

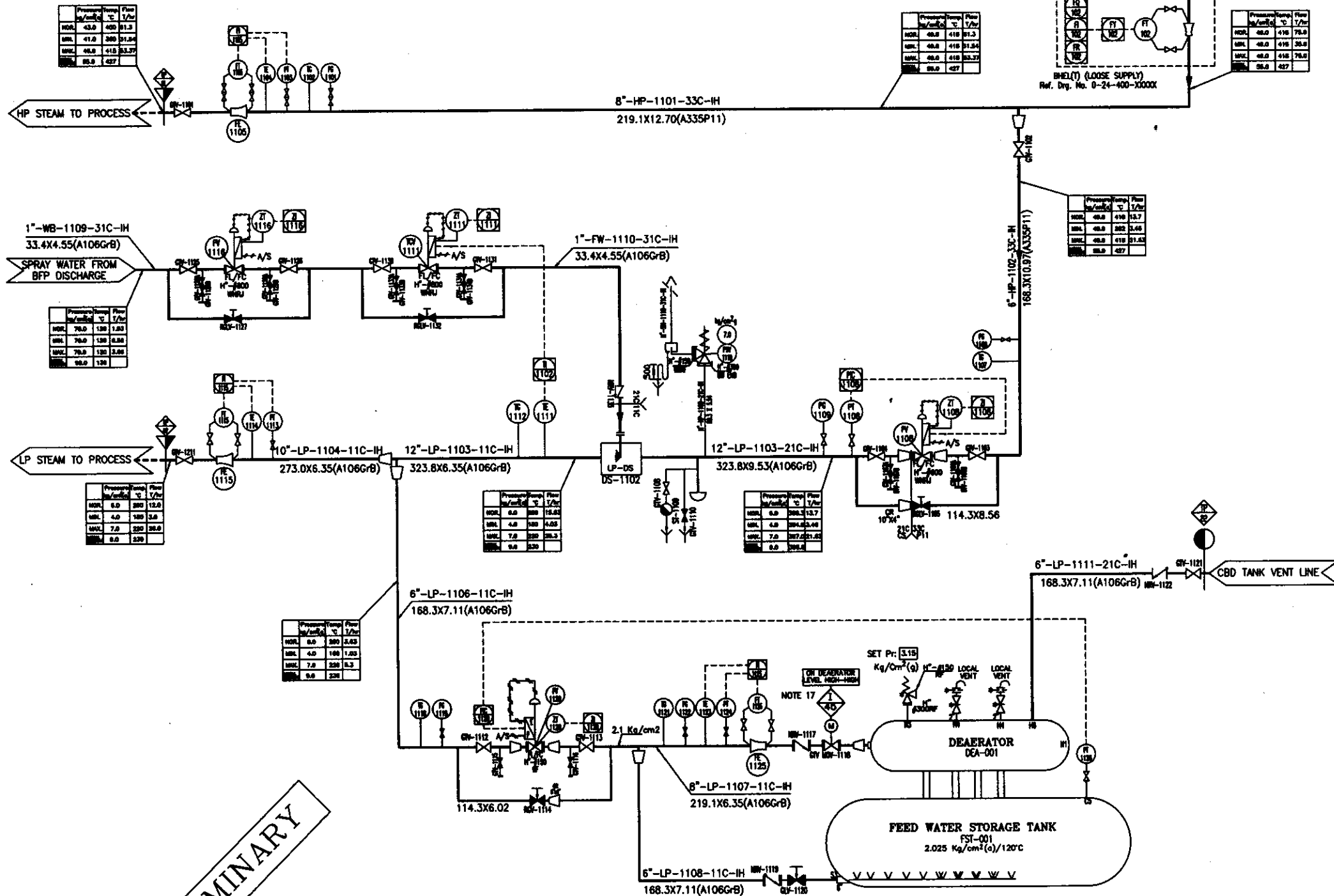
FIRST ANGLE PROJECTION

DRG. NO. 1-381-01-04008

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GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

PRELIMINARY

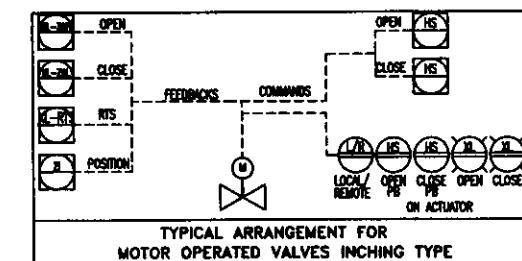
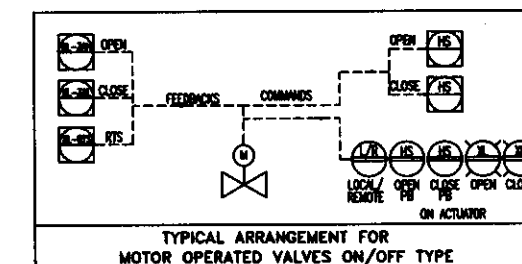


NOTES:-

1. MIN. 150 UP STREAM AND 50 DOWN STREAM STRAIGHT LENGTH TO BE MAINTAINED FOR ALL FLOW ELEMENTS.
2. HIGH POINT VENTS AND LOW POINT DRAINS SHALL BE PROVIDED AT SUITABLE LOCATIONS AS PER PIPING LAYOUT. THE VENT AND DRAIN SHALL BE AS SHOWN TYPICALLY IN THIS P & ID.
3. ALL TEMPERATURE INSTRUMENTS ARE PROVIDED WITH THERMOWELL.
4. ALL DRAIN LINES SHALL BE 3/4" SIZE UNLESS OTHERWISE STATED.
5. ALL VALVES SHALL BE PROVIDED WITH INTEGRAL BYPASS VALVE IF THE SIZE IS 26" AND ABOVE FOR 150, 16" & ABOVE FOR 300 RATINGS, 6" & ABOVE FOR 600, 4" & ABOVE FOR 900 & 1500 RATINGS.
6. ALL FLOW NOZZLES AND FLOW ORIFICES ARE TO BE SUPPLIED DULY CALIBRATED FROM A REPUTED LABORATORY. CALIBRATION CERTIFICATE TO BE PRODUCED BEFORE INSTALLATION OF ALL EQUIPMENT
7. ALL PRESSURE INSTRUMENTS SHALL BE WITH PROCESS ISOLATION GATE VALVE AND AN INSTRUMENT ISOLATION VALVE, WITH PROVISION FOR VENT AND DRAIN.
8. ALL ON/OFF TYPE MOTORISED VALVES SHALL BE PROVIDED WITH OPEN & CLOSE LIMIT SWITCHES. ALL INCHING TYPE MOVES SHALL BE PROVIDED WITH OPEN CLOSE LIMIT SWITCHES APART FROM POSITION TRANSMITTER.
9. INDICATES SAFETY SET PRESSURE IN kg/cm²(g)
10. ALL SAFETY VALVES ARE FULL FLOW CAPACITY.
11. MINIMUM STRAIGHT LINE TO BE MAINTAIN DOWN STREAM OF PRDS AS RECOMMENDED BY THE PRDS SUPPLIER. LOCATION OF TEMPERATURE ELEMENT SHALL ALSO BE LOCATED BEYOND THE RECOMMENDED STRAIGHT LENGTH.
12. IF THE MAIN VALVE IS MOTOR OPERATED THEN THE BYPASS VALVE ALSO SHALL BE MOTOR OPERATED.
13. ALL MOTORISED VALVES SHALL BE PROVIDED WITH HAND WHEEL AND ELEMENT SHALL ALSO BE LOCATED BEYOND THE RECOMMENDED STRAIGHT LOCK OPEN/CLOSED FACILITY.
14. ALL LIMIT SWITCHES SHALL BE PROXIMITY TYPE.
15. ALL VENTS SHALL BE LEFT AT SAFE HEIGHT AND SHALL NOT BE DIRECTED TOWARDS PATH WAY.
16. "*" INDICATES ITEMS SUPPLIED ALONGWITH EQUIPMENT.
17. FOR INTERLOCK SUMMARY REFER FEED WATER P&ID
Drg. No:1-38101-03902.
18. END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS:
i) ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
ii) STUB ENDING WITH M33X2 FOR TEMPERATURE

REF. DRG NO.

1. P&ID FOR FEED WATER SYSTEM 1-381-01-03901
2. P&ID FOR DM MAKE UP SYSTEM 1-381-01-03902
3. P&ID FOR WATER & STEAM CIRCUIT (HRSG) 0-24-400-XXXX



SCOPE

BHEL (H) MSIL
BHEL (H) BHEL-TRY (HRSG/UB)

TAG NO. INDEX

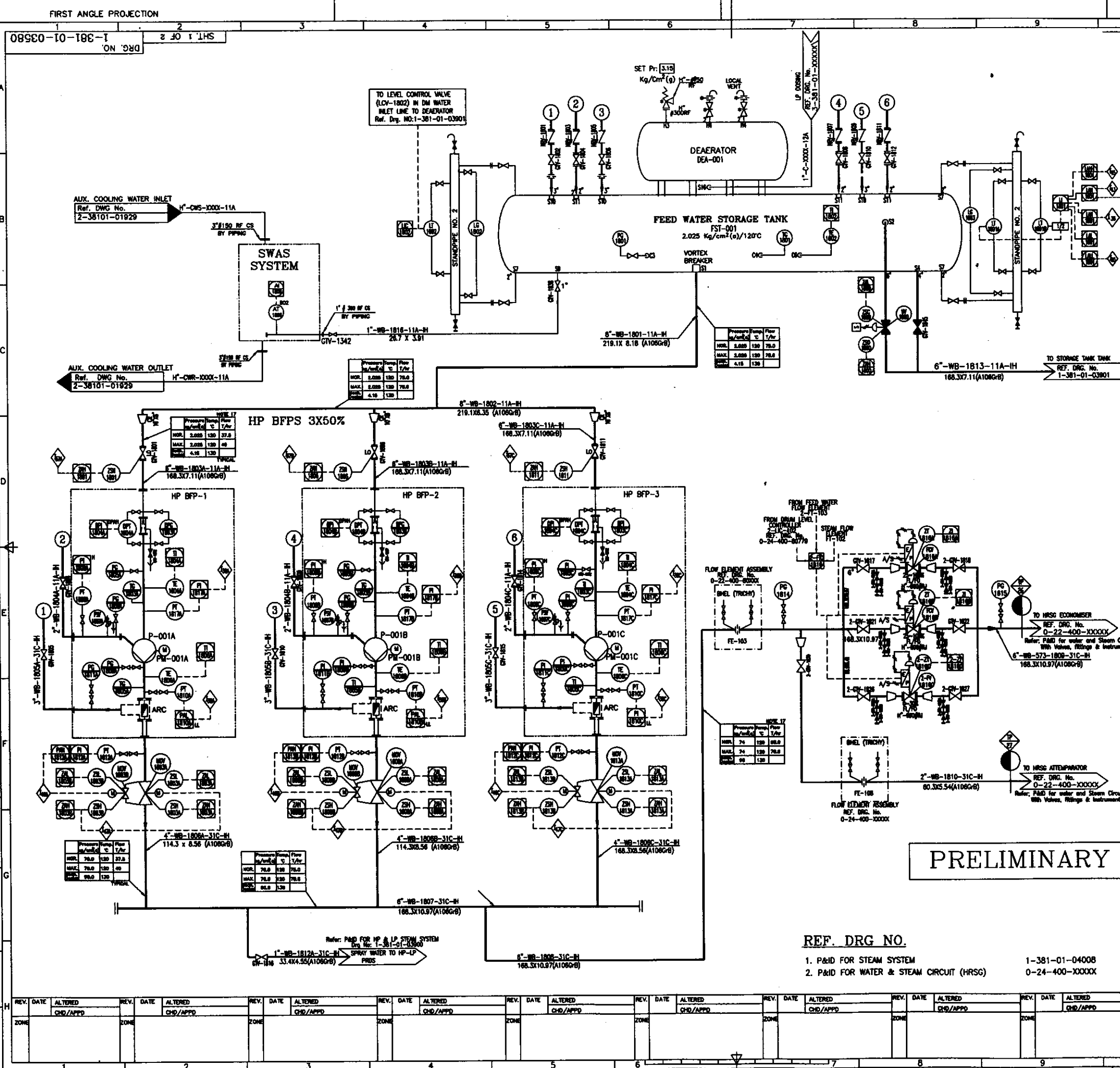
TAGS USED	RANGE	SPARE TAGS
EQUIPMENT TAG	---	---
LINE NUMBERS	1111	---
VALVE TAG	1135	---
INSTRUMENTATION TAG	1126	---
TERMINAL POINT	55-56	---

CUSTOMER: MARUTI - SUZUKI INDIA LIMITED
MANESAR - HARYANA

PROJECT: 1 x Fr5 GTG BASED CO-GEN PLANT
MANESAR-II

 SHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME		DATE	NO. OF		
		DRGN. DURGA		10.05.10	WHR.		
		CHD. M.S.S.N		10.05.10	N.A.		
		APPRO. P. SUDHAR BABU		10.05.10	N.A.		
DEPT. PED	UNTL. DATE OR G/W/Y		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF
CODE 400	9/11/11		N.T.S	N.A.	N.A.	N.A.	ITEMS N.A.
TITLE				DRG. NO.	REV.		
P&ID FOR MP, LP AND				1-381-01-04008			
DEAERATOR STEAM SYSTEM				CHD. NO.	P		
CARD CODE				4008-XXX-1111			
NA				SHT. NO.	01	NO. OF SHT.	01

INVENTORY NO	SIGN AND DATE	REF. ORG. NO.	COMPUTER FILE NAME
		13910000138	138101033802-950-800.DWG



- ## NOTES:-
1. MIN. 15D UP STREAM AND 5D DOWN STREAM STRAIGHT LENGTH TO BE MAINTAINED FOR ALL FLOW ELEMENTS.
 2. ALL TEMPERATURE INSTRUMENTS ARE PROVIDED WITH THERMOWELL.
 3. ALL DRAIN LINES SHALL BE 3/4" SIZE UNLESS OTHERWISE STATED.
 4. ALL FLOW NOZZLES AND FLOW ORIFICES ARE TO BE SUPPLIED DULY CALIBRATED FROM A REPUTED LABORATORY. CALIBRATION CERTIFICATE TO BE PRODUCED BEFORE INSTALLATION OF ALL EQUIPMENT
 5. ALL PRESSURE INSTRUMENTS SHALL BE WITH PROCESS ISOLATION GATE VALVE AND AN INSTRUMENT ISOLATION VALVE, WITH PROVISION FOR VENT AND DRAIN.
 6. ALL ON/OFF TYPE MOTORISED VALVES SHALL BE PROVIDED WITH OPEN CLOSE LIMIT SWITCHES APART FROM POSITION TRANSMITTER.
 7. INDICATES SAFETY SET PRESSURE IN $\text{kg}/\text{cm}^2(\text{G})$
 8. IF THE MAIN VALVE IS MOTOR OPERATED THEN THE BYPASS VALVE ALSO SHALL BE MOTOR OPERATED.
 9. ALL MOTORISED VALVES SHALL BE PROVIDED WITH HAND WHEEL AND LOCK OPEN/CLOSED FACILITY.
 10. ALL LIMIT SWITCHES SHALL BE PROXIMITY TYPE.
 11. ALL VENTS SHALL BE LEFT AT SAFE HEIGHT AND SHALL NOT BE DIRECTED TOWARDS PATH WAY.
 12. ALL FEED CONTROL STATIONS ARE TO BE LOCATED ON GROUND.
 13. * INDICATES SCOPE OF SUPPLY BY VENDOR.
 14. END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS:
 - i) ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
 - ii) STUB ENDING WITH M33X2 FOR TEMPERATURE

<u>INTERLOCK SUMMARY</u>				
EQUIPMENT INVOLVED	LOGIC NO.	TAG NOS. INVOLVED	CONDITION FOR LOGIC EXECUTION	ACTION
HRSO'S HP BOILER FEED WATER PUMPS,	135	LT-1801(LALL)	FEED WATER STORAGE TANK LEVEL LOW	TRIP RUNNING BFP (P-801A/C)
	136	LT-1801(LAH)	FEED WATER STORAGE TANK LEVEL NORMAL	START PERMISSIVE FOR BFPs
	137A	ZAH-1801	PUMP SUCTION VALVE LIMIT SWITCH OPEN	START PERMISSIVE FOR BFP-1 (P-801A)
	137B	ZAH-1808	PUMP SUCTION VALVE LIMIT SWITCH OPEN	START PERMISSIVE FOR BFP-2 (P-801B)
	137C	ZAH-1811	PUMP SUCTION VALVE LIMIT SWITCH OPEN	START PERMISSIVE FOR BFP-3 (P-801C)
	138A	PT-1817A(PAL)	BFP SUCTION PRESSURE LOW	TRIP RUNNING PUMP(P-801A)
	138B	PT-1817B(PAL)	BFP SUCTION PRESSURE LOW	TRIP RUNNING PUMP(P-801B)
	138C	PT-1817C(PAL)	BFP SUCTION PRESSURE LOW	TRIP RUNNING PUMP(P-801C)
	138A	PT-1810A(PAL)	BFP DISCHARGE PRESSURE LOW	ALARM START OF STANDBY BFP TRIP RUNNING BFP
	138B	PT-1810B(PAL)	BFP DISCHARGE PRESSURE LOW	ALARM START OF STANDBY BFP TRIP RUNNING BFP
138C	PT-1810C(PAL)	BFP DISCHARGE PRESSURE LOW	ALARM START OF STANDBY BFP TRIP RUNNING BFP	
GENERATOR FEED WATER STORAGE TANK	143	LT-1801(LAH)	LEVEL SHOWN ABOVE HIGH LEVEL	OPEN OVERFLOW VALVE (AH-1800)
	144	LT-1801(LAH)	LEVEL SHOWN BELOW HIGH LEVEL	CLOSE OVERFLOW VALVE (AH-1800)
	145	LT-1801(LAH/H)	LEVEL HIGH HIGH	CLONE DEGENERATOR SHUT VALVE (HSH-GVY-1118)
HP BFP DISCHARGE LINE MOV'S	148A	PT-1812A(PAH) OR ON PUMP START	DISCHARGE PRESSURE HIGH OR ON PUMP START	OPEN BYPASS VALVE OF MAIN DISCHARGE VALVE(MSH-GVY-1083B)
	147A	ZAH-1803B	DISPRESS VALVE LIMIT SWITCH OPEN	OPEN MAIN DISCHARGE VALVE (MSH-GVY-1083A)
	148B	PT-1812B(PAH) OR ON PUMP START	DISCHARGE PRESSURE HIGH OR ON PUMP START	OPEN BYPASS VALVE OF MAIN DISCHARGE VALVE(MSH-GVY-1083B)
	147B	ZAH-1808B	DISPRESS VALVE LIMIT SWITCH OPEN	OPEN MAIN DISCHARGE VALVE (MSH-GVY-1083A)
	148C	PT-1812C(PAH) OR ON PUMP START	DISCHARGE PRESSURE HIGH OR ON PUMP START	OPEN BYPASS VALVE OF MAIN DISCHARGE VALVE(MSH-GVY-1083B)
	147C	ZAH-1813B	DISPRESS VALVE LIMIT SWITCH OPEN	OPEN MAIN DISCHARGE VALVE (MSH-GVY-1813A)

SCOPE		TAG NO. INDEX		
		TACS USED	RANGE	SPARE TAGS
EQUIPMENT TAG		---		
LINE NUMBERS		1801-16		
VALUE TAG		1801-44		
INSTRUMENTATION TAG		P 1801-17		
		T 1801-06	---	
TERMINAL POINT		85		

PRELIMINARY

<u>REF. DRG NO.</u>	
1. P&ID FOR STEAM SYSTEM	1-381-01-04008
2. P&ID FOR WATER & STEAM CIRCUIT (HRSG)	0-24-400-XXXXX

CUSTOMER: MARUTI – SUZUKI INDIA LIMITED													
MANESAR – HARYANA													
PROJECT: 1 x Fr5 GTG BASED CO-GEN PLANT													
MANESAR-II													
BHARAT HEAVY ELECTRICALS LTD.						NAME		SIGN.		DATE			
HYDERABAD						DRN. DURGA		By		05.05.10			
						CHD. U.S.S.N				05.05.10			
						APPRO. P. SUDHAR BABU				05.05.10			
DEPT. PED CODE 450		UNTL. DRWS. OR S/M/Y				SCALE H.T.S.		WEIGHT (KGS) -N.A.-		REF. TO ASSY. DRG. -N.A.-			
										ITEM NO. NO. OF REFS. -N.A.-			
TITLE PAID FOR FEED WATER SYSTEM						CARD CODE		DRG. NO. 1-381-01-03902				REV. P.	
								CHG. DRG. NO. 3902-XXX-1118				REV. P.	
						SHT. No 1		NO. OF SHT. 2					

FIRST ANGLE PROJECTION

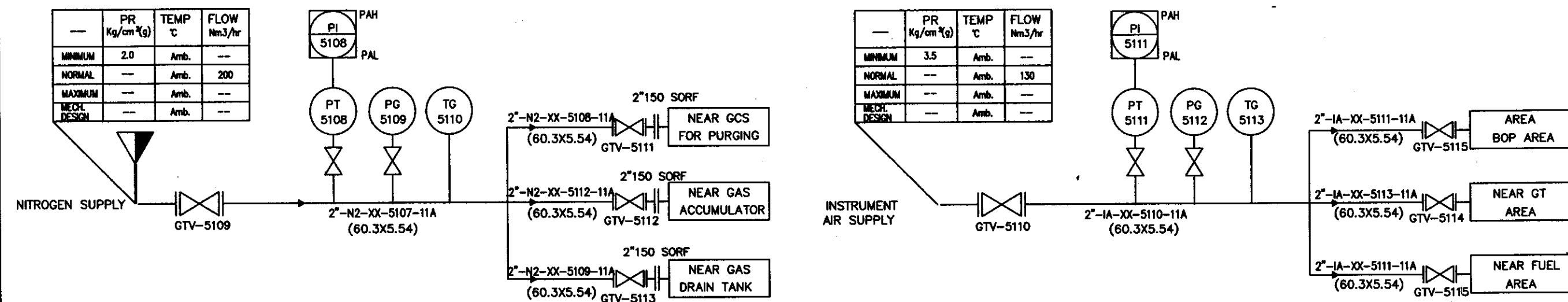
(ALL DIMENSIONS ARE IN mm)

62610-1018C-2

DRG. NO. 10 10 10 HS

P&ID 24

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NOTES

1. FURTHER DISTRIBUTION OF INSTRUMENT AIR SHALL BE DONE AT SITE.

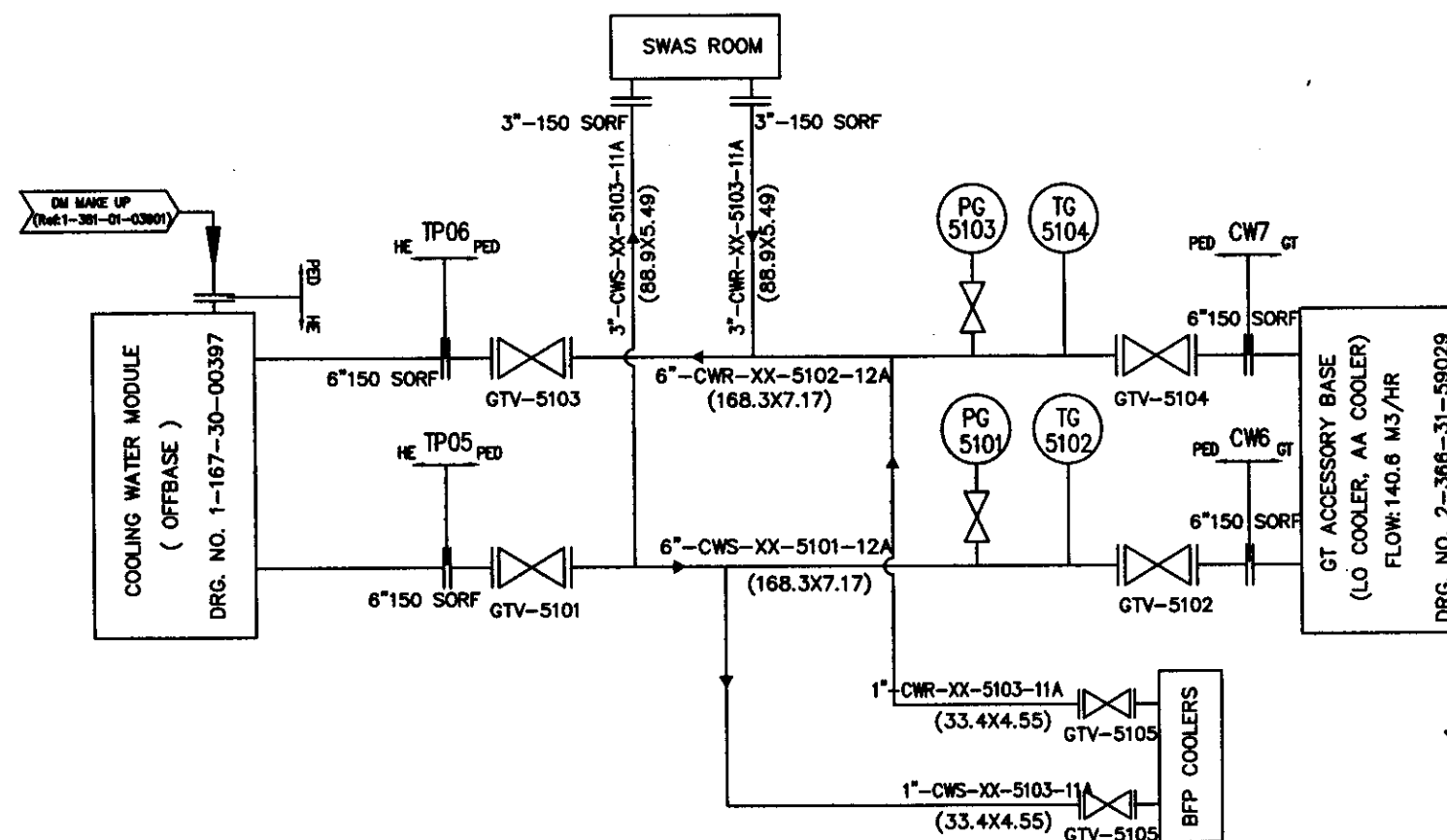
LEGEND

DCS
(O.D.XTH.)

TAG NO. INDEX

	TAGS USED	RANGE	UNUSED TAGS
LINE NUMBERS	5101-5113	5101-5100	---
VALVE TAG	5101-5115	5101-5100	---
INSTRUMENTATION TAG	5101-5113	5101-5100	---

INTERNAL SCOPE	SCOPE OF SUPPLY
OTHERS PED	CUSTOMER B.H.E.L.



PRELIMINARY

CUSTOMER: MARUTI - SUZUKI INDIA LIMITED
MANESAR - HARYANA

PROJECT: 1 x Fr5 GTG BASED CO-GEN PLANT
MANESAR-II

NAME	SIGN.	DATE	NO. OF VAR.
DRN. DURGA		11.05.10	---
CHD. RADHIKA		11.05.10	---
APPD. P. SUDHIR		11.05.10	---

DEPT.	UNTL. DIMS.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS
CODE	9/M/7		---	---	---	---

TITLE	CARD CODE	DRAWING NO.	REV.
P&ID FOR UTILITIES	NA	2-38101-01929	P

SHT. No 01 NO. OF SHT. 01

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		CHD/APPD	ZONE		CHD/APPD

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-38101-03897

SHT. 01 OF 03

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GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

TEMP °C	FLOW NM ³ /HR.
20.0	8522
27.0	11700
NORMAL	
MIN.-MAX.	
MECH. DESIGN	

* SEE NOTE 1.8

TEMP °C	FLOW NM ³ /HR.
20.0	8522
27.0	11700
NORMAL	
MIN.-MAX.	
MECH. DESIGN	

* SEE NOTE 1.8

LOCAL GAUGE BOARD
JUNCTION BOX FOR SIGNAL CABLES
JUNCTION BOX FOR CONTROL CABLES

FROM PLANT IN SYSTEM
REF. P&ID NO. 1-38101-03898

FROM PLANT IN SYSTEM
REF. P&ID NO. 1-38101-03898

INSTRUMENT AIR 1"
NITROGEN FOR PURGING(1")

2119-V-6801
GAS SCRUBBER-1
(MULTI CYCLONE)
SEE NOTE-2.2 & 2.11

HIGH LEVEL : OPEN LOV 6804
LOW LEVEL : CLOSE LOV 6804

GAS CONDITIONING SKID

6"-FGV-2119-6804-11A

TO VENT HEADER
CONTD IN SH.02 OF 03

TEMP °C	FLOW NM ³ /HR.
20.0	8522
27.0	11700
NORMAL	
MIN.-MAX.	
MECH. DESIGN	

TO FLOW METER OF GT
CONTD IN SH.02 OF 03

6"-P-2119-6802-22A

BLV-6810

1" HRV-6811

1" GTV-6812

1" CONNECTION
* SEE NOTE 1.8

2119-V-6802
SEPARATOR #1
SEE NOTE-2.2 & 2.11

2119-V-6803
SEPARATOR #2
SEE NOTE-2.2 & 2.11

TO GAS CONDENSATE DRAIN TANK

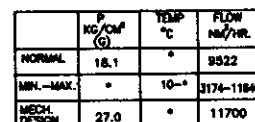
2"-FGD-2119-6803-21A

CONTD IN SH.02 OF 03

CUSTOMER		MARUTI SUZUKI INDIA LIMITED MANESAR, GURGAON, HARYANA	
PROJECT		MARUTI MANESWAR-II COGENERATION PLANT	
DESIGNED BY		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD	
DATE	28.04.10	NO. OF	1
CHKD. BY	M. S. P. BANU	DATE	28.04.10
APPRO. BY	R. C. V. S.	DATE	28.04.10
DEPT. CODE	480	SCALE	1:1
UNIT	MM	WEIGHT (KG)	-N.A.-
DWG. NO.	1-38101-03897	REV. NO.	01
TITLE		P & I DIAGRAM FOR OFF-BASE GAS SYSTEM FOR GT & HRSG	
SHT. No. 01		NO. OF SHT. 03	

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

I



GAS TURBINE
FR-5

TAP FOR FUTURE
INMIM

GAS CONDENSATE DRAINS FROM
COMMON SCRUBBER+FILTER SEPARATOR
SKID FOR GTs

OPERATING PRESSURE = ATMOSPHERIC
DESIGN PRESSURE = 3.5 KG/CM² (G)
2119-T-6804
(BURIED IN A PIT)

FUEL GAS CONDENSATE DRAIN TANK (2.0 M³) NEAR CCS AREA

VALVES(' * ' MARKED) AND INSTRUMENTATION ON DRAIN TANK ARE PROVIDED BY TANK VENDOR
REST OF THE VALVE ARE PROVIDED BY BHEL-PED-MECH.

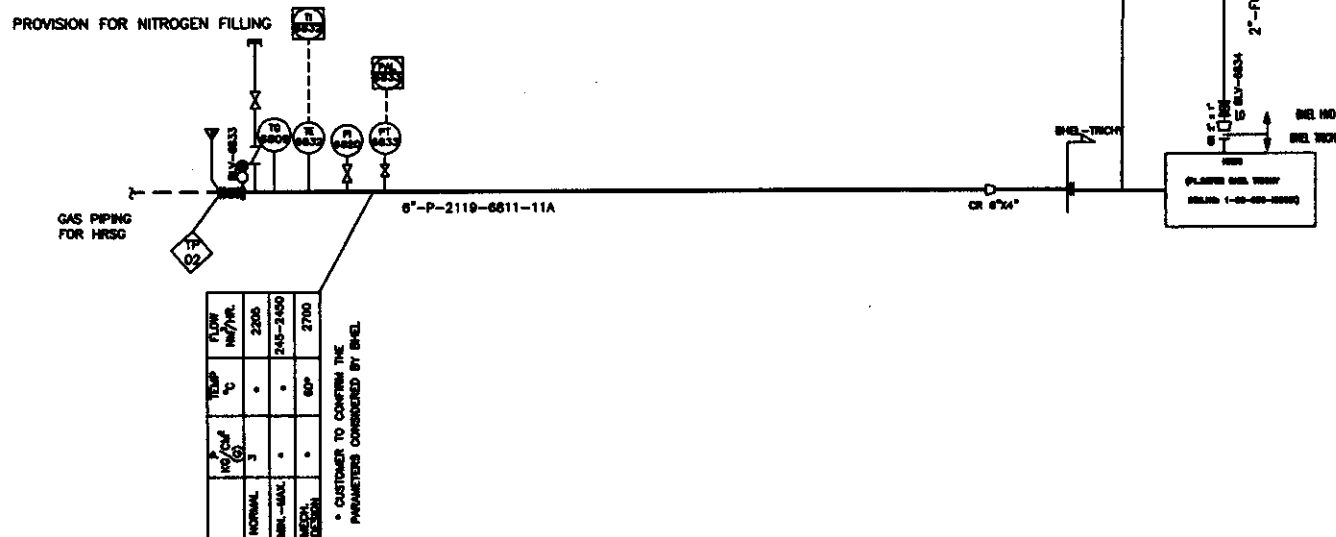
TITLE OF LOGIC	LOGIC NO.	TAG NOS. INVOLVED	CONDITIONS FOR LOGIC EXECUTION	REMARKS	PROCESS INTERLOCK EXECUTED IN
ESO-8804	I-101	LWH-8804A/B/C (2 OF 3 LOGIC)	LEVEL HIGH HIGH IN TANK/OUT DRAIN OF GT	TO CLOSE IN AUTO ESO-8804/8828 TO OPEN IN AUTO BOV-8807/8828	BOP DCS
			IN CASE OF FIRE IN GT (SEE NOTE 2.5)	TO CLOSE IN AUTO ESO-8828 & TO OPEN IN AUTO BOV-8828	
			IN CASE OF LONG SHUTDOWN/ EMERGENCY	TO CLOSE REMOTE MANUALLY ESO-8802, ESO-8808 TO OPEN REMOTE MANUALLY BOV-8807, BOV-8815, BOV-8816, BOV-8828.	
LCV-8804	I-102	LWH-8804B/C (1 OF 2 LOGIC)	LEVEL HIGH IN TANK/OUT DRAIN FOR GT	TO OPEN IN AUTO LCV-8804	BOP DCS
		LAL-8804B/C (1 OF 2 LOGIC)	LEVEL LOW IN TANK/OUT DRAIN FOR	TO CLOSE IN AUTO LCV-8804	
FUEL GAS CONDENSATE DRAIN TANK PUMP OF CCS	I-103	LWH-8830	CONDENSATE LEVEL IN THE TANK HIGH	TO START PUMP MANUALLY	BOP DCS
		LAL-8830	CONDENSATE LEVEL IN THE TANK LOW	TO TRIP PUMP IN AUTO	

	RANGE	USED IN THIS ORG. NO.	SPARE
INSTRUMENTS	P:6801-6899 T:6801-6899 6801-6899(REST)	6820 6809 6833	
VALVES	6801-6899	6834	
PIPE LINES	6801 TO 6899	6812	
INTERLOCKS	101-110	103	
TERMINAL POINTS	70-79	71	
EQUIPMENT NOS.			

LOCAL PB STNS FOR MOTOR BY PED-ELEC

CUSTOMER		MARUTI SUZUKI INDIA LIMITED MANESAR, GURGAON, HARYANA																					
PROJECT		MARUTI MANESWAR-II COGENERATION PLANT																					
		BHARAT HEAVY ELECTRICALS LTD.		HYDERABAD		<table border="1"> <tr> <th>NAME</th> <th>SIGN.</th> <th>DATE</th> <th>NO.</th> </tr> <tr> <td>DRN. S. SURENDRA</td> <td>sw/-</td> <td>28.04.10</td> <td>1</td> </tr> <tr> <td>CHD. M S P BABU</td> <td></td> <td>28.04.10</td> <td>2</td> </tr> <tr> <td>APPRO. R.C.V.S</td> <td>rcv/-</td> <td>28.04.10</td> <td>3</td> </tr> </table>		NAME	SIGN.	DATE	NO.	DRN. S. SURENDRA	sw/-	28.04.10	1	CHD. M S P BABU		28.04.10	2	APPRO. R.C.V.S	rcv/-	28.04.10	3
NAME	SIGN.	DATE	NO.																				
DRN. S. SURENDRA	sw/-	28.04.10	1																				
CHD. M S P BABU		28.04.10	2																				
APPRO. R.C.V.S	rcv/-	28.04.10	3																				
DEPT.	PED.	UNITS. DRWS.	ORL.	SCALE	WEIGHT (KGS)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF															
CODE	150	G/S/M/Y		NTS	-N.A.-	-N.A.-	-N.A.-	-N.A.-															
TITLE						P & I DIAGRAM FOR OFF-BASE GAS SYSTEM FOR GT& HRSG																	
CARD NO. N.A.						REEL SHEET NO. 1-35101-03897 CUSTOMER SPEC. NO. 03197-575-1166																	
						SHT. No. 02 NO. OF SHT. 03																	

FIRST ANGLE PROJECTION

DRG. NO. 1-38101-03897
SHT. 03 OF 03P2105
6924

NOTES:-

- 1.1. VENTS/DRAINS ARE SHOWN ONLY TO MEET SYSTEM REQUIREMENTS. ADDITIONAL HIGH POINT VENT AND LOW POINT DRAINS SHALL BE PROVIDED ACCORDING TO FINAL LAYOUT. ALL INSTRUMENT ISOLATION VALVES, VENT & DRAIN VALVES ARE OF GATE TYPE.
- 1.2. NECESSARY ROOT VALVES, INST. ISOLATION VALVES, VENT/DRAIN VALVES WILL BE PROVIDED FOR PR., DP, FLOW, & LEVEL MEASURING INST. EVEN THOUGH SAME WILL BE PROVIDED AS PER APPROVED INSTRUMENT HOOK UP DRAWING.
- 1.3. FUEL GAS LINES DOWNSTREAM OF FILTER SEPARATOR SKID IS OF STAINLESS STEEL MATERIAL.
- 1.4. ALL VENTS AND DRAINS UP TO FIRST ISOLATION VALVE (NON LO TYPE) SHALL BE OF STAINLESS STEEL MATERIAL FOR SS LINES.
- 1.5. FOR MATERIAL SPECIFICATION OF PIPES, FITTINGS ETC., PLEASE REFER TO PIPING DESIGN SPECIFICATION.
- 1.6. THIS BALL VALVE ALONG WITH SPECTACLE BLIND SHALL BE OPENED AFTER ENSURING THAT THE NRVs IN THE N2 SYSTEM ARE NOT PASSING. ANY READING IN THE PRESSURE GAUGE IS RESULT OF PASSING THROUGH NRVs.
- 1.7. THE VENT VALVE ON FUEL GAS CONDENSATE DRAIN TANK SHALL BE NORMALLY OPEN TO FLARE HEADER. PSV IS PROVIDED ONLY FOR ADDITIONAL SAFETY TO MEET ANY EVENTUALITY.
- 1.8. FOR LEGEND REF. TO DOC.NO. : 2-38101-00783
- 1.9. AS PER CONTRACT, MECHANICAL DESIGN PRESSURE IS INDICATED AS 30 KG/CM2(G). HOWEVER, AS GT'S MAXIMUM MECHANICAL DESIGN PRESSURE IS 27 KG/CM2(G), CUSTOMER TO LIMIT FUEL GAS MECHANICAL DESIGN PRESSURE AT TERMINAL POINT TO 27 KG/CM2(G) AND CONFIRM ACCORDINGLY. ALSO CUSTOMER TO CONFIRM MINIMUM & MAXIMUM SUPPLY PRESSURES AS WELL AS SUPPLY TEMPERATURES OF FUEL GAS.
- 1.10. CUSTOMER/CONSULTANT SHALL ENSURE INSTRUMENT AIR SUPPLY BEFORE COMMISSIONING OF THE GAS CONDITIONING SKID FOR OPERATION OF THE INSTRUMENTS(LEVEL CONTROL VALVES/SHUTDOWN/BLOWDOWN/SOLENOID VALVES).
- 1.11. ALL BALL VALVES IN FUEL GAS SYSTEM ARE OF FIRE SAFE DESIGN ONLY.
- 1.12. CUSTOMER TO FURNISH MINIMUM, MAXIMUM & MECHANICAL DESIGN PRESSURE OF FUEL GAS FOR HRSG. FURTHER CUSTOMER TO FURNISH MINIMUM, NORMAL, MAXIMUM & MECHANICAL DESIGN TEMPERATURE OF FUEL GAS FOR HRSG.

- 2.1. VOTAGE RATING SOLENOID VALVE = 24 V DC. TYPE OF SOLENOID VALVE = UNIVERSAL TYPE
- 2.2. LEVEL TRANSMITTERS ON KNOCK OUT DRUM ARE OF TORQUE TUBE TYPE AND THESE TRANSMITTERS ARE MOUNTED AT SAME ELEVATION.
- 2.3. ALL ELECTRICAL EQUIPMENT AND RELAY INSTRUMENTATION IN FUEL GAS SYSTEM ARE DESIGNED TO EXPLOSION PROOF TO CL 1, DIV.2, GR. C & D AS PER NEC.
- 2.5. FIRE IN GT SYSTEM MAY OCCUR IN THE FOLLOWING AREAS.
 - A) GT COMPARTMENT
 - B) GENERATOR COMPARTMENT
 - C) GT ACCESSORY BASE
 - D) GT LIQUID FUEL MODULE
 FIRE IN ANY OF THE ABOVE DEFINED AREAS IS BEING COMMUNICATED BY MARK-VI TO DCS AND ACCORDINGLY, CLOSURE/OPENING OF ON/OFF VALVES IS BEING IMPLEMENTED BY DCS.
- 2.6. SET POINTS FOR SCRUBBER ARE AS FOLLOWS:
 - (A) LALL = 75 MM, (B) LAL = 125 MM, (C) LAH = 225 MM, (D) LAHH = 275 MM
- 2.7. SET POINTS FOR FILTER SEPARATOR ARE AS FOLLOWS:
 - (A) LAL = 125 MM, (B) LIC = 175 MM, (C) LAH = 225 MM
- 2.8.
 - - INDICATES FIELD MOUNTED INSTRUMENT.
 - - INDICATES DCS INSTRUMENT.
 - ⊗ - INDICATES LOCAL GAUGE BOARD/LOCAL PANEL INSTRUMENT.
- 2.9. FSV-6803/6817/6818 ARE FIRE SAFE CONDITION VALVES AS PER API-520.
- 2.10. THE FSV INDICATION (FSV) REPRESENTS 1"(INLET) x 2"(OUTLET) VALVE WITH "D" TYPE ORIFICE AND SET PRESSURE OF 27 KG/CM2(G).
- 2.11. ALL VESSELS(SCRUBBER, FILTER SEPARATOR & GAS CONDENSATE DRAIN TANKS) SHALL BE DESIGNED AS ASME SEC. VIII, DIV. 1
- 2.12. (i) OUTLET ISOLATION VALVE OF SAFETY VALVE SHALL BE ALWAYS KEPT OPEN.
(ii) OUTLET ISOLATION VALVE OF SAFETY VALVE SHALL BE CLOSED ONLY WHEN THE INLET ISOLATION VALVE OF SAFETY VALVE IS CLOSED AND THE SPACE BETWEEN THE SAFETY VALVE AND INLET ISOLATION VALVE IS ADEQUATELY DEPRESSURISED THROUGH BLEED VALVE.
(iii) SAFETY VALVE SHALL BE TAKEN FOR MAINTENANCE ONLY AFTER THE SPACE BETWEEN THE INLET VALVE AND SAFETY VALVE AND SPACE BETWEEN SAFETY VALVE AND OUTLET ISOLATION VALVE ARE SAFELY DEPRESSURISED THROUGH RESPECTIVE BLEED VALVES..
- 2.13. ALL INSTRUMENT TAG NO'S SHALL BE PREFIXED BY UNIT NO: 2119.

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

CUSTOMER		MARUTI SUZUKI INDIA LIMITED			
		MANESAR, GURGAON, HARYANA			
PROJECT		MARUTI MANESWAR-II COGENERATION PLANT			
BY		NAME		SIGN.	DATE
S. SURENDRA		S. SURENDRA		28.04.10	WIR.
CHD. M. S. P. BABU		CHD. M. S. P. BABU		28.04.10	-NA-
APPD. R.C.V.S.		APPD. R.C.V.S.		29.04.10	-NA-
DEPT.	UNITS	SCALE	WEIGHT	REF. TO ASSY. DRG.	ITEM NO.
CODE	OR	MTS	-N.A.-	-N.A.-	-N.A.-
TITLE		P & I DIAGRAM FOR OFF-BASE GAS SYSTEM FOR GT & HRSG		REV. NO.	
N.A.		N.A.		03197-576-1168	
SHT. No. 03		NO. OF SHT. 03			

00630-1-38101-03900

SH. 01 OF 03

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GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY08261

INVENTORY NO. _____

REV. DATE _____

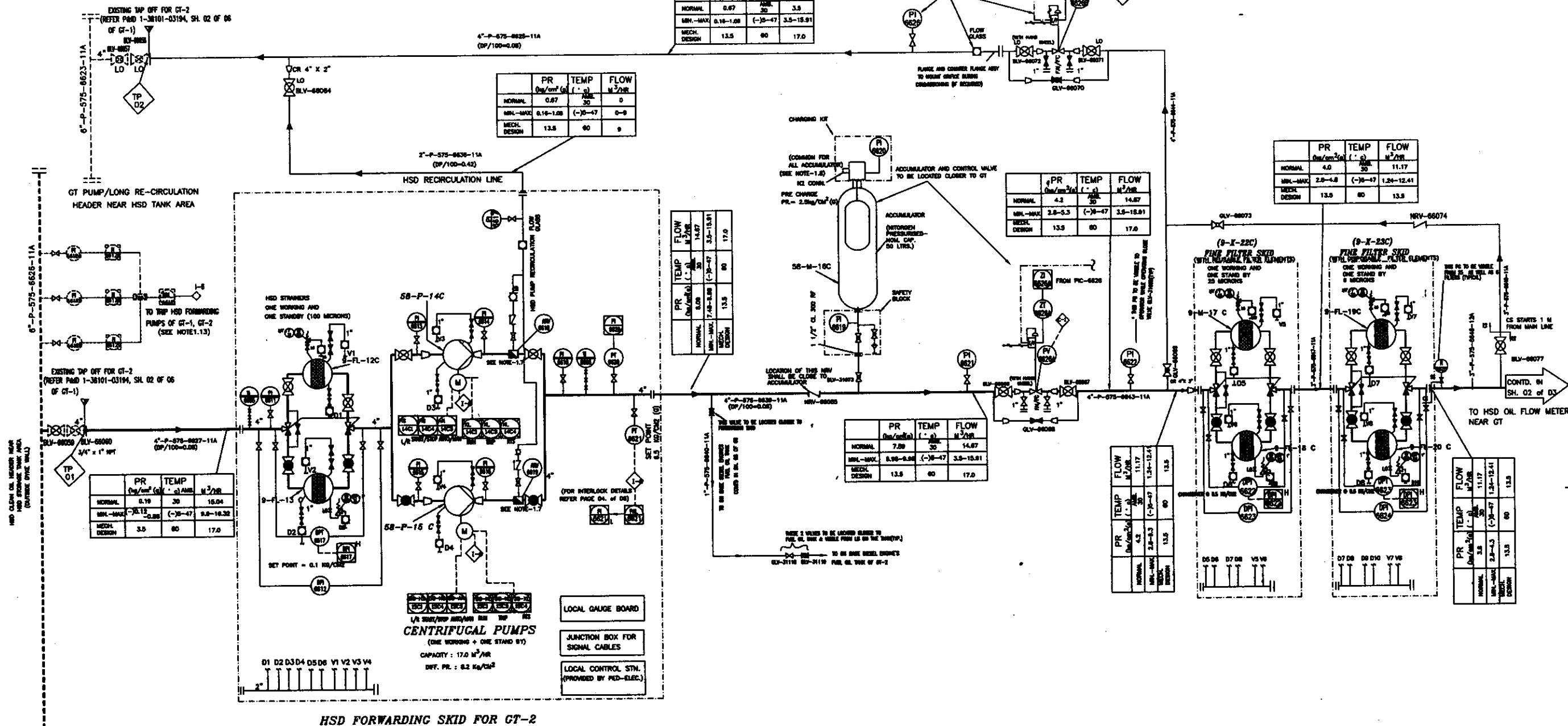
COMPUTER FILE NAME _____

3810101-03900



REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD
ZONE				ZONE				ZONE				ZONE				ZONE			

CUSTOMER				MARUTI SUZUKI INDIA LIMITED				
				MANESAR, GURGAON, HARYANA				
PROJECT				MARUTI MANESAR-II COGENERATION PLANT				
BY				BHARAT HEAVY ELECTRICALS LTD.				
HYDERABAD								
DEPT.	PER.	UNTL. DMS.	OR	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS
450		6/4/7		NTS	-N.A.-	-N.A.-	-N.A.-	-N.A.-
TITLE				P & I DIAGRAM FOR OFF-BASE HSD SYSTEM FOR GT-2				
DRAWN BY				S.SURENDRA				
CHKD. BY				M. S. P. BHADU				
APPD. BY				R.C.V.S.				
SHT. No. 01				NO. OF SHT. 03				



	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	3.5
MIN-MAX	0.10-1.00	(-30-47)	3.5-15.91
MECH. DESIGN	13.5	60	17.0

	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	0
MIN-MAX	0.10-1.00	(-30-47)	0-0
MECH. DESIGN	13.5	60	0

	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	14.87
MIN-MAX	0.10-1.00	(-30-47)	3.5-15.91
MECH. DESIGN	13.5	60	17.0

	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	14.87
MIN-MAX	0.10-1.00	(-30-47)	3.5-15.91
MECH. DESIGN	13.5	60	17.0

	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	14.87
MIN-MAX	0.10-1.00	(-30-47)	3.5-15.91
MECH. DESIGN	13.5	60	17.0

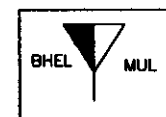
	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	11.17
MIN-MAX	0.10-1.00	(-30-47)	1.24-12.41
MECH. DESIGN	13.5	60	13.5

	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	11.17
MIN-MAX	0.10-1.00	(-30-47)	1.24-12.41
MECH. DESIGN	13.5	60	13.5

	PR	TEMP	FLOW
	(kg/cm ² g)	(°C)	(m ³ /hr)
NORMAL	0.67	30	11.17
MIN-MAX	0.10-1.00	(-30-47)	1.24-12.41
MECH. DESIGN	13.5	60	13.5

	G	F
GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY08261		

INVENTORY NO	ISSUE AND DATE	REF. ORG. NO.	COMPUTER FILE NAME
			1381010141-501-202 RMF



	PR (lb/cm ²)	TEMP (°C)	FLOW m ³ /hr
NORMAL	3.8	21	11.17
MIN.-MAX.	2.8-4.3	(-35-67)	1.24-12.41
MECH. DESIGN	13.5	80	13.5

	PR (kg/cm^2) (g)	TEMP ($^{\circ}\text{C}$)	FLOW M^3/HR
NORMAL	3.3	21	11.17
MIN. - MAX.	2.8 - 3.8	(-)-47	1.24 - 12.41
MEDICAL DESIGN	13.5	80	13.5

[illegible]

CUSTOMER		MARUTI SUZUKI INDIA LIMITED MANESAR, GURGAON, HARYANA					
PROJECT		MARUTI MANESAR-II COGENERATION PLANT					
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME		SIGN.		DATE	
		DRN.		S.SURENDRA		03.05.10	
		CHD.		M S P BANU		03.05.10	
		APPD.		R.C.V.S		03.05.10	
DEPT.	ORD. DMS.		SCALE	HEIGHT (NO.)	REF. TO ASSY. DRG.		ITEM NO.
CODE	QTY.		MTS	-N.A.-	-N.A.-	-N.A.-	ITEM
430	0/N/Y						
TITLE		P & I DIAGRAM FOR OFF-BASE HSD SYSTEM FOR GT-2		CARD NO.	1-36101-03900		
				CARD NO.	03194-575-1166		
				SHT. No. 02	NO. OF SHT. 03		

006E0-1018E-1 ON 03 SHI. 03 OF 03 DRG. NO. 1-38101-03900

INTERLOCK SUMMARY

TITLE OF LOGIC	LOGIC NO.	TAG NOS. INVOLVED	CONDITIONS FOR LOGIC EXECUTION	REMARKS	PROCESS INTERLOCK EXECUTED IN
HSD FORWARDING PUMPS FOR GT	I-6	PAL-6612A PAL-6612B PAL-6612C (2 OUT OF 3 LOGIC) (SEE NOTE 1.9)	FIRE SIGNAL FROM GT-2 SYSTEM (SEE NOTE 1.9)	TO TRIP RUNNING FORWARDING PUMP	DCS
			HSD CLEAN OIL TANK LEVEL LOW	TO TRIP RUNNING FORWARDING PUMP	
		PAL-6621	FORWARDING PUMP DISCHARGE PR. LOW	TO START STANDBY PUMP (TRIPPING OF RUNNING PUMP ON LEVEL LOW IN TANK/ FIRE IN GT AREA SHOULD OVERRIDE STARTING OF STANDBY PUMP DUE TO LOW PR.) RUNNING WORKING PUMP SHALL BE TRIPPED MANUALLY.	
HSD PR. AT INLET OF GT	I-7	PAL-6625	NON ACTIVATION OF PAL-3137	START PERMISSIVE FOR GT ON HSD	DCS
TRIP VALVE NEAR GT	I-8	MOV-6627	ON FIRE SIGNAL IN GT AREA	CLOSE SHUT DOWN VALVE MOV-3241	DCS
GAS TO HSD CHANGEOVER LOGIC OF GT	CONTROL LOOP DESOR. C-1	PV-6628A	FOLLOWING CHANGEOVER LOGIC SHALL BE IMPLEMENTED IN DCS A) ON CHANGEOVER SIGNAL FROM MARK-V FROM GAS TO HSD MODE, THE % OF OPENING OF MAIN PRESSURE CONTROL VALVE WILL BE RAMPED UP TO REQUIRED % OF OPENING DIRECTLY BY DCS(BYPASSING CONTROLLER, PIC-3108 BASED ON LOAD OF GT IN A SPAN OF SAY 5 SECONDS. B) THE ESTIMATED REQUIRED % OPENING OF CONTROL VALVE AT FULL LOAD OF GT WHILE CHANGEOVER IS 75%. C) THE ESTIMATED REQUIRED % OPENING OF CONTROL VALVE AT FINAL OF GT WHILE CHANGEOVER IS 33%. D) THE ESTIMATED REQUIRED % OPENING OF CONTROL VALVE AT INTERMITTENT LOADS OF GT WHILE CHANGEOVER WILL BE BETWEEN 33% TO 75% DEPENDING ON LOAD OF GT. E) ONE MINUTE AFTER SUCCESSFUL CHANGEOVER OF GT FROM GAS TO HSD MODE, THE CONTROL OF PCV WILL AGAIN BE TRANSFERRED TO PIC-3139 F) ACTUAL SETTING WILL BE FINE TUNED DURING COMMISSIONING. C) DEDICATED HAND WIRED SIGNAL TO BE PROVIDED FROM MARK-V TO DCS/DCS FOR IMPLEMENTING THE LOGIC IN EITHER DCS/DCS.		
			A) BY PASS CONTROL VALVE PV-3139B IS PROVIDED TO . MAINTAIN PR. OF HSD AT INLET OF GT DURING START UP/ CHANGEOVER OF GT FROM GAS MODE TO HSD MODE. B) ACCORDINGLY, THE BY PASS CONTROL VALVE PV-3139B IS CONTINUOUSLY PUT IN 20% OPENING AS A CONTINUOUS . LONG RE-CIRCULATION FLOW THOROUGH SYSTEM OF ABOUT 3.5 M3/HR. C) CONTINUOUS OPENING OF BY PASS PCV PV-3139B WILL ALWAYS PUT MAIN CONTROL VALVE PV-3138A IN ACTION THUS, MAINTAINING PR. AT INLET OF GT WITHIN ALLOWABLE LIMITS, THUS ENSURING SMOOTH STARTUP OF GT ON HSD FUEL/CHANGEOVER TO HSD. D) ALSO PL. SEE NOTE : 1.10, 2.5 & 2.7.		
BY-PASS CONTROL VALVE PV-6628B	CONTROL LOOP DESOR. C-1	PV-6628B			

NOTES:

- VENTS/DRAINS ARE SHOWN ONLY TO MEET SYSTEM REQUIREMENTS. ADDITIONAL HIGH POINT VENT AND LOW POINT DRAINS SHALL BE PROVIDED ACCORDING TO FINAL LAYOUT.
ALL HIGH POINT VENTS/DRAINS SHALL BE PROVIDED WITH 1" VALVE, FLANGE AND BLIND FLANGE.
THE DRAIN POINTS SHALL BE TERMINATED AT MIN. 300 MM ABOVE FFL.
ALL INSTRUMENT ISOLATION VALVES, VENT & DRAIN VALVES ARE OF GATE TYPE AS PER BHEL'S PIPING MATERIAL SPECIFICATION.
- PLEASE REFER TO PIPING DESIGN SPECS AND LINE SPECS FOR MATERIAL OF CONSTRUCTION AND LINE RATINGS.
- ALL MAIN PROCESS VALVES FOR HSD/FUEL GAS SYSTEM SHALL BE BALL VALVES ONLY.
- FUEL OIL PIPING UP STREAM OF 6 MICRON FILTER(INCLUDING FILTER) IS OF CS MATERIAL.
FUEL OIL PIPING DOWN STREAM OF 6 MICRON FILTER SHALL BE OF SS MATERIAL.
THE BRANCH LINES CONNECTED TO MAIN SS LINE SHALL BE OF STAINLESS STEEL MATERIAL UP TO 1ST ISOLATION VALVE/ 1 METER FROM MAIN LINE, WHICHEVER IS THE CLOSER.
REST OF THE BRANCH PIPE LINES SHALL BE OF CARBON STEEL MATERIAL.
- EACH FORWARDING SKID IS DESIGNED FOR FULL FLOW REQUIREMENT OF ONE NO.OF GTG AND EACH SKID CONSISTS OF TWO NOS. OF PUMPS(1 WORKING + 1 STANDBY)
- THE FORWARDING PUMPS ARE SUITABLE FOR OUTDOOR LOCATION.
- ARC VALVE SHALL BE LOCATED CLOSER TO PUMP DISCHARGE FLANGE.
- A NITROGEN HEADER WITHIN HSD AREA WILL BE LAID BY BHEL AND TERMINATED AT BATTERY LIMIT.
A TAP OFF NEAR EACH ACCUMULATOR WILL BE PROVIDED FOR FILLING OF ACCUMULATOR.
- FIRE IN GTG SYSTEM MAY OCCUR IN FOLLOWING AREA.
A) GT COMPARTMENT
B) GENERATOR COMPARTMENT
C) GT ACCESSORY BASE
D) GT LIQUID FUEL MODULE
FIRE IN ANY OF THE ABOVE SAID AREAS BEING COMMUNICATED BY CO2 GTG FIRE FIGHTING PANEL TO DCS AND ACCORDINGLY, CLOSURE/OPENING OF ON/OFF VALVE AT GT INLET IS BEING IMPLEMENTED BY DCS
- IN ORDER TO CATER TO ANY UNFORESEEN PROBLEMS DURING COMMISSIONING : IN THE IMPLEMENTATION OF CHANGEOVER LOGIC THE LONG RE-CIRCULATION LINE IS DESIGNED FOR FULL FLOW OF GT, TO ENSURE THAT THERE IS NO HARDWARE LIMITATION IN IMPLEMENTING ALTERNATIVE LOGIC.
- DISTANCE BETWEEN 2 BLOCK VALVES (WITH BLEED) SHALL BE LIMITED TO MAX. OF 1 M TO MINIMISE DRAINED QUANTITY.
- CUSTOMER SHALL ENSURE PROPER HANDLING & STORAGE MEASURES AS PER DOC. No: PEMC-789(RECOMMENDED MEASURES FOR UNLOADING & STORAGE OF LIQUID FUEL FOR TROUBLE FREE OPERATION OF GT).
- THESE INSTRUMENTS ON CLEAN OIL OUTLET HEADER ARE PROVIDED AS PART OF GT-1 PACKAGE.
PRESSURE ALARM LOW LOW SIGNAL(PAL-6612) NEED TO BE EXTENDED FOR GT-2 ALSO.

- INSTRUMENT HOOK-UP SCHEMES ARE NOT INDICATED.
HOWEVER, NECESSARY ROOT VALVES, INST. ISOLATION VALVES, VENT/DRAIN VALVES WILL BE PROVIDED FOR PR., DP, FLOW, & LEVEL MEASURING INST.
AS PER APPROVED INSTRUMENT HOOK UP DRAWING.
- ALL INSTRUMENT TAG NO'S SHALL BE PREFIXED BY UNIT NO:575.
- TYPICAL TSV INDICATION 
REPRESENTS 3/4" x 1" VALVE WITH NPT PROCESS CONNECTION AND SET PRESSURE OF 13.5 KG/CM2(G).
- THE INPUT DATA FOR SELECTION OF PRESSURE CONTROL VALVE FOR GTs IS AS PER ADJACENT TABLE-1.

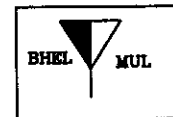
TABLE-1
(FOR MAIN CONTROL VALVE OF GT)

	PR. UPSTREAM OF PCV KG/CM ² (G)	PR. DOWN STREAM OF PCV KG/CM ² (G)	FLOW M ³ /HR	TEMP °C
MAX. CV CONDITION	5.98	5.3	15.91	47
MIN. CV CONDITION	9.98	2.8	3.5	(-35)
NOML. CV CONDITION	7.58	4.2	14.67	30
MECHANICAL DESIGN = 13.5 KG/CM ² (G)				

TABLE-2
(FOR BYPASS CONTROL VALVE OF GT)

	PR. UPSTREAM OF PCV KG/CM ² (G)	PR. DOWN STREAM OF PCV KG/CM ² (G)	FLOW M ³ /HR	TEMP °C
MAX. CV CONDITION	2.8	1.08	15.91	47
MIN. CV CONDITION	5.3	0.16	3.5	(-35)
NOML. CV CONDITION	4.2	0.67	3.5	30
MECHANICAL DESIGN = 13.5 KG/CM ² (G)				

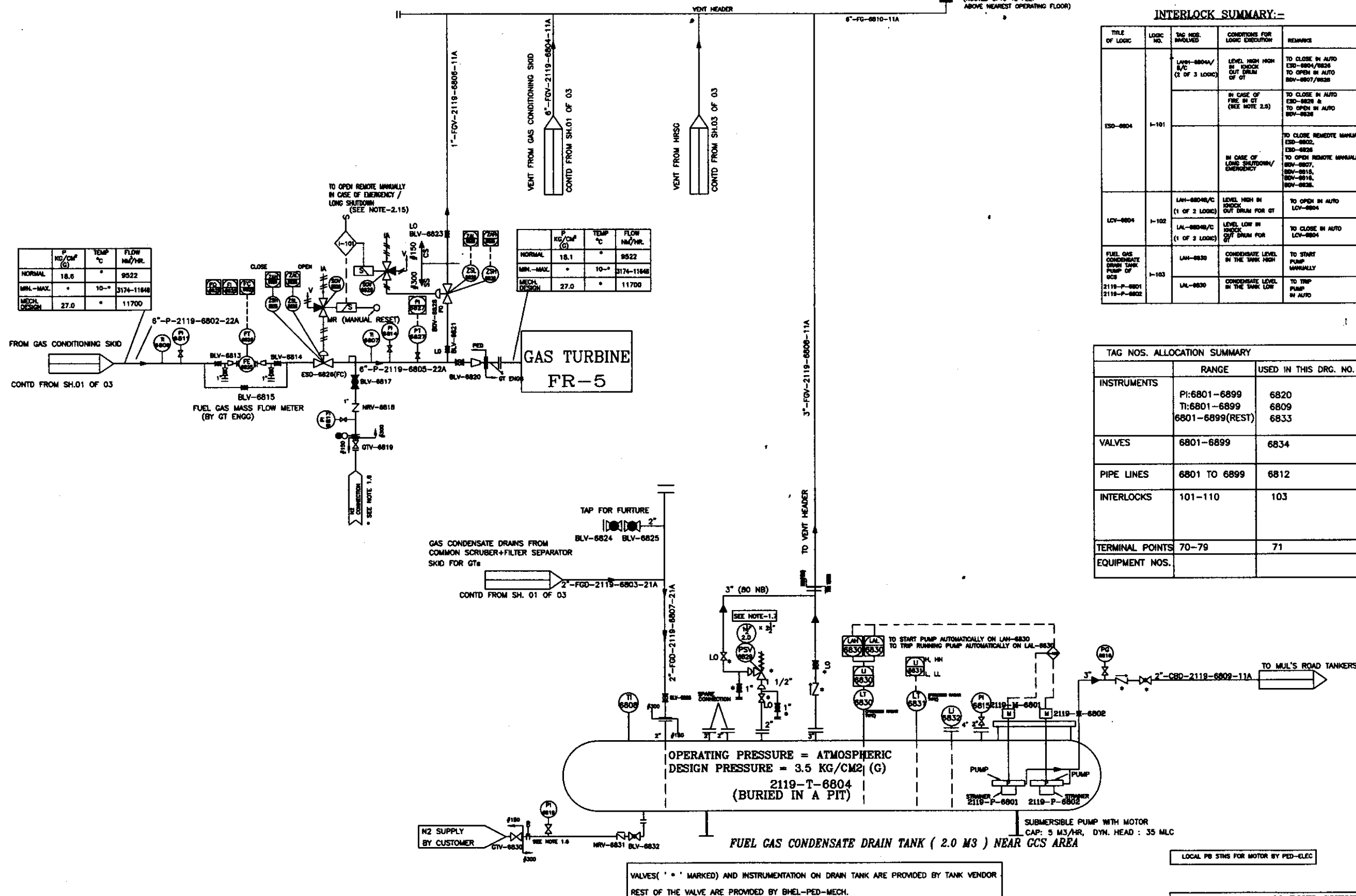
- THE INPUT DATA FOR SELECTION OF BY PASS CONTROL VALVE FOR GTs IS AS PER ADJACENT TABLE-2.
- A SOFTWARE LOCK SHALL BE PROVIDED IN DCS TO LIMIT THE MAXIMUM OPENING OF BYPASS CONTROL VALVE(PV-31042B) TO 20%. THIS IS REQUIRED AS FURTHER OPENING OF BYPASS VALVE WILL DEPRIVE GT OF FUEL OIL THUS LEADING TO TRIPPING OF GT ON LOW OIL PRESSURE.
- THESE TRANSMITTERS ARE OF DP (WITH DIAPHRAGM SEALS) TYPE CALIBRATED FOR LEVEL AND LP PORT OF TRANSMITTER IS LEFT TO ATMOSPHERE.
- PROVISION OF PID CONTROLLER IS CONSIDERED FOR THE BYPASS PRESSURE CONTROL VALVE(PV-31042B) IN IMPLEMENTING ANY OTHER ALTERNATIVE LOGIC.



TAG NOS. ALLOCATION SUMMARY			
	RANGE	USED IN THIS DRG. NO.	SPARE
INSTRUMENTS	TSV	6621	
	PI/DPI/PG/DPG	6635	
	TI/TG	6606	
	PT/DPT AND REST	6645	
VALVES	66001-66150	66105	
PIPE LINES	6601-6690	6670	
INTERLOCKS	01-10	09	
TERMINAL POINTS	50-60	51	
EQUIPMENT NOS.			

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD
ZONE			ZONE			ZONE			ZONE			ZONE		

CUSTOMER				MARUTI SUZUKI INDIA LIMITED			
				MANESAR, GURGAON, HARYANA			
PROJECT				MARUTI MANESAR-II COGENERATION PLANT			
SHARAT HEAVY ELECTRICALS LTD.				NAME	SHRI.	DATE	NO. OF
HYDERABAD				DRN.	S.SURENDRA	06/11	03.08.10
				CHD.	M S P BANSI	06/11	03.08.10
				APPD.	R.C.V.S	06/11	03.08.10
DEPT.	CD	UNTL. DMS.	OR	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.
450		6/4/11		NTS	-NA-	-NA-	-NA-
TITLE				P & I DIAGRAM FOR			
				OFF-BASE HSD SYSTEM			
				FOR GT-2			
				CARD CODE	1-38101-03900	REV.	NO. OF
				NO.	03194-575-1186	00	ITEMS
				SHT. No. 03	NO. OF SHT. 03		

DRG. NO. 1-38101-03897
SHT. 02 OF 03

INTERLOCK SUMMARY:-

TITLE OF LOGIC	LOGIC NO.	TAG NOS. INVOLVED	CONDITIONS FOR LOGIC EXECUTION	REMARKS	PROCESS INTERLOCK EXECUTED IN
ESD-6804	I-101	LAL-6804A/C (2 OF 3 LOGIC)	LEVEL HIGH IN TANK OUT DRAIN OF GT	TO CLOSE IN AUTO ESD-6804/6825 TO OPEN IN AUTO BOV-6807/6826	BOP DCS
			IN CASE OF FIRE IN GT (SEE NOTE 2.5)	TO CLOSE IN AUTO ESD-6825 & TO OPEN IN AUTO BOV-6826	
			IN CASE OF LONG SHUTDOWN/ OVERCLOCK	TO CLOSE REMOTE MANUALLY ESD-6802, ESD-6825 TO OPEN REMOTE MANUALLY BOV-6807, BOV-6815, BOV-6816, BOV-6826.	
LCV-6804	I-102	LAL-6804B/C (1 OF 2 LOGIC)	LEVEL HIGH IN TANK OUT DRAIN FOR GT	TO OPEN IN AUTO LCV-6804	BOP DCS
		LAL-6804B/C (1 OF 2 LOGIC)	LEVEL LOW IN TANK OUT DRAIN FOR GT	TO CLOSE IN AUTO LCV-6804	
FUEL GAS CONDENSATE DRAIN TANK PUMP OF DCS	I-103	LAL-6830	CONDENSATE LEVEL IN THE TANK HIGH	TO START PUMP MANUALLY	BOP DCS
		LAL-6830	CONDENSATE LEVEL IN THE TANK LOW	TO TRIP PUMP IN AUTO	

TAG NOS. ALLOCATION SUMMARY

	RANGE	USED IN THIS DRG. NO.	SPARE
INSTRUMENTS	PI:6801-6899	6820	
	TI:6801-6899	6809	
	6801-6899(REST)	6833	
VALVES	6801-6899	6834	
PIPE LINES	6801 TO 6899	6812	
INTERLOCKS	101-110	103	
TERMINAL POINTS	70-79	71	
EQUIPMENT NOS.			

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

CUSTOMER			
MARUTI SUZUKI INDIA LIMITED MANESAR, GURGAON, HARYANA			
PROJECT MARUTI MANESWAR-II COGENERATION PLANT			
BHEL BHARAT HEAVY ELECTRICALS LTD. HYDERABAD	NAME	SIGN.	DATE
	DR. S. SURENDRA		29.04.10
	CHD. M. S. P. BABU		29.04.10
APPD. R.C.V.S	ALL		29.04.10
DEPT. PED	UNTL. DRAS.	SCALE	WEIGHT (KG)
CODE 450	6/4/7	NTS	-N.A.-
TITLE		REF. TO ASSY. DRG.	ITEM NO. NO. OF ITEMS
P & I DIAGRAM FOR OFF-BASE GAS SYSTEM FOR GT & HRSG		-N.A.-	-N.A.-
CARD CODE	SUPPLIER DRG. NO.	1-38101-03897	REV. NO.
N.A.	03197-575-1188		
SHT. No. 02	NO. OF SHT. 03		

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SIGN. AND DATE OF REV. NO. AND DATE OF APPROVAL

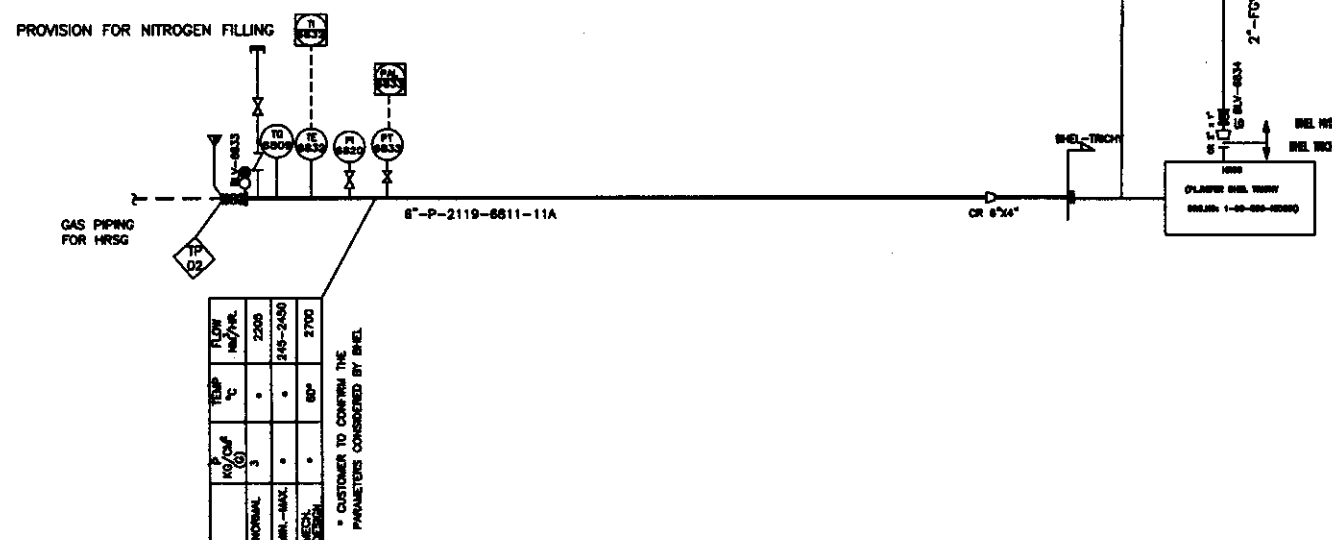
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9/6/24

DRG. NO. 1-38101-03897

SHT. 03 OF 03

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261



NOTES:-

- 1.1. VENTS/DRAINS ARE SHOWN ONLY TO MEET SYSTEM REQUIREMENTS. ADDITIONAL HIGH POINT VENT AND LOW POINT DRAINS SHALL BE PROVIDED ACCORDING TO FINAL LAYOUT. ALL INSTRUMENT ISOLATION VALVES, VENT & DRAIN VALVES ARE OF GATE TYPE.
- 1.2. NECESSARY ROOT VALVES, INST. ISOLATION VALVES, VENT/DRAIN VALVES WILL BE PROVIDED FOR PR., DP, FLOW, & LEVEL MEASURING INST. EVEN THOUGH SAME WILL BE PROVIDED AS PER APPROVED INSTRUMENT HOOK UP DRAWING.
- 1.3. FUEL GAS LINES DOWNSTREAM OF FILTER SEPARATOR SKID IS OF STAINLESS STEEL MATERIAL.
- 1.4. ALL VENTS AND DRAINS UPTO FIRST ISOLATION VALVE (NON LO TYPE) SHALL BE OF STAINLESS STEEL MATERIAL FOR SS LINES.
- 1.5. FOR MATERIAL SPECIFICATION OF PIPES, FITTINGS ETC., PLEASE REFER TO PIPING DESIGN SPECIFICATION.
- 1.6. THIS BALL VALVE ALONG WITH SPECTACLE BLIND SHALL BE OPENED AFTER ENSURING THAT THE NRVs IN THE N2 SYSTEM ARE NOT PASSING. ANY READING IN THE PRESSURE GAUGE IS RESULT OF PASSING THROUGH NRVs.
- 1.7. THE VENT VALVE ON FUEL GAS CONDENSATE DRAIN TANK SHALL BE NORMALLY OPEN TO FLARE HEADER. PSV IS PROVIDED ONLY FOR ADDITIONAL SAFETY TO MEET ANY EVENTUALITY.
- 1.8. FOR LEGEND REF. TO DOC.NO. : 2-38101-00783
- 1.9. AS PER CONTRACT, MECHANICAL DESIGN PRESSURE IS INDICATED AS 30 KG/CM2(G). HOWEVER, AS GT'S MAXIMUM MECHANICAL DESIGN PRESSURE IS 27 KG/CM2(G), CUSTOMER TO LIMIT FUEL GAS MECHANICAL DESIGN PRESSURE AT TERMINAL POINT TO 27 KG/CM2(G) AND CONFIRM ACCORDINGLY. ALSO CUSTOMER TO CONFIRM, MINIMUM & MAXIMUM SUPPLY PRESSURES AS WELL AS SUPPLY TEMPERATURES OF FUEL GAS.
- 1.10. CUSTOMER/CONSULTANT SHALL ENSURE INSTRUMENT AIR SUPPLY BEFORE COMMISSIONING OF THE GAS CONDITIONING SKID FOR OPERATION OF THE INSTRUMENTS(LEVEL CONTROL VALVES/SHUTDOWN/BLOWDOWN/SOLENOID VALVES).
- 1.11. ALL BALL VALVES IN FUEL GAS SYSTEM ARE OF FIRE SAFE DESIGN ONLY.
- 1.12. CUSTOMER TO FURNISH MINIMUM, MAXIMUM & MECHANICAL DESIGN PRESSURE OF FUEL GAS FOR HRSG. FURTHER CUSTOMER TO FURNISH MINIMUM, NORMAL, MAXIMUM & MECHANICAL DESIGN TEMPERATURE OF FUEL GAS FOR HRSG.

- 2.1. VOTAGE RATING SOLENOID VALVE = 24 V DC, TYPE OF SOLENOID VALVE = UNIVERSAL TYPE
- 2.2. LEVEL TRANSMITTERS ON KNOCK OUT DRUM ARE OF TORQUE TUBE TYPE AND THESE TRANSMITTERS ARE MOUNTED AT SAME ELEVATION.
- 2.3. ALL ELECTRICAL EQUIPMENT AND RELAVENT INSTRUMENTATION IN FUEL GAS SYSTEM ARE DESIGNED TO EXPLOSION PROOF TO CL 1, DIV.2, GR. C & D AS PER NEC.
- 2.5. FIRE IN GT SYSTEM MAY OCCUR IN THE FOLLOWING AREAS.
 - A) GT COMPARTMENT
 - B) GENERATOR COMPARTMENT
 - C) GT ACCESSORY BASE
 - D) GT LIQUID FUEL MODULE
 FIRE IN ANY OF THE ABOVE DEFINED AREAS IS BEING COMMUNICATED BY MARK-VI TO DCS AND ACCORDINGLY, CLOSURE/OPENING OF ON/OFF VALVES IS BEING IMPLEMENTED BY DCS.
- 2.6. SET POINTS FOR SCRUBBER ARE AS FOLLOWS:
 - (A) LALL = 75 MM, (B) LAL = 125 MM, (C) LAH = 225 MM, (D) LAHH = 275 MM
- 2.7. SET POINTS FOR FILTER SEPARATOR ARE AS FOLLOWS:
 - (A) LAL = 125 MM, (B) LUC = 175 MM, (C) LAH = 225 MM
- 2.8.
 - -INDICATES FIELD MOUNTED INSTRUMENT.
 - -INDICATES DCS INSTRUMENT.
 - ⊗ -INDICATES LOCAL GAUGE BOARD/LOCAL PANEL INSTRUMENT.
- 2.9. FSV-6803/6617/6818 ARE FIRE SAFE CONDITION VALVES AS PER API-520.
- 2.10. THE FSV INDICATION REPRESENTS 1"(INLET) x 2"(OUTLET) VALVE WITH 'D' TYPE ORIFICE AND SET PRESSURE OF 27 KG/CM2(G).
- 2.11. ALL VESSELS(SCRUBBER, FILTER SEPARATOR & GAS CONDENSATE DRAIN TANKS) SHALL BE DESIGNED AS ASME SEC. VIII, DIV. 1
- 2.12. (i) OUTLET ISOLATION VALVE OF SAFETY VALVE SHALL BE ALWAYS KEPT OPEN.

(ii) OUTLET ISOLATION VALVE OF SAFETY VALVE SHALL BE CLOSED ONLY WHEN THE INLET ISOLATION VALVE OF SAFETY VALVE IS CLOSED AND THE SPACE BETWEEN THE SAFETY VALVE AND INLET ISOLATION VALVE IS ADEQUATELY DEPRESSURISED THROUGH BLEED VALVE.

(iii) SAFETY VALVE SHALL BE TAKEN FOR MAINTENANCE ONLY AFTER THE SPACE BETWEEN THE INLET VALVE AND SAFETY VALVE AND SPACE BETWEEN SAFETY VALVE AND OUTLET ISOLATION VALVE ARE SAFELY DEPRESSURISED THROUGH RESPECTIVE BLEED VALVES..
- 2.13. ALL INSTRUMENT TAG NO'S SHALL BE PREFIXED BY UNIT NO: 2119.

CUSTOMER				MARUTI SUZUKI INDIA LIMITED MANESAR, GURGAON, HARYANA			
PROJECT				MARUTI MANESWAR-II COGENERATION PLANT			
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME		SIGN.		DATE	
CHD. M S P BABU		S. SURENDRA		ed/-		29.04.10	
APPD. R.C.V.S		S. S. BABU		S. S. BABU		29.04.10	
APPD. R.C.V.S		S. S. BABU		S. S. BABU		29.04.10	
DEPT.	PED.	UNTOLO. DRMS.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS
CODE 480	9/4/1	9/4/1	MTS	-N.A.-	-N.A.-	-N.A.-	-N.A.-
TITLE				P & I DIAGRAM FOR OFF-BASE GAS SYSTEM FOR GT & HRSG			
SHT. No. 03		NO. OF SHT. 03		SHT. No. 03		NO. OF SHT. 03	

(ALL DIMENSIONS ARE IN mm)

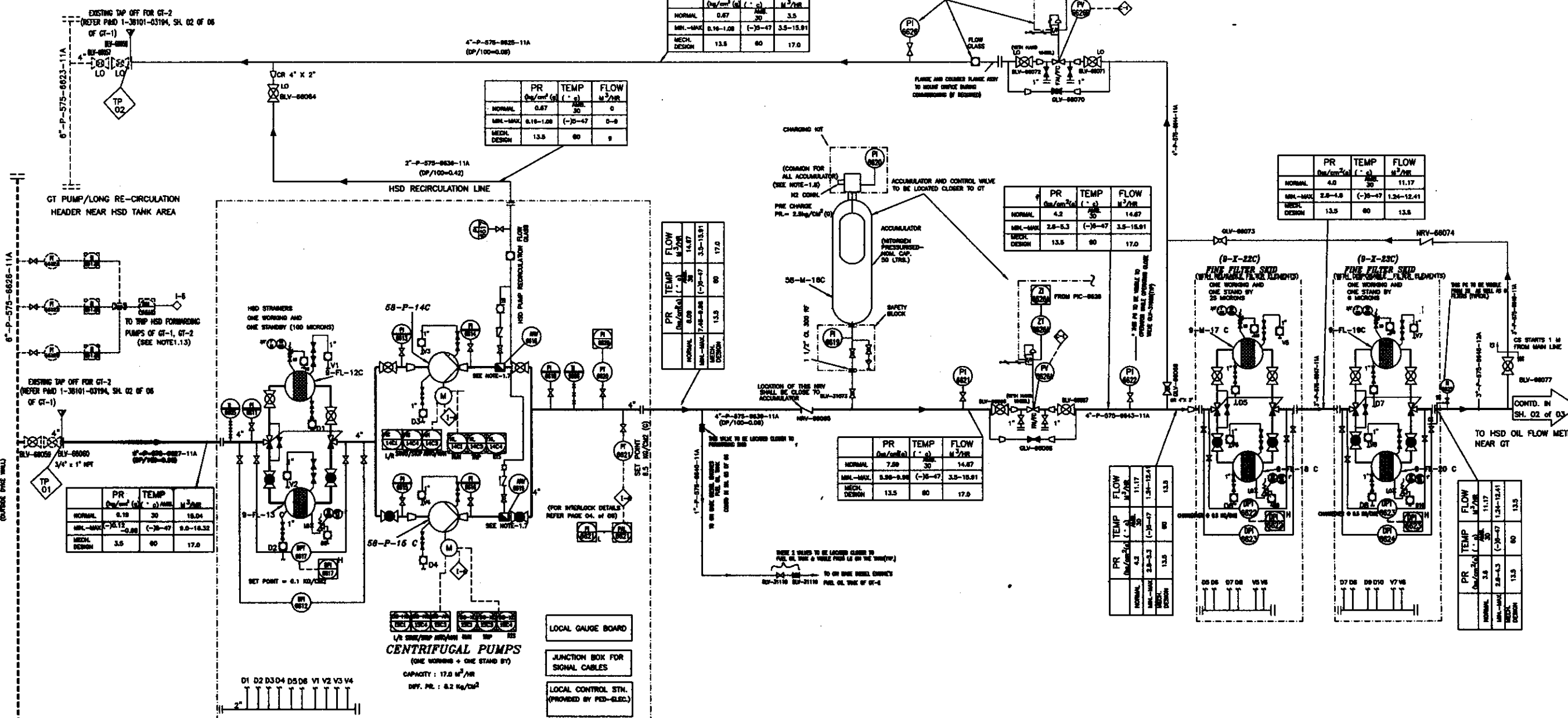
PER 10/2/24

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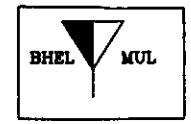
00600-1018C-1
DRG. NO. 1-38101-03900

FIRST ANGLE PROJECTION

SH. 01 OF 02



HSD FORWARDING SKID FOR GT-2

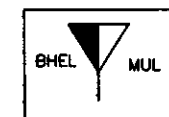


REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD	REV.	DATE	ALTERED	CHD/APPD
ZONE				ZONE				ZONE				ZONE				ZONE			

CUSTOMER		MARUTI SUZUKI INDIA LIMITED			
		MANESAR, GURGAON, HARYANA			
PROJECT		MARUTI MANESAR-II COGENERATION PLANT			
BY		BHARAT HEAVY ELECTRICALS LTD.			
HYDERABAD					
DEPT.	DESIGN	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.
CODE	450	1/4"	1.5	-N.A.-	-N.A.-
TITLE		P & I DIAGRAM FOR OFF-BASE HSD SYSTEM FOR GT-2			
DRG. NO.		1-38101-03900			
SHT. No. 01		NO. OF SHT. 03			

G		F
GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY08261		

INVENTORY NO	SIGN. AND DATE	REF. ORG. NO.	COMPUTER FILE NAME
			1970101413-S03-007 1967

[illegible]

CUSTOMER		MARUTI SUZUKI INDIA LIMITED MANESAR, GURGAON, HARYANA							
PROJECT		MARUTI MANESAR-II COGENERATION PLANT							
		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME S. SURENDRA CHD. M S P BABU APPO. R.C.V.S.		SIGN. w/- DATE 03.05.10 03.05.10 03.05.10		NO. OF WIR. -NA- -NA- -NA-	
DEPT.	PPD ORG. OMS. G/M/Y		SCALE	WEIGHT (KGS)	REF. TO ASSY. Dwg.	ITEM NO.	NO. OF ITEMS -NA- -NA- -NA-		
CODE	400		MTS	-NA-	-NA-				
TITLE				CARD	SERIAL Dwg. No. 1-38101-03900 SUPERSEDED Dwg. No. 03194-975-1166				
P & I DIAGRAM FOR OFF-BASE HSD SYSTEM FOR GT-2				NO.	NO. OF SHT. 03 NO. OF SHT. 03				

SHT. 03 OF 03

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	G	F
GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY08261		

- 1.1. VENTS/DRAINS ARE SHOWN ONLY TO MEET SYSTEM REQUIREMENTS. ADDITIONAL HIGH POINT VENT AND LOW POINT DRAINS SHALL BE PROVIDED ACCORDING TO FINAL LAYOUT.
ALL HIGH POINT VENTS/DRAINS SHALL BE PROVIDED WITH 1" VALVE, FLANGE AND BLIND FLANGE.
THE DRAIN POINTS SHALL BE TERMINATED AT MIN. 300 MM ABOVE FFL.
ALL INSTRUMENT ISOLATION VALVES, VENT & DRAIN VALVES ARE OF GATE TYPE AS PER BHEL'S PIPING MATERIAL SPECIFICATION.
- 1.2. PLEASE REFER TO PIPING DESIGN SPECS AND LINE SPECS FOR MATERIAL OF CONSTRUCTION AND LINE RATINGS.
- 1.3. ALL MAIN PROCESS VALVES FOR HSD/FUEL GAS SYSTEM SHALL BE BALL VALVES ONLY.
- 1.4. FUEL OIL PIPING UP STREAM OF 8 MICRON FILTER(INCLUDING FILTER) IS OF CS MATERIAL.
FUEL OIL PIPING DOWN STREAM OF 8 MICRON FILTER SHALL BE OF SS MATERIAL.

THE BRANCH LINES CONNECTED TO MAIN SS LINE SHALL BE OF STAINLESS STEEL MATERIAL
UPTO 1ST ISOLATION VALVE/ 1 METER FROM MAIN LINE, WHICHEVER IS THE CLOSER.
REST OF THE BRANCH PIPE LINES SHALL BE OF CARBON STEEL MATERIAL.
- 1.5. EACH FORWARDING SKID IS DESIGNED FOR FULL FLOW REQUIREMENT OF ONE NO.OF GTG AND EACH SKID CONSISTS OF TWO NOS. OF PUMPS(1 WORKING + 1 STANDBY)
- 1.6. THE FORWARDING PUMPS ARE SUITABLE FOR OUTDOOR LOCATION.
- 1.7. ARC VALVE SHALL BE LOCATED CLOSER TO PUMP DISCHARGE FLANGE.
- 1.8. A NITROGEN HEADER WITHIN HSD AREA WILL BE LAID BY BHEL AND TERMINATED AT BATTERY LIMIT.
A TAP OFF NEAR EACH ACCUMULATOR WILL BE PROVIDED FOR FILLING OF ACCUMULATOR.
- 1.9. FIRE IN GTG SYSTEM MAY OCCUR IN FOLLOWING AREA.
 - A) GT COMPARTMENT
 - B) GENERATOR COMPARTMENT
 - C) GT ACCESSORY BASE
 - D) GT LIQUID FUEL MODULE
FIRE IN ANY OF THE ABOVE SAID AREAS BEING COMMUNICATED BY CO2 GTG FIRE FIGHTING PANEL TO DCS AND ACCORDINGLY, CLOSURE/OPENING OF ON/OFF VALVE AT GT INLET IS BEING IMPLEMENTED BY DCS
- 1.10. IN ORDER TO CATER TO ANY UNFORESEEN PROBLEMS DURING COMMISSIONING IN THE IMPLEMENTATION OF CHANGEOVER LOGIC THE LONG RE-CIRCULATION LINE IS DESIGNED FOR FULL FLOW OF GT, TO ENSURE THAT THERE IS NO HARDWARE LIMITATION IN IMPLEMENTING ALTERNATIVE LOGIC.
- 1.11. DISTANCE BETWEEN 2 BLOCK VALVES (WITH BLEED) SHALL BE LIMITED TO MAX. OF 1 M TO MINIMISE DRAINED QUANTITY.
- 1.12. CUSTOMER SHALL ENSURE PROPER HANDLING & STORAGE MEASURES AS PER DOC. No: PEMC-769(RECOMMENDED MEASURES FOR UNLOADING & STORAGE OF LIQUID FUEL FOR TROUBLE FREE OPERATION OF GT).
- 1.13. THESE INSTRUMENTS ON CLEAN OIL OUTLET HEADER ARE PROVIDED AS PART OF GT-1 PACKAGE.
PRESSURE ALARM LOW SIGNAL(PALL-6612) NEED TO BE EXTENDED FOR GT-2 ALSO.

- 2.1. INSTRUMENT HOOK-UP SCHEMES ARE NOT INDICATED. HOWEVER, NECESSARY ROOT VALVES, INST. ISOLATION VALVES, VENT/DRAIN VALVES WILL BE PROVIDED FOR PR., DP, FLOW, & LEVEL MEASURING INST. AS PER APPROVED INSTRUMENT HOOK UP DRAWING.
- 2.2. ALL INSTRUMENT TAG NO'S SHALL BE PREFIXED BY UNIT NO:575.
- 2.3. TYPICAL TSV INDICATION  REPRESENTS 3/4" x 1" VALVE WITH NPT PROCESS CONNECTION AND SET PRESSURE OF 13.5 KG/CM2(G).
- 2.4. THE INPUT DATA FOR SELECTION OF PRESSURE CONTROL VALVE FOR GTS IS AS PER ADJACENT TABLE-1.

	PR. UPSTREAM OF PCY KG/CM ² (G)	PR. DOWN STREAM OF PCY KG/CM ² (G)	FLOW M ³ /HR	TEMP °C
MAX. CY CONDITION	5.96	5.3	15.91	47
MIN. CY CONDITION	9.96	2.8	3.5	(-)
NORM. CY CONDITION	7.50	4.2	14.67	30

MECHANICAL DESIGN = 13.5 KG/CM² (g)

	PR. UPSTREAM OF PCV KG/CM ² (g)	PR. DOWN STREAM OF PCV KG/CM ² (g)	FLOW M ³ /HR	TE
MAX. CV CONDITION	2.8	1.08	15.81	4
MIN. CV CONDITION	5.3	0.16	3.5	(-)
NORM. CV CONDITION	4.2	0.67	3.5	3

MECHANICAL DESIGN = 13.5 KG/CM² (g)

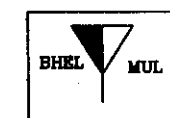
2.5. THE INPUT DATA FOR SELECTION OF BY PASS CONTROL VALVE FOR GTs IS AS PER ADJACENT TABLE-2.

MIN. CV CONDITION	5.3	0.16	3.5	(-)-5
NORMAL CV CONDITION	4.2	0.67	3.5	30
MECHANICAL DESIGN = 13.5 KG/CM ² (g)				

2.5. A SOFTWARE LOCK SHALL BE PROVIDED IN DCS TO LIMIT THE MAXIMUM OPENING OF BYPASS CONTROL VALVE(PV-31042B) to 20%. THIS IS REQUIRED AS FURTHER OPENING OF BYPASS VALVE WILL DEPRIVE GT OF FUEL OIL THUS LEADING TO TRIPPING OF GT ON LOW OIL PRESSURE.

2.6. THESE TRANSMITTERS ARE OF DP (WITH DIAPHRAGM SEALS) TYPE CALIBRATED FOR LEVEL AND LP PORT OF TRANSMITTER IS LEFT TO ATMOSPHERE.

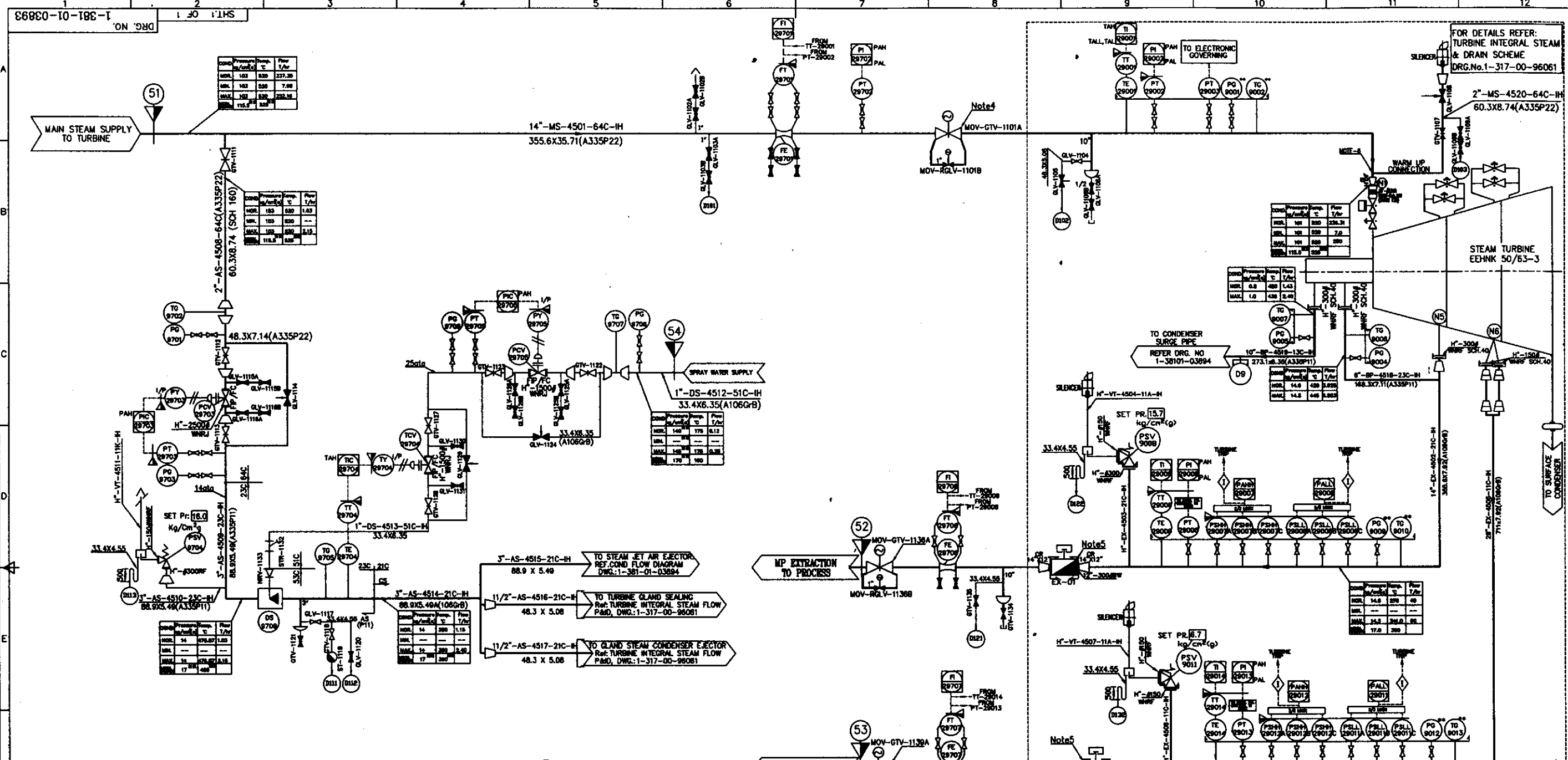
2.7. PROVISION OF PID CONTROLLER IS CONSIDERED FOR THE BYPASS PRESSURE CONTROL VALVE(PV-31042B) IN IMPLEMENTING ANY OTHER ALTERNATIVE LOGIC.



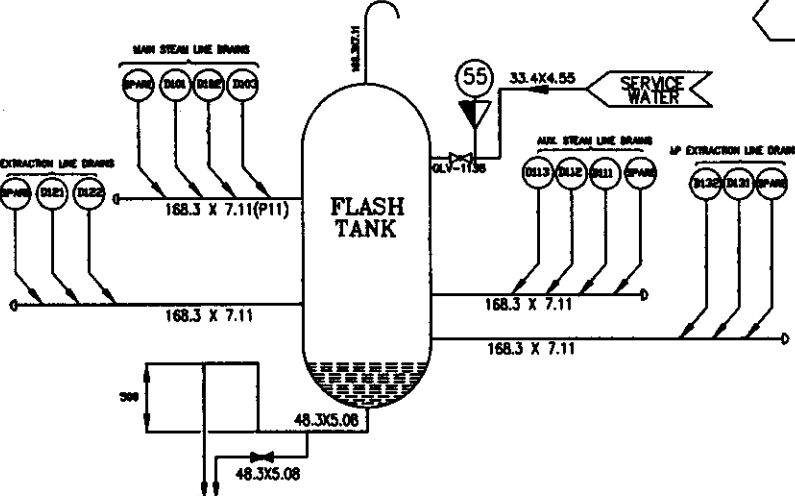
REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD
ZONE			ZONE			ZONE			ZONE			ZONE		

CUSTOMER		MARUTI SUZUKI INDIA LIMITED MANESAR, GURGAON, HARYANA							
PROJECT		MARUTI MANESAR-II COGENERATION PLANT							
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME		SIGN		DATE		NO. OF WKS.	
		DRN. S.SURENDRA		ms/-		03.05.10			
		CHD. M S P BABU				03.05.10		-NA-	
		APPD. R.C.V.S				03.05.10			
DEPT. PED		UNIT. DRWS. OR. G/M/Y				SCALE		WEIGHT (KGS)	
CODE 430				NTS		-N.A.-		-N.A.-	
TITLE		P & I DIAGRAM FOR		CARD CODE		1-38101-03900		REV. NO.	
OFF-BASE HSD SYSTEM		FOR GT-2		N.A.		03194-575-1166		NO. OF SFT. 03	

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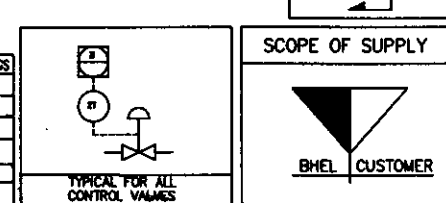


- NOTES:-
- REFERENCE DRAWINGS:-
 - a) LEGEND FOR SCHEMES 1-317-00-00079
 - b) P&ID FOR CONDENSATE SYSTEM 1-381-01-03582
 - c) INTEGRAL STEAM FLOW P&ID 1-317-00-81561
 - ALL DRAINS & VENTS SHALL BE OF 1" UNLESS OTHERWISE SPECIFIED.
 - DRAINS SHALL BE PROVIDED AT ALL LOWEST POINTS BASED ON LAYOUT.
 - THIS VALVE IS TO BE LOCATED AS CLOSE AS POSSIBLE TO TURBINE TO PERMIT THE LONGEST LENGTH OF PIPING TO BE WARMED UP.
 - QCMRV'S ARE TO BE LOCATED AS CLOSE AS POSSIBLE TO TURBINE NOZZLE.
 - THE WARM UP VENT CONNECTION SHALL BE WITHIN 1 METRE FROM EMERGENCY STOP VALVE.
 - END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS:
 - ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
 - STUB ENDING WITH M33x2 FOR TEMPERATURE
 - LEGEND:
 - ITEM SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT. PARAMETERS TO BE CONFIRMED BY CUSTOMER.
 - INTERLOCK & PROTECTION REALISED IN DCS
 - DCS
 - INSTRUMENTS MOUNTED ON LOCAL GAUGE RACK



TAG NUMBERING INDEX

TAG NO. INDEX	TAG NO. RANGE	SPARE TAGS
EQUIPMENT TAG		
LINE NUMBERS	4501-4520	-
VALVE TAGS	1101-1130	-
INSTRUMENTATION TAG	8701-8707	-
INTERLOCK TAG		-
TERMINAL POINT	51 - 55	-



STATUS OF DRAWING: FOR APPROVAL

CUSTOMER: TAMILNADU NEWSPRINT AND PAPERS LTD., KAGITHAPURAM

PROJECT CONSULTANT: SPB-PC SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

TYPE OF PRODUCT OR NAME OF CUSTOMER: REVAMPING OF STEAM & POWER SYSTEM 41 MW STG SET

NAME	SIGN.	DATE	NO. OF VAR.
DRN. DURGA		07.07.10	
CHD. M.S.S.N		07.07.10	N.A.
APPD. P.S.B		07.07.10	

DEPT. PED UNITS DMS. GR. S/N/T SCALE WEIGHT (KG) REF. TO ASSY. ORG. ITEM NO. NO. OF ITEMS

TITLE: P&ID FOR STEAM SYSTEM

REV. 00

SH. No 1 NO. OF SH. 1

6880-10-188-1
ON 080
DRG. NO.

Refer: P&ID FOR STEAM SYSTEM
Drg no: 1-381-01-03893

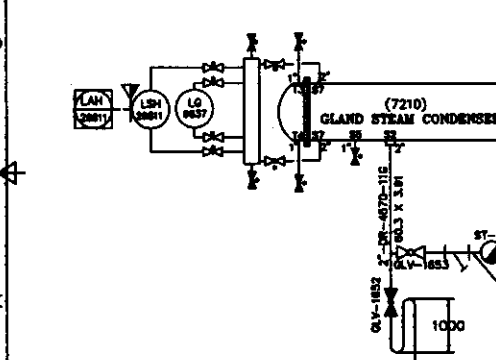
AUX. STEAM
14 ata, 350°C

NOTES:-

- REFERENCE DRAWINGS/DOCS:-
a) LEGEND FOR SCHEMES : 1-317-00-00079
b) TURBINE INTEGRAL STEAM AND DRAIN FLOW P&ID : 1-317-00-98061
- END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
-ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
-STUB ENDING WITH M33X2 FOR TEMPERATURE.
- DRAINS AND VENTS SHOWN ARE INDICATIVE ONLY. DRAINS AND VENTS SHALL BE PROVIDED AS PER PIPING LAYOUT.
- LEGEND
◇ INTERLOCKS & PROTECTIONS REALISED IN DCS.
* ITEMS SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT.
Y INDICATES DRAIN AT THE NEAREST TRENCH.

STEAM JET AIR EJECTOR ASSEMBLY

REFER: TURBINE INTEGRAL
STEAM FLOW P&ID DIAGRAM
ZONE: G-7



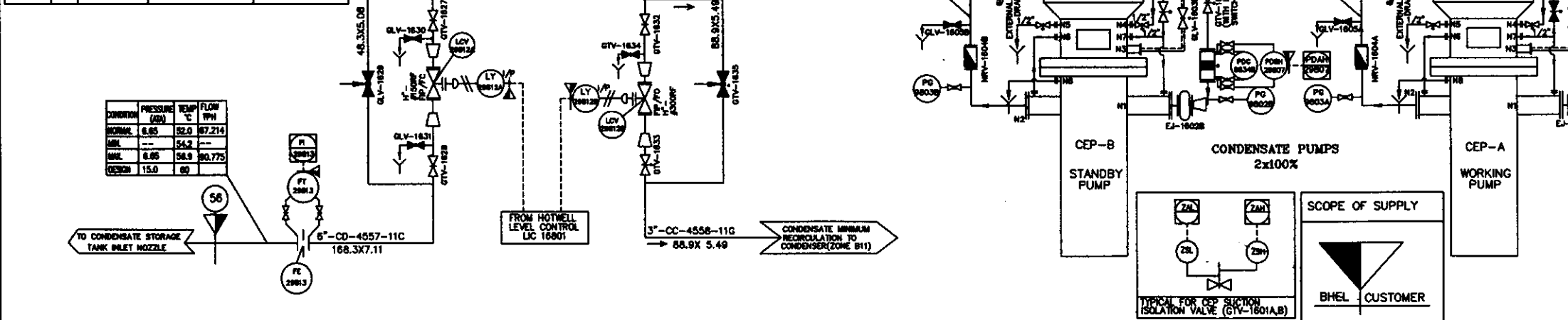
INTERLOCK SUMMARY

EQUIPMENT INVOLVED	LOGIC NO.	TAG NOS. INVOLVED	CONDITION FOR LOGIC EXECUTION	ACTION
CEP	I ₁	LAL-28804	HORNELL LEVEL NOT LOW	CONSENT TO CEP START
CEP	I ₂	LAL-28805	HORNELL LEVEL HIGH	AUDIBLES OF STANDBY CEP
CEP	I ₃	LAL-28803	HORNELL LEVEL LOW LOW	TRIP WORKING CEP

CONDITION	PRESSURE (kg)	TEMP (°C)	FLOW (TPH)
NORMAL	6.85	52.0	67.214
MIN	6.85	54.2	—
MAX	6.85	58.9	80.775
DESIGN	15.0	60	—

CONDITION	PRESSURE (kg)	TEMP (°C)	FLOW (TPH)
NORMAL	6.85	52.0	40
MIN	6.85	54.2	40
MAX	6.85	58.9	40
DESIGN	15.0	60	—

CONDITION	PRESSURE (kg)	TEMP (°C)	FLOW (TPH)
NORMAL	6.85	45.6	67.214
MIN	6.85	40.0	30.291
MAX	6.85	52.2	80.775
DESIGN	15.0	60	—

DETAIL-A
TAG NUMBERING INDEX

TAG NO. INDEX	TAGS NO. RANGE	SPARE TAGS
EQUIPMENT TAG	—	—
LINE NUMBERS	4551-4573	—
VALVE TAG	1801-1808	—
INSTRUMENTATION TAG	2801-2817	—
TERMINAL POINT	56-57	—
INTERLOCK TAG	1-5	—

STATUS OF DRAWING:
FOR APPROVAL

CUSTOMER: TAMILNADU NEWSPRINT AND PAPERS LTD., KAGITHAPURAM

PROJECT CONSULTANT: SPB-PC SPB PROJECTS AND CONSULTANCY LIMITED, CHENNAI INDIA

TYPE OF PRODUCT OR NAME OF CUSTOMER: REVAMPING OF STEAM & POWER SYSTEM 41 MW STG SET

DEPT. PED: BHARAT HEAVY ELECTRICALS LTD. HYDERABAD

SCALE: N.T.S.

WEIGHT (KG): —

ITEM NO.: —

NO. OF ITEMS: —

DATE: 07.07.10

REV. 00

TITLE: P&ID FOR CONDENSATE SYSTEM

CUST. DNG. NO.: 1-381-01-03894

SHT. No 1 NO. OF SHT. 1

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

Page 2 of 2
15 of 24

3-381-01-02945

DRG. NO.

SHT. 1 OF 1

NOTES:-

1) REFERENCE DRAWINGS/DOCS:-

a) LEGEND FOR SCHEMES : 1-317-00-00079

2) END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
 -ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
 -STUB ENDING WITH M33X2 FOR TEMPERATURE.

3) LEGEND

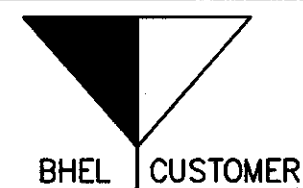
 INTERLOCKS & PROTECTIONS REALISED IN DCS.

 DCS

* ITEMS SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT.

 INDICATES DRAIN AT THE NEAREST TRENCH.

SCOPE OF SUPPLY



TAG NUMBERING INDEX

TAG NO. INDEX	TAG NOS RANGE	SPARE TAGS
EQUIPMENT TAG	--	
LINE NUMBERS	4591-4596	-
VALVE TAG.	1701-1706	
INSTRUMENTATION TAG	9851-62 29851-854	
INTERLOCK TAG.	--	
TERMINAL POINT	61 - 64	

 STATUS OF DRAWING:
 FOR APPROVAL

CUSTOMER:

TAMILNADU NEWSPRINT AND PAPERS LTD.,
KAGITHAPURAM

PROJECT CONSULTANT:

SPB-PC

SPB PROJECTS AND CONSULTANCY LIMITED,
CHENNAI INDIA

TYPE OF PRODUCT

OR

NAME OF CUSTOMER

REVAMPING OF STEAM & POWER SYSTEM
41 MW STG SET
 BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO. OF VAR.
DRN.	DURGA SHARAN		07.07.10	
CHD.	M.S.S.N		07.07.10	-N.A-
APPD.	SUDHEER BABU		07.07.10	

DEPT.
PPEM
CODEUNTL. DIMS.
GR.
2/M/YSCALE
-NTS-WEIGHT (KG)
-N.A-REF. TO ASSY. DRG.
-N.A-ITEM NO.
-N.A-NO. OF
ITEMS
-N.A-TITLE
P&ID FOR AUXILLIARY
COOLING WATER SYSTEMCARD
CODE
-N.A-DRAWING NO.
3-381-01-02945REV.
00

SHT. No 1

NO. OF SHT. 1

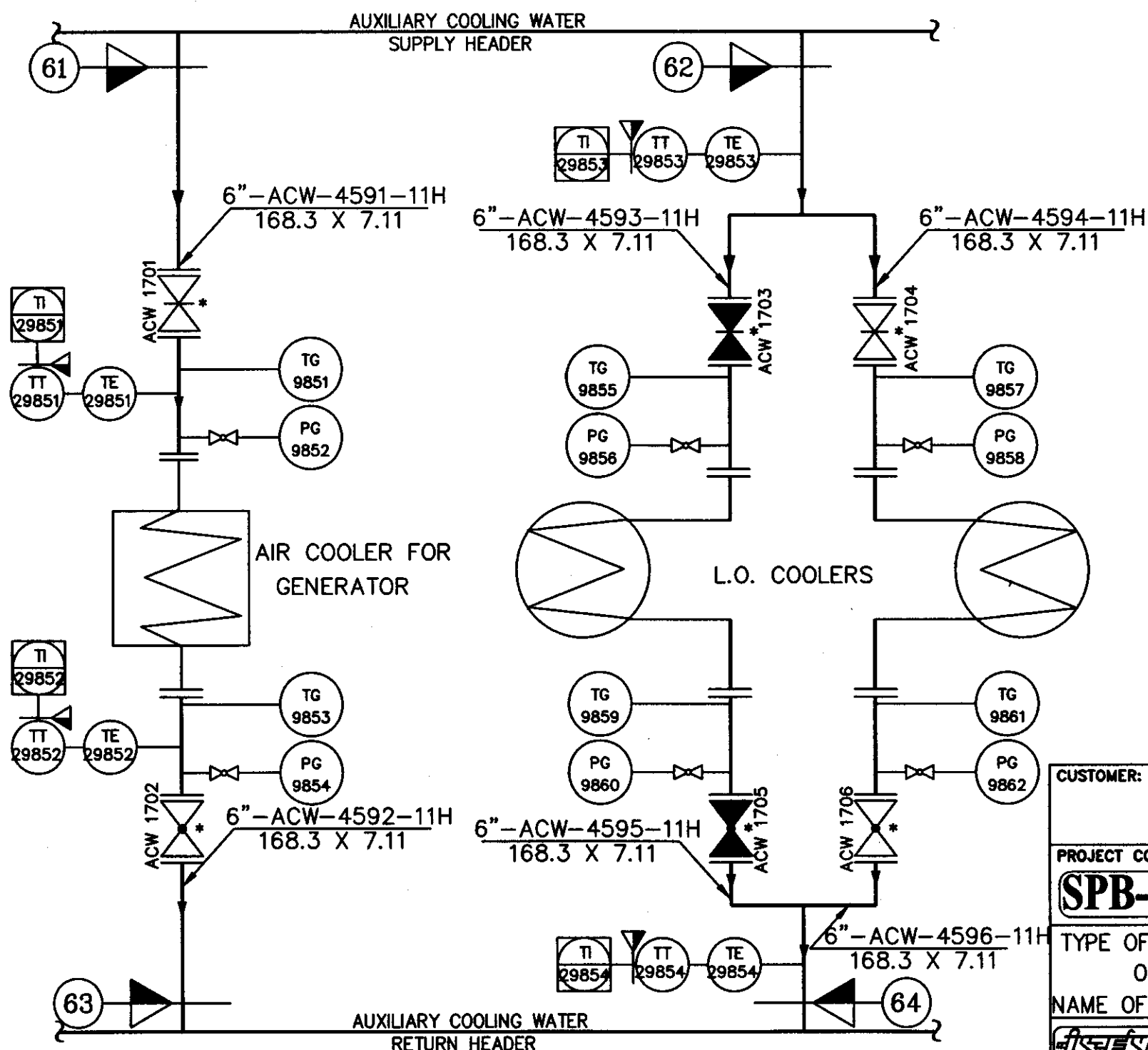
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COMPUTER FILE NAME
338102945-S00-R00.DWG

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD			CHD/APPD			CHD/APPD

ZONE	ZONE	ZONE

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

Pg. 1 of 2
25/07/2010

3-381-01-02946

DRG. NO.

SHT. 1 OF 1

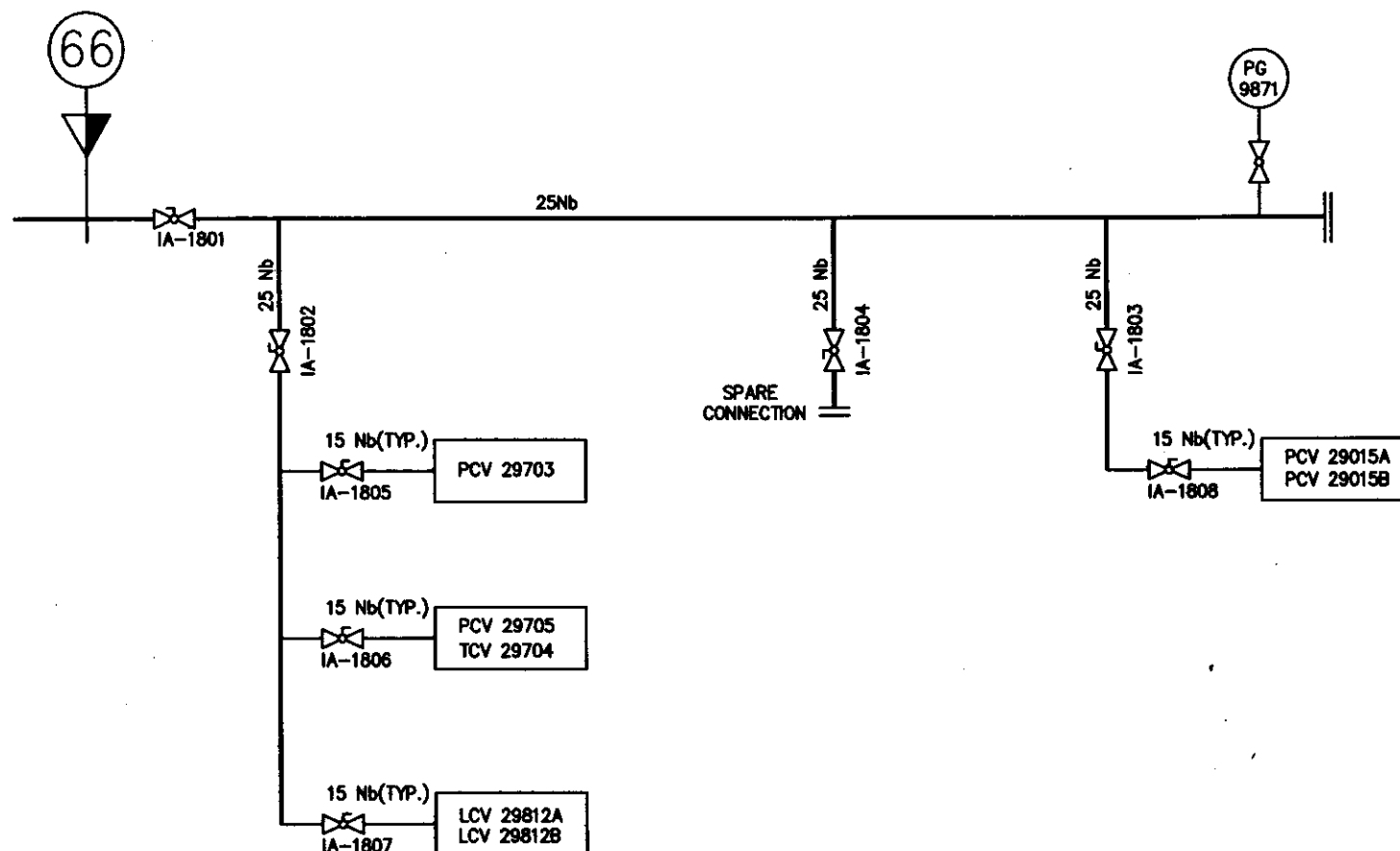
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COMPUTER FILE NAME
33810102946-S00-R00.DWG

SIGN. AND DATE

REF. DRG. NO.

INVENTORY NO



NOTES:-

1. NORMAL WORKING PRESSURE-6 kg/cm² (g).
2. NORMAL WORKING TEMPERATURE- 50°C.
3. DESIGN PRESSURE-10 kg/cm² (g).
4. DESIGN TEMPERATURE - 55°C.
5. PIPES SHALL BE OF IS 1239(GALV.).
6. PIPES SHALL HAVE SCREWED ENDS AND THE PIPING THREADS SHALL BE AS PER ASA-B-2.1.
7. ALL FITTINGS TILL THE TERMINATING VALVES SHALL BE PROVIDED AND THESE SHALL BE OF CARBON STEEL
8. ALL VALVES SHALL BE BALL TYPE WITH CARBON STEEL BODY ABOVE (50Nb) FORGED CARBON STEEL BODY (50Nb & BELOW) AND STAINLESS STEEL INTERNALS. ROOT VALVES FOR INSTRUMENTS SHALL BE GLOBE TYPE WITH CARBON STEEL BODY AND STAINLESS STEEL INTERNALS.
9. PIPE JOINT CONNECTIONS SHALL BE SEAL WELDED TO AVOID LEAKAGES.

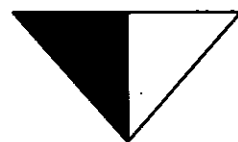
SCOPE OF SUPPLY



BHEL CUSTOMER

STATUS OF DRAWING:
FOR APPROVAL

SCOPE OF SUPPLY



BHEL CUSTOMER

S.NO	VALVE SIZE	TYPE OF VALVE	TAGNOS	NO OF VALVES	REMARKS
1.	25Nb	BALL VALVE	IA-1801 TO IA-1804	4	
2.	15Nb	BALL VALVE	IA-1805 TO IA-1808	4	

CUSTOMER:

TAMILNADU NEWSPRINT AND PAPERS LTD.,
KAGITHAPURAM

PROJECT CONSULTANT:

SPB-PC

SPB PROJECTS AND CONSULTANCY LIMITED,
CHENNAI INDIA

TYPE OF PRODUCT

OR

REVAMPING OF STEAM & POWER SYSTEM
41 MW STG SET

NAME OF CUSTOMER

BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO. OF VAR.
DRN.	DURGA SHARAN		07.07.10	
CHD.	M.S.S.N		07.07.10	-N.A-
APPD.	SUDHEER BABU		07.07.10	

DEPT.
PPM
CODEUNTO. DIMS.
GR.
E/M/VSCALE
-NTS-WEIGHT (KG)
-N.A-REF. TO ASSY. DRG.
-N.A-ITEM NO.
-N.A-NO. OF ITEMS
-N.A-

TITLE

INSTRUMENT AIR
DISTRIBUTION SCHEMECARD
CODE
-N.A-DRAWING NO.
3-381-01-02946REV.
00

SHT. No 1

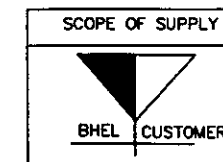
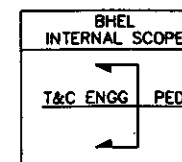
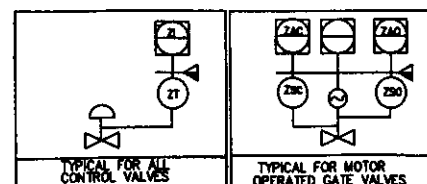
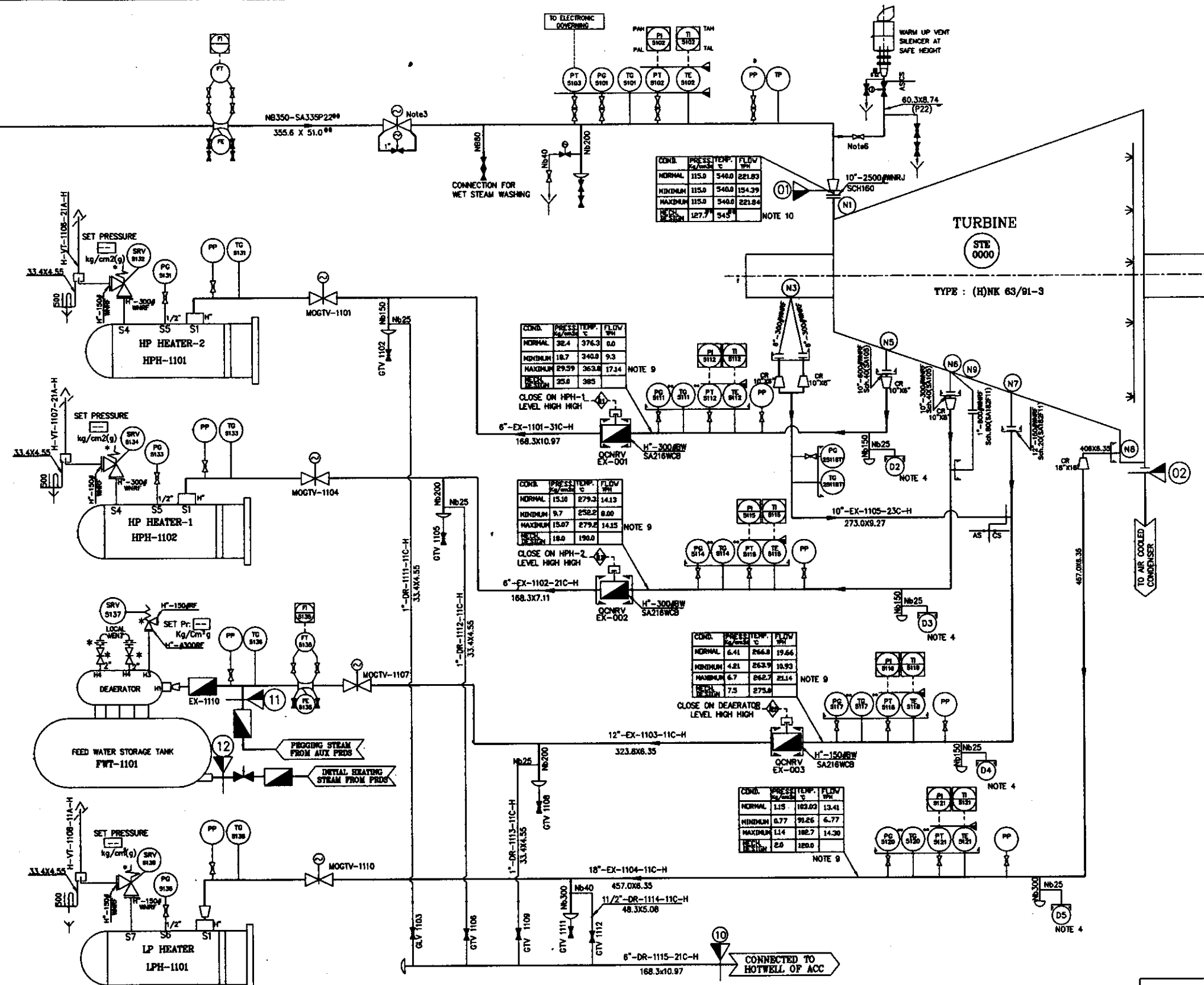
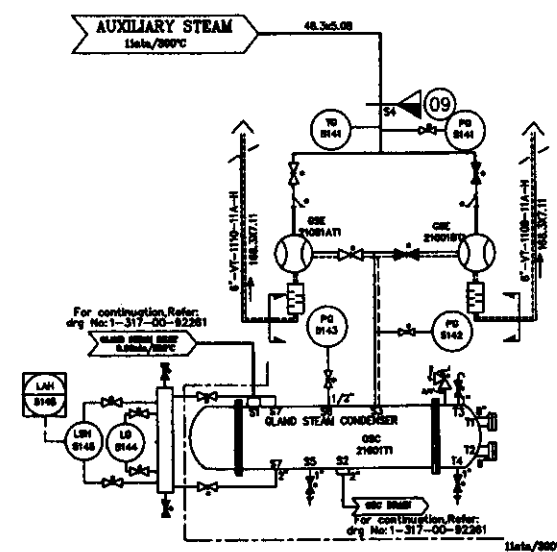
NO. OF SHT. 1

1660-10-18E-1 SH. 1 OF 1

PG 101
17824

NOTES:-

- 1) ALL DRAINS & VENTS SIZES SHALL BE OF 1" UNLESS OTHERWISE SPECIFIED.
- 2) DRAINS SHALL BE PROVIDED AT ALL LOWEST POINTS BASED ON LAYOUT.
- 3) THIS VALVE IS TO BE LOCATED AS CLOSE AS POSSIBLE TO TURBINE TO PERMIT THE LONGEST LENGTH OF PIPING TO BE WARMED UP.
- 4) DRAINS D2 TO D5 ARE CONNECTED TO DRAIN POT OF ACC. REFER TURBINE INTEGRAL STEAM FLOW P&ID: 1-381-01-92261.
- 5) QONRV'S ARE TO BE LOCATED AS CLOSE AS POSSIBLE TO TURBINE NOZZLE.
- 6) THIS WARM UP VENT CONNECTION SHALL BE WITHIN 1 METRE FROM EMERGENCY STOP VALVE.
- 7) END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
-ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
-STUB ENDING WITH M33x2 FOR TEMPERATURE
- 8) LEGEND
 a) ITEM SUPPLIED ALONG WITH RESPECTIVE EQUIPMENT.
 b) DATA TO BE CONFIRMED BY CUSTOMER..
 c) INTERLOCK & PROTECTION REALISED IN DCS
 d) DCS(CUSTOMER'S SCOPE)
 e) INSTRUMENTS MOUNTED ON LOCAL GAUGE RACK
- 9) THE NORMAL, MINIMUM & MAXIMUM PARAMETERS OF THE LINE INDICATED IN THE PARAMETERS TABLE CORRESPOND TO THE GUARANTEE, MINIMUM & MAXIMUM FLOW CONDITION RESPECTIVELY.
- 10) REFERENCE DRAWINGS:-
 a) LEGEND FOR SCHEMES 1-317-00-00079
 b) P&ID FOR HEATERS DRAIN & VENT SYSTEM 1-381-01-03992
 c) INTEGRAL STEAM FLOW P&ID 1-317-00-97561
 d) FEED WATER SYSTEM 1-381-01-03996



STATUS: FOR APPROVAL

TYPE OF PROJECT 1 x 40 MW + 50% EXTRA DEESIGN STG SET
OR M/s MANIKGARH CEMENT LIMITED,
NAME OF CUSTOMER Gadchandur, Chandrapur, Maharashtra

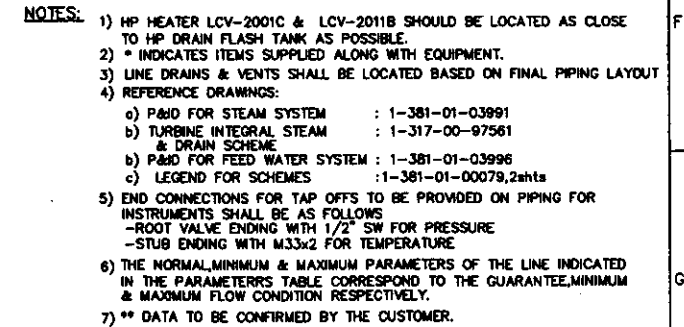
NAME	SION	DATE	NO. OF
ALTO. DURGA	Chp	28.08.10	VAR.
CHD. M.S.S.N		28.08.10	N.A.
APPO. P.S.B.	Chp	28.08.10	N.A.

DEPT. P&ID	UNITS. DMS.	SCALE	WEIGHT (KG)	REF. TO ASSY. ORG.	ITEM NO.	NO. OF
430	OR	NTS	N.A.	N.A.	N.A.	ITEMS
TITLE P&ID FOR STEAM SYSTEM						REV.
DRAWING NO. 1-381-01-03991						00
SHT. No 1						NO. OF SHT. 1

NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

INVENTORY NO. 13810103991-000-000

INVENTORY NO	SIGN. AND DATE	REF. DOC. NO.



TYPE OF PROJECT										1X40% + 50% EXTRA DESIGN STG SET									
&										M/s MANIKGARH CEMENT LIMITED									
NAME OF CUSTOMER										GAandchandur-Chandrapur Maharstra									
										BHARAT HEAVY ELECTRICALS LTD.									
										HYDERABAD									
										NAME		SIGN.		DATE		NO. OF VAR.			
										DURG				28.08.10					
CHD.		M.S.S.N		28.08.10		N.A													
APPO.		P.S.B.		28.08.10															
DEPT. P.D.		UNITED DMS.		SCALE		WEIGHT (KG)		REF. TO ASSY. ORG.		ITEM NO.		NO. OF ITEMS							
CODE 450		G/H		M.T.S		N.A		N.A		N.A		N.A							
										DRAWING NO.									
TITLE										1-381-01-03992									
HEATERS DRAINS & VENT SYSTEM										REV. 00									
										SHT. NO. 1 NO. OF SHT. 1									

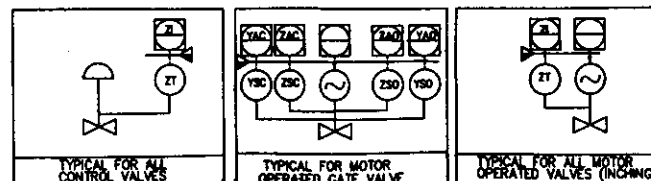
INVENTORY NO.



- 1) UNTIL UNLESS SPECIFIED OTHERWISE, ALL THE DRAINS & VENTS SHALL BE OF 25MM(33.4x4.55).
- 2) * INDICATES ITEMS SUPPLIED ALONG WITH EQUIPMENT.
- 3) LINE DRAINS & VENTS SHALL BE LOCATED BASED ON FINAL PIPING LAYOUT DRAWING.
- 4) END CONNECTIONS FOR TAP OFFS TO BE PROVIDED ON PIPING FOR INSTRUMENTS SHALL BE AS FOLLOWS
-ROOT VALVE ENDING WITH 1/2" SW FOR PRESSURE
-FOR TEMPERATURE WITH M332, RATING SHALL
SHALL BE AS THAT OF THE LINE.
- 5) ## DATA TO BE CONFIRMED BY THE CUSTOMER.
- 6) REFERENCE DRAWINGS:
 - a) LEGEND FOR SCHEMES : 1-381-01-00079.
 - b) P&ID FOR STEAM SYSTEM : 1-381-01-03992
 - c) P&ID FOR HEATERS DRAIN & VENT SYSTEM. : 1-381-01-03992

INTERLOCK SUMMARY				
EQUIPMENT INVOLVED	LOGIC NO.	TAG NOS. INVOLVED	CONDITION FOR LOGIC EXECUTION	ACTION
DEAERATOR LEVEL	I21	LALL-1805A LALL-1805B LALL-1805C	LEVEL LOW LOW	TRIP ALL BOILER FEED PUMPS (BFPs)
	I22	LAN-1807	LEVEL NORMAL	START PERMISSIVE OF ALL BFPs
	I23	LAH-1809A	LEVEL HIGH+50mm	OPEN DEAERATOR OVERFLOW VALVE(MOGTV-1801)
	I24	LAH-1809B	LEVEL HIGH-50mm	CLOSE DEAERATOR OVERFLOW VALVE(MOGTV-1801)
	I25	LAHH-1810A LAHH-1810B	LEVEL HIGH HIGH	CLOSE STEAM EXTRACTION LINE MOV (MOGTV-1107) CLOSE OCHRV IN STEAM EXTRACTION LINE (EX-003)

TAG. NOS. RANGE		SCOPE OF SUPPLY
LINE RANGE	VALVES	 <u>BHEL</u> <u>CUSTOMER</u>
1801-1802	1801 - 1802	
INST-RANGE		
1801-		
TERMINAL POINTS	INTERLOC NO. RANGE	
21 - 22,25-30,37-43	21 - 24	

[illegible]

TYPE OF PROJECT & NAME OF CUSTOMER										1X40% + 50% EXTRA DESIGN STG SET M/s MANIKGARH CEMENT LIMITED Gandchandur-Chandrapur Maharashtra									
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD										DIN.		DURG		SIGN.		DATE		NO. OF VAR.	
										CHD.		M.S.S.N				28.06.10		-N.A.-	
										APPD.		P.S.B.		1 June 2010		28.06.10			
DEPT. CODE 450		UNTOOL. DIMS. OR S/W/H				SCALE MTS		WEIGHT (KG)		REF. TO ASSY. DRG.				ITEM NO.		NO. OF ITEMS			
-N.A.-		-N.A.-		-N.A.-		-N.A.-		-N.A.-		-N.A.-				-N.A.-		-N.A.-			
TITLE P&ID FOR FEED WATER SYSTEM								CARD CODE N.A.		DRAWING NO. 1-381-01-03996 SHT. No 1						REV 00 NO. OF SHT. 1			

FIRST ANGLE PROJECTION

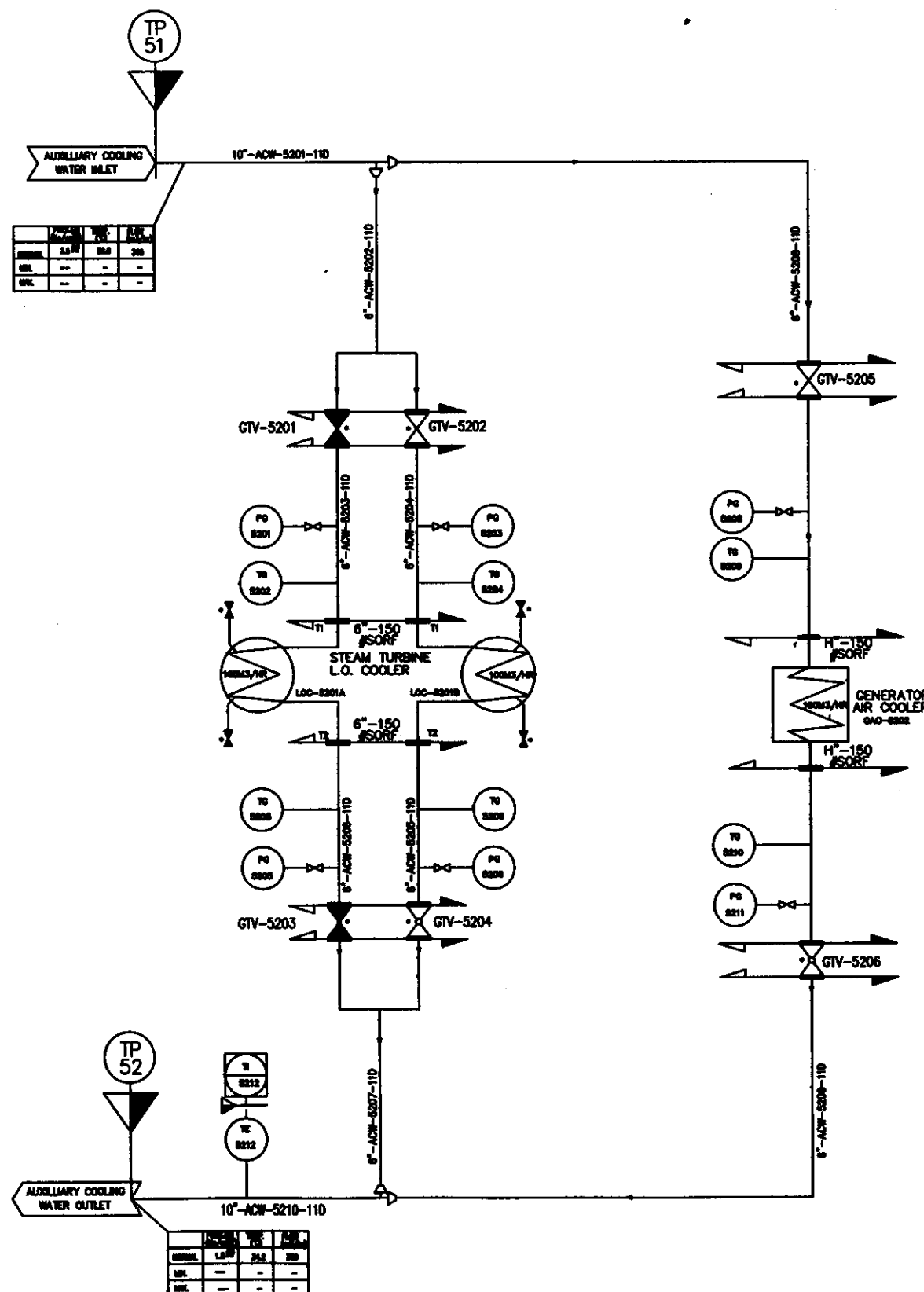
(ALL DIMENSIONS ARE IN mm)

98820-10186-S

DRG. NO. 3-38101-02938

SHEET 1 OF 1

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY



NOTES

1. ANY PROCESS REQUIRED VENTS/DRAWS HAVE BEEN INDICATED IN THIS P&ID. ALL OTHER HIGH POINT VENTS AND LOW POINT DRAWS SHALL BE PROVIDED AS PER PIPING LAYOUTS. SAME CAN BE USED AS SAMPLE POINTS, WHENEVER NECESSARY.

LEGEND

* INDICATES ITEMS SUPPLIED ALONG WITH EQUIPMENT
 # DATA TO BE CONFIRMED BY THE CUSTOMER

□ DOB (CUSTOMER SCOPE)

REFERENCE DRAWINGS

a) G.A. OF ST. OIL COOLER 3-188-01-00484
 b) AIR COOLER ELEMENT (STEAM TURBINE GENERATOR) 3-188-03-10000

TAG NO. SUMMARY

TAG NO.	ITEM	QTY	UNIT
101-ACW-5201-110	PIPE	1	M
101-ACW-5202-110	PIPE	1	M
101-ACW-5203-110	PIPE	1	M
101-ACW-5204-110	PIPE	1	M
101-ACW-5205-110	PIPE	1	M
101-ACW-5206-110	PIPE	1	M
101-ACW-5207-110	PIPE	1	M
101-ACW-5208-110	PIPE	1	M
101-ACW-5209-110	PIPE	1	M
101-ACW-5210-110	PIPE	1	M
101-ACW-5211-110	PIPE	1	M
101-ACW-5212-110	PIPE	1	M
101-ACW-5213-110	PIPE	1	M
101-ACW-5214-110	PIPE	1	M
101-ACW-5215-110	PIPE	1	M
101-ACW-5216-110	PIPE	1	M
101-ACW-5217-110	PIPE	1	M
101-ACW-5218-110	PIPE	1	M
101-ACW-5219-110	PIPE	1	M
101-ACW-5220-110	PIPE	1	M
101-ACW-5221-110	PIPE	1	M
101-ACW-5222-110	PIPE	1	M
101-ACW-5223-110	PIPE	1	M
101-ACW-5224-110	PIPE	1	M
101-ACW-5225-110	PIPE	1	M
101-ACW-5226-110	PIPE	1	M
101-ACW-5227-110	PIPE	1	M
101-ACW-5228-110	PIPE	1	M
101-ACW-5229-110	PIPE	1	M
101-ACW-5230-110	PIPE	1	M
101-ACW-5231-110	PIPE	1	M
101-ACW-5232-110	PIPE	1	M
101-ACW-5233-110	PIPE	1	M
101-ACW-5234-110	PIPE	1	M
101-ACW-5235-110	PIPE	1	M
101-ACW-5236-110	PIPE	1	M
101-ACW-5237-110	PIPE	1	M
101-ACW-5238-110	PIPE	1	M
101-ACW-5239-110	PIPE	1	M
101-ACW-5240-110	PIPE	1	M
101-ACW-5241-110	PIPE	1	M
101-ACW-5242-110	PIPE	1	M
101-ACW-5243-110	PIPE	1	M
101-ACW-5244-110	PIPE	1	M
101-ACW-5245-110	PIPE	1	M
101-ACW-5246-110	PIPE	1	M
101-ACW-5247-110	PIPE	1	M
101-ACW-5248-110	PIPE	1	M
101-ACW-5249-110	PIPE	1	M
101-ACW-5250-110	PIPE	1	M
101-ACW-5251-110	PIPE	1	M
101-ACW-5252-110	PIPE	1	M
101-ACW-5253-110	PIPE	1	M
101-ACW-5254-110	PIPE	1	M
101-ACW-5255-110	PIPE	1	M
101-ACW-5256-110	PIPE	1	M
101-ACW-5257-110	PIPE	1	M
101-ACW-5258-110	PIPE	1	M
101-ACW-5259-110	PIPE	1	M
101-ACW-5260-110	PIPE	1	M
101-ACW-5261-110	PIPE	1	M
101-ACW-5262-110	PIPE	1	M
101-ACW-5263-110	PIPE	1	M
101-ACW-5264-110	PIPE	1	M
101-ACW-5265-110	PIPE	1	M
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101-ACW-5292-110	PIPE	1	M
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101-ACW-5294-110	PIPE	1	M
101-ACW-5295-110	PIPE	1	M
101-ACW-5296-110	PIPE	1	M
101-ACW-5297-110	PIPE	1	M
101-ACW-5298-110	PIPE	1	M
101-ACW-5299-110	PIPE	1	M
101-ACW-5300-110	PIPE	1	M

INTERNAL SCOPE	SCOPE OF SUPPLY
CUSTOMER'S R&M.E.L.	CUSTOMER'S R&M.E.L.

STATUS : FOR APPROVAL

TYPE OF PROJECT 1X40% + 50% EXTRA DESIGN STG SET
 & M/s MANIKGARH CEMENT LIMITED
 NAME OF CUSTOMER GAandchundur-Chandrapur Maharstra

BHARAT HEAVY ELECTRICALS LTD.
 HYDERABAD

DATE: 10/01/2008
 TIME: 10:00 AM
 SCALE: 1:100
 SHEET NO: 00

PROJECT NO: 3-381-01-02938
 SHEET NO: 1
 NO. OF SHEET: 1

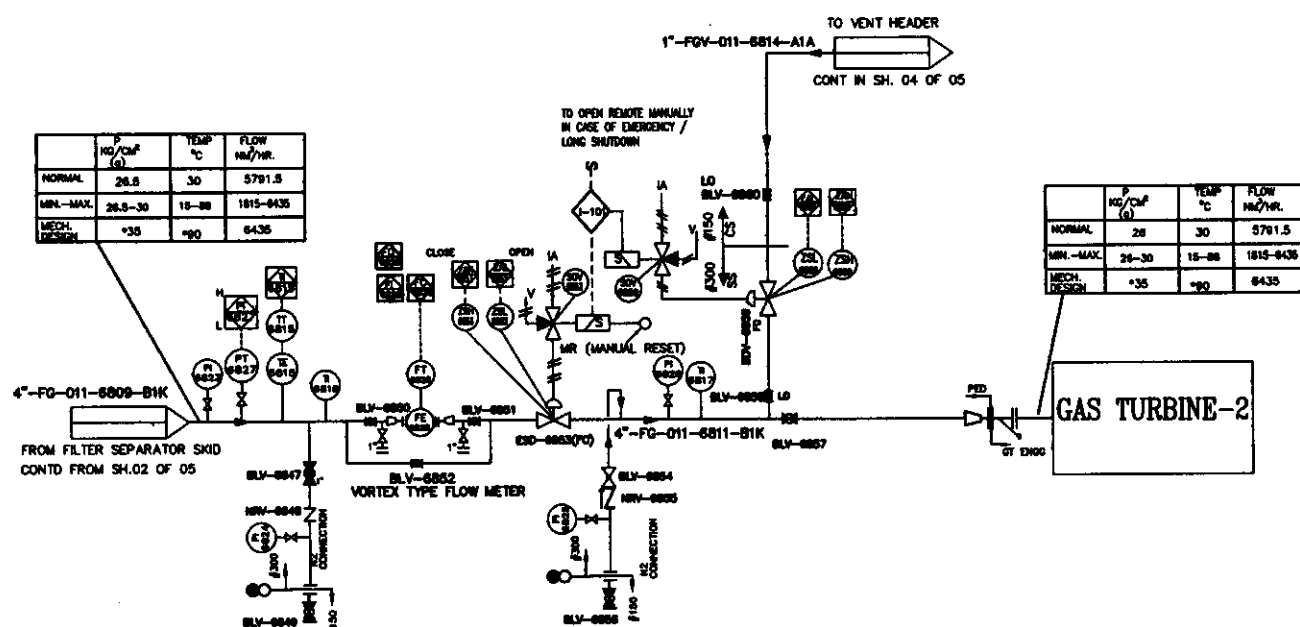
DATE: 10/01/2008
 TIME: 10:00 AM

GENERAL DIMENSIONAL LIMITS ETS & TOLERANCES AS PER HY0230261	6	7
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	PR. UPSTREAM OF PCV KG/CM ² (G)	PR. DOWN STREAM OF PCV KG/CM ² (G)	FLOW NM ³ /HR	TEMP. °C
MAX. CV CONDITION	31.8	30.0	12870	24.8
MIN. CV CONDITION	32.0	28.0	3628	24.8
NORM. CV CONDITION	31.8	28.0	11583	24.8

MECHANICAL DESIGN = 40.0 KG/CM² (g)



- 1.1. VENTS/DRAINS ARE SHOWN ONLY TO MEET SYSTEM REQUIREMENTS. ADDITIONAL HIGH POINT VENT AND LOW POINT DRAINS SHALL BE PROVIDED ACCORDING TO FINAL LAYOUT.
- 1.2. ALL INSTRUMENT ISOLATION VALVES, VENT & DRAIN VALVES ARE OF GATE TYPE.
- 1.3. NECESSARY ROOT VALVES, INST. ISOLATION VALVES, VENT/DRAIN VALVES WILL BE PROVIDED FOR PR., DP, FLOW, & LEVEL MEASURING INST. EVEN THOUGH SAME WILL BE PROVIDED AS PER APPROVED INSTRUMENT HOOK UP DRAWING.
- 1.4. FUEL GAS LINES DOWNSTREAM OF FILTER SEPARATOR SKID IS OF STAINLESS STEEL MATERIAL
- 1.5. ALL VENTS AND DRAINS UPTO FIRST ISOLATION VALVE (NON LO TYPE) SHALL BE OF STAINLESS STEEL MATERIAL FOR SS LINES
- 1.6. FOR MATERIAL SPECIFICATION OF PIPES, FITTINGS ETC., PLEASE REFER TO PIPING DESIGN SPECIFICATION
- 1.7. THIS BALL VALVE ALONG WITH SPECTACLE BLIND SHALL BE OPENED AFTER ENSURING THAT THE NRVs IN THE N2 SYSTEM ARE NOT PASSING. ANY READING IN THE PRESSURE GAUGE IS RESULT OF PASSING THROUGH NRVs.
- 1.8. THE VENT VALVE ON FUEL GAS CONDENSATE DRAIN TANK SHALL BE NORMALLY OPEN TO FLARE HEADER. PSV IS PROVIDED ONLY FOR ADDITIONAL SAFETY TO MEET ANY EVENTUALITY.
- 1.9. FOR LEGEND REF. TO DOC.NO. : 2-38101-00783
- 1.10. CUSTOMER/CONSULTANT TO CONFIRM THE MECHANICAL DESIGN PRESSURE AND TEMPERATURE AT PLANT B/L.
- 1.11. CUSTOMER/CONSULTANT SHALL ENSURE INSTRUMENT AIR SUPPLY BEFORE COMMISSIONING OF THE GAS CONDITIONING SKID FOR OPERATION OF THE INSTRUMENTS (LEVEL CONTROL VALVES/SHUTDOWN/BLOWDOWN/SOLENOID VALVES).
- 1.12. ALL BALL VALVES IN FUEL GAS SYSTEM ARE OF FIRE SAFE DESIGN ONLY.
- 2.1. VOTAGE RATING SOLENOID VALVE = 24 V DC, TYPE OF SOLENOID VALVE = UNIVERSAL TYPE
- 2.2. LEVEL TRANSMITTERS ON KNOCK OUT DRUM ARE OF TORQUE TUBE TYPE AND THESE TRANSMITTERS ARE MOUNTED AT SAME ELEVATION.
- 2.3. ALL ELECTRICAL EQUIPMENT AND RELAYMENT INSTRUMENTATION IN FUEL GAS SYSTEM ARE DESIGNED TO EXPLOSION PROOF TO CL 1, DIV.2, GR. C & D AS PER NEC.
- 2.4. THE INPUT DATA FOR SELECTION OF PRESSURE CONTROL VALVE [PSV-6803] FOR GT IS AS PER ADJACENT TABLE-1.
PRESSURE, FLOW, TEMPERATURE ARE INDEPENDENT OF EACH OTHER AND THE WORST POSSIBLE CONDITIONS SHALL BE CONSIDERED FOR SIZING OF THE CONTROL VALVES.
- 2.5. FIRE IN GT SYSTEM MAY OCCUR IN THE FOLLOWING AREAS.
A) GT COMPARTMENT
B) GENERATOR COMPARTMENT
C) GT ACCESSORY BASE
D) GT LIQUID FUEL MODULE
FIRE IN ANY OF THE ABOVE DEFINED AREAS IS BEING COMMUNICATED BY MARK-VI TO DCS AND ACCORDINGLY, CLOSURE/OPENING OF ON/OFF VALVES IS BEING IMPLEMENTED BY DCS.
- 2.6. SET POINTS FOR SCRUBBER ARE AS FOLLOWS:
(A) LALL = 75 MM, (B) LAL = 125 MM, (C) LAH = 225 MM, (D) LAHH = 275 MM
- 2.7. SET POINTS FOR FILTER SEPARATOR ARE AS FOLLOWS:
(A) LAL = 125 MM, (B) LIC = 175 MM, (C) LAH = 225 MM
- 2.8.  -INDICATES FIELD MOUNTED INSTRUMENT.
 -INDICATES DCS INSTRUMENT.
 -INDICATES LOCAL GAUGE BOARD/LOCAL PANEL INSTRUMENT.
- 2.9. FSV-6803/6617/6818 ARE FIRE SAFE CONDITION VALVES AS PER API-520.
- 2.10. THE FSV INDICATION  REPRESENTS 1"(INLET) x 2"(OUTLET) VALVE WITH "D" TYPE ORIFICE AND SET PRESSURE OF 32 KG/CM2(G).
- 2.11. ALL VESSELS (FILTER SEPARATOR) SHALL BE DESIGNED AS ASME SEC. VIII, DIV. 1
- 2.12. (i) OUTLET ISOLATION VALVE OF SAFETY VALVE SHALL BE ALWAYS KEPT OPEN.
(ii) OUTLET ISOLATION VALVE OF SAFETY VALVE SHALL BE CLOSED ONLY WHEN THE INLET ISOLATION VALVE OF SAFETY VALVE IS CLOSED AND THE SPACE BETWEEN THE SAFETY VALVE AND INLET ISOLATION VALVE IS ADEQUATELY DEPRESSURISED THROUGH BLEED VALVE.
(iii) SAFETY VALVE SHALL BE TAKEN FOR MAINTENANCE ONLY AFTER THE SPACE BETWEEN THE INLET VALVE AND SAFETY VALVE AND SPACE BETWEEN SAFETY VALVE AND OUTLET ISOLATION VALVE ARE SAFELY DEPRESSURISED THROUGH RESPECTIVE BLEED VALVES..
- 2.13. ALL INSTRUMENT TAG NO'S SHALL BE PREFIXED BY UNIT NO: 2119.
- 2.14. BLOW DOWN VALVES ARE OF CLASS VI LEAKAGE CLASS AND SHALL BE OF BALL TYPE WITH 0.6 CV.

STATUS : FOR REVIEW

PROJECT	:	BRAHMPUTRA PETROCHEMICAL COMPLEX, ASSAM
OWNER	:	BRAHMPUTRA CRACKER AND POLYMERS LIMITED
ITEM	:	GT DRIVEN RICH GAS COMPRESSOR
CONSULTANT	:	EIL, NEW DELHI

TYPE OF PRODUCT	RICH GAS COMPRESSOR
NAME OF CUSTOMER/	BCPL ASSAM
NAME OF PROJECT	

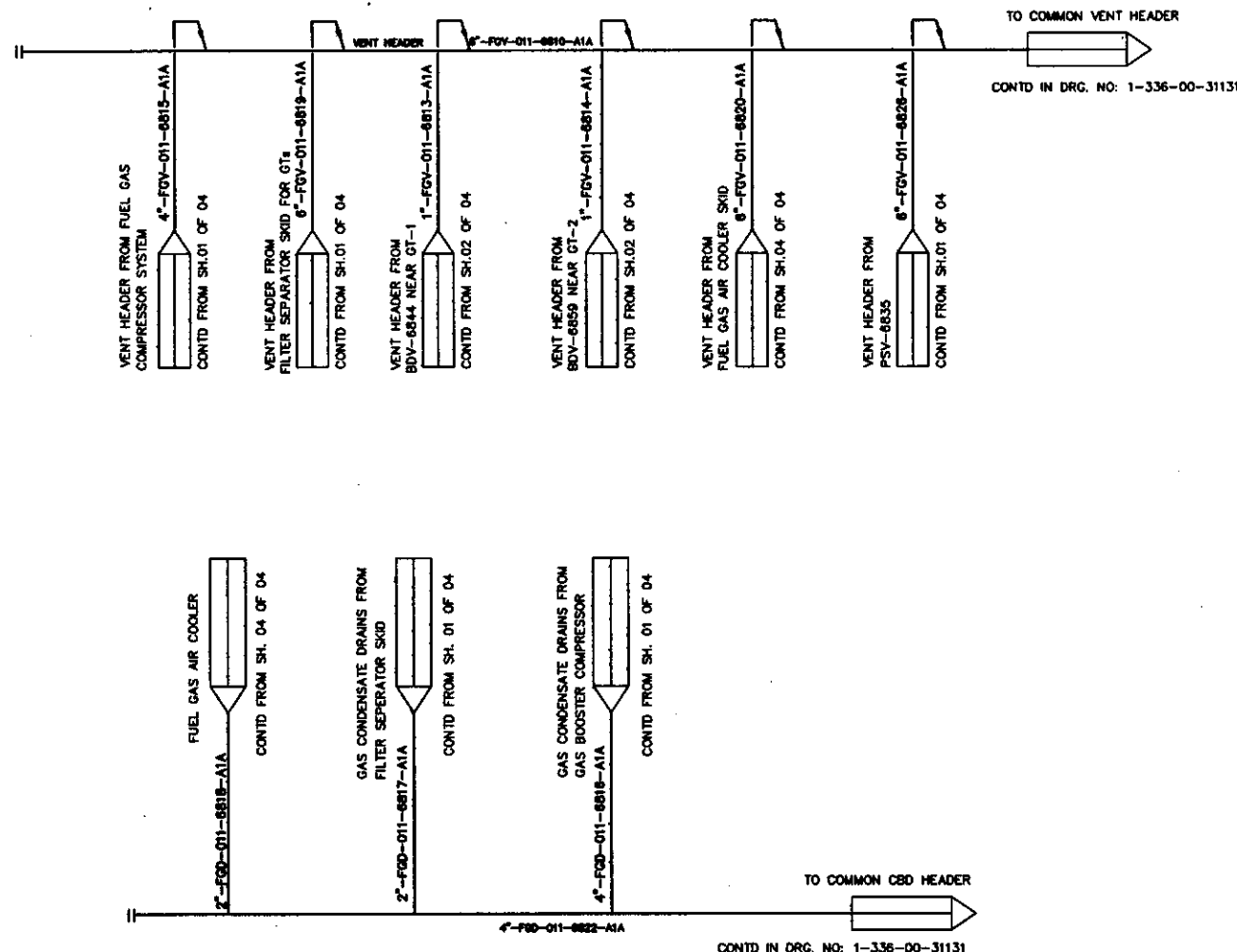
NAME OF PROJECT		NAME	SIGN.	DATE	NO. OF VARS.
S	BHARAT HEAVY ELECTRICALS LTD. HYDERABAD	DRN.	S.SURENDRA	28.08.10	
				28.08.10	

REF. SYLNOG		OWNER, DIS.	SCALE	WEIGHT (KG)	REF. TO ASSY. NO.	ITEM NO.	NO. OF ITEMS
DEPT			M.T.C	M.A	M.A	M.A	M.A

FILE NO.	415		N.T.S.	-N.A.-	-N.A.-	-N.A.-	-N.A.-
TITLE	P & I DIAGRAM FOR OFF-BASE GAS SYSTEM			CARD CODE	DRAWING NO. 1-38101-03998		REV 00
			N.A.	SHEET NO. 02	NO. OF SHEETS 04		

DRG. NO. 1-38101-03998

SHT. NO. 03 OF 04



INTERLOCK SUMMARY:-

TITLE OF LOGIC	LOGIC NO.	TAG NOS. INVOLVED	CONDITIONS FOR LOGIC EXECUTION	REMARKS	PROCESS INTERLOCK EXECUTED IN
880-8801	1-201		IN CASE OF FIRE IN GT (SEE NOTE 2.6)	TO CLOSE IN AUTO CSD-8801, 8802, 8803, 8804 & 8805 TO OPEN IN AUTO SDV-8804, 8819, 8820, 8844 & 8859	SOP DCS
			IN CASE OF LONG SHUTDOWN/EMERGENCY	TO CLOSE REMOTE MANUALLY SDV-8801, 8804, 8805, 8844 & 8859 TO OPEN REMOTE MANUALLY SDV-8804, 8819, 8820, 8844 & 8859	SOP DCS
LOV-8803	1-802	LAL-8803A/B/C (2 OF 3 LOGIC)	LEVEL HIGH IN TANK OUT DRUM FOR GT	TO OPEN IN AUTO LOV-8803	SOP DCS
		LAL-8803A/B/C (2 OF 3 LOGIC)	LEVEL LOW IN TANK OUT DRUM FOR GT	TO CLOSE IN AUTO LOV-8803	SOP DCS
FUEL GAS CONDENSATE DRAIN TANK PUMP OF DCS	1-203	LAL-8829	CONDENSATE LEVEL IN THE TANK HIGH	TO START PUMP IN AUTO	SOP DCS
		LAL-8829	CONDENSATE LEVEL IN THE TANK LOW	TO TRIP PUMP IN AUTO	SOP DCS

TAG NOS. ALLOCATION SUMMARY

	RANGE	USED IN THIS DRG. NO.	SPARE
INSTRUMENTS	PI/DPI:6801-6899 TI:6801-6899 6801-6899(REST)	6835 6819 6836	
VALVES	6801-6899	6861	
PIPE LINES	6801 TO 6899	6826	
INTERLOCKS	201-210	203	
TERMINAL POINTS	01-10	06	
EQUIPMENT NOS.			

BHIEL BCPL

STATUS : FOR REVIEW

PROJECT : BRAHMPUTRA PETROCHEMICAL COMPLEX, ASSAM
 OWNER : BRAHMPUTRA CRACKER AND POLYMERS LIMITED
 ITEM : GT DRIVEN RICH GAS COMPRESSOR
 CONSULTANT : EIL, NEW DELHI

TYPE OF PRODUCT : RICH GAS COMPRESSOR
 NAME OF CUSTOMER/ : BCPL ASSAM
 NAME OF PROJECT :

NAME : S. SURENDRA
 CHD. : M S P DMSU
 APPD. : R.C.V.S

DATE : 25.06.10
 NO. OF WKS. : 04
 SCALE : N.T.S.
 WEIGHT (KG) : -N.A.-
 REF. TO ASSY. DRG. : -N.A.-
 ITEM NO. : -N.A.-
 W/O.F. (T/S) : -N.A.-

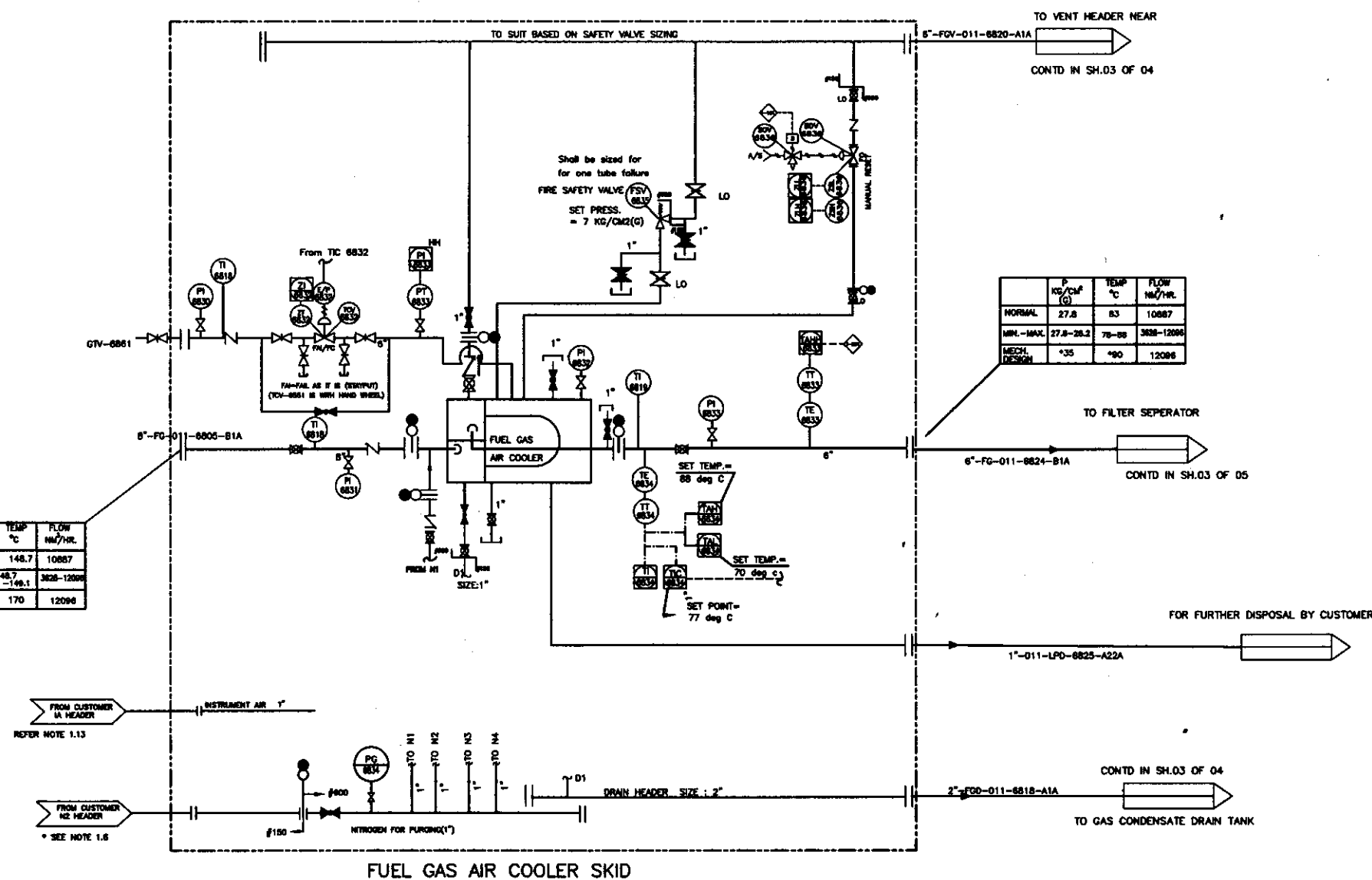
TITLE : P & I DIAGRAM FOR OFF-BASE GAS SYSTEM
 CARD CODE : N.A.
 DRAWING NO. : 1-38101-03998
 SHT. No. : 03
 NO. OF SHT. : 04

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GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

98680-10101-1
DRG. NO. 04 OF 04

	P KG/CM ² (G)	TEMP °C	FLOW NM ³ /HR.
NORMAL	28.1	148.7	10887
MIN.-MAX.	28.1-28.2	148.7 -149.1	3828-12088
MECH. DESIGN	*35	170	12088



	P KG/CM ² (G)	TEMP °C	FLOW NM ³ /HR.
NORMAL	27.8	83	10887
MIN.-MAX.	27.8-28.2	78-88	3828-12088
MECH. DESIGN	*35	*90	12088

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HYD30261

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD
ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE		

STATUS : FOR REVIEW

PROJECT : BRAHMPUTRA PETROCHEMICAL COMPLEX, ASSAM
OWNER : BRAHMPUTRA CRACKER AND POLYMERS LIMITED
ITEM : GT DRIVEN RICH GAS COMPRESSOR
CONSULTANT : EIL, NEW DELHI

TYPE OF PRODUCT : RICH GAS COMPRESSOR
NAME OF CUSTOMER/ : BCPL ASSAM
NAME OF PROJECT :

BHPL BCPL

NAME : S. SURENDRA
SIGN. :
DATE : 29.08.10
NO. OF :
CHD. : M S P BABU
APPD. : R.G.V.S
REV. :
ITEM NO. :
NO. OF :
ITEMS :
REV. :
NO. OF :
ITEMS :

SCALE : N.T.S.
WEIGHT (KG) :
REF. TO ASSY. DRG. :
ITEM NO. :
NO. OF :
ITEMS :
REV. :
NO. OF :
ITEMS :

TITLE : P & I DIAGRAM FOR
OFF-BASE GAS SYSTEM
DRAWING NO. : 1-38101-03998
REV. :
SHT. No : 04
NO. OF SHT. : 04