, F96 & F97, Sipcot Industrial Park,Irungattukottai, -Chennai-TAMIL NADU India Phone- 044- 47104200, FAX : 044-47100073, Pincode : 602117, Email : info@severnglocon.co.in
		BOMAFA SPECIAL VALVE SOLUTIONS PVT LTD	Mr. K.M. Anklesaria/ R. M. Anklesaria Plot No: 285/2, Panchratna Estate, Near Ramol Bridge, Vatva Ahmedabad Phone- 079-40083825 Pincode : 382445 Email : info@bomafa-india.com	Works-1->Mr. K.M. Anklesaria/ Mr. R.M. Anklesaria Dir Plot No: 285/2, Panchratna Estate, Near Ramol Bridge, Vatva, -Ahmedabad- GUJARAT INDIA Phone- 079-40083825 FAX : Pincode : 382445 Email : info@bomafa-india.com
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		Koso India Private Limited,	H 33 & 34, MIDC, Ambad, Nashik, Phone- 09650223433 Pincode : 422010, Email : jetmal.gour@koso.co.in	Works-1->P.J.ASHOK KUMAR/SEEMA ANAND Control Valve Division, H-33&34, MIDC, Ambad, -Nashik-MAHARASHTRA India Phone- 91 944 744 3198 FAX : 0491 - 5269914 Pincode : 422010 Email : pja@koso.co.in;enquiry@koso.co.in Works-2->+P.J.ASHOK KUMAR/SEEMA ANAND J-1,MIDC,Ambad -Nashik-MAHARASHTRA India Phone- 91 944 744 3198 FAX : 0491 - 5269914 Pincode : 422010 Email : pja@koso.co.in;enquiry@koso.co.in
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10	LEVEL GAUGE	TOSHNIWAL BROTHERS PVT.LTD.	WORKS:TOSHNIWAL IND.PVT.LTD, INDUSTRIAL ESTATE MAKHUPURA, AJMER Phone- 441171 Pincode : 305002 Email : toshniwalprocess@gmail.com	
		BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B , IMT MANESAR Gurgaon Phone- 0124-4366000 TO 9 Pincode : 122001 Email : sales@blissanand.com	Works-1->Mr. Bharat Kumar/ Mr. Sasi Kumar Plot No. 92B & 93B,Sec V, IMTManesar -GURGAON-HARYANA INDIA Phone- 0124-4366000 TO 9 FAX : 0124-2290884 Pincode : 122002 Email : bharat@blissanand.com
		SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@siainstruments.co.in	Works-1->R Gopinath 27 Nahur Udyog Industrial Premises,M.M.Malviya Road, Mulund(-MUMBAI-MAHARASHTRA INDIA Phone- +912225918567 FAX : +912225918566 Pincode : 400080 Email : sales@siainstruments.co.in
11	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	BOSE PANDA INSTRUMENTS PVT.LTD.	Mr. Partha Bose 44, Saheed Hemanta Kumar Bose, Sarani, Kolkata Phone- +91 33 2548 7220 Pincode : 700074 Email : parthabosebpi@gmail.com; bosepanda@vsnl.net	Works-1->Mr. Partha Bose 44, Saheed Hemanta Kumar Bose,Sarani, Kolkata-WEST BENGAL India Phone- +91 33 2548 7220 FAX : +91 33 2548 0429, Pincode : 700074 Email : parthabosebpi@gmail.com hosenanda@vsnl.net
		A.N. INSTRUMENTS PVT. LTD.	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA Phone- 24757784,22472509 Pincode : 700020 Email : anidel@bol.net.in	Works-1->Mr. Gautam Mukherjee Kusumba,Sonarpur Station Road,P.O. -Narendrapur, -Kolkata-WEST BENGAL INDIA Phone- 9836878855 FAX : 033-24342748 Pincode : 700103 Email : okm_ani@hotmail.com
		H.GURU INDUSTRIES	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA Phone- 033 2282 2463 / 1637 Pincode : 700071 Email : mguuru@vsnl.net	Works-1->NA NA -- Phone- FAX : Pincode : Email :
		FORBES MARSHALL (HYD) LTD.	MR SAILESH PATALAY/MR. M K SRINIVASAN PLOT NO.A-19/2, & T-4/2, IDA, NACHARAM, HYDERABAD Phone- 9849913704 Pincode : 500 076 Email : mksrinivasan@forbesmarshall.com	Works-1->MR G.SRINIVASAN/MR ANUJ MALPANI PLOT NO:A-19/2 & T-4/2,IDA. NACHARAM , -HYDERABAD-TELANGANA INDIA Phone- 09866550762 FAX : 040 27152193 Pincode : 560076 Email : gshrinivasan@forbesmarshall.com
		PRECISION MASS PRODUCTS PVT. LTD.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol Phone- 9999464663 Pincode : 382729 Email : sales@precisionmass.com	Works-1->Mr. Hitesh Parmar/Mr. Hitesh Parmar Plot No.2306, Phase II, GIDC Chhatral, -Kalol-GUJARAT INDIA Phone- 9327359227 FAX : 02764-233440 Pincode : 382729 Email : hitesh.parmar@ashcroftindia.com

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		Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	Works-1->Mr. Shyam Warilani/Mr. V Suresh Babu Plot No 34 A GIDC A Phase 1, -VAPI-GUJARAT INDIA Phone- +91 11 4161 7111 FAX : 022 2687 3613 Pincode : 396 195 Email : pbajaj@baumer.com
		H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	32,INDUSTRIAL SUBURB YESWANTHAPUR BANGALORE Phone- 080-23370300, Pincode : 560022 Email : info@hgurusouth.com	Works-1->Shikha Hazra/ Shyamal Hazra 32, Industrial Suburb,Yeshwanthpur -BANGALORE-KARNATAKA INDIA Phone- 080-23370300 FAX : 080-23379890 Pincode : 560022 Email : shikhabazra@hgurusouth.com
		GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai, Phone- 011-41607463, Pincode : 400016, Email : gjcdelhi@general-gauges.com,	Works-1->Gauge Bourdon India Pvt. Ltd., Plot No-4, 5, 6,Jawahar Co-operative Industrial Estate, -Kalamboli Taluka Panvel-MAHARASHTRA India Phone- 022-27421095, FAX : 022-27421901, Pincode : 410209, Email : info@general-gauges.com
		Nesstech Instruments Private Limited	26/2, G Type, Global Industrial Park Near Nahuli Railway Crossing, Valvada Vapi Phone- 9920576002 Pincode : 396105 Email : sales@nesstech.co.in	Works-1-> Others 26/2, G Type, Global Ind. Park Near Nahuli Railway Crossing, -Vapi-GUJARAT INDIA Phone- 9920576002 FAX : Pincode : 396105 Email : sales@nesstech.co.in, bkpadia@nesstech.co.in
		SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai, Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com	Works-1->Scientific Center, Others By-Pass Junction,Near Kalsekar College kausa, mumbra,Thane -Mumbai-MAHARASHTRA INDIA Phone- 022-25491409,9892230623 FAX : Pincode : 400612 Email : sdbpl@vsnl.com
12	TEMP. ELEMENT	DETRIVE INSTRUMENTATION & ELECTRONICS LTD.	320, TV INDUSTRIAL ESTATE, OFF.DR.A.BESANT ROAD, BEHIND GLAXO, WORLI, MUMBAI Phone- 24934125,24938403 Pincode : 400025 Email : trivtech@vsnl.com	Works-1->Mr. A.D.Solomon J-14, MIDC, TARAPORE, BOISER STN., -THANE-MAHARASHTRA India Phone- FAX : Pincode : Email : trivtech@vsnl.com
		Nesstech Instruments Private Limited	26/2, G Type, Global Industrial Park Near Nahuli Railway Crossing, Valvada Vapi Phone- 9920576002 Pincode : 396105 Email : sales@nesstech.co.in	Works-1-> Others 26/2, G Type, Global Ind. Park Near Nahuli Railway Crossing, -Vapi-GUJARAT INDIA Phone- 9920576002 FAX : Pincode : 396105 Email : sales@nesstech.co.in, bkpadia@nesstech.co.in
		Thermal Instrument India Pvt. Ltd.	Mr. Raghavendra M. Kulkarni 194/195, Gopi Tank Road Behind Citylight Cinema,Mahim Mumbai Phone- 09322664709 Pincode : 400016 Email : ramk@giconindia.com	Works-1->Mr. Raghavendra M. Kulkarni Survey No. 250A/B, Post-Mangaon,Tal.- Kudal, Dist.- Sindhudurg, --MAHARASHTRA India Phone- 09322664709 FAX : 022-24455026 Pincode : 416519 Email : ramk@giconindia.com
		Tempsens Instrument (I) Pvt Ltd	MR. V.P.RATHI/MR. HEMANT RATHI B-188A ROAD NO.5 , M.I.A UDAIPUR Phone- 09352420069 Pincode : 313003 Email : info@tempsens.com	Works-1->Mr. S.D Deval B-188A ROAD NO.5 ,M.I.A -UDAIPUR-RAJASTHAN INDIA Phone- 9352501530 FAX : 0294-3057750 Pincode : 313003 Email : deval@tempsens.com
		Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	Works-1->Mr. Shyam Warilani/Mr. V Suresh Babu Plot No 34 A GIDC A Phase 1, -VAPI-GUJARAT INDIA Phone- +91 11 4161 7111 FAX : 022 2687 3613 Pincode : 396 195 Email : pbajaj@baumer.com
		GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	D2/5, Mapusa Industrial Estate, Mapusa, Goa, Phone- 09326054551, Pincode : 403507, Email : sumukh@goainstruments.com.	Works-1->Mr. S.G. Dixit D2/5, Mapusa Industrial Estate, -Mapusa-GOA INDIA Phone- 09326054551 FAX : 0832-2262331 Pincode : 403 507 Email : sumukh@goainstruments.com
		PYRO ELECTRIC INSTRUMENTS GOA PVT.LTD.	M. D. BICHU/R. M. BICHU G.B, HILL CROWN APARTMENTS, COLLEGE ROAD, MAPUSA Phone- 9326114601 Pincode : 403507 Email : priyanka.marketing@pyro-electric.in	Works-1->A A KULKARNI/ VINOD C G PLOT NO. 71,BICHOLIM INDUSTRIAL ESTATE -BICHOLIM-GOA INDIA Phone- 9326114409 FAX : 91 832 2363381 Pincode : 403529 Email : pyroworks@pyro-electric.in
		GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai, Phone- 011-41607463, Pincode : 400016, Email : gjcdelhi@general-gauges.com,	Works-1->Gauge Bourdon India Pvt. Ltd., Plot No-4, 5, 6,Jawahar Co-operative Industrial Estate, -Kalamboli Taluka Panvel-MAHARASHTRA India Phone- 022-27421095, FAX : 022-27421901, Pincode : 410209, Email : info@general-gauges.com
		TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhupura, Ajmer, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,	Works-1-> Khasra No.: 218-230& 235, Industrial Estate,Makhupura, -Ajmer-RAJASTHAN India Phone- 9887865856, FAX : 0145-2695174, Pincode : 305002, Email : rajeev.gupta@tipl.com
		SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai, Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com	Works-1->Scientific Center, Others By-Pass Junction,Near Kalsekar College kausa, mumbra,Thane -Mumbai-MAHARASHTRA INDIA Phone- 022-25491409,9892230623 FAX : Pincode : 400612 Email : sdbpl@vsnl.com
13	TEMPERATURE GAUGE	H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	32,INDUSTRIAL SUBURB YESWANTHAPUR BANGALORE Phone- 080-23370300, Pincode : 560022 Email : info@hgurusouth.com	Works-1->Shikha Hazra/ Shyamal Hazra 32, Industrial Suburb,Yeshwanthpur -BANGALORE-KARNATAKA INDIA Phone- 080-23370300 FAX : 080-23379890 Pincode : 560022 Email : shikhabazra@hgurusouth.com
		GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai, Phone- 011-41607463, Pincode : 400016, Email : gjcdelhi@general-gauges.com,	Works-1->Gauge Bourdon India Pvt. Ltd., Plot No-4, 5, 6,Jawahar Co-operative Industrial Estate, -Kalamboli Taluka Panvel-MAHARASHTRA India Phone- 022-27421095, FAX : 022-27421901, Pincode : 410209, Email : info@general-gauges.com
		H.GURU INDUSTRIES	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA Phone- 033 2282 2463 / 1637 Pincode : 700071 Email : mguru@vsnl.net	Works-1->NA NA -- Phone- FAX : Pincode : Email :
		GOA THERMOSTATIC INSTRUMENTS PVT.LTD.	FLAT -B , GF, HILL CROWN APTS., COLLEGE ROAD, MAPUSA Phone- Pincode : 403525 Email : gtilworks@pyro-electric.in	Works-1->Mrs Saanvi Naik BICHOLIM, -BICHOLIM-GOA INDIA Phone- 9595855152 FAX : Pincode : 403 529 Email : saanvi.naik@thermostatic.in
		A.N. INSTRUMENTS PVT. LTD.	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA Phone- 24757784,22472509 Pincode : 700020 Email : anidel@bol.net.in	Works-1->Mr. Gautam Mukherjee Kusumba,Sonarpur Station Road,P.O. -Narendrapur, -Kolkata-WEST BENGAL INDIA Phone- 9836878855 FAX : 033-24342748 Pincode : 700103 Email : gkm_ani@hotmail.com
		FORBES MARSHALL (HYD) LTD.	MR SAILESH PATALAY/MR. M K SRINIVASAN PLOT NO.A-19/2, & T-4/2, IDA, NACHARAM, HYDERABAD Phone- 9849913704 Pincode : 500 076 Email : mksrinivasan@forbesmarshall.com	Works-1->MR G.SRINIVASAN/MR ANUJ MALPANI PLOT NO:A-19/2 & T-4/2,I.DA. NACHARAM, -HYDERABAD-TELANGANA INDIA Phone- 09866550762 FAX : 040 27152193 Pincode : 560076 Email : oshrinivasan@forbesmarshall.com
		GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	D2/5, Mapusa Industrial Estate, Mapusa, Goa, Phone- 09326054551, Pincode : 403507, Email : sumukh@goainstruments.com.	Works-1->Mr. S.G. Dixit D2/5, Mapusa Industrial Estate, -Mapusa-GOA INDIA Phone- 09326054551 FAX : 0832-2262331 Pincode : 403 507 Email : sumukh@goainstruments.com
		PRECISION MASS PRODUCTS PVT. LTD.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol GUJARAT 9999464663 Pincode : 382729 Email : sales@precisionmass.com	Works-1->Mr. Hitesh Parmar/Mr. Hitesh Parmar Plot No.2306, Phase II, GIDC Chhatral, -Kalol-GUJARAT INDIA Phone- 9327359227 FAX : 02764-233440 Pincode : 382729 Email : hitesh.parmar@ashcroffindia.com

		Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	Works-1->Mr. Shyam Warilani/Mr. V Suresh Babu Plot No 34 A GIDC A Phase 1, -VAPI-GUJARAT INDIA Phone- +91 11 4161 7111 FAX : 022 2687 3613 Pincode : 396 195 Email : pbajaj@baumer.com
14	TRANSMITTERS	YOKOGAWA INDIA LIMITED,	PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, BANGALORE, Phone- 080-41586000, Pincode : Email : uday.shankar@in.yokogawa.com,	Works-1-> PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, -BANGALORE-KARNATAKA INDIA Phone- 080-41586000, FAX : 080-28521442, Pincode : Email : uday.shankar@in.yokogawa.com
		ABB INDIA LIMITED	MR. RAJIV GOVIL 14, MATHURA ROAD, FARIDABAD Phone-09971085678 Pincode : 121003 Email : vijin.swami@in.abb.com	
		V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDLAREA, PH-1 NEW DELHI Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com	Works-1->Mr. BHAGWAN SINGH/ Mr. NANDAN SINGH F-61, OKHLA INDLAREA,PHASE-1 -NEW DELHI-DELHI INDIA Phone- 011-47627200 Extn. 3 FAX : 011- 26819440 Pincode : 110 020 Email : production@vautomat.com
		Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com	
		TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhapura, Ajmer, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,	Works-1-> Khasra No.: 218-230& 235, Industrial Estate,Makhapura, Ajmer-RAJASTHAN India Phone- 9887865856, FAX : 0145-2695174, Pincode : 305002, Email : rajeev.gupta@tipl.com
		Endress + Hauser (India) Pvt. Ltd.,	Mr. Prakash Vaghela 215-216, DLF Tower 'A', Jasola District Centre, New Delhi, Phone- 9717593001, Pincode : 110025, Email : prakash.vaghela@in.endress.com,	Works-1-> M-171 to 173, MIDC, Waluj, -Aurangabad-MAHARASHTRA India Phone- 9881000474, FAX : 0240-2555179, Pincode : 431136, Email : Narendra.Kulkarni@wetzler.endress.com
		SBEM PVT. LTD.	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE, Phone- 912041030100 Pincode : 411009 Email : newdelhi@sbem.co.in	Works-1->MR. MOHAN PADWAL 691/A/2,BIBWEWADI INDL ESTATE -PUNE-MAHARASHTRA INDIA Phone- 918600042374 FAX : 912024215670 Pincode : 411037 Email : wm@sbem.co.in
		PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,	Works-1->Mr. Santosh Shukla Others R-628,TTC Industrial Area, MIDC Rabale, -Navi Mumbai-MAHARASHTRA India Phone- 9821350761, FAX : 022-27695559, Pincode : 400701, Email : sales@panamengineers.com
		SMART INSTRUMENTS LTD, BRAZIL	Agents: Digital Electronic Ltd. 74/11 'C' Cross Road MIDC Andheri (East) MUMBAI Phone- 28208477 Pincode : 400093 Email : corp@delbby.rgms.ems.vsnl.net.in	
		SIEMENS LIMITED	Dr. Armin Bruck/Sandeep Mathur 130, Pandurang Budhkar Marg Worli Mumbai Phone- 0124 383 7377 Pincode : 400018 Email : ankit.varshney@siemens.com	Works-1->Ankit Varshney Kalwa Works, Thane-Belapur Road, Thane, -MUMBAI-MAHARASHTRA INDIA Phone- FAX : Pincode : 400708 Email :
		Moore Industries International Inc.	Leonard.W. Moore/ Matt Moren 16650 Schoenborn St. North Hills Phone- +1 818 830 5548 Pincode : 91343 Email : mmoren@mijinet.com	Works-1->Matt Moren/Gina Cruz 16650 Schoenborn St., North Hills - CALIFORNIA- USA Phone- +1 818 894 7111, ext FAX : +1 818 830 5588 Pincode : 91343 Email : gcruz@mijinet.com
		EMERSON PROCESS MANAGEMENT (INDIA) PVT.LTD.	Mr. Amit Patthankar/Vikram Raj Singh 206-210,BALARAMA BUILDING 2ND FLR. BANDRA EAST MUMBAI Phone- 9619121500 Pincode : 400051 Email : vikramraj.singh@emerson.com	Works-1->Kalpesh Chandan/Hrishikesh Aghor Plot No. A 145/4 TTC IND AREA,MIDC, PAWANE, -NAVI MUMBAI-MAHARASHTRA INDIA Phone- 9619688001 FAX : 022-66736000 Pincode : 400 705 Email : Kalpesh.chandan@emerson.com
		Honeywell Automation India Limited	Mr. Ritvij Kulkarni 917, INTERNATIONAL TRADE TOWER, NEHRU PLACE, NEW DELHI Phone- 9890200584 Pincode : 110019 Email : rajesh.chaudhary@honeywell.com	Works-1->Mr.Kedar Tillu 53, 54, 56 & 57,Hadapsar Industrial Estate -PUNE-MAHARASHTRA INDIA Phone- 9665034625 FAX : 020 66039905 Pincode : 411013 Email : kedar.tillu@honeywell.com
		NIVO CONTROLS PVT. LTD.	Mr. Praveen Toshniwal 104-115, Electronic Complex, Indore Phone- 0731-4081305 Pincode : 452010 Email : sales@nivocontrols.com	Works-1->Mr. Praveen Toshniwal 104-115, Electronic Complex, -Indore-MADHYA PRADESH India Phone- 0731-4081305 FAX : 0731-255075 Pincode : 452010 Email : sales@nivocontrols.com
15	ULTRASONIC FLOW METERS	Electronet Equipments Pvt Ltd.	Mr. Rajendra Nagaonkar/MD, Plot No. 84, 85 & 86, Tiny Industrial Estate Kondhwa Budruk, Pune Phone- 9822015256 Pincode : 411048 Email : ho@eeplindia.com	Works-1-> Others Plot No. 84, 85 & 86, Tiny Industrial Estate, Kondhwa Budruk -Pune-MAHARASHTRA INDIA Phone- 20-26932039 FAX : 20-26934122 Pincode : 411048 Email : ho@eeplindia.com
		Adept Fluidyne Pvt. Ltd.	Vinayak Gadre Plot No 4,S.No.17/1-B Kothrud Industrial Estate Pune Phone- 020 25464551 Pincode : 411038 Email : info@adepfluidyne.com	Works-1-> Plot No 4,S.No.17/1-B Kothrud Industrial Estate -Pune-MAHARASHTRA india Phone- 020 25464551 FAX : Pincode : 411038 Email : info@adepfluidyne.com
		FLEXIM Flexible Industriemesstechnik GmbH	Boxberger Str., 4, Berlin Berlin Phone- 0049 30 93 66 76 60 Pincode : 12681 Email : info@flexim.de	Works-1-> Others Boxberger Str. 4, -Berlin- GERMANY Phone- 0049 30 93 66 76 60 FAX : Pincode : 12681 Email : info@flexim.de
		Rockwin Flowmeter India Pvt. Ltd.	B-24, Site-IV, Sahibabad Industrial Area Ghaziabad, Phone- 9810129687 Pincode : 201010, Email : amiya@rockwin.com	Works-1->MR Rajiv PRAKASH B-24, Site-IV, Sahibabad Industrial Area, -Ghaziabad-UTTAR PRADESH India Phone- 9810129687 FAX : 01202895450 Pincode : 201010, Email : rajiv@rockwin.com
		FLASH FORGE PVT LTD	Mr. Gautam Makker, 503, 'A'-wing, Delphi, Orchard Avenue Road, Powai Mumbai Phone- 022-42784300 Pincode : 400076 Email : hemendrapati@f.f.co.in	Works-1-> Others M/s Endress & Hauser, Aurangabad, Maharashtra -Aurangabad-MAHARASHTRA INDIA Phone- FAX : Pincode : Email : Works-2->+ Others M/s Endress & Hauser, Bhiwandi,Thane -Thane-MAHARASHTRA INDIA Phone- FAX : Pincode : Email :
		NIVUS GMBH	Mr. Marcus Fischer Im Taele 2, D - 75031 Eppingen Phone- 00491712233770 Pincode : Email : carolin.schuster@nivus.com	Works-1->Mr. Marcus Fischer CEO Im Taele 2, Eppingen, -Baden Wuerttemberg,-Foreign Country GERMANY Phone- 0049-726291910 FAX : Pincode : 75031 Email : carolin.schuster@nivus.com

Note:

1. The above sub-vendor list is tentative & reference only. However Sub-Vendor List is subject to BHEL/end user approval without any commercial/ delivery implication.


2. New Sub-Vendor if proposed by Vendor during contract stage shall subject to BHEL/ end user approval without any commercial/ delivery implication.

ANNEXURE 1
FORMAT FOR PROVENNESS CERTIFICATE

Award/Contract Agreement/
Order enclosed


Sl.No.	Item Description	Plant No.1
5.00.00	INSTRUMENTS (PRIMARY & SECONDARY)	
(i)	Type of Instrument	
(ii)	Make / Model	
(iii)	Name of Power Station (Location & Address)	
(iv)	Unit Size (MW)	
(v)	Commissioning date	
	Whether above instruments have atleast one (1) year satisfactory operation in one (1) power station having unit rating of 200 MW or above.	Yes/No
(vi)	Client's certificate attached	Yes/No

Signature of authorized signatory.....


	3x800 MW PATRATU TPS GYPSUM DEWATERING EQUIPMENT TECHNICAL SPECIFICATION SUB-VENDOR LIST	SPECIFICATION NO. PE-TS-434-571-A901	
		SECTION : I	
		SUB-SECTION : D	
		REV. 00	
		SHEET 1 OF 1	

ANNEXURE-I


1. REFER ELECTRICAL AND C&I SPECIFICATION FOR APPLICABLE SUB-VENDOR LIST FOR THE RELEVANT ITEMS FOR REFERENCE.
2. THE LIST OF ALL BOUGHT OUT ITEMS WITH MAKES AND COUNTRY OF ORIGIN AND CONTACT DETAILS OF THE MANUFACTURERS TO BE MENTIONED ALONG WITH OFFER TO BE SUBMITTED IN THE FORMAT ATTACHED IN SECTION III AS AN INFORMATION TO BHEL.
3. ACCEPTANCE OF MAKES SHALL BE SUBJECT TO BHEL/ CUSTOMER ACCEPTANCE DURING THE DETAILED ENGINEERING WITHOUT COST AND DELIVERY IMPLICATION TO BHEL.

	3x800 MW PATRATU TPS	SPECIFICATION NO. PE-TS-434-571-A901	
	GYPSUM DEWATERING EQUIPMENT	SECTION : I	
		SUB-SECTION : D	
	TECHNICAL SPECIFICATION MANDATORY SPARES LIST	REV. 00	
SHEET 1 OF 4			

ANNEXURE-II
MANDATORY SPARES LIST

	3x800 MW PATRATU TPS	SPECIFICATION NO. PE-TS-434-571-A901	
	GYPSUM DEWATERING EQUIPMENT	SECTION : I	
	TECHNICAL SPECIFICATION	SUB-SECTION : D	
	MANDATORY SPARES LIST	REV. 00	SHEET 2 OF 4

SI. No.	DESCRIPTION	Qty.
I.	MECHANICAL	
1	Hydro-cyclones (Gypsum Primary Dewatering, Secondary Waste Water and any other Hydrocyclone)	
a.	Hydro-cyclone Isolation Valve	10% of each type OR 1 no. whichever is higher
b.	Hydro-Cyclone	10% of each type OR 1 no. whichever is higher
c.	Hydro-Cyclone rubber lining	10% of each type OR 1 no. whichever is higher
2	Vacuum Belt Filter	
a.	Filter Cloth	2 sets
b.	Belt (if applicable)	1 sets
c.	Vacuum Box Seals	2 sets
d.	Drive Motor (if applicable)	1 no.
3	Vacuum Breaker Valves	
a.	Valve Assembly	1 no.
b.	Actuator	1 no.
4	Horizontal Centrifugal Pumps	
a.	Complete Impeller Assembly	1 no. of each type
b.	Casing Liners	1 set* of each type
c.	Bearing	2 set*
d.	Motor	1 no. of each type
e.	Pump discharge valve assembly	1 no. of each type
5	Slurry Valves	2 no. of each type & size
6	Slurry Line Bends	2 no. of each type & size
7	Slurry (Filtrate Extraction) Pumps	
a.	Impeller Assembly	1 no. of each type
b.	Casing Liner	2 no. of each type
c.	Seals	4 set of each type
d.	Bearings	2 no. of each type
e.	Motor	1 no. of each type
f.	Motor-Pump Coupling	1 no. of each type
8	Sump Pumps	
a.	Complete Impeller Assembly	1 no. of each type
b.	Casing Liners	1 set* of each type
c.	Bearing	2 set*
d.	Motor	1 no. of each type
e.	Pump discharge valve assembly	1 no. of each type

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	MANDATORY SPARES LIST	REV. 00	SHEET 3 OF 4

II.	MEASURING INSTRUMENTS	
i	Electronic Transmitters	
a.	Transmitters of all types, ranges and model no. (for the measurement of Pressure, differential pressure flow, level, etc.)	10% or 1 no. of each type and model, whichever is more
b.	1.2 Level Transmitters (Ultrasonic/ radar type)	50% of each type and length, including sensors
ii	Temperature Elements	
a.	RTD's of each type and length (with head assembly, terminal block & nipple)	10% or 2 nos. of each type and length, whichever is more
b.	Thermocouples of each type like K-type, R-type, metal etc.(with head assembly, terminal block & nipple)	10% or 2 nos. of each type and length, whichever is more
c.	Thermowell for application like mill outlet temperature and SH/RH/Eco/ flue gas temp. in furnace	10% or 2 nos. of each type and length whichever is more
d.	Temperature transmitters	10% of each type & model
iii	Local Indicators like temperature gauges, pressure gauges, differential pressure gauges, flow gauges, flow meters etc.,	5% or 1 no. of each make, model and type whichever is more (to be divided to various ranges in proportion to main of all make, model, type population)
iv	Process Actuated Switch Devices Includes all types of Pressure, differential pressure, flow, temperature, differential temperature, level switch Devices	5% or 1 no. of each type and model whichever is more
v	PD Type Flow Transmitters	1 no. of each type & model
vi.	Any other instrument (If applicable)	10% or 1 no. of each type and model whichever is more


Note:

1. One set means 100% complete replacement of the particular component/equipment, as mentioned i.e., Set for the particular equipment, would include all components required to replace the item. For example, a set of bearing shall include all hardware normally required while replacing the bearings. It is further, intended that the assembly / sub-assembly which have different orientation (like left hand or right hand, top or bottom), different direction of rotation or mirror image positioning or any other reasons which result in maintaining two different sets of the spares to be used for the subject assembly / sub-assembly, these shall be considered as different types of assembly/sub-assembly.

2. Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc. these shall cover all the items supplied and installed.

3. In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the above list.

4. Any item which is quoted as "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Bidder without any commercial implications. The Bidder shall note that if there is any change/ variation in equipment/ system during detail engineering which causes any change/ variation in the essential spares quantity, the same shall be supplied without any commercial implications. The price indicated for the mandatory spares shall be considered for the purpose of evaluation.

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5. The bidder shall warrant that all spares supplied will be new and in accordance with the Contract Documents and will be free from defects in design, material and workmanship.

6. All spares supplied under this contract shall be strictly interchangeable with parts for which they are intended for replacements. These spares should include all mounted accessories like components, boards, add or items, fitting, connectors etc. and be complete in all respects so that the replacement of the main items by these spares does not require any additional item. The vendors must conform the pair to pair compatibility of each electrical spares modules with the modules should be supplied in the original package. All electronic modules should be pre-set and/or pre-programmed for ready use at site. Alternatively, suitable instruction sheet indicating the details of required PCB jumper position, BCD which is setting, EPROM/PROM listing etc should be packed along with each module. Also a caution mark sign should be put on all such module which needs pre-setting/pre-programming before putting them in to service. The spare shall be treated and properly packed for long term storage.

7. Each spare shall be clearly marked and labelled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.


8. Any item which is quoted as "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the Bidder without any commercial implications. The Bidder shall note that if there in any change/ variation in equipment/ system during detail engineering which causes any change/ variation in the essential spares quantity, the same shall be supplied without any commercial implications. The price indicated for the mandatory spares shall be considered for the purpose of evaluation.

9. All the spares shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan. Mandatory spares shall not be dispatched before dispatch of corresponding main equipment. The spares shall be treated and packed for a long storage under the climatic condition prevailing at site.

10. The bidder shall indicate the service expectancy period for the mandatory spare parts under normal operating conditions before replacement is necessary.

11. The Contractor will provide Employer with cross-sectional drawings, catalogues, assembly drawings and other relevant documents so as to enable the Employer to identify and finalize order for recommended spares.

12. The bidder shall guarantee the long term availability of spares to the Employer for the full life of the equipment covered under the Contract. The bidder shall guarantee that before going out of production of spare parts of the equipment covered under the Contract, he shall give the Employer at least 2 years advance notice so that the latter may order his bulk requirement of spares, if he so desires. Further, in case of discontinuance of manufacture of any spares by the bidder and/or his Sub-vendors, bidder will provide the Employer, two years in advance, with full manufacturing drawings, material specifications and technical information including information on alternative equivalent makes required by the Employer for the purpose of manufacture/procurement of such items.

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ANNEXURE- III**1.01.00 INSPECTION AND TESTS DURING MANUFACTURE**

1.01.01 The method and techniques to be used by the Bidder for the control of quality during manufacture of all plant and equipment shall be agreed with the Owner.

1.01.02 The Owner's general requirements with respect to quality control and the required shop tests are set out elsewhere in this specification.

1.01.03 Before any item of plant or equipment leaves its place of manufacture, the Owner shall be given the option of witnessing inspections and tests for compliance with the specification and related standards.

1.01.04 Advance notice shall be given to the Owner as agreed in the Contract, prior to the stage of manufacture being reached, and the piece of plant must be held at this stage until the Owner has inspected the piece, or has advised in writing that inspection is waived. If having consulted the Owner and given reasonable notice in writing of the date on which the piece of plant will be available for inspection, the Owner does not attend, the Bidder may proceed with manufacturing having forwarded to the Owner duly certified copies of his own inspection and test results.

The owner's representative shall have at all reasonable times access to bidder's or his sub-vendor's premises and shall have power to inspect/ examine materials and workmanship or equipment under manufacture.


The Bidder shall forthwith forward to the engineer duly certified copies of the Test Certificates in six copies (one to the Purchaser and five to the Consulting Engineer) for approval. Further nine (9) copies of Shop Test Certificates shall be bound with Instruction Manuals referred to elsewhere in the specification.

For electrical equipment, routine tests as per relevant IS/International standard as detailed in the specification are to be carried out on all equipment. Type tests are also to be carried out on selected equipment as detailed in the specifications of the electrical equipment concerned.

1.01.05 Under no circumstances, any repair or welding of castings be carried out without the consent of the Engineer. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Engineer.

1.01.06 All the individual and assembled rotating parts shall be statically and dynamically balanced at the works. Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Bidder shall allow for trial assembly prior to dispatch from place of manufacture.

1.01.07 All materials used for the manufacture of equipment covered under this specification shall be of tested quality. Relevant test certificates shall be made available to the Purchaser. The certificates shall include tests for mechanical properties and chemical analysis of representative

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material. Equipment or parts coming under any statutory Regulations shall be certified by a Competent Authority under the regulations in the specified format.

1.01.08 All pressure parts connected to pumping main shall be subjected to hydraulic testing at a pressure of 150% of shut-off head for a period not less than one hour. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than one hour.

1.01.09 All necessary non-destructive examinations shall be performed to meet the applicable code requirements.

1.01.10 All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination magnaflux and ultrasonic testing shall be employed wherever necessary/ recommended by the applicable code. At least 10% of all major but welding joints shall be radiographed unless otherwise stipulated.


Bidder's scope shall include to preparation of all necessary documents, co-ordination and follow-up for above approval related to bidder's works. Owner shall only forward assistance/ endorsement of documents /design /drawings /reports/records to be submitted for approval as stipulated/ required by Statutory Authorities till registration of the unit and clearance for commercial operation.

1.02.00 PERFORMANCE TESTS AT SITE


1.02.01 The full requirements for testing the system shall be agreed between the Owner and the Bidder subject to end-Customer's approval. The completely erected System shall be tested by the Bidder on site under normal operating conditions. The Bidder shall also ensure the correct performance of the System under abnormal conditions, i.e. the correct working of the various emergency and safety devices, interlocks, etc.

1.02.02 The Bidder shall provide complete details of his normal procedures for testing, for the quality of erection and for the performance of the erected plant. These tests shall include site pressure test on all erected pipe work to demonstrate the quality of the piping and the adequacy of joints made at site.


1.02.03 The Bidder shall furnish the quality procedures to be adopted for assuring quality from the receipt of material at site, during storage, erection, pre-commissioning to tests on completion and commissioning of the complete system/equipment.

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1.03.00	SPECIFIC INSPECTION REQUIREMENT FOR COMPONENTS/EQUIPMENTS
1.	Hydro-cyclones
a.	Visual
b.	Dimensional etc.
2.	Pumps :
c.	All pressure parts shall be hydraulically tested at 150% of the shut-off head or 200% of rated head, whichever is higher for 30 minutes. No leakage is allowed.
d.	Impeller and rotor shall be first statically balanced and then dynamically balanced according to ISO 1940 (in the case of impellers this shall be done before and after mounting of the service rotor shaft).
e.	Vibration levels measured on the non-rotating parts shall not exceed the zone limit "B" as defined in ISO 10816 at steady conditions and shall not exceed the zone limit "C" as defined in ISO 10816 at transient conditions.
f.	List of Non-Destructive test over and above the material test are as follows: Casing: Material test, Magnetic particle (MPI), DP and Hydro test, as applicable Impeller- DPT and MPI as applicable Shaft- Ultrasonic (UT), DPT and MPI Sleeve- DP and Hardness test/ Manufacturer's recommendation Mechanical Seal- Manufacturer's recommendation. Base Plate- Stress relieving of weld. Replaceable Rubber liner- Shore Hardness, Class and Type certificate
g.	Vibration test and Noise level test shall be witnessed at shop. (as already stated above.)
h.	Mechanical running and the performance test shall be conducted for Pump at the Bidder's works before dispatch or where the test facilities are available. All pumps to be performance tested as per Hydraulic Institute Standard/Indian Standard. Performance test to include check for noise, vibration level and temperature rise.
i.	The Bidder shall conduct performance test for the remaining pump and submit the reports.
3.	Vacuum Belt Filters:
a.	Impeller, casing and shaft of vacuum pumps shall be tested for chemical and mechanical properties as per relevant standard. All plates above 40mm shall be 100% Ultrasonically tested.
b.	UT on shaft (if greater or equal to 40mm) and impeller shall be carried out.
c.	All vacuum pumps shall be tested at shop for capacity, power, pressure, efficiency, noise and vibration etc.
d.	Filter cloths and belts shall be tested for physical properties as per relevant Standard.

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4.	General Inspection Requirements to be considered are as below:				
1.	Sl.No.	Item	Inspection & Test Item	Remarks	
	1.	1.	Hydro-cyclones	Material certificate check	
			Dimensional Inspection		
	2.	2.	Pumps	Material certificate check	Shaft & impeller only
				Dimensional inspection	
				Non-destructive testing	DPT on shaft & impeller
				Hydrostatic test	
				Balancing Test	Static & dynamic
				Performance test	Incl. Noise & Vibration
	3.	3.	Motors	Material certificate check	
				Non Destructive Testing	
				Dimensional inspection	
				Balancing Test	Static & dynamic
				Function test	
	4.	4.	Vacuum Belt filter (with Accessories)	Material certificate check	
				Dimensional inspection	
				Function test	Short time no load test
	5.	5.	Vacuum Receiver	Material certificate check	
				Dimensional inspection	
				Hydrostatic Test	
	6.	6.	Belt Filter Vent Fan	Material certificate check	
				Dimensional inspection	
				Performance Test	
	7.	7.	Conveyor & Silo Extraction Device	Material certificate check	
				Dimensional inspection	
Function Test				Short time no load test	
8.	8.	Rubber lining Pipe	Dimensional inspection		
			Visual Inspection		
			Spark Test		
9.	9.	Flow Nozzles	Material certificate check		
			Dimensional Inspection		


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	10.	Control Panel	Insulation Resistance Test	
			Dielectric Strength Test	
			Function Test	
			Dimensional Inspection	
	11.	Control valve & valves	Material certificate check	
			Hydrostatic test	
			Seat leak test	
			Function test	
			Dimensional Inspection	
	12.	RTD	Material certificate check	
			Performance test	
			Hydrostatic test	
	13.	Shut off valve	Material certificate check	
			Hydrostatic test	
			Seat Leak test	
			Function Test	
			Dimensional Inspection	
	14.	Flow meter	Material certificate check	
			Calibration Test	
			Dimensional Inspection	
Hydrostatic test				
15.	Butterfly Valve	Material Certificate check		
		Non-destructive testing		
		Hydrostatic test		
		Operation test	Motorized valve only	
2.	Valves and Specialties shall be tested as per relevant standards / codes. Seat Leakage and hydraulic test to be carried out as per relevant standards /codes.			
3.	Pipes and fittings shall be tested as per relevant standards/ codes.			
4.	MQP (Manufacturing Quality Plan) shall be submitted by the bidder along with the technical offer. Above mentioned item-wise inspection requirement is tentative only and shall be mutually discussed and finalized during detail engineering.			

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5.	Bidder shall furnish written copies of shop production, fabrication and quality test procedures and drawings to be used for review by BHEL / BHEL's Customer prior to manufacture. Inspection of above mentioned tests by BHEL/ BHEL's Customer representative at bidder's works is envisaged
6.	The Bidder shall furnish performance test procedure along with standard. The test procedure will be reviewed and approved by the BHEL / BHEL's Customer.
7.	A dynamic balancing certificates stating that the rotating assembly has been balanced dynamically shall be sent to BHEL/ BHEL's Customer within one (1) week of the successful completion of balancing.
8.	Vibration levels shall be measured during shop running/performance tests.
9.	For surfaces with rubber lining, Welding shall be visually inspected to verify the absence of rough area and unacceptable transition between surfaces which prevent the adequate adherence of rubber. The acceptance criteria shall be as per latest standard.
10.	For surfaces with rubber lining, degree of cleaning shall be visually checked before the application of the coating. There must be no area with oxidation, dirt or partially or generalized corrosion defects.
11.	Test certificates shall be issued for each lot of raw material used in the coating, corresponding to specific weight and traction resistance.
12.	For surfaces with rubber lining, adherence test shall be conducted on production samples. Adherence test shall be conducted on the actual surface through hammering. In order to verify the absence of air pockets (or) surface without adherence.
13.	For surfaces with rubber lining, Coating thickness shall be checked at 100%. A High voltage porosity test will be conducted on 100 % of the coated surface.
14.	Equipment shall not be released for shipment, until shop tests data and performance tests curves have been approved by Owner.
15.	Bidder should furnish performance guarantee as per applicable standard guarantee for the design, manufacture, material and safe operation of the equipment's.
16.	BHEL/BHEL's Customer of their authorized third party inspection agency representative shall witness the test at Bidder's works and a notice of minimum three (3) weeks shall be given for attending the inspection.
17.	Bidder to arrange all calibrated gauges, Instruments during inspection at works and also during performance test at site. All inspection, measuring and test equipment(s) used by Bidder shall be calibrated (<i>at accredited laboratory, as applicable</i>) periodically depending on its use and criticality of the test/measurement to be done. The Bidder shall maintain all the relevant records of periodic calibration and instrument identification, and shall produce the same for inspection by the Owner. Wherever asked specifically, the Bidder shall re-calibrate the measuring/test equipment in the presence of Project Manager/Inspector.
18.	Mechanical running test shall be carried out for Vacuum Belt Filter, Vacuum Pump & Belt Filter Wash Pump. Bidder to arrange Motor for the shop test and inspection.
19.	In case, order is placed on a foreign vendor (i.e. supplies from outside India), vendor will tie-up with BHEL approved inspection agency on their own cost and carry out inspection as per the Quality Plan approved by BHEL/ BHEL's Customer. Vendor shall furnish BHEL the inspection reports and other documents required as per approved Quality plan duly signed by the Inspection Agency after their witness for our review and acceptance.

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	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		QUALITY PLAN				SPEC. NO : PE-TS-434-571-A901		DATE:	
			CUSTOMER : M/s PVUNL (A JV of M/s NTPC & M/s JBVNL)				QP NO.: PE-V0-434-571-A001		DATE: 24.09.2020	
			PROJECT: 3x800 MW PATRATU TPS				PO NO.:		DATE:	
			ITEM: GYPSUM DEWATERING EQUIPMENT		SYSTEM: FGD PACKAGE		SECTION: FGD		SHEET 1 of 10	

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	C/ N				D	M	C	N	

1.0 RAW MATERIAL (*Material shall be as per Drawing)


1.1	Vacuum pump	Physical & Chemical for impeller, casing, shaft.	MA	Physical	100%		Approved Drawing/Data sheet	Approved Drawing/Data sheet	TC	√	P	V	V	NOTE-5
		NDT of Impeller, casing, shaft, sleeve	MA	DPT	100%		Approved Drawing/Data sheet	Approved Drawing/Data sheet	IR	√	P	V	V	NOTE-5
		Balancing of Rotating Parts	MA	Static & Dynamic Balancing	100%		IS/ISO 21940-11	IS/ISO 21940-11	IR	√	P	V	V	NOTE-5
		NDT of Impeller & Shaft	MA	UT	100%		ASTM A 388/ASME Sec. V	ASTM A 388/ASME Sec. V	IR	√	P	V	V	UT of shaft $\geq \phi$ 40mm NOTE-5
1.2	Speed reducer	Visual, dimensional, Run test including oil leakage, Temp.	MA	Visual	100%		Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	IR	√	P	V	V	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

748361/2022/PS-PEM-MAX

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		QUALITY PLAN				SPEC. NO : PE-TS-434-571-A901		DATE:	
			CUSTOMER : M/s PVUNL (A JV of M/s NTPC & M/s JBVNL)				QP NO.: PE-V0-434-571-A001		DATE: 24.09.2020	
			PROJECT: 3x800 MW PATRATU TPS				PO NO.:		DATE:	
			ITEM: GYPSUM DEWATERING EQUIPMENT		SYSTEM: FGD PACKAGE		SECTION: FGD		SHEET 2 of 10	

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/ N				*	D	M	C	
1	2	3	4	5	6		7	8	9		**			
					M	C/ N								
		rise, Noise level and vibration												
1.3	AC Drive													Refer Electrical AC Drive SQP for details.
1.4	Belt	Visual & review of test certificate (Tensile, Elongation, Thickness)	MA	Visual	100%		Approved Drawing/Data sheet	Approved Drawing/Data sheet	TC	√	P	V	V	
1.5	Filter Cloth	Physical Properties (Tensile, Elongation, Thickness, air permeability test, etc.)	MA	Physical	100%		Approved Drawing/Data sheet	Approved Drawing/Data sheet	TC	√	P	V	V	
1.6	Water Pump/ Slurry Pump	Chem. & Mech. Properties of Impeller, Casting,	MA	Chemical Mechanical	100%		Approved Drawing/Data sheet	Approved Drawing/Data sheet	TC	√	P	V	V	UT of shaft $\geq \phi$ 40mm *Lining if applicable

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

748361/2022/PS-PEM-MAX

SL NO.		COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS				
1		2	3	4	5	6		7	8	9	*	**			
						M	C/ N				D	M	C	N	
			Shaft, Lining*												
			Balancing of Rotating Parts	MA	Static & Dynamic Balancing	100%		IS/ISO 21940-11	IS/ISO 21940-11	IR	√	P	V	V	
			Hydro test of casing	MA	Static pressure testing	100%		Approved Drawing/Data sheet	Approved Drawing/Data sheet	IR	√	P	V	V	Hydrostatic testing of casings for 30min.at 1.5 times of shut-off head or 2 times pump rated head which ever higher.
			NDT of Impeller, casing, shaft, sleeve	MA	DPT	100%		Approved Drawing/Data sheet	Approved Drawing/Data sheet	IR	√	P	V	V	
			NDT of Impeller & Shaft	MA	UT	100%		ASTM A 388/ASME Sec. V	ASTM A 388/ASME Sec. V	IR	√	P	V	V	UT of shaft ≥φ 40mm

BHEL					BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY		Sign & Date		Doc No:	Sign & Date	Name	Seal
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Reviewed by:		
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI			Reviewed by:		
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL			Approved by:		

748361/2022/PS-PEM-MAX

SL NO.		COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS	
1		2	3	4	5	6		7	8	9	*	**		
						M	C/ N				D	M	C	N
1.12		Instruments (Transmitters, Switches, Gauges, RTD etc.)												Refer Instruments (Transmitters, Switches, Gauges, RTD etc.) SQP
2.0	FINAL INSPECTION (Vacuum belt filter assembly)													
2.1	Vacuum belt filter assembly	Dimensional	MA	Dimensional	100%	100%	Approved Drawing	Approved Drawing	IR	√	P	W	V	
		Run test(for 30 minutes)	MA	Visual, Measurement	100%	100%	Approved Drawing	Approved Drawing	IR	√	P	W	V	
2.2	All components required paints.	Paint Finish, Paint Thickness, High voltage porosity test	MA	Measurement	100%	100%	Approved Drawing/Data sheet	Approved Drawing/Data sheet	IR	√	P	W	V	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			



MANUFACTURER/ BIDDER/ SUPPLIER
NAME & ADDRESS

QUALITY PLAN

SPEC. NO : PE-TS-434-571-A901

DATE:

CUSTOMER : M/s PVUNL (A JV of M/s NTPC & M/s JBVNL)

QP NO.: PE-V0-434-571-A001

DATE: 24.09.2020

PROJECT: 3x800 MW PATRATU TPS

PO NO.:

DATE:

ITEM: GYPSUM DEWATERING EQUIPMENT

SYSTEM: FGD PACKAGE

SECTION: FGD


SHEET 5 of 10

748361/2022/PS-PEM-MAX

SL NO.		COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1		2	3	4	5	6		7	8	9	*	**			
						M	C/ N				D	M	C	N	
2.3		Vacuum pump/ Water Pump/ Slurry Pump	Dimension, Capacity, power, pressure, efficiency, noise, vibration, temperature rise	MA	Measurement	100%	100%	Approved Drawing/Data sheet	Approved Drawing/Data sheet	IR	√	P	W	V	NOTE-5
3	VACCUM TANK/STRUCTURES/DUCTS/HOPPERS (RAW MATRIAL INSPECTION)														
3.1		Plates for shell and dished ends & structural, Ducts and Hoppers	Chemical & Physical	MA	Chemical & Physical	1 /Heat		Approved Data Sheet /Drawing	Approved Data Sheet /Drawing	TC	√	P	V	V	
4.0	IN PROCESS CONTROLS														
4.1		Welding (As applicable)	WPS,PQR,WPQ	CR	Visual	100%		ASME Sec, IX	ASME Sec, IX	Report	√	P	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Sign & Date		Name	Seal
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI						
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL						
Approved by:											


748361/2022/PS-PEM-MAX

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		QUALITY PLAN				SPEC. NO : PE-TS-434-571-A901		DATE:	
			CUSTOMER : M/s PVUNL (A JV of M/s NTPC & M/s JBVNL)				QP NO.: PE-V0-434-571-A001		DATE: 24.09.2020	
			PROJECT: 3x800 MW PATRATU TPS				PO NO.:		DATE:	
			ITEM: GYPSUM DEWATERING EQUIPMENT		SYSTEM: FGD PACKAGE		SECTION: FGD		SHEET 7 of 10	

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/ N				*	D	M	C	
1	2	3	4	5	6		7	8	9	*	**			
					M	C/ N				D	M	C	N	
4.2	Stress Relieving	Physical	MA	Physical	100%		Approved Drg./ Datasheet	Approved Drg./ Datasheet	HT chart	√	P	V	V	As applicable
4.3	Plates for structures, Ducts, Hoppers	NDT	MA	UT	100%	100%	ASTM A 435	ASTM A 435	IR	√	P	W	V	Only for thickness>40 mm
4.4	Welds	Weld Defect	MA	DPT	100%/ 10 %	100%/ 10%	Approved Drg./ Datasheet/ ASME Sec – VIII Div.1	Approved Drg./ Datasheet/ ASME Sec – VIII Div.1	IR	√	P	W	V	Note-7
				MPI	100%/ 10 %		Approved Drg./ Datasheet/ ASME Sec – VIII Div.1	Approved Drg./ Datasheet/ ASME Sec – VIII Div.1	IR	√	P	V	V	Note-7
				RT	100%/ 10%		Approved Drg./	Approved Drg./	IR	√	P	V	V	Note-7

BHEL					BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY		Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal		Sign & Date	Name	Seal
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI			Reviewed by:		
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL			Approved by:		

748361/2022/PS-PEM-MAX

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS			QUALITY PLAN				SPEC. NO : PE-TS-434-571-A901			DATE:		
				CUSTOMER : M/s PVUNL (A JV of M/s NTPC & M/s JBVNL)				QP NO.: PE-V0-434-571-A001			DATE: 24.09.2020		
				PROJECT: 3x800 MW PATRATU TPS				PO NO.:			DATE:		
				ITEM: GYPSUM DEWATERING EQUIPMENT		SYSTEM: FGD PACKAGE		SECTION: FGD			SHEET 8 of 10		

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS	
					M	C/ N				*	D	M	C		N
1	2	3	4	5	6		7	8	9		**				
					M	C/ N					D	M	C	N	
							Datasheet/ ASME Sec – VIII Div.1	Datasheet/ ASME Sec – VIII Div.1							
5.0	FINAL INSPECTION (Complete Equipment/ System)														
5.1	Complete Equipment/ System	Dimensional	MA	Dimension	100%	100%	Approved Drawing	Approved Drawing	Approved Drawing	√	P	W	V	NOTE-5	
		Nozzle Orientation	CR	Dimension	100%	100%	Approved Drawing	Approved Drawing	IR	√	P	W	V	NOTE-5	
		Hydro Test	CR	Hydro Test	100%	100%	2X working PR or 1.5x design PR Whichever is higher for 30 minutes	2X working PR or 1.5x design PR Whichever is higher for 30 minutes	IR	√	P	W	V	NOTE-5	
		Pneumatic Test of RF pads for soundness /leakages	CR	Pneumatic Test	100%	100%	ASME SEC – VIII / appd. Drg/ appd. Datasheet	ASME SEC – VIII /appd. Drg/ appd. Datasheet	IR	√	P	W	V	*as applicable NOTE-5	
5.2(a)	Rubber Lining of tank	Spark test	MA	Electrical	100%		Approved datasheet	Approved datasheet	IR	√	P	V	V	Spark test 10-12.5KV min.	

BHEL					BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY		Sign & Date		Doc No:			
Sign & Date	Name		Sign & Date	Name	Seal		Sign & Date	Name	Seal	
Prepared by:	RAJESH RANJAN		Checked by:	ASHISH PANIGRAHI			Reviewed by:			
Reviewed by:	SUBHASHISH GUPTA		Reviewed by:	RK JAISWAL			Approved by:			

748361/2022/PS-PEM-MAX


SL NO.		COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS		
1		2	3	4	5	6		7	8	9	*	**			
						M	C/ N				D	M	C	N	
5.2(b)		Rubber Lining of tank	Hardness testing	MA	Physical	100%	100%	Approved datasheet	Approved datasheet	IR	√	P	W	V	Shore hardness value shall be within 60. NOTE-5
5.3		Junction Box													Refer Junction Box SQP for details
5.4		Painting & Marking	Paint Finish, Thickness, HV porosity test	MA	Visual	100%	100%	Appd. Drg /Data Sheet	Appd. Drg /Data Sheet	IR	√	P	V	V	NOTE-5
5.5		Packing	Proper Packing	MA	Visual	100%	100%	BHEL packing specification	BHEL packing specification	Packing List	√	P	W	V	NOTE-5,8
5.6		Quality Dossier	Document	MA	Visual	100%	100%	Compilation of documents	Compilation of documents	Quality Dossier	√	P	V	V	

LEGENDS:

*RECORDS, IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
 ** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, C: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, N: CUSTOMER,
 P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE
 MA: MAJOR, MI: MINOR, CR: CRITICAL
 IR: INTERNAL REPORT D: DOCUMENTATION
 RT: RADIOGRAPHY TEST UT: ULTRASONIC TEST DPT: DIE PENETRANT TEST MPI: MAGNETIC PARTICLE INSPECTION

BHEL					BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY		Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal		Sign & Date	Name	Seal
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI			Reviewed by:		
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL			Approved by:		


748361/2022/PS-PEM-MAX

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS			QUALITY PLAN				SPEC. NO : PE-TS-434-571-A901		DATE:			
								CUSTOMER : M/s PVUNL (A JV of M/s NTPC & M/s JBVNL)		QP NO.: PE-V0-434-571-A001		DATE: 24.09.2020	
				PROJECT: 3x800 MW PATRATU TPS				PO NO.:		DATE:			
				ITEM: GYPSUM DEWATERING EQUIPMENT		SYSTEM: FGD PACKAGE		SECTION: FGD		SHEET 10 of 10			
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS	
1	2	3	4	5	6		7	8	9	*	**		
					M	C/ N					D	M	

NOTES:

- ORIGINAL TCS/ PHOTOCOPIES CERTIFIED IN ORIGINAL BY MILL SHALL BE FURNISHED FOR REVIEW .
- IN CASE OF FOREIGN SUPPLIER, ALL TEST CERTIFICATES SHALL BE FURNISHED BY THE SUPPLIER, DULY WITNESSED/ VERIFIED BY SUPPLIER'S TPI.
- BHEL RESERVES THE RIGHT FOR CONDUCTING REPEAT TEST, IF REQUIRED.
- DURING TESTING ONLY CALIBRATED MEASURING AND TESTING INSTRUMENT IS TO BE USED AND. CALIBRATION CERTIFICATES ARE NEEDED TO BE FURNISHED DURING INSPECTION.
- THESE TESTS/CHECKS ARE INDICATIVE ONLY. FURTHER TESTS MAY BE ADDED BASED ON END CUSTOMER REQUIREMENT AND WILL BE FINALISED DURING DETAILED ENGINEERING.
- ALL PIPES AND FITTINGS SHALL BE TESTED AS PER APPLICABLE CODE.
- NDT REQUIREMENT:
 - DPT: 100% DPT ON ROOT RUN OF BUTT WELD, NOZZLE WELDS AND FINISHED FILLET WELDS BY MANUFACTURER. REPORTS TO BE FURNISHED FOR REVIEW DURING INSPECTION. 10% DPT ON ALL FINISHED BUTT WELDS TO BE WITNESSED BY INSPECTING AGENCY.
 - MPI: FOR STRUCTURAL STEEL WELDS: PLATES OF 25MM<=THICKNESS<32MM- 100% MPI; FOR PLATES OF THICKNESS <25MM-10% MPI. EDGE FOR SHOP WELD SHALL BE EXAMINED BY MPI FOR PLATE THICKNESS >= 32MM
 - RT: BUTT WELDS OF DISHED ENDS SHALL BE STRESS RELIEVED AND SUBJECTED TO 100% RT. 10% RT (COVERING ALL 'T'/CROSS JOINTS) OF BUTT WELDS. FOR STRUCTURAL STEEL WELDS: 100% RT ON BUTT-WELDS OF PLATE THICKNESS>= 32MM
- MATERIAL SHALL BE PACKED SUITABLY IN ORDER TO AVOID DAMAGE DURING TRANSIT AND ALSO DURING STORAGE AT SITE IN TROPICAL CLIMATE CONDITIONS.
- LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS (IS/ ASME/ IEC ETC.) INDICATED IN QP SHALL BE REFERRED.

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL				
ENGINEERING			QUALITY			Sign & Date		Doc No:				
	Sign & Date	Name		Sign & Date	Name	Seal		Sign & Date	Name	Seal		
Prepared by:		RAJESH RANJAN	Checked by:		ASHISH PANIGRAHI							
Reviewed by:		SUBHASHISH GUPTA	Reviewed by:		RK JAISWAL							

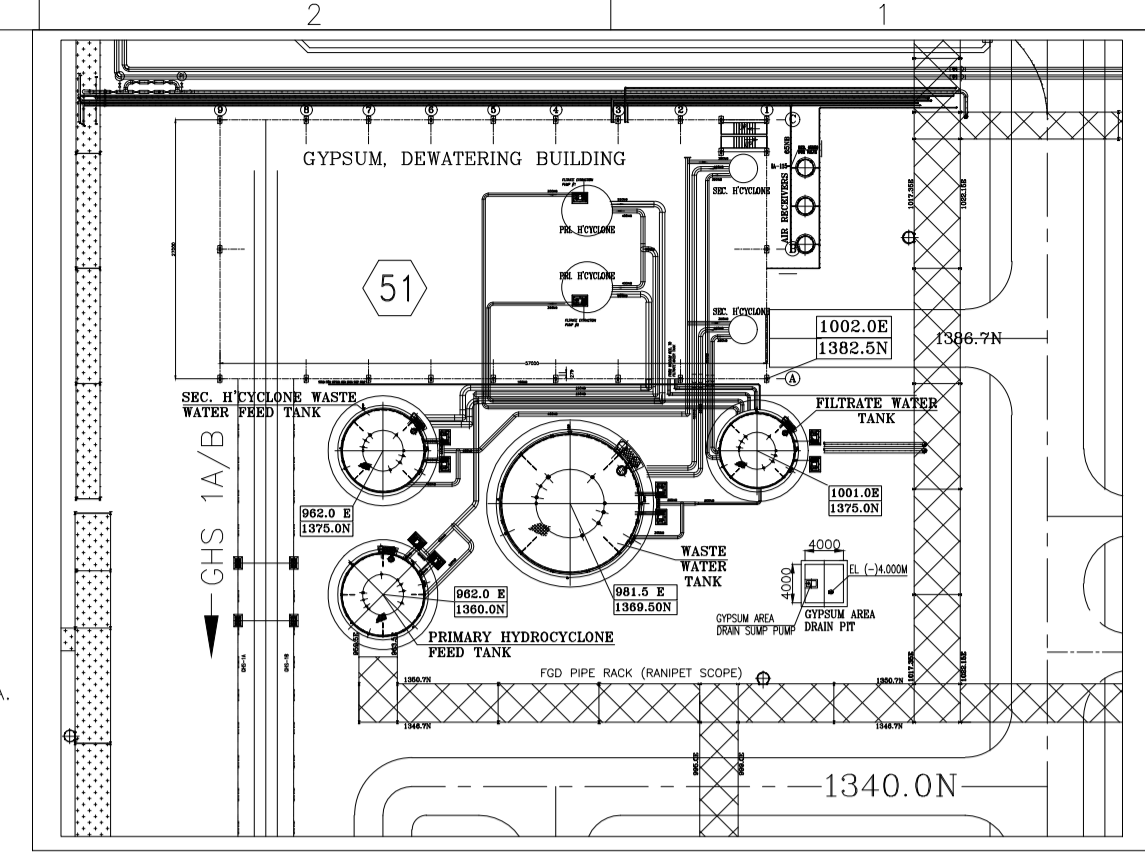
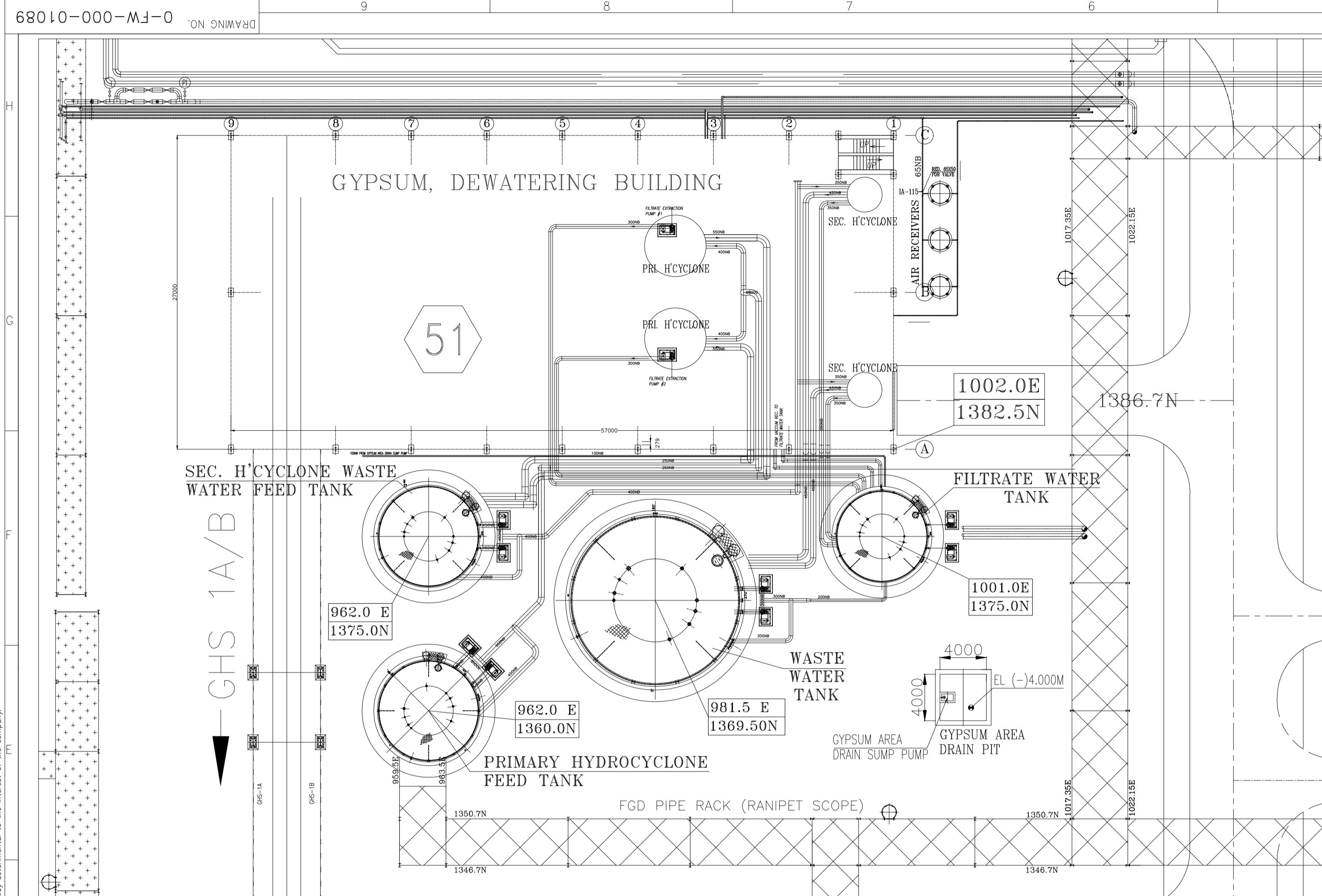
	3x800 MW PATRATU TPS GYPSUM DEWATERING EQUIPMENT TECHNICAL SPECIFICATION INPUT DRAWING LIST	SPECIFICATION No: PE-TS-434-571-A901	
		SECTION : I	
		SUB-SECTION : D	
		REV. 00	
		SHEET 1 OF 1	

ANNEXURE-IV

INPUT DRAWINGS BY BHEL

Sl.No.	Drawing Title	PVUNL/NTPC Drawing No.
1.	General arrangement of Dewatering building	9585-001-109-PVM-B-046
2.	P&ID - Legends & Notes	9585-001-109-PVM-F-025
3.	P&ID of Primary Hydrocyclone with Dewatering System	9585-001-109-PVM-F-011
4.	P&ID of Vacuum Belt filter & Wash Tanks	9585-001-109-PVM-F-029
5.	Typical Scheme of Filtrate Extraction Pump	PE-FEP-00
6.	P&ID of Secondary Hydrocyclone	9585-001-109-PVM-F-026
7.	P&ID of Filtrate Water System	9585-001-109-PVM-F-015
8.	P&ID of Waste Water Discharge System	9585-001-109-PVM-F-014
9.	GA of Gypsum Handling Conveyor	9585-001-155-PVM-B-034
10.	Plant Layout of FGD System	9585-001-109-PVM-F-001
11.	Plot Plan	9585-001-999-POC-F-001

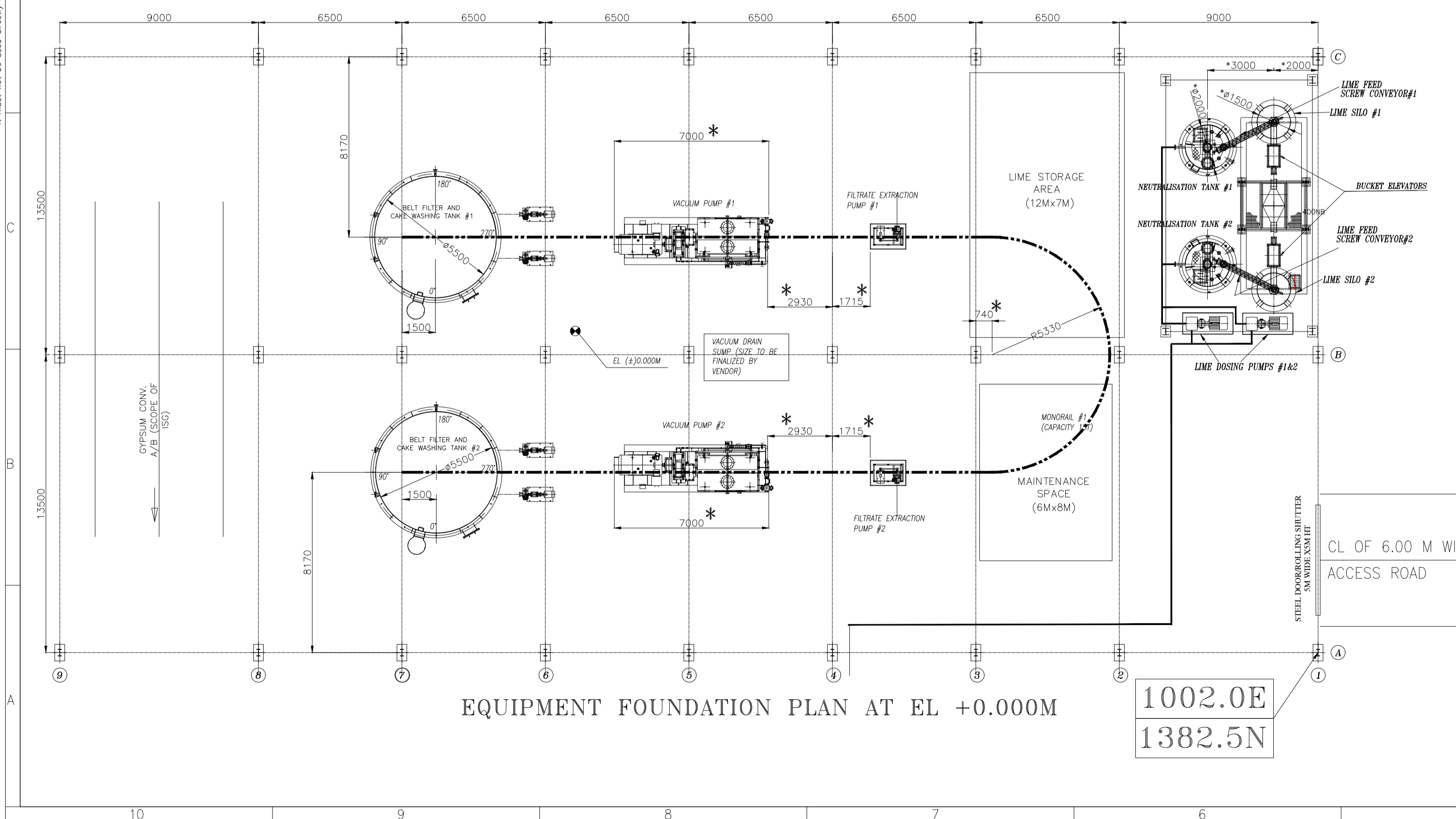
FIRST ANGLE PROJECTION ALL DIMENSIONS ARE IN MM



- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETERS AND ELEVATIONS IN METERS, UNLESS OTHERWISE SPECIFIED.
 - EL (±)0.00M IS FFL OF POWER HOUSE BUILDING WHICH CORRESPONDS TO RL (+)375.50M
 - THIS DRAWING IS TENTATIVE CONSIDERING NOT-TO-EXCEED LOADS, BUILDING CIVIL DRAWING SHALL BE PREPARED ACCORDINGLY.
 - FLOOR OPENINGS, PIPE CROSSINGS SHALL BE FINALIZED DURING DETAILED ENGINEERING.
 - FLOOR ELEVATIONS INDICATED TO BE USED FOR CIVIL DESIGN. EQUIPMENT FINALIZATION AS PER GDS/LDS VENDOR DATA AFTER ORDER PLACEMENT.
 - DETAILS OF STAIRCASE, SUITABLE DOORS, WINDOWS, VENTILATORS SHALL BE PROVIDED IN DRAWINGS AT SL. 12, 13 & 14 OF REFERENCE DRAWING TABLE. GA &
 - REFER NTPC DRG. NO 9585-001-155-PVM-B-034 FOR LOAD DATA OF GYPSUM BELT CONVEYOR.
 - DIMENSIONS MARKED AS * ARE TENTATIVE ONLY AND WILL BE CONFIRMED AS PER GDS/LDS VENDOR DATA.
 - IF REQUIRED, A SUITABLE CUTOUT WILL BE PROVIDED AT THE FLOOR (EL 14.00M) TO ACCOMMODATE BUCKET ELEVATOR OF LIME DOSING SYSTEM.

LIST OF EQUIPMENTS					
BQPT NO	NOS	DISCRIPTIONS	APPX WEIGHT OF EACH EQPT UNDER OPERATION	LOCATION	REMARKS.
1	02	VACUUM BELT FILTER	140 MT	ON FIRST FLOOR EL(+14.00)	THE EQUIPMENT COLUMNS WILL BE SUPPORTED ON THE FLOOR
2	02	SECONDARY HYDRO CYCLONE - (SET)	20 MT (INCLUDING SUPPORTING PLATFORMS)	ON SECOND FLOOR EL(+24.30)	THE EQUIPMENT HAS 4 COLUMNS WHICH WILL BE SUPPORTED ON THE FLOOR
3	02	NEUTRALISATION (LIME DOSING) TANK WITH AGITATOR	7.5 MT	GROUND FLOOR @ EL(+0.00)	SEPARATE FOUNDATION OR FLOOR MOUNTED AS PER CIVIL DESIGN
4	02	LIME FEED SCREW CONVEYER	2.5 MT	ABOVE NEUTRALISATION (LIME DOSING) TANK	THE SCREW CONVEYER WILL BE MOUNTED BELOW LIME SILO/HOPPER
5	02	LIME DOSING SILO/HOPPER, MANUAL GATE, MOTORIZED GATE, ROTARY FEEDER & SUPPORT STRUCTURE	15 MT (COMBINED WEIGHT INCLUDING SUPPORTS)	ABOVE NEUTRALISATION (LIME DOSING) TANK	LIME SILO WILL BE SUPPORTED ON PLATFORM ON SUPPORTING STRUCTURE
6	02	PRIMARY HYDROCYCLONE	15MT (INCLUDING SUPPORTING PLATFORMS)	ON SECOND FLOOR EL(+24.30)	PRIMARY HYDRO CYCLONE WILL BE SUITABLY SUPPORTED ON FLOOR
7	02	VACUUM PUMP & MOTOR	30 MT	GROUND FLOOR @ EL(+0.00)	FOUNDATION TO BE PROVIDED AS PER CIVIL DESIGN
8	02	VACUUM RECEIVER	15 MT	FIRST FLOOR @ EL(+14.00)	FLOOR MOUNTED
9	02	BELT FILTER(CLOTH) / CAKE WASH TANK WITH PUMPS & MOTORS	1 MT	GROUND FLOOR @ EL(+0.00)	SEPARATE FOUNDATION OR FLOOR MOUNTED AS PER CIVIL DESIGN
10	02	BUCKET ELEVATOR ASSY. (WITH SURGE HOPPER & VIBRATING FEEDER) FOR LIME FEED	20.5 MT	FROM GROUND FLOOR TO LIME STORAGE SILO TOP	THE BUCKET ELEVATOR IS MOUNTED ON RIT FLOOR AND WILL REACH TO LIME SILO TOP THROUGH SUPPORT STRUCTURE.
11	02	BAG FILTER WITH BLOWERS	0.6 MT	ON LIME STORAGE SILO PLATFORM	WHICH WILL BE SUPPORTED ON FLOOR
12	02	LIME DOSING PUMPS	0.3 MT	GROUND FLOOR @ EL(+0.00)	FOUNDATION TO BE PROVIDED AS PER CIVIL DESIGN
13	01	PRIMARY HYDROCYCLONE FEED TANK & PUMPS WITH MOTORS	AS PER REFERENCE DRG	OUTSIDE GDW BUILDING	SEPARATE FOUNDATION OR FLOOR MOUNTED AS PER CIVIL DESIGN
14	02	SECONDARY HYDROCYCLONE FEED TANK & PUMPS WITH MOTORS	AS PER REFERENCE DRG	OUTSIDE GDW BUILDING	FOUNDATION TO BE PROVIDED AS PER CIVIL DESIGN
15	01	FILTRATE WATER TANK & PUMPS WITH MOTORS	AS PER REFERENCE DRG	OUTSIDE GDW BUILDING	SEPARATE FOUNDATION OR FLOOR MOUNTED AS PER CIVIL DESIGN
16	01	WASTE WATER STORAGE TANK & PUMPS WITH MOTORS	AS PER REFERENCE DRG	OUTSIDE GDW BUILDING	FOUNDATION TO BE PROVIDED AS PER CIVIL DESIGN
17	02	FILTRATE EXTRACTION PUMPS & MOTORS	3 MT	GROUND FLOOR @ EL(+0.00)	FOUNDATION TO BE PROVIDED AS PER CIVIL DESIGN
18	02	PLATFORM FOR VACUUM BELT FILTERS	25 MT	AS SHOWN	FOUNDATION TO BE PROVIDED AS PER CIVIL DESIGN
19	02	DISCHARGE CHUTE	- MT	VBF DISCHARGE Ø14.0M	FOUNDATION TO BE PROVIDED AS PER CIVIL DESIGN

LIST OF REFERENCE DRAWINGS			
SL. NO	DRAWING NO.	DRAWING TITLE	AGENCY
1	9585-001-109-PVM-F-001	PLANT LAYOUT OF FGD SYSTEM	PEM/BAP
2	9585-001-109-PVM-Y-037	GENERAL ARRANGEMENT & DATA SHEET OF LIME DOSING SYSTEM INCLUDING SCHEME	PEM/VENDOR
3	9585-001-109-PVM-B-022	DATA SHEET & GENERAL ARRANGEMENT OF VACUUM BELT FILTER	PEM/VENDOR
4	9585-001-109-PVM-B-020	GA & DATA SHEET OF PRIMARY & SECONDARY DEWATERING HYDROCYCLONES	PEM/VENDOR
5	9585-001-155-PVM-L-003	FLOW DIAGRAM OF GYPSUM HANDLING SYSTEM	ISG
6	9585-001-155-PVM-B-034	GA OF CONVEYOR GBC 1A/1B	ISG/VENDOR
7	9585-001-155-PVM-B-019	GA DRAWING OF PRIMARY HYDRO CYCLONE FEED TANK	PEM/VENDOR
8	9585-001-155-PVM-B-023	GA DRAWING OF FILTRATE WATER TANK	PEM/VENDOR
9	9585-001-109-PVM-B-016	GA DRAWING OF SECONDARY HYDRO CYCLONE FEED TANK	PEM/VENDOR
10	9585-001-109-PVM-B-027	GA DRAWING OF WASTE WATER TANK	PEM/VENDOR
11	9585-001-109-PVM-B-023A (SHEET 3&4 OF 4)	GA DRAWING OF CAKE/BELT FILTER WASH TANKS	PEM/VENDOR
12	9585-001-315-PVC-C-1602	GYPSUM DEWATERING BLDG.- ARCHITECTURAL PLANS & FINISHING SCHEDULE	PEM
13	9585-001-315-PVC-C-1603	GYPSUM DEWATERING BLDG.- ARCHITECTURAL ELEVATIONS	PEM
14	9585-001-315-PVC-C-1604	GYPSUM DEWATERING BLDG.- ARCHITECTURAL SECTIONS	PEM



NTPC DRG No.: 9585-001-109-PVM-B-046

PROJECT: 3x800MW PATRATU SUPER THERMAL POWER PROJECT PHASE-I

OWNER: NTPC LIMITED

MAN CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA

JOB NO. 434 STATUS CONTRACT

REV.	DATE	ALTD	CHD	APPD

REV.	DATE	ALTD	CHD	APPD

TITLE: LAYOUT DETAILS OF GYPSUM DEWATERING BUILDING

DEPT. SCALE: BAP DRAWING NO. 0-FW-000-01089

SIGN DATE: SHEET 01 OF 02 REV.04

CAD FILE NAME: F:\3x800 MW Patratu _GDS\GDW patratu final_23.06.2021.dwg
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FIRST ANGLE PROJECTION ALL DIMENSIONS ARE IN MM

68010-000-MJ-0 DRAWING NO.

Indicate approach to platform and handrail

Furnish discharge chute sectional details. How discharge chute is bifurcated to each of the conveyor? Furnish detail arrangement

Provide platform along with handrail in each elevation for maintenance.

Indicate chute jam switch, inspection window

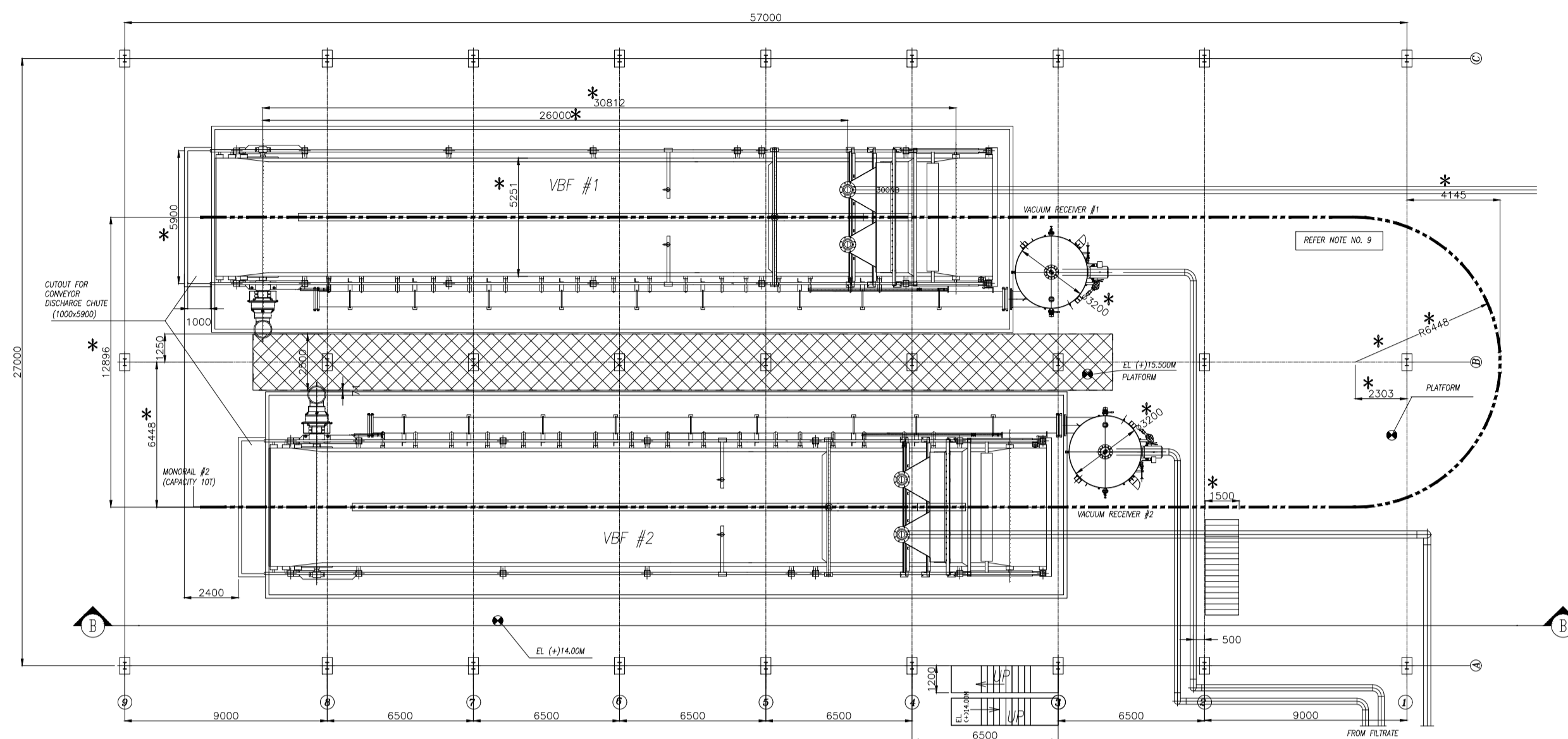
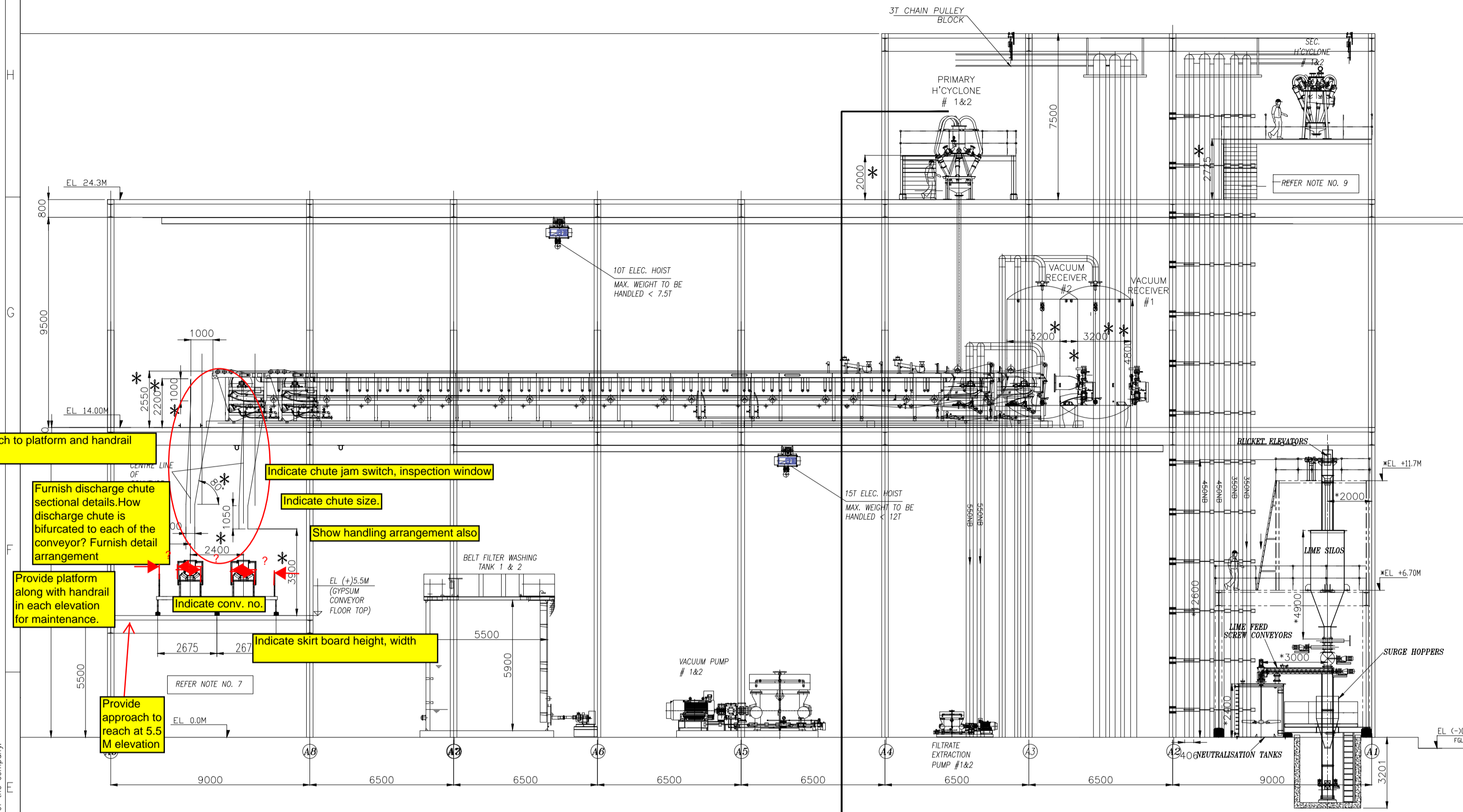
Indicate chute size.

Show handling arrangement also

Indicate conv. no.

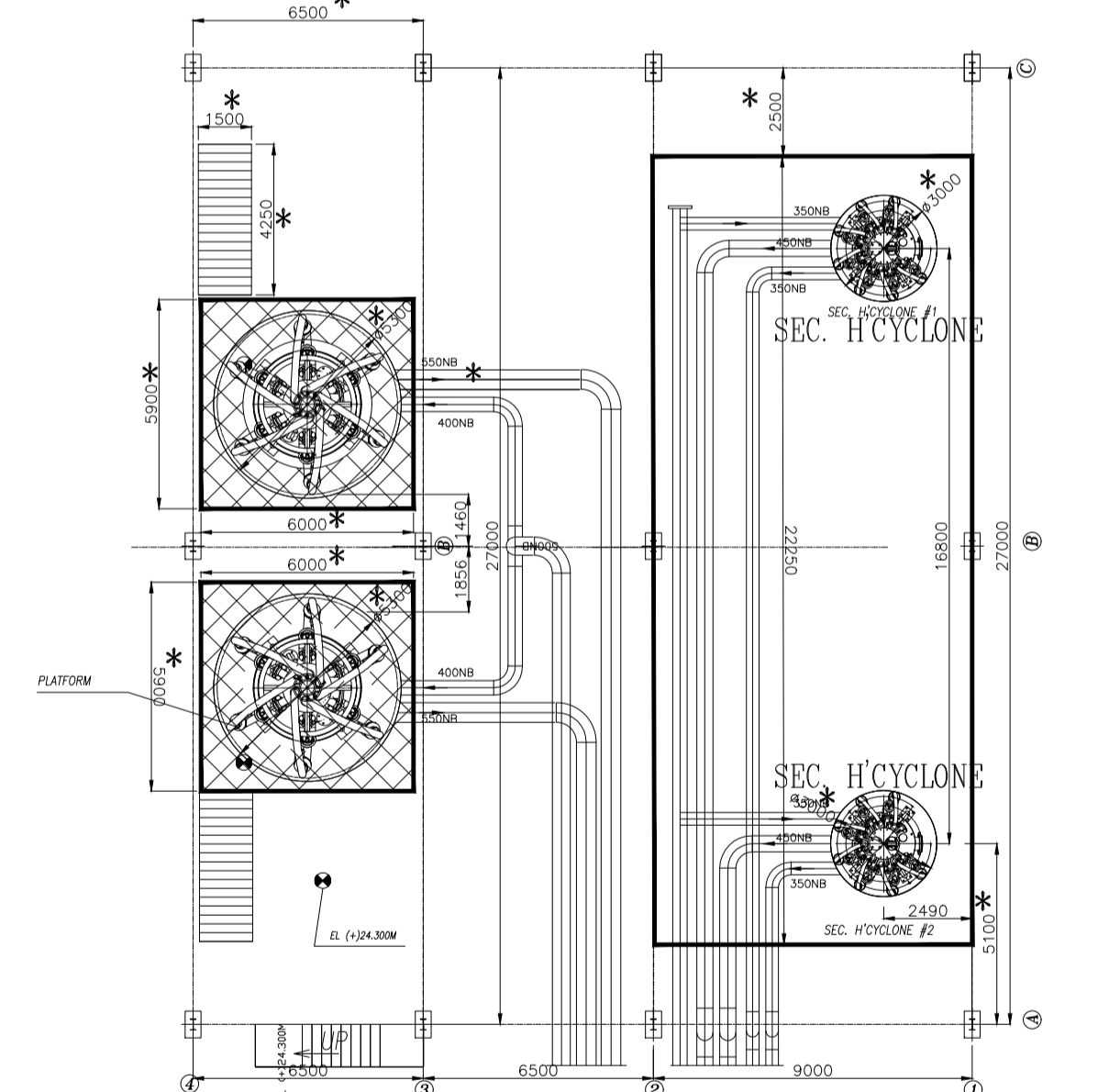
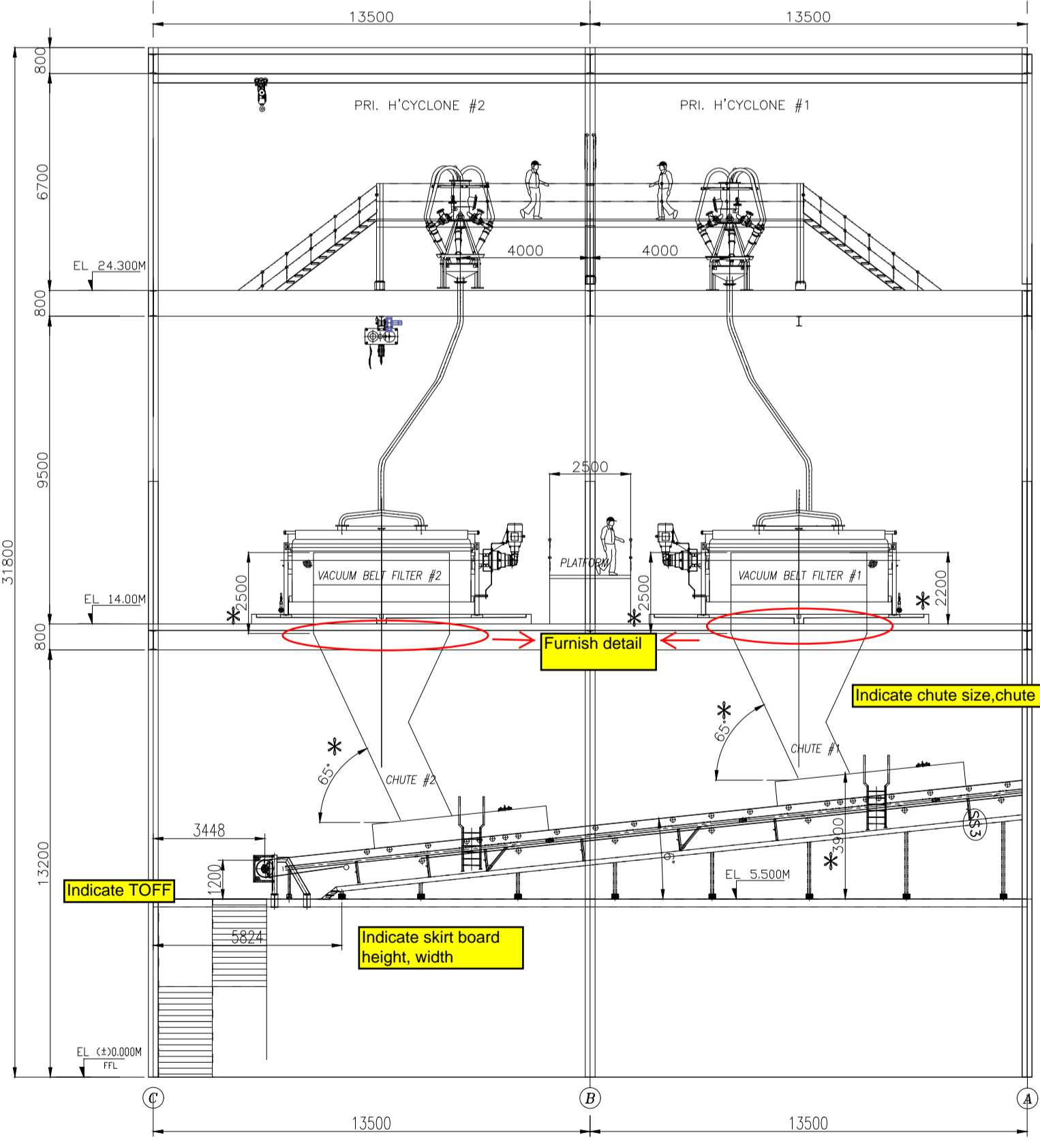
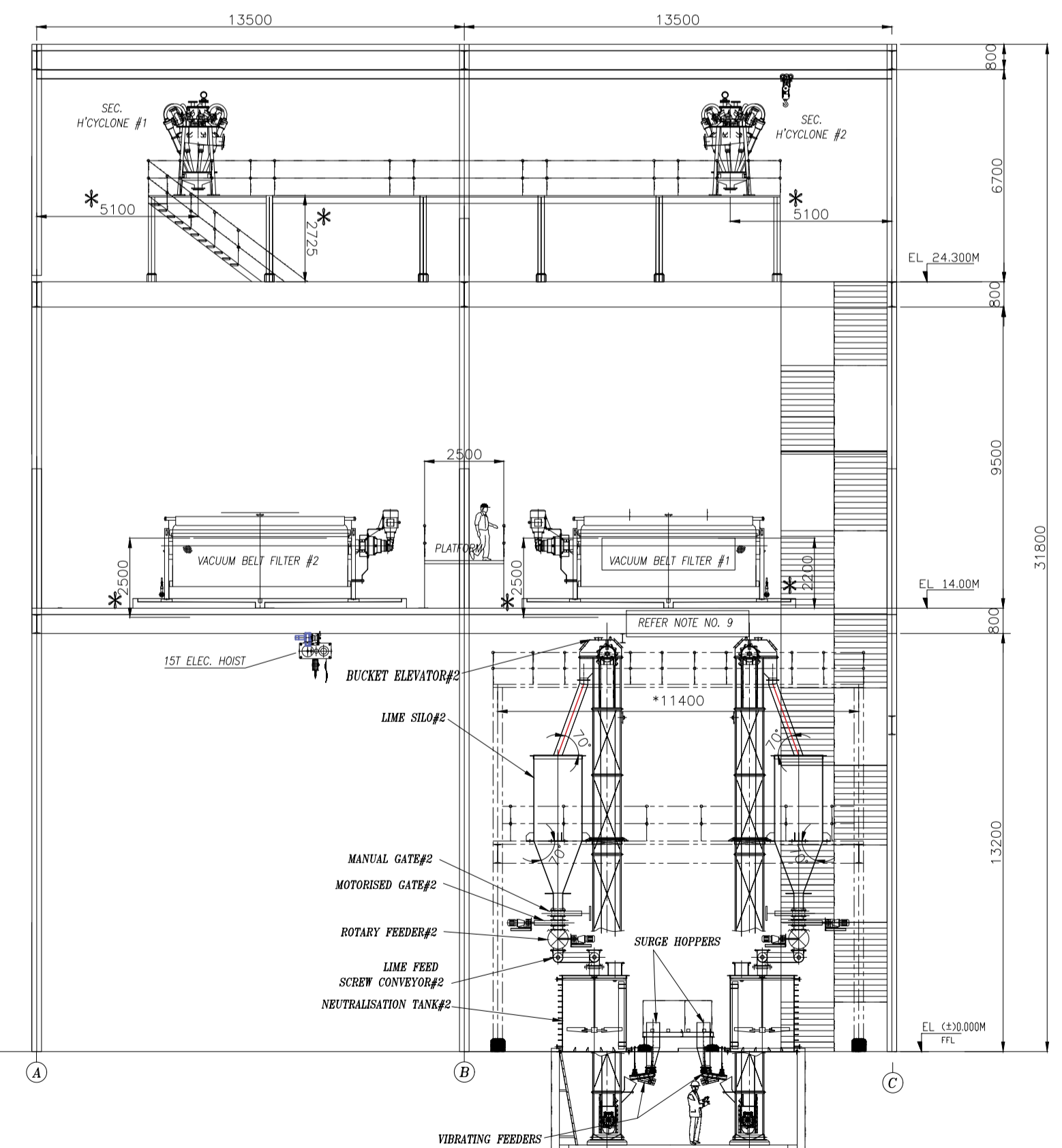
Indicate skirt board height, width

Provide approach to reach at 5.5 M elevation



Tentative Load data of all equipment shall be furnished in a tabular format for civil design.

SECTION - BB (TYPICAL)



EQUIPMENT FOUNDATION PLAN AT EL (+)24.300M

JOB NO.	434
STATUS	CONTRACT
DISTRIBUTION	
TO	
No. OF	

NTPC DRG No.: 9585-001-109-PVM-B-046
 PROJECT 3x800MW PATRATU SUPER THERMAL POWER PROJECT PHASE-I

OWNER	NTPC	NTPC LIMITED		
MAIN CONTRACTOR	BHARAT HEAVY ELECTRICALS LTD	POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA		
DEPT CODE	M			
DRN	YK	NAME	SIGN	DATE
DESIGN	RR			20.06.2021
CHKD	SG			20.06.2021
APPD	SKB			20.06.2021

TITLE LAYOUT DETAILS OF GYPSUM DEWATERING BUILDING

DEPT.	SCALE	BAP DRAWING NO.
SIGN		0-FW-000-01089
DATE		SHEET 02 OF 02 REV.04

CAD FILE NAME: F:\3x800 MW Patratu _GDS\GDW patratu final_23.06.2021.dwg

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A3

DRAWING No.

THIRD ANGLE PROJECTION	No. REQ'D
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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 CLOSES 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 ₂ 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) ₂ 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

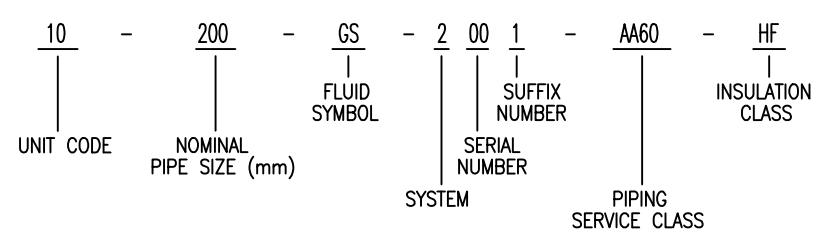
SERVICE CLASS	MATERIAL	FLUID SYMBOL
AA40	IIR RUBBER LINED PIPING	LS, WP, WC
AA60	IIR RUBBER LINED PIPING	GS,FS,WW,DD
BA01	Gr.304 STAINLESS STEEL PIPING	AI, LOL
BA02	Gr.304 STAINLESS STEEL PIPING	LOH
BA03	Gr.316L STAINLESS STEEL PIPING	WP, AO
CA01	CARBON STEEL GENERAL PIPING	AS,AO,AC,AF,LD
CC01	CARBON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

30 UNIT-3 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	10.12.18
	CHD P NAVEEN	10.12.18
M	APPD V KESAVAN	10.12.18

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

TITLE: P & ID - LEGENDS & NOTES (1/2)		SCALE: NTS
NTPC DRG NO. 9585-001-109-PVM-F-025		SH 01 of 02
BHEL DRG NO. 3-FW-000-00567	FILE NO. B240 - 00001	REV NO. 00

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THIRD ANGLE PROJECTION No. REQ'D **A3**

DRAWING No.

INSTRUMENT ABBREVIATION

	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
1	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		
2	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(TE)ST CONNECTION		
3	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
4	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 SWITCH
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

DEPT CODE	NAME (BHEL)	DATE
DRN	R YUVARAJ	10.12.18
CHD	P NAVEEN	10.12.18
APPD	V KESAVAN	10.12.18

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

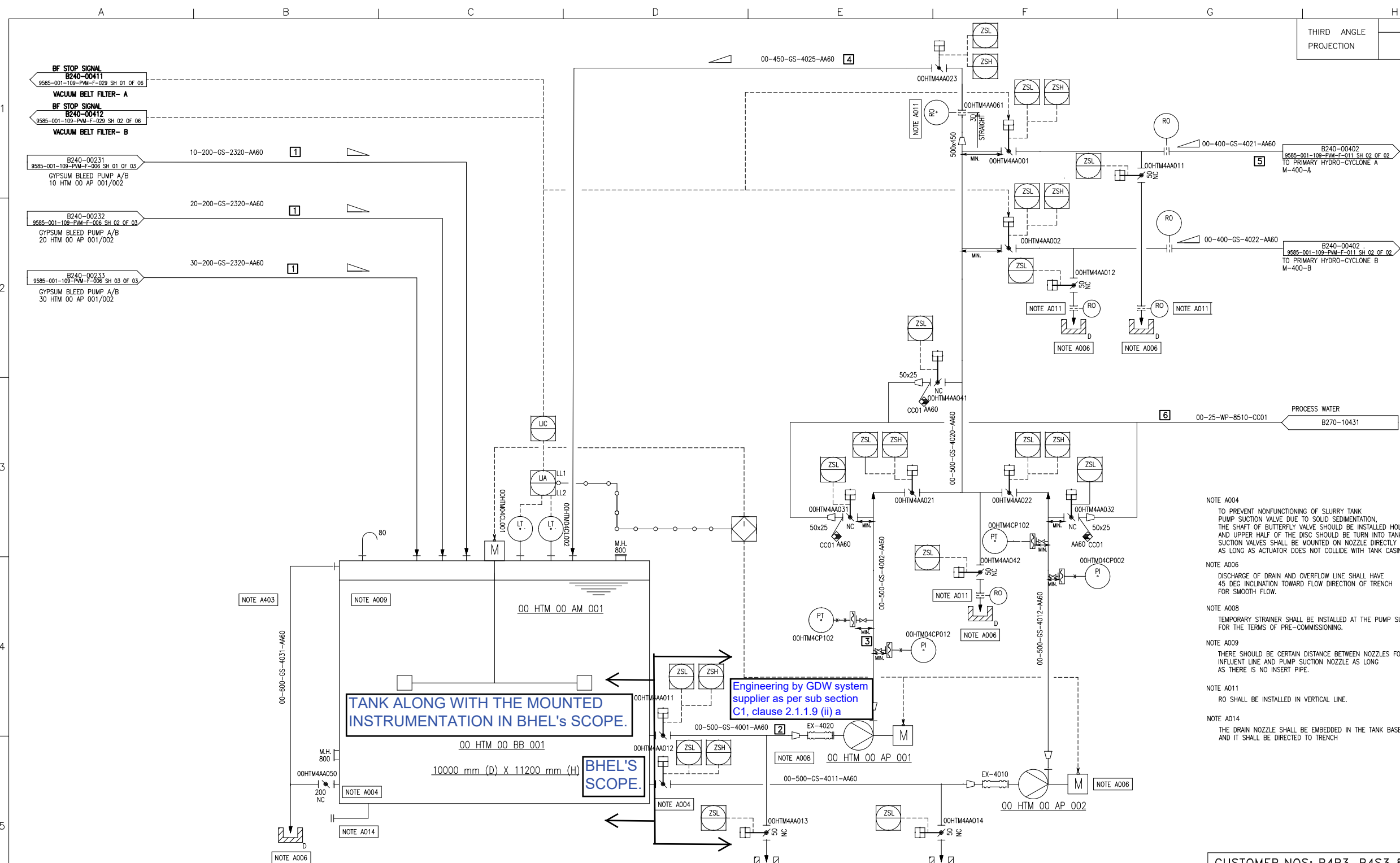
TITLE: P & ID - LEGENDS & NOTES (2/2)		SCALE: NTS
NTPC DRG NO. 9585-001-109-PVM-F-025		SH 02 of 02
BHEL DRG NO. 3-FW-000-00567	FILE NO. B240 - 00002	REV NO. 00

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THIRD ANGLE PROJECTION
No. REQ'D

A3
DRAWING No.



TANK ALONG WITH THE MOUNTED INSTRUMENTATION IN BHEL'S SCOPE.

BHEL'S SCOPE.

Engineering by GDW system supplier as per sub section C1, clause 2.1.1.9 (ii) a

- 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 A009
THERE SHOULD BE CERTAIN DISTANCE BETWEEN NOZZLES FOR INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG AS THERE IS NO INSERT PIPE.
- NOTE A011
RO SHALL BE INSTALLED IN VERTICAL LINE.
- NOTE A014
THE DRAIN NOZZLE SHALL BE EMBEDDED IN THE TANK BASE AND IT SHALL BE DIRECTED TO TRENCH

S NO	SECTION	FLOW m ³ /hr	TEMP (°C)	DENSITY kg/m ³
1	Gypsum bleed from Gypsum bleed pump	480.0	62.1	1177
2	Primary hydrocyclone feed pump suction	1420.0	62.1	1177
3	Primary hydrocyclone feed pump discharge	1420.0	62.1	1177
4	Recirculation flow	710.0	62.1	1177
5	Primary hydrocyclone flow	710.0	62.1	1177
6	Process water flow for flushing	3	36.0	994

00 HTM 00 BB 001 PRIMARY HYDRO-CYCLONE FEED TANK
 00 HTM 00 AM 001 PRIMARY HYDRO-CYCLONE FEED
 00 HTM 00 AP 001/002 PRIMARY HYDRO-CYCLONE FEED PUMP

CUSTOMER NOS: R4R3, R4S3 & R4S4

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

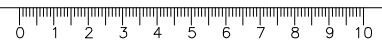
DEPT CODE	NAME (BHEL)	DATE
DRN	R.PRASANTH	13.12.19
CHD	R.YUVARAJ	13.12.19
APPD	P.NAVEEN	13.12.19

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

P & ID - PRIMARY HYDROCYCLONE
 SCALE: NTS

NTPC DRG NO. 9585-001-109-PVM-F-011 SH 01 of 02
 BHEL DRG NO. 3-FW-000-00560 FILE NO. B240 - 00401 REV NO. 02

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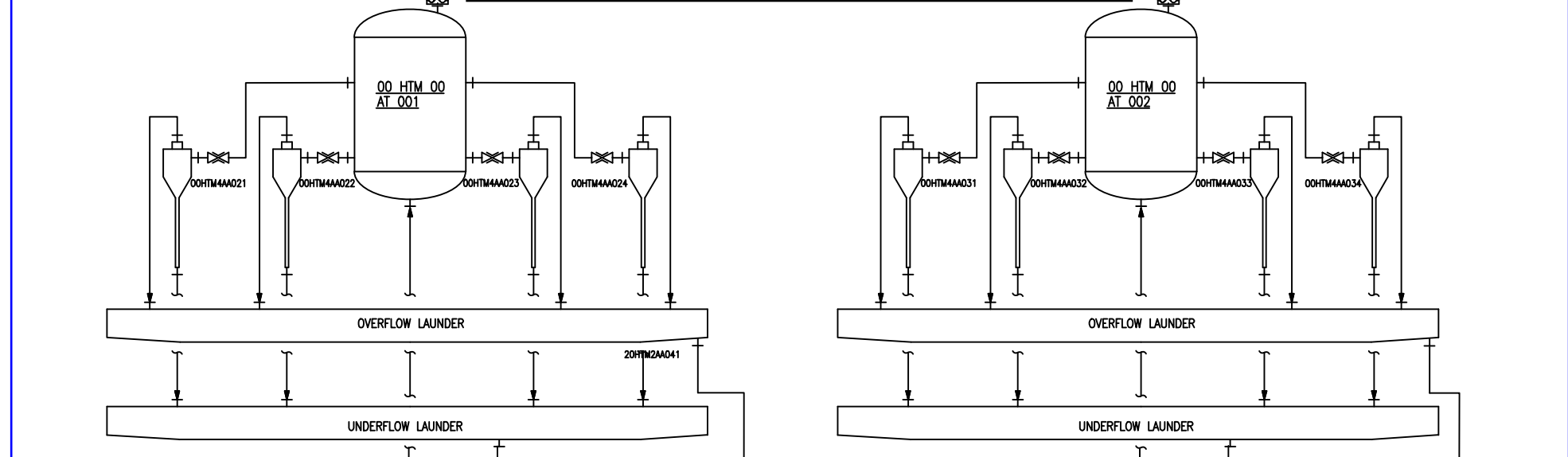


THIRD ANGLE PROJECTION No. REQ'D

A3

DRAWING No.

In Bidder's scope including U/F & O/F Launder.



B240-00402
9585-001-109-PVM-F-011 SH 01 OF 02
FROM PRIMARY HC FEED PUMP A/B
00 HTM 00 AP 001/002

Engineering & Supply by Bidder

00-400-GS-4021-AA60

Engineering by Bidder as per sub section C1, clause 2.1.1.9 (ii) a.

Engineering & Supply by Bidder

Engineering by Bidder as per sub section C1, clause 2.1.1.9 (ii) b.

Scope same as PHC-001

Engineering & supply by Bidder as per sub section C1, clause 2.1.1.9 (i) a

B240-00441
9585-001-109-PVM-F-026 SH 01 OF 02
TO SECONDARY WASTE WATER HYDROCYCLONE FEED TANK
00 HTM 04 BB 001

00-550-GS-4051-AA60

P&ID VACUUM BELT FILTER-B

B240-00412
9585-001-109-PVM-F-029 SH 02 OF 04
TO VACUUM BELT FILTER B
00 HTM 01 AT 002

B240-00441
9585-001-109-PVM-F-026 SH 01 OF 02
TO SECONDARY WASTE WATER HYDROCYCLONE FEED TANK
00 HTM 04 BB 001

P&ID VACUUM BELT FILTER-A

B240-00411
9585-001-109-PVM-F-029 SH 01 OF 04
TO VACUUM BELT FILTER A
00 HTM 01 AT 001

B240-00402
9585-001-109-PVM-F-011 SH 01 OF 02
FROM PRIMARY HC FEED PUMP A/B
00 HTM 00 AP 001/002

00-400-GS-4022-AA60

S NO	SECTION	FLOW m ³ /hr	TEMP (°C)	DENSITY kg/m ³
1	Primary hydrocyclone feed flow	710	62.1	1177
2	Primary hydrocyclone underflow	182	62.1	1360
3	Primary hydrocyclone overflow	528.0	62.1	1114

00 HTM 00 AT 001/002
PRIMARY HYDROCYCLONE A/B

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	13.12.19
CHD	R.YUVARAJ	13.12.19
APPD	P.NAVEEN	13.12.19

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

P & ID - PRIMARY HYDROCYCLONE
SCALE: NTS

NTPC DRG NO. 9585-001-109-PVM-F-011 SH 02 OF 02
BHEL DRG NO. 3-FW-000-00560 FILE NO. B240 - 00401 REV NO. 02

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THIRD ANGLE
No. REQ'D

A3

DRAWING No.

S NO	SECTION	FLOW m ³ /hr	TEMP(C)	DENSITY kg/m ³
1	Gypsum slurry line to belt filter	181.7	62.1	1360
2	Gypsum outlet from belt filter to gypsum handling system	122.9 TPH	53.2	900
3	Filtrate water from vacuum receiver to filtrate water tank	169.9	62.1	1006
4	Vacuum pump flow	LATER	LATER	LATER
5	Seal water to vacuum pump	93	36.0	990
6	Seal water return	93	36.0	990

- NOTE B003
SYSTEM COMPONENTS WRITTEN IN THE DRAWING ARE JUST DEFAULT. TYPE WILL BE SUBJECT TO CHANGE DUE TO VENDOR SELECTION.
- NOTE A402
BIRD SCREEN SHALL BE INSTALLED.
- NOTE A405
NOZZLE OF PRESSURE INDICATOR SHALL NOT HAVE A POCKET. IT MAY CAUSE REMAIN OF DRAIN.
- NOTE A406
CAKE WASH PIPING SHALL BE MOVABLE SO THAT ITS POSITION CAN BE ADJUSTED WELL DURING COMMISSIONING.
- NOTE A407
WASH, SEAL AND LUBRICATION WATER PIPING SHALL BE DESIGNED TO DISTRIBUTE WATER EQUALLY (EX. TO CONNECT SUPPLY LINE TO MIDDLE OF HEADER).
- NOTE B403
STRAINER CAN BE OMITTED IF ANOTHER ONE IS APPLIED UPSTREAM.
- NOTE B405
GYPSUM CHUTE SHALL BE DESIGNED VERTICALLY, NOT OBLIQUELY.

Complete System in Bidder scope EXCEPT:

1. Piping with accessories from Filtrate Extraction Pump to Filtrate Water Tank. Refer Scheme No. PE-FEP-00.
2. Associated drain of vacuum belt filters (drip tray) to filtrate tanks. Refer sub section C1, clause 2.1.1.9 (ii) f of the Specification.

CUSTOMER NOS: R4R3, R4S3 & R4S4

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

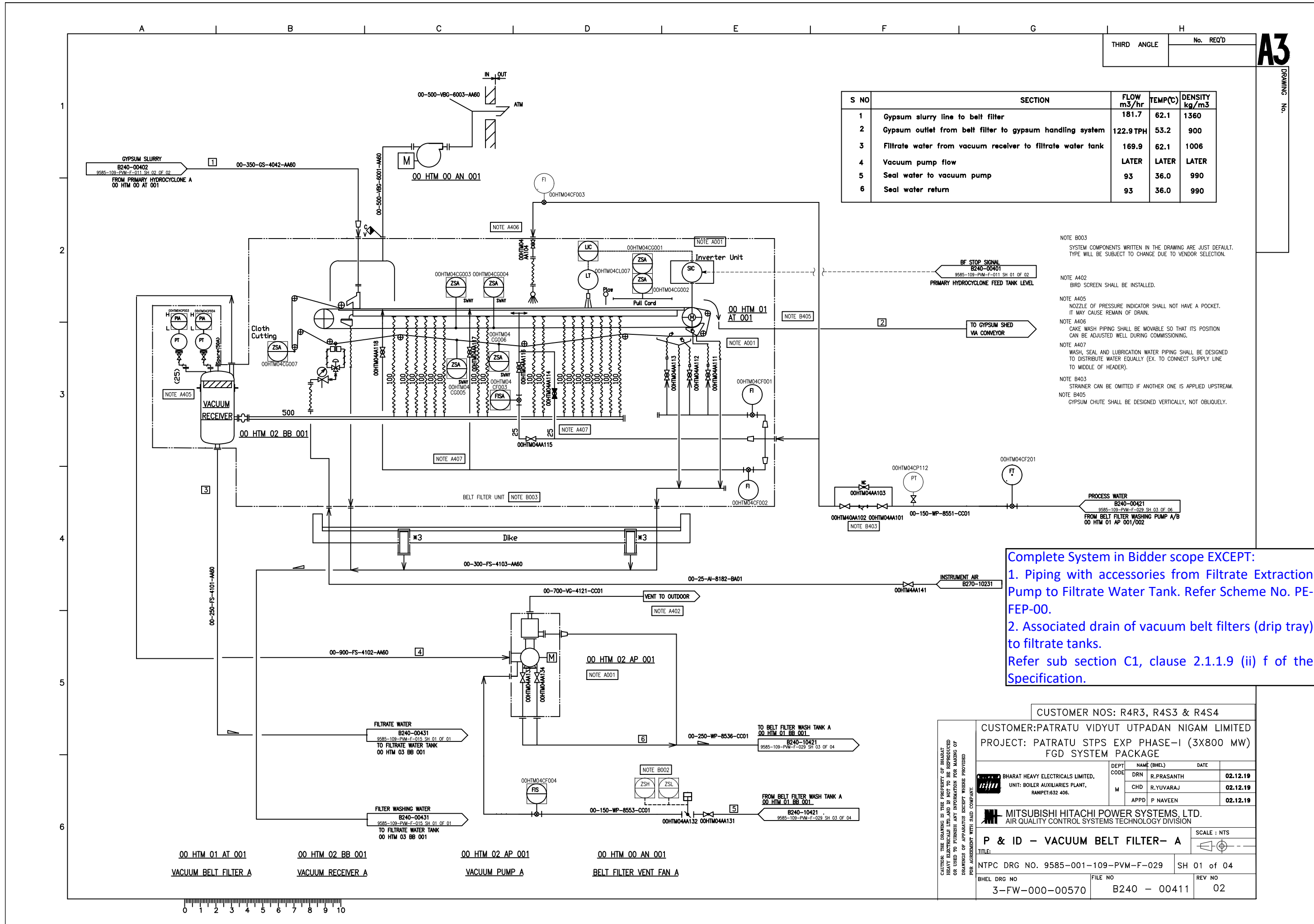
DEPT CODE	NAME (BHEL)	DATE
DRN	R.PRASANTH	02.12.19
CHD	R.YUVARAJ	02.12.19
APPD	P.NAVEEN	02.12.19

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

P & ID - VACUUM BELT FILTER- A

SCALE: NTS

NTPC DRG NO. 9585-001-109-PVM-F-029 SH 01 of 04
BHEL DRG NO. 3-FW-000-00570 FILE NO. B240 - 00411 REV NO. 02



00 HTM 01 AT 001 VACUUM BELT FILTER A
00 HTM 02 BB 001 VACUUM RECEIVER A
00 HTM 02 AP 001 VACUUM PUMP A
00 HTM 00 AN 001 BELT FILTER VENT FAN A

THIRD ANGLE	No. REQ'D
-------------	-----------

A3

DRAWING No.

S NO	SECTION	FLOW m ³ /hr	TEMP(°C)	DENSITY kg/m ³
1	Gypsum slurry line to belt filter	181.7	62.1	1360
2	Gypsum outlet from belt filter to gypsum handling system	122.9 TPH	53.2	900
3	Filtrate water from vacuum receiver to filtrate water tank	169.9	62.1	1006
4	Vacuum pump flow	LATER	LATER	LATER
5	Seal water to vacuum pump	93	36.0	990
6	Seal water return	93	36.0	990

NOTE B003
SYSTEM COMPONENTS WRITTEN IN THE DRAWING ARE JUST DEFAULT. TYPE WILL BE SUBJECT TO CHANGE DUE TO VENDOR SELECTION.

NOTE A402
BIRD SCREEN SHALL BE INSTALLED.

NOTE A405
NOZZLE OF PRESSURE INDICATOR SHALL NOT HAVE A POCKET. IT MAY CAUSE REMAIN OF DRAIN.

NOTE A406
CAKE WASH PIPING SHALL BE MOVABLE SO THAT ITS POSITION CAN BE ADJUSTED WELL DURING COMMISSIONING.

NOTE A407
WASH, SEAL AND LUBRICATION WATER PIPING SHALL BE DESIGNED TO DISTRIBUTE WATER EQUALLY (EX. TO CONNECT SUPPLY LINE TO MIDDLE OF HEADER).

NOTE B403
STRAINER CAN BE OMITTED IF ANOTHER ONE IS APPLIED UPSTREAM.

NOTE B405
GYPSUM CHUTE SHALL BE DESIGNED VERTICALLY, NOT OBLIQUELY.

Same scope as that of Belt filter -A.

CUSTOMER NOS: R4R3, R4S3 & R4S4

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

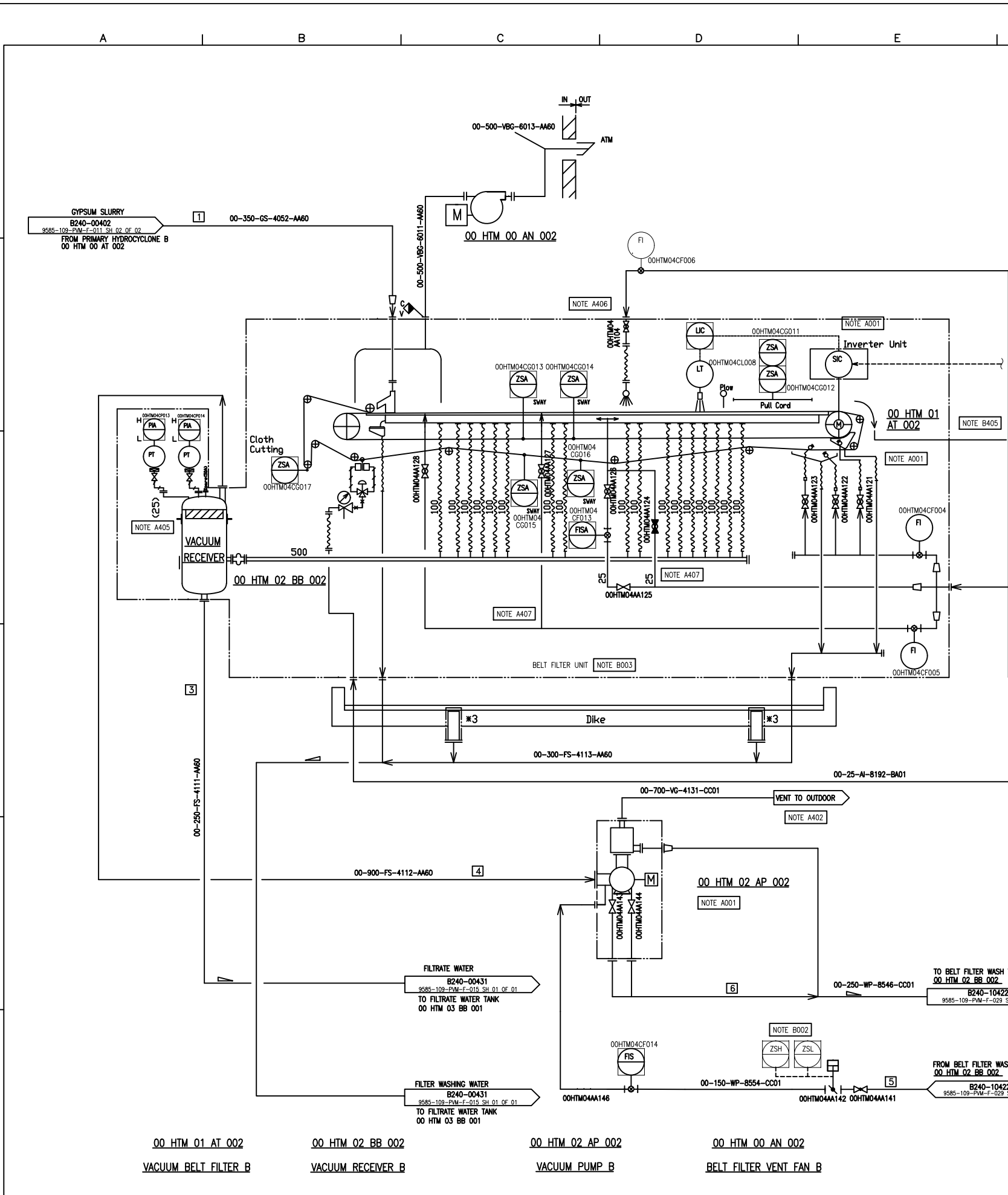
DEPT CODE	NAME (BHSL)	DATE
DRN	R.PRASANTH	02.12.19
CHD	R.YUVARAJ	02.12.19
APPD	P.NAVEEN	02.12.19

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

P & ID - VACUUM BELT FILTER- B

NTPC DRG NO. 9585-001-109-PVM-F-029	SH 02 of 04
BHEL DRG NO 3-FW-000-00570	FILE NO B240 - 00412
	REV NO 02

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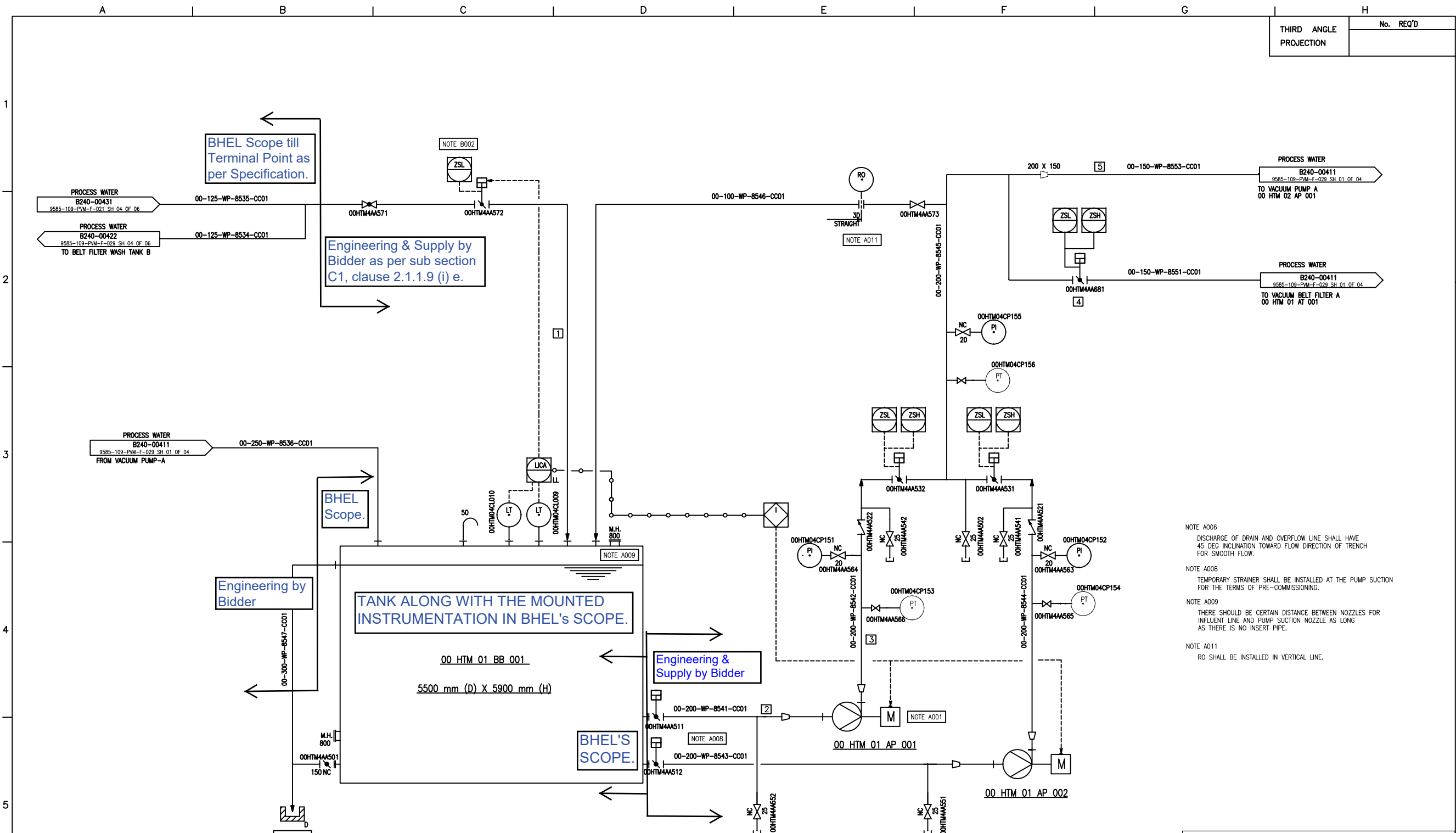


THIRD ANGLE PROJECTION

No. REQ'D

A3

DRAWING No.



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 INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG AS THERE IS NO INSERT PIPE.

NOTE A011
RO SHALL BE INSTALLED IN VERTICAL LINE.

TANK ALONG WITH THE MOUNTED INSTRUMENTATION IN BHEL'S SCOPE.

Engineering by Bidder

BHEL Scope till Terminal Point as per Specification.

Engineering & Supply by Bidder as per sub section C1, clause 2.1.1.9 (i) e.

Engineering & Supply by Bidder

00 HTM 01 BB 001
BELT FILTER WASH TANK A

00 HTM 01 AP 001/002
BELT FILTER WASHING PUMP A/B

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 CODE	NAME (BHEL)	DATE
	DRN	R.PRASANTH	02.12.19
	CHD	R.YUVARAJ	02.12.19
	APPD	P.NAVEEN	02.12.19

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

P & ID - VACUUM BELT FILTER (BELT FILTER WASH TANK A)

SCALE: NTS

NTPC DRG NO. 9585-001-109-PVM-F-029 SH 03 of 04

BHEL DRG NO. 3-FW-000-00570 FILE NO. B240 - 00421 REV NO. 02

S NO	SECTION	FLOW m ³ /hr	TEMP(C)	DENSITY kg/m ³
1	Process water to belt filter tank	93.2	36	990
2	At the suction of belt filter wash pump	225.0	36	990
3	At the discharge of belt filter wash pump	225.0	36	990
4	Process water to belt filter wash	93.2	36	990
5	Vacuum pump Seal water	93.2	36	990



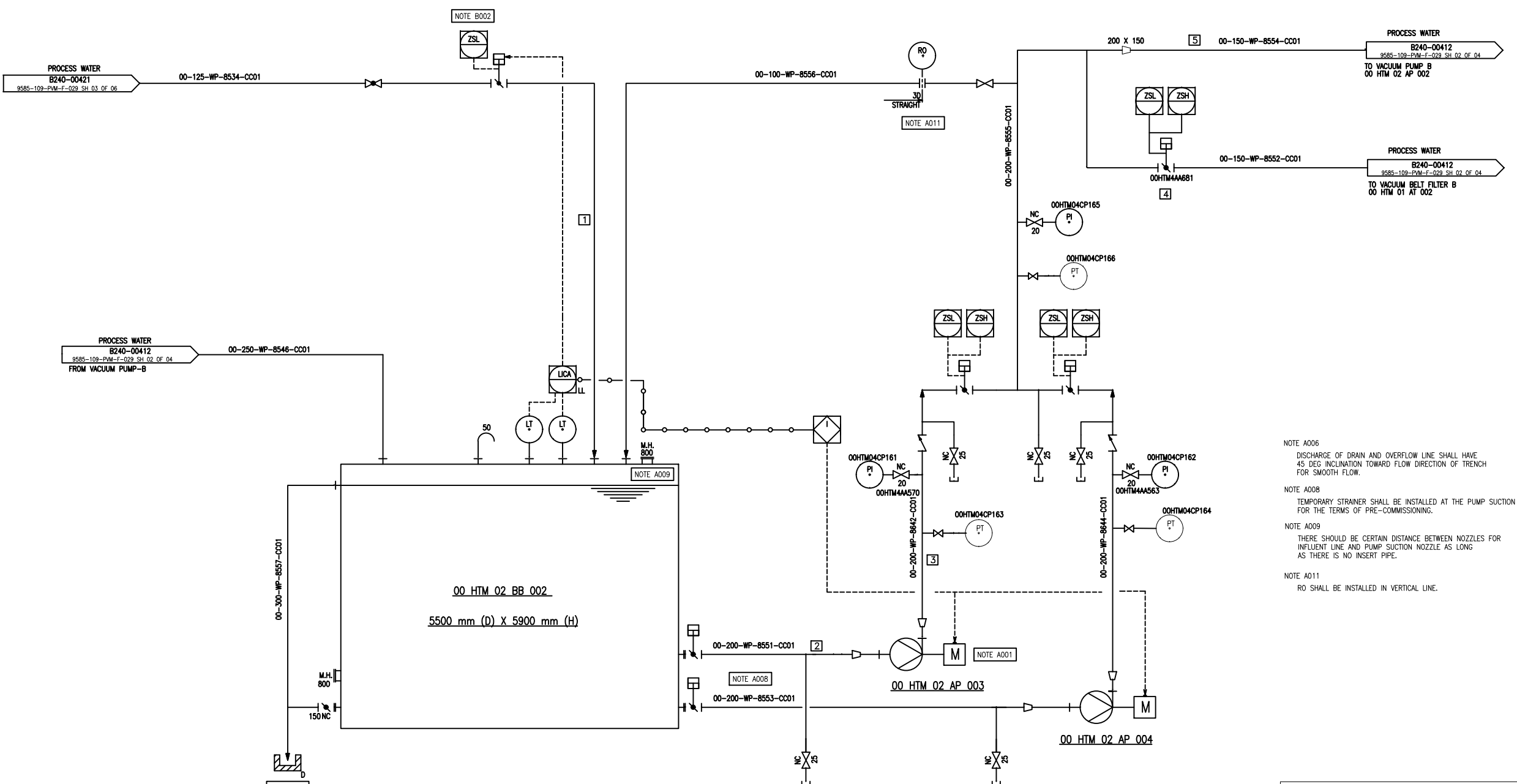
Same scope as that of Wash Tank - A

THIRD ANGLE PROJECTION
No. REQ'D

A3

DRAWING No.

1
2
3
4
5
6



- 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 INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG AS THERE IS NO INSERT PIPE.
- NOTE A011
RO SHALL BE INSTALLED IN VERTICAL LINE.

00 HTM 02 BB 002
BELT FILTER WASH TANK B

00 HTM 02 AP 003/004
BELT FILTER WASHING PUMP C/D

S NO	SECTION	FLOW m3/hr	TEMP(C)	DENSITY kg/m3
1	Process water to belt filter tank	93.2	36	990
2	At the suction of belt filter wash pump	225.0	36	990
3	At the discharge of belt filter wash pump	225.0	36	990
4	Process water to belt filter wash	93.2	36	990
5	Vacumm pump Seal water	93.2	36	990

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	02.12.19
CHD	R.YUVARAJ	02.12.19
APPD	P.NAVEEN	02.12.19

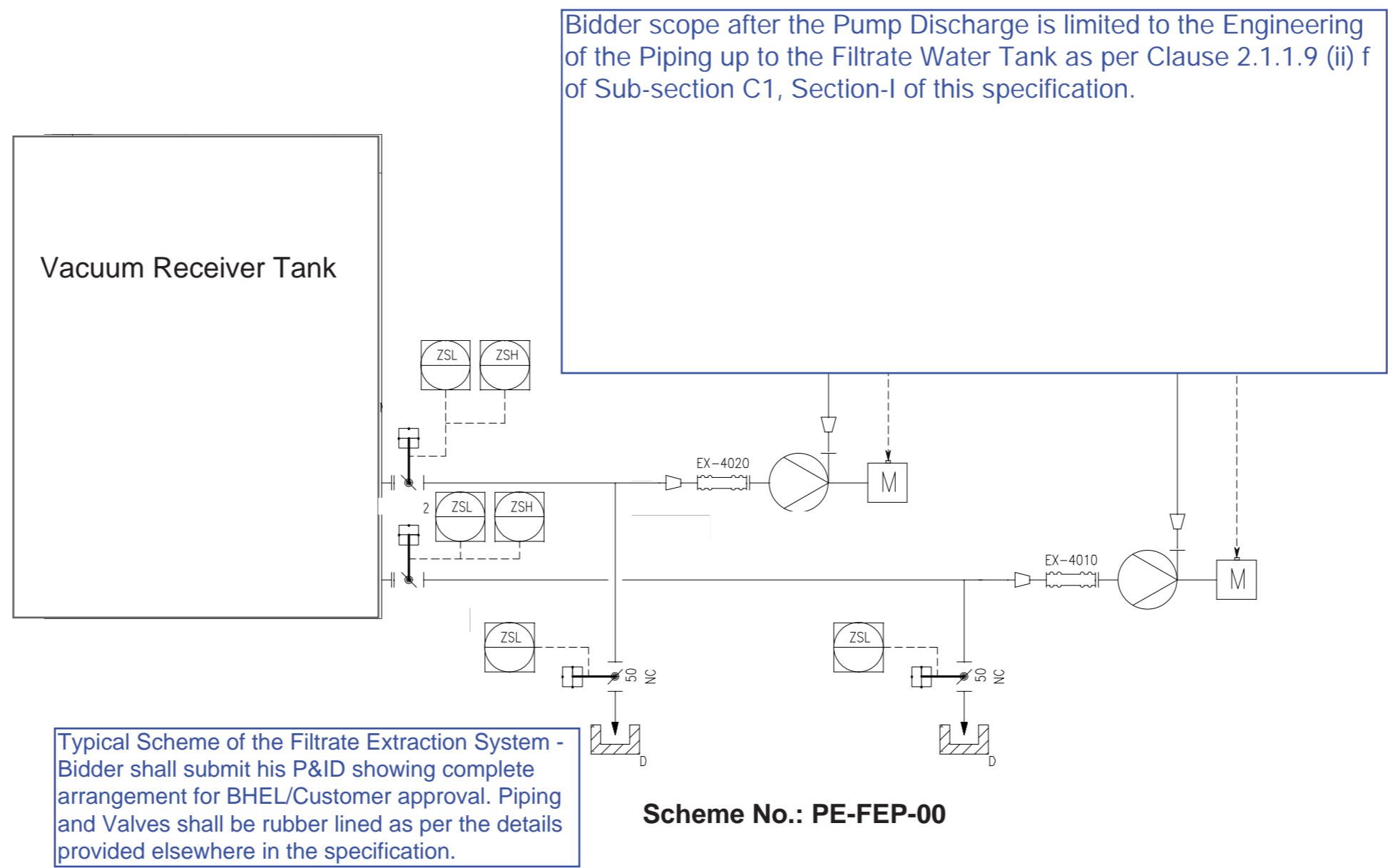
MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - VACUUM BELT FILTER (BELT FILTER WASH TANK B)

NTPC DRG NO. 9585-001-109-PVM-F-029		SH 04 of 04	
BHEL DRG NO	FILE NO	REV NO	
3-FW-000-00570	B240 - 00422	02	

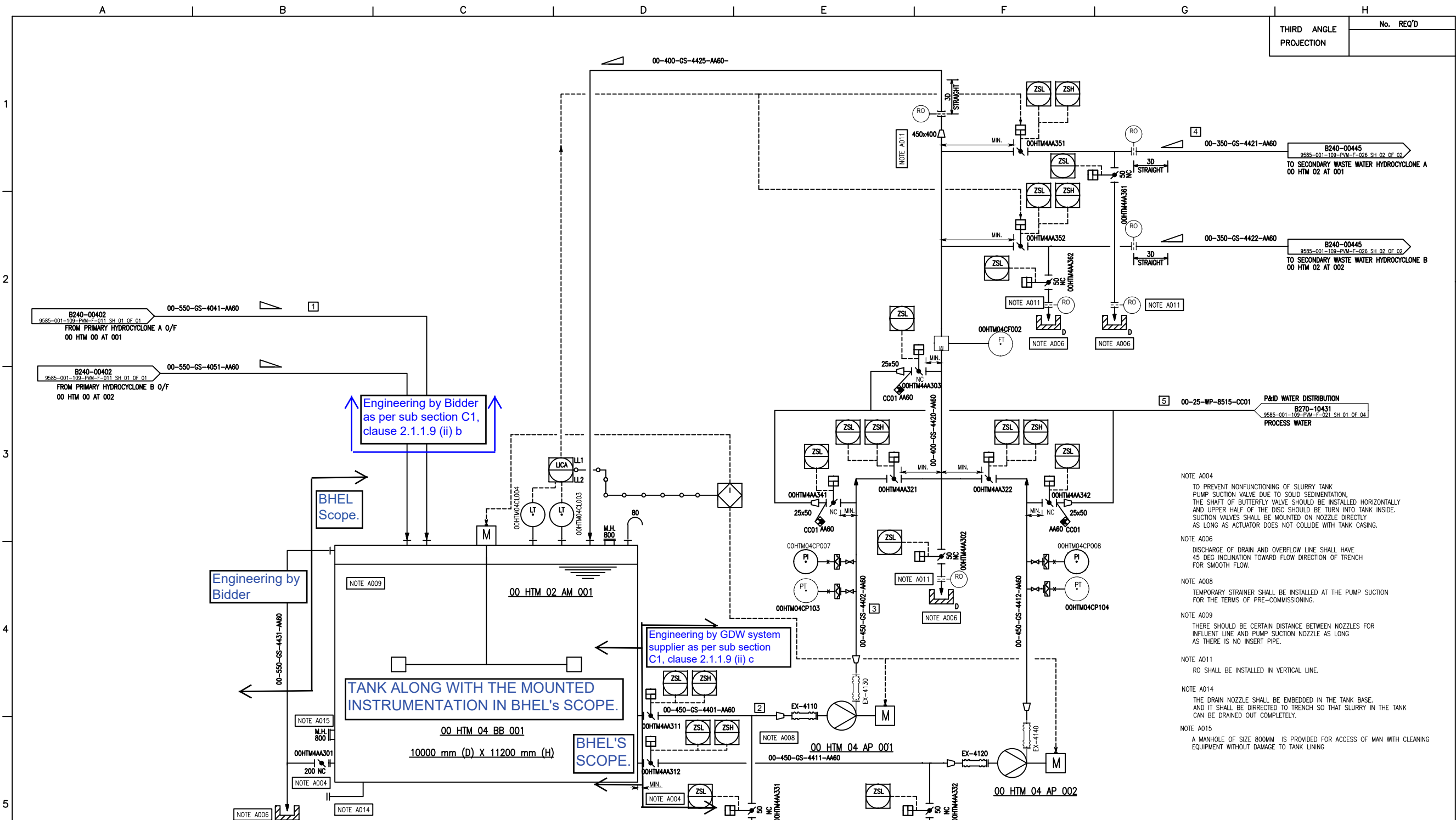


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THIRD ANGLE PROJECTION
No. REQ'D

A3
DRAWING No.



Engineering by Bidder as per sub section C1, clause 2.1.1.9 (ii) b

BHEL Scope.

Engineering by Bidder

TANK ALONG WITH THE MOUNTED INSTRUMENTATION IN BHEL'S SCOPE.

Engineering by GDW system supplier as per sub section C1, clause 2.1.1.9 (ii) c

BHEL'S SCOPE.

- 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 A009
THERE SHOULD BE CERTAIN DISTANCE BETWEEN NOZZLES FOR INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG AS THERE IS NO INSERT PIPE.
- NOTE A011
RO SHALL BE INSTALLED IN VERTICAL LINE.
- 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 A015
A MANHOLE OF SIZE 800MM IS PROVIDED FOR ACCESS OF MAN WITH CLEANING EQUIPMENT WITHOUT DAMAGE TO TANK LINING

00 HTM 04 BB 001
SECONDARY WASTE WATER HYDROCYCLONE FEED TANK

00 HTM 02 AM 001
SECONDARY WASTE WATER HYDROCYCLONE FEED TANK AGITATOR

00 HTM 04 AP 001/002
SECONDARY WASTE WATER HYDROCYCLONE FEED TANK PUMP A/B

S NO	SECTION	FLOW m ³ /hr	TEMP (°C)	DENSITY kg/m ³
1	Primary hydrocyclone overflow	528.0	62.1	1114
2	Secondary hydrocyclone feed pump suction	1060.0	62.1	1114
3	Secondary hydrocyclone feed pump discharge	1060.0	62.1	1114
4	Secondary hydrocyclone flow	528.0	62.1	1114
5	Process water flow for flushing	3	36.0	990



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	02.12.19
CHD	R.YUVARAJ	02.12.19
APPD	P.NAVEEN	02.12.19

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

P & ID - SECONDARY HYDROCYCLONE FEED TANK
SCALE: NTS

NTPC DRG NO. 9585-001-109-PVM-F-026 SH 01 of 02

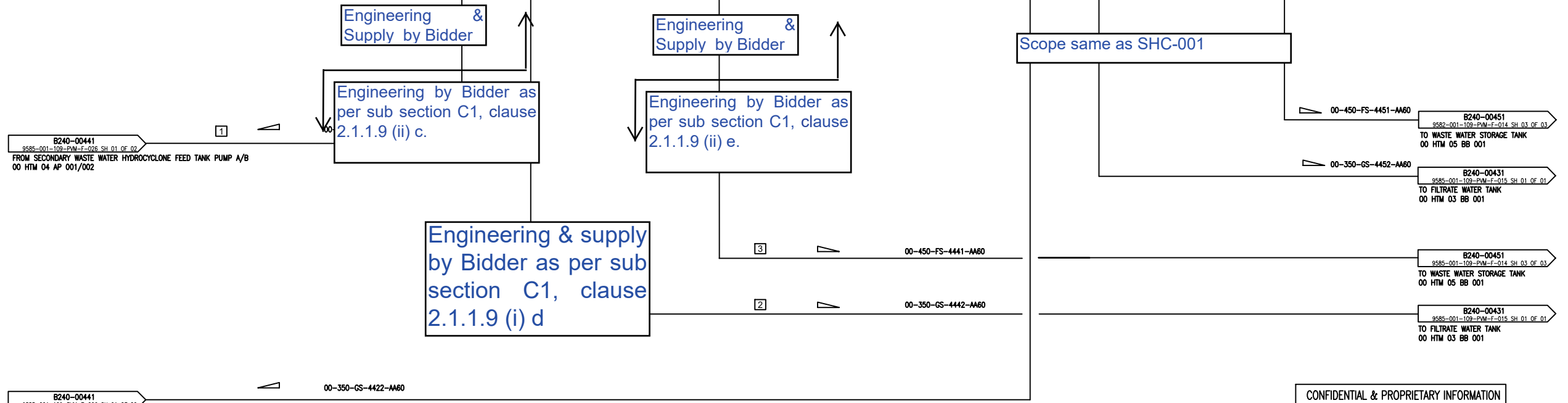
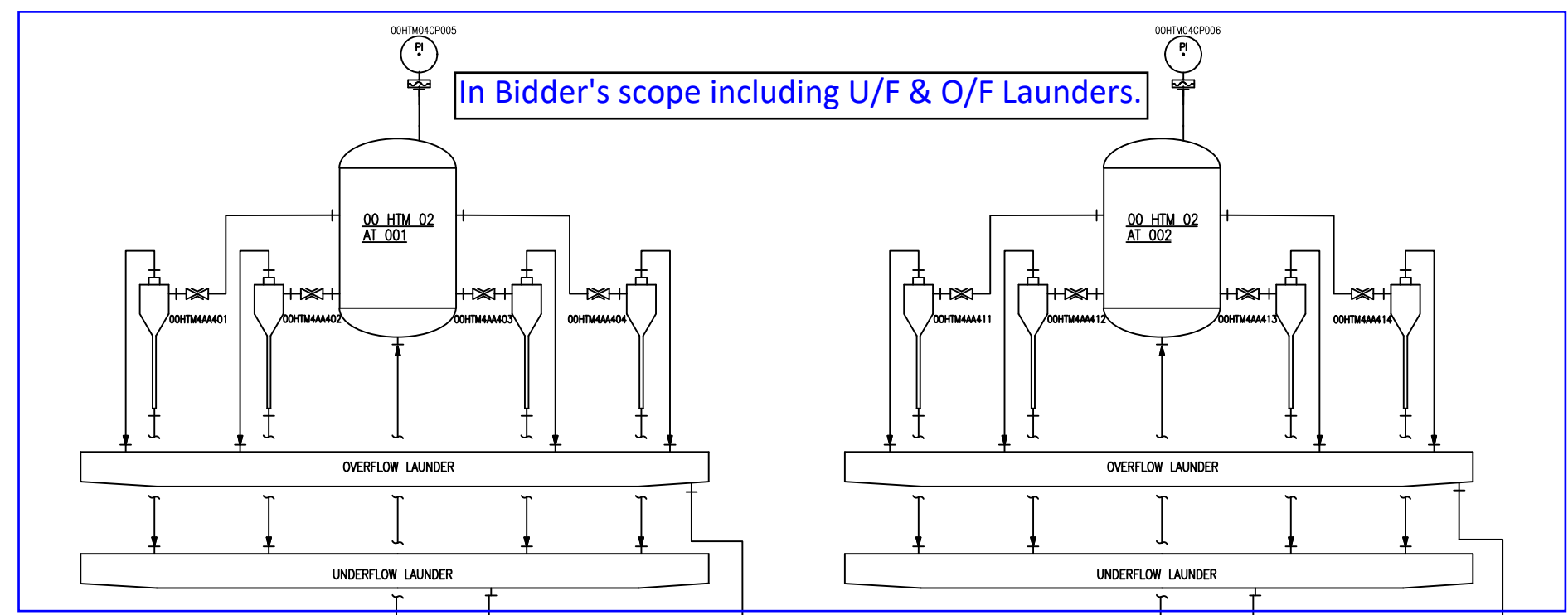
BHEL DRG NO	FILE NO	REV NO
3-FW-000-00568	B240 - 00441	02

CAUTION: THE DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. AND IS NOT TO BE REPRODUCED OR USED TO FURNISH ANY INFORMATION FOR MAKING OF DRAWINGS OF APPARATUS EXCEPT WHERE PROVIDED FOR AGREEMENT WITH SAID COMPANY.

THIRD ANGLE PROJECTION No. REQ'D

A3

DRAWING No.



B240-00441
9585-001-109-PVM-F-026 SH 01 OF 02
FROM SECONDARY WASTE WATER HYDROCYCLONE FEED TANK PUMP A/B
00 HTM 04 AP 001/002

00-350-GS-4422-AA60

00-450-FS-4441-AA60

00-350-GS-4442-AA60

CONFIDENTIAL & PROPRIETARY INFORMATION

00 HTM 02 AT 001/002
SECONDARY
HYDROCYCLONE A/B

S NO	SECTION	FLOW m ³ /hr	TEMP (°C)	DENSITY kg/m ³
1	Secondary hydrocyclone feed flow	528.0	62.1	1114
2	Secondary hydrocyclone underflow	198.1	62.1	1262
3	Secondary hydrocyclone overflow	329.9	62.1	1025



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	02.12.19
CHD	R.YUVARAJ	02.12.19
APPD	P.NAVEEN	02.12.19

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

P & ID - SECONDARY HYDROCYCLONE

SCALE: NTS
NTPC DRG NO. 9585-001-109-PVM-F-026 SH 02 of 02

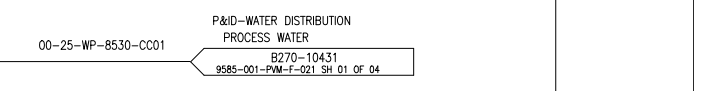
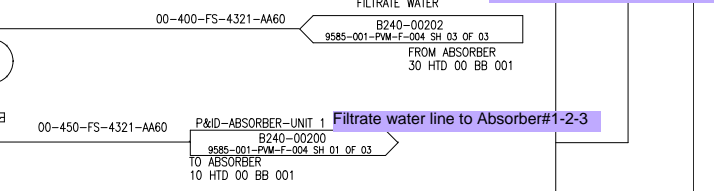
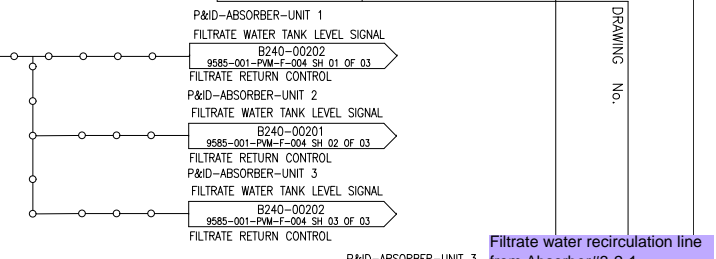
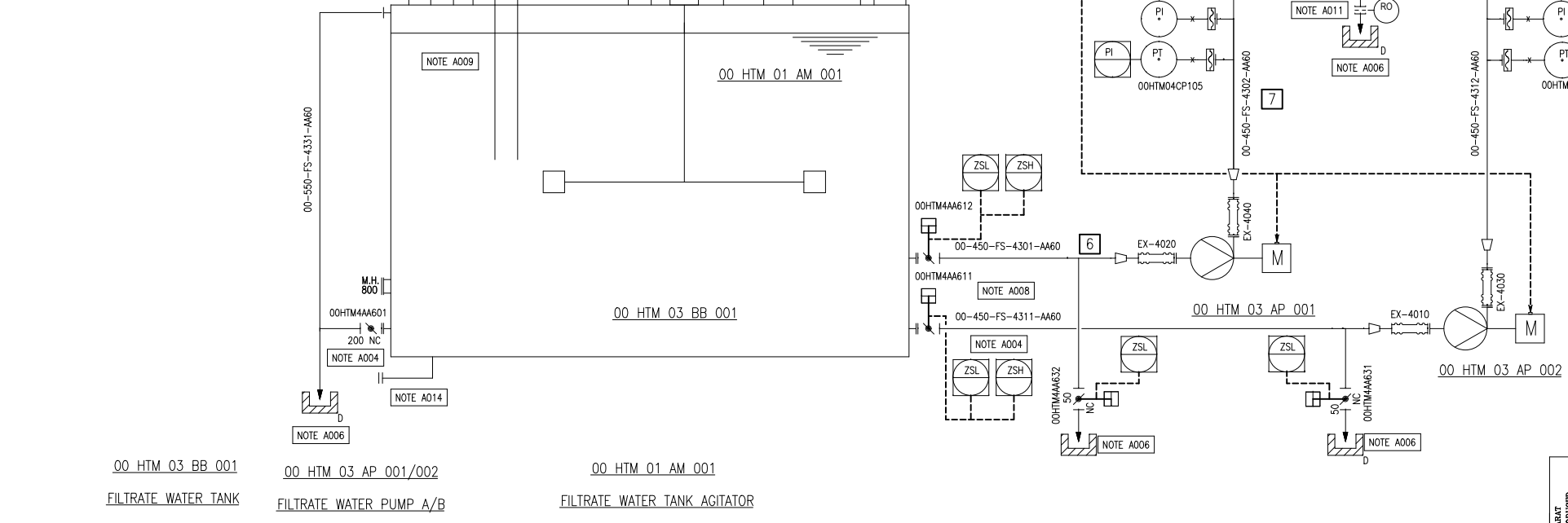
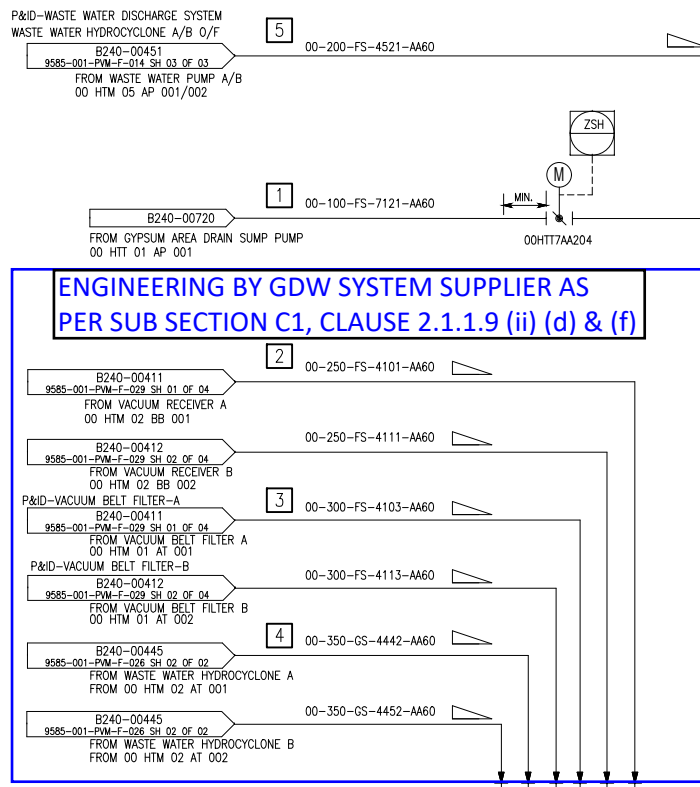
BHEL DRG NO 3-FW-000-00568	FILE NO B240 - 00445	REV NO 02
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A3

DRAWING No.

THIRD ANGLE PROJECTION No. REQ'D



- 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 A009 THERE SHOULD BE CERTAIN DISTANCE BETWEEN NOZZLES FOR INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG AS THERE IS NO INSERT PIPE.
- NOTE A011 RO SHALL BE INSTALLED IN VERTICAL LINE.
- 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.

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

DEPT CODE	NAME (BHEL)	DATE
DRN	R.PRASANTH	30.10.19
CHD	R.YUVARAJ	30.10.19
APPD	P.NAVEEN	30.10.19

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

P & ID - FILTRATE WATER TANK

SCALE: NTS

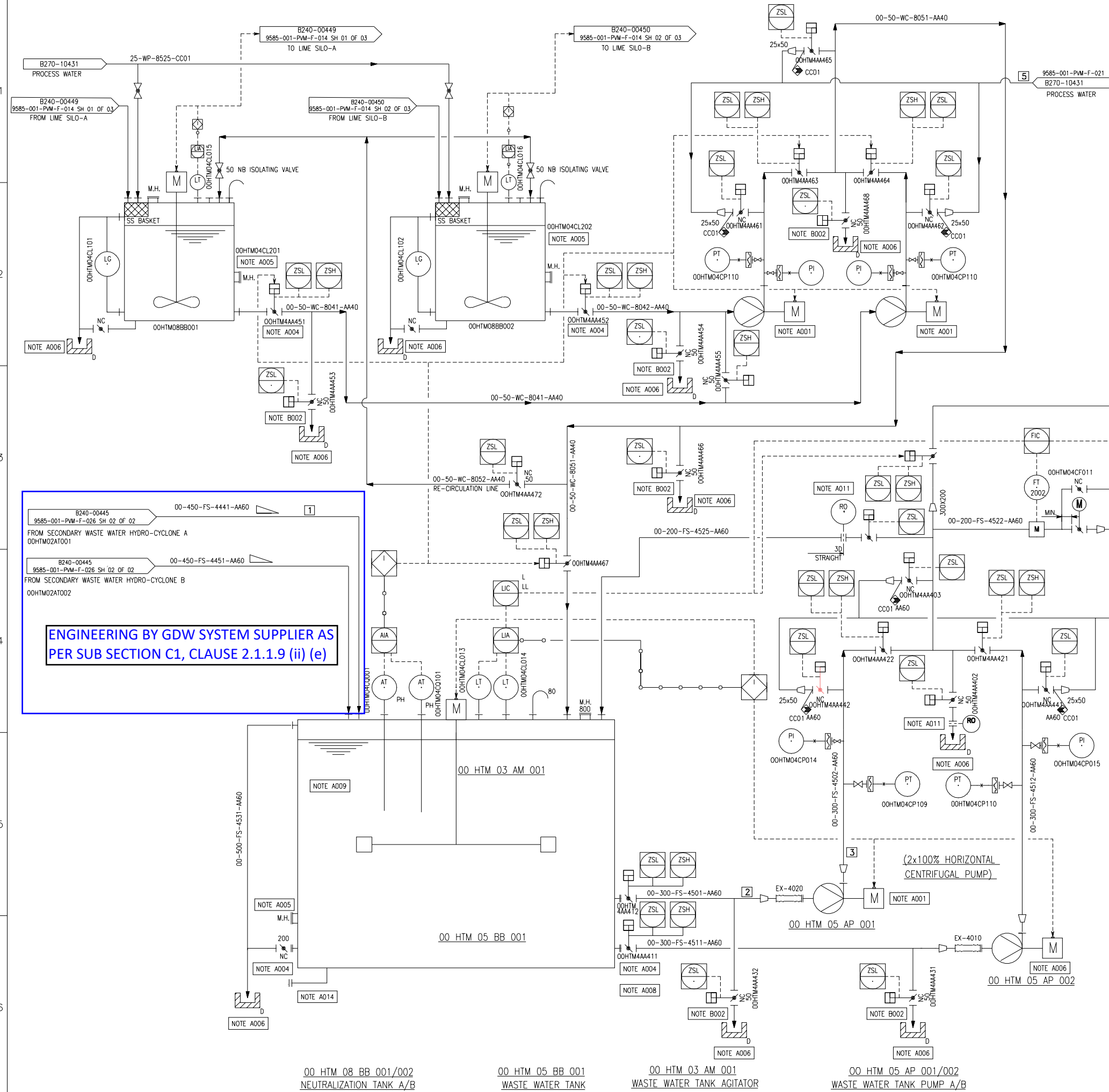
NTPC DRG NO. 9585-001-109-PVM-F-015 SH 01 of 01

BHEL DRG NO. 3-FW-000-00562 FILE NO. B240 - 00431 REV NO. 01

S NO	SECTION	FLOW m ³ /hr	TEMP(C)	DENSITY(kg/m ³)
1	Gypsum slurry from gypsum area drain sump pump	50	62.1	1177
2	Filtrate water from vacuum receiver	90	62.1	1006
3	Wash Water from vacuum belt filter	129	36.0	990
4	Underflow from sec waste water hydrocyclone	198.1	62.1	1262
5	Waste water slurry from waste water tank	169	62.1	1025
6	Suction line of filtrate tank pump	1170	58.3	1098
7	Discharge line from filtrate pump	1170	58.3	1098
8	Common discharge line to absorber	1170	58.3	1098
9	Process water for flushing	3.0	36.0	990



CAUTION: THE DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. AND IS NOT TO BE REPRODUCED OR USED TO FURNISH ANY INFORMATION FOR MAKING OF DRAWINGS OF APPARATUS EXCEPT WHERE PROVIDED FOR AGREEMENT WITH SAID COMPANY.



S NO	SECTION	FLOW m ³ /hr	pH	TEMP (°C)	DENSITY kg/m ³
1	Gyp slurry from sec hydrocyclone	329.9	>5.5	62.1	1025
2	Gyp slurry to WW pump Suction	480	7.0	62.1	1025
3	Gyp slurry from WW pump discharge	480	7.0	62.1	1025
4	Gyp slurry to filtrate water tank	169	7.0	62.1	1025
5	Process water line for flushing	3	7.0	36	994
6	Gyp slurry to NTPC terminal point	161	7.0	62.1	1025

- NOTE A001 MOTOR PID ARE NOT SHOWN.
- 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 A005 A MANHOLE SIZE OF 800 MM IS PROVIDED TO TAKE CARE OF ACCESS OF MAN TANK. LINING AS PER MHPS EXPERIENCE.
- 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 INFLUENT LINE AND PUMP SUCTION NOZZLE AS LONG AS THERE IS NO INSERT PIPE.
- NOTE A011 RO SHALL BE INSTALLED IN VERTICAL LINE.
- NOTE A014 THE DRAIN NOZZLE SHALL BE EMBEDDED IN THE TANK BASE AND IT SHALL BE DIRECTED TO TRENCH.
- 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.

ENGINEERING BY GDW SYSTEM SUPPLIER AS PER SUB SECTION C1, CLAUSE 2.1.1.9 (ii) (e)

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	25.08.2020
CHD	R.YUVARAJ	25.08.2020
APPD	P.NAVEEN	25.08.2020

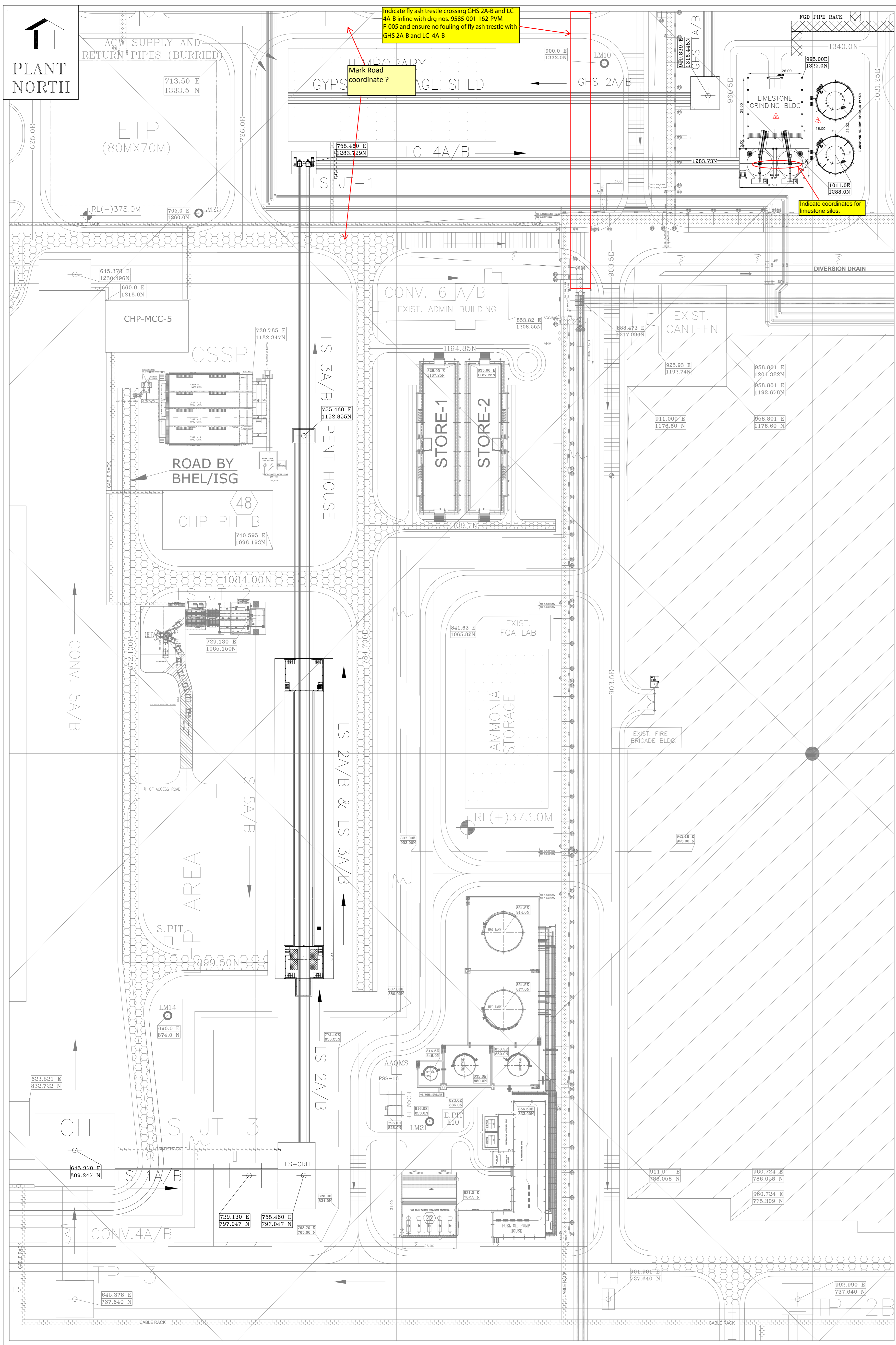
MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - WASTE WATER SYSTEM SCALE : NTS

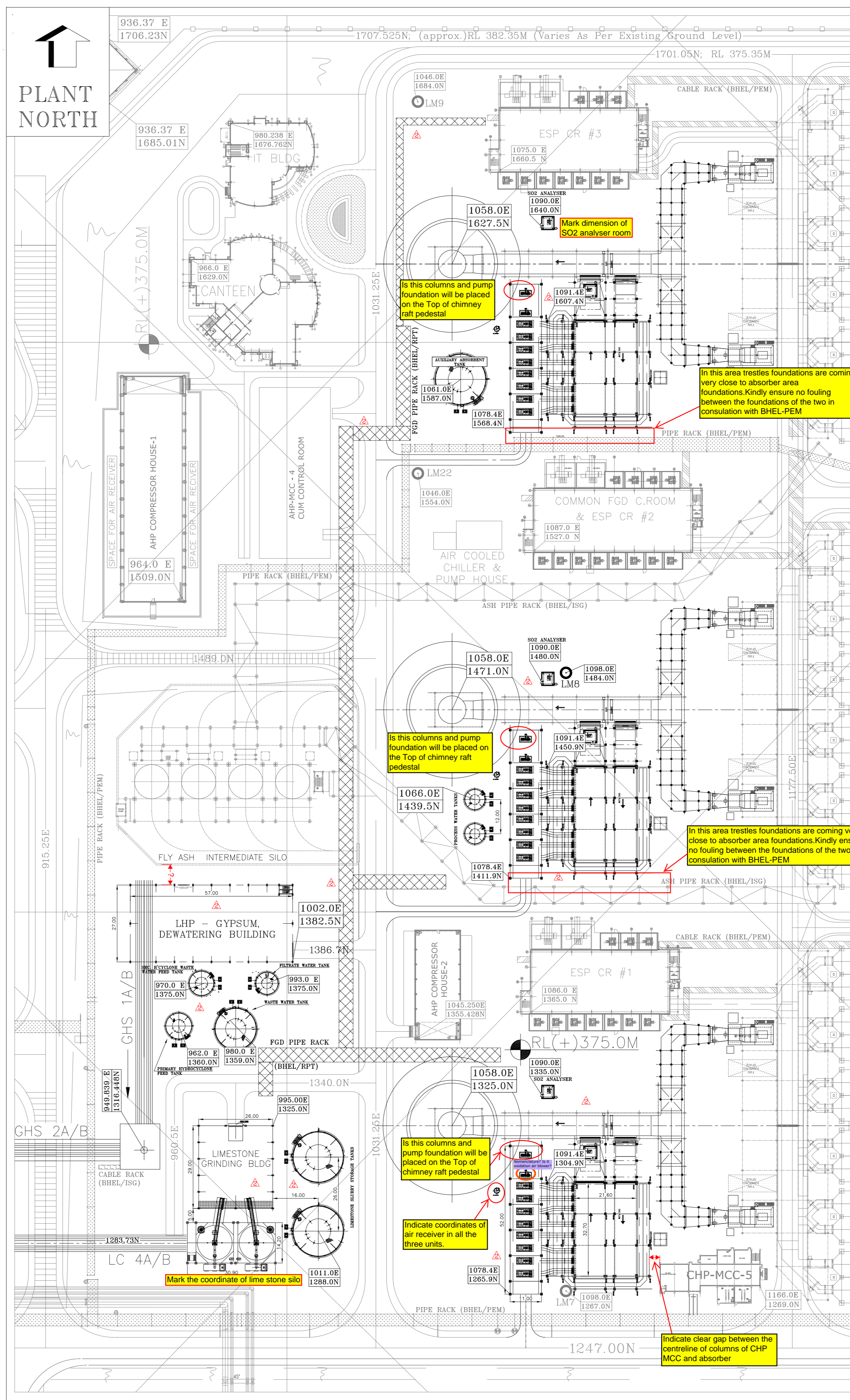
TITLE: NTPC DRG NO. 9585-001-109-PVM-F-014 SH 03 of 03

BHEL DRG NO	FILE NO	REV NO
3-FW-000-00561	B240 - 00451	06

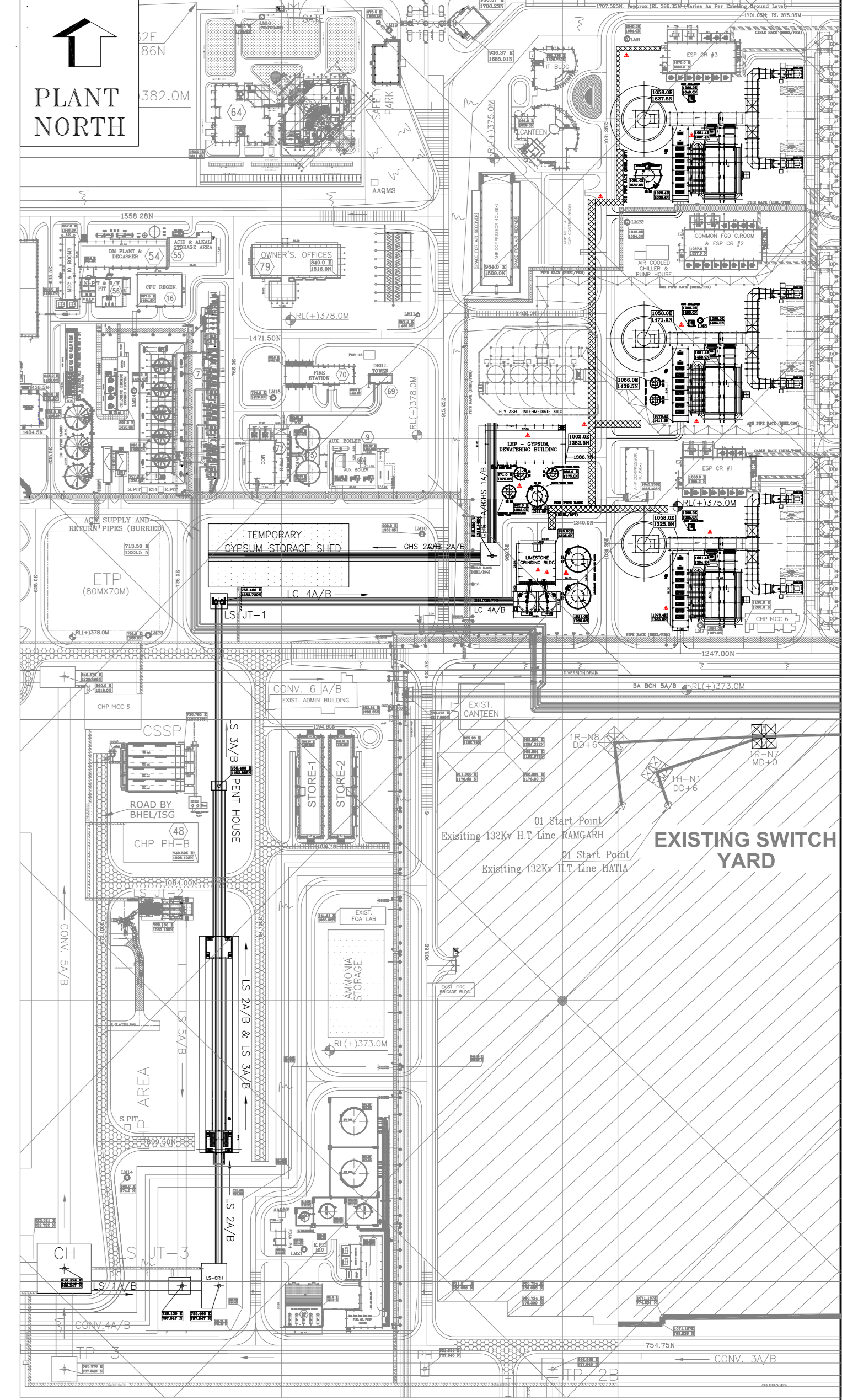




LHP & GHP AREA



ABSORBER AREA



KEY PLAN

LEGEND:-

FGL	FINISHED GROUND LEVEL
FFL	FINISHED FLOOR LEVEL
BMB	BALL MILL BUILDING
GBD	GYPSUM DEWATERING BUILDING
FWT	FILTER WATER TANK
LSST	LIMESTONE SLURRY STORAGE TANK (REAGENT TANK)
AAT	ALUMINA ADSORBENT TANK
BUF	BOOST UP FAN
WWT	WASTE WATER TANK
SHFT	SECONDARY HYDRO CYCLONE FEED TANK
PWT	PROCESS WATER TANK
CLWT	CLARIFIED WATER TANK

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES
 - FINISH FLOOR LEVEL = RL (+)375.50 M CORRESPONDS TO PLANT EL 0.0M (GROUND FLOOR OF STG BUILDING) FINISHED GROUND LEVEL OF BOP AREA AS MARKED.

REFERENCE DRAWINGS:-

S.NO	DRAWING NAME	BHEL DWG. NO.	NTPC DWG. NO.
1.	PLOT PLAN	PE-DG-434-100-M001	9585-001-999-POC-F-001
2.	GA OF BALL MILL BUILDING	O-FW-000-01084	9585-001-109-PVM-B-047
3.	GA OF GYPSUM DEWATERING BUILDING (HOLD)		(HOLD)
4.	GA OF GYPSUM STORAGE SHED		9585-001-155-PVM-B-069
5.	GA OF LIMESTONE CRUSHER HOUSE		9585-001-155-PVM-B-086
6.	GA OF DE SYSTEM FOR LIMESTONE SHED		9585-001-155-PVM-F-205

- HOLDS:
- GYPSUM DEWATERING BUILDING
 - TANKS
 - LIMESTONE HANDLING FACILITIES

Tanks and Limestone handling facilities are either approved or under approval stage, so why kept under HOLD? Remove all the HOLD.

REVISION MARKED AS:

REV	DATE	ALTD	BY	APPD	REV	DATE	ALTD	BY	APPD
02	02/01/2020	RC	PADHI/BKA	C.GANESH	01	15/06/2019	RL	PADHI	C.GANESH

CUSTOMER NOS: R4R3, R4S3, R4S4

NTPC DRG NO: 9585-001-109-PVM-F-001

CUSTOMER: NTPC LIMITED.

PROJECT: 3x800 MW PATRATU SUPER THERMAL POWER PROJECT - FGD SYSTEM PACKAGE

REV	DATE	ALTD	BY	APPD	REV	DATE	ALTD	BY	APPD
01	16.04.19		SURYA PRANASH		01	16.04.19		CHD	LOKANATHAN
02	16.04.19		UNIT-OPERATOR/HAZARDOUS PLANT, ANNEHISED ISE.		01	16.04.19		APPD	R S BALAJI

TITLE: LAYOUT OF FGD SYSTEM

DRAWING NO: 0-FW-000-00549

SCALE: 1:10

REV: 2

Plot Plan shall be updated based on subject drawing and BHEL to check the interface with other systems.

Elevator to be identified for each absorber and limestone grinding building.

In this column and pump foundation will be placed on the Top of chimney raft pedestal.

In this column and pump foundation will be placed on the Top of chimney raft pedestal.

In this column and pump foundation will be placed on the Top of chimney raft pedestal.

Indicate coordinates of air receiver in all the three units.

Indicate clear gap between the Cartrails of columns of CHP MCC and absorber.

In this area trusses foundations are coming very close to absorber area foundations. Kindly ensure no fouling between the foundations of the two in consultation with BHEL/PEM.

In this area trusses foundations are coming very close to absorber area foundations. Kindly ensure no fouling between the foundations of the two in consultation with BHEL/PEM.

Indicate clear gap between the Cartrails of columns of CHP MCC and absorber.

Indicate fly ash tristle crossing GHS 2A/B and LC 4A/B inline with drg nos. 9585-001-162-PVM-F-005 and ensure no fouling of fly ash tristle with GHS 2A/B and LC 4A/B

Mark Road coordinate ?

Indicate coordinates for limestone silo.

Mark the coordinate of lime stone silo.