



**AMENDMENT ON TECHNICAL SPECIFICATION FOR COMPRESSED AIR SYTEM
PACKAGE
5 X 800 MW YADADRI TPS**

SPECIFICATION NO.: PE-TS-417-555-A001

AMENDMENT NO # 1

REV. NO. 00 DATE: 06/08/2018

The following modifications with respect to Technical Specification of compressed air system BHEL's Technical specification no **PE-TS-417-555-A001** shall apply.
Bidder to note that existing clauses/details as appearing in the specification stands deleted and clauses/details as mentioned in "Modified to or Read as" column shall be applicable and complied by the bidder.

MODIFIED CLAUSES/PAGE NUMBERS.

Sl no.	Section	Description	Clause	Page no	Existing clause/details	Modified to or Read as
1.	IA	SEPCIFIC TECHNICAL REQUIREMENT-MECHANICAL	1.1.3	12	10 Nos. Air Receivers (4 nos adjacent to compressor house#1 & 6 nos adjacent to compressor house#2) of minimum 15 (Fifteen) Cu.M capacity each with instruments, relief valve, drain connection with automatic trap stations and other accessories as specified.	17 Nos. Air Receivers (5 nos adjacent to compressor house #1 & 7 nos adjacent to compressor house #2) and 5 Nos unit air receiver (1 no. near each TG building) of minimum 25 (Twenty five) Cu.M capacity each with instruments, relief valve, drain connection with automatic trap stations and other accessories as specified.
2.	IA	ANNEXURE-IV, INPUT DRAWINGS OF TENDER)	--	171-174	drawings 1. P& ID of compressed air system within compressor house (PE-DG-417-555-A018) 2. Compressor house layout (PE-DG-417-555-A015)	Revised drgs. are attached as annexure – A 1. P& ID of compressed air system within compressor house (PE-DG-417-555-A018) 2. Compressor house layout (PE-DG-417-555-A015)
3.	IA	ANNEXURE-VII	--	192	Approved design memorandum of CAS	Revised design memorandum of Compressed air system is attached as annexure -B
4.	IA	ANNEXURE-III, MDLWITH SUBMISSION SCHEDULE	--	167	MDL with submission schedule	Revised MDL is attached as annexure -C
5.	IIID	List of documents to be submitted with bid	--	387	List of documents to be submitted with bid	Revised list of documents to be submitted with bid is attached as annexure -D
6.	IIIE	Electric load data of CAS	--	395	Electric load data of CAS	Revised electrical load list is attached as annexure -E
7.	IIIF	Suggestive BBU of CAS	--	398	Suggestive BBU of CAS	Kindly consider this as null and void.



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AMENDMENT NO # 1

REV. NO. 00

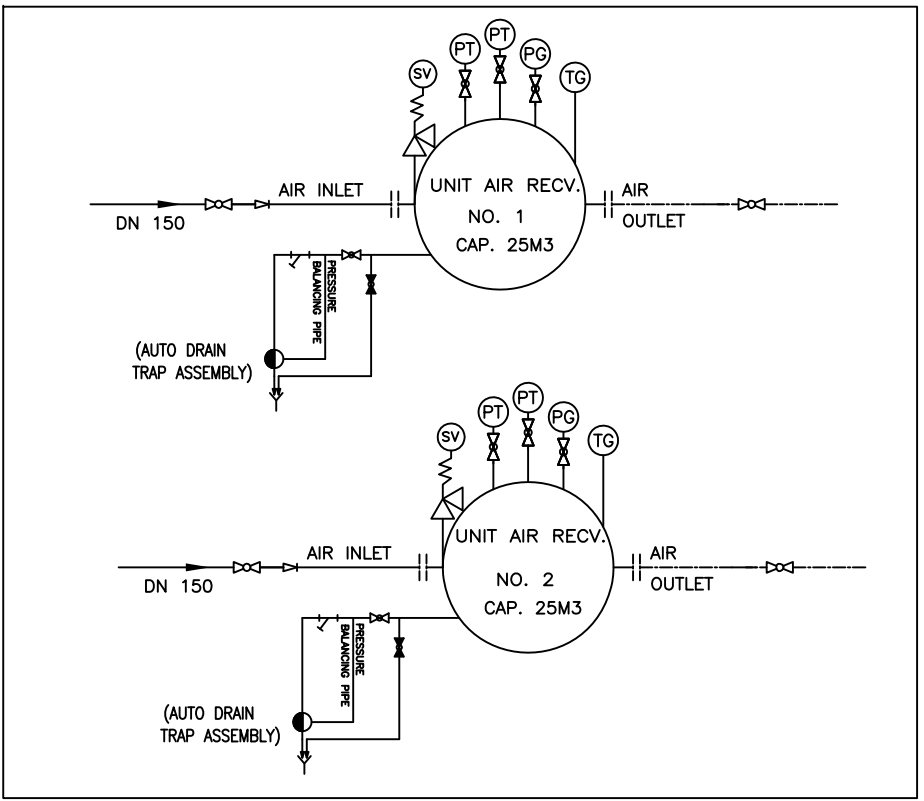
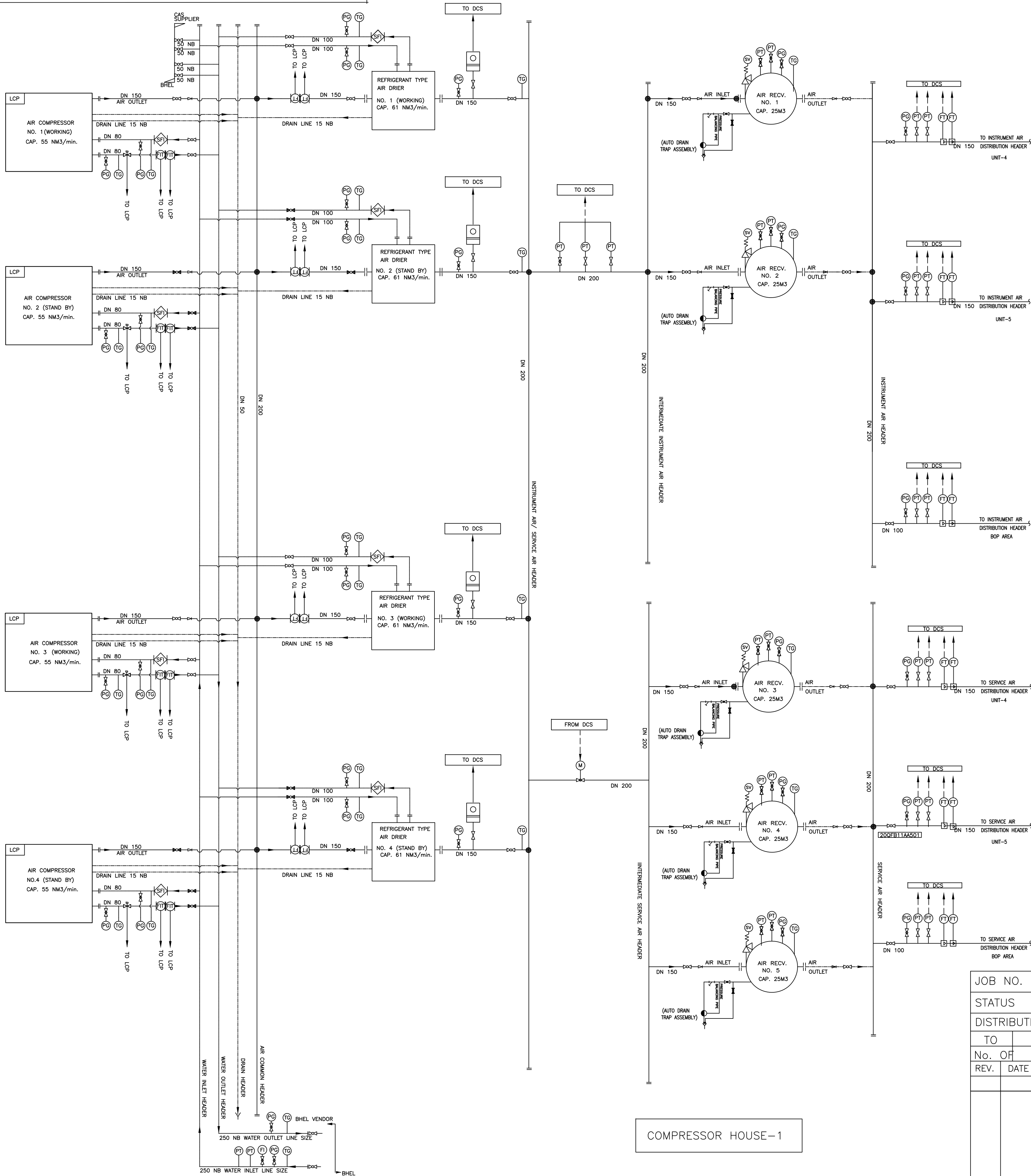
DATE: 06/08/2018

8.	IA	ANNEXURE-V, Mandatory spare list	3.1.1	177	Transmitters/ Gauges/Switches etc. along with relevant accessories -20% of total or at least two (whichever is higher) for each type along with accessories.	Transmitters/ Gauges/Switches etc. along with relevant accessories -20% of total or at least four (whichever is higher) for each type along with accessories.
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ANNEXURE-A

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DRAWING NO. PE-DG-417-555-A018



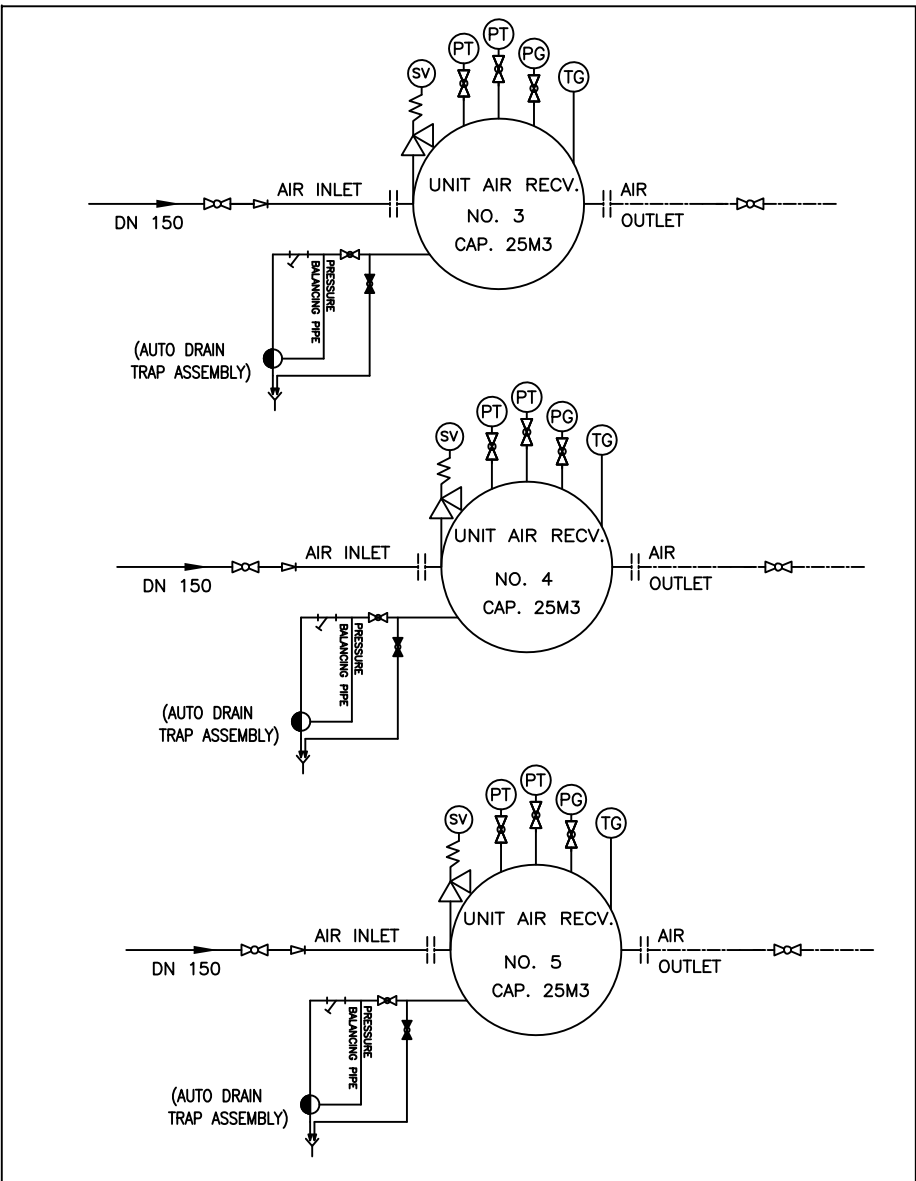
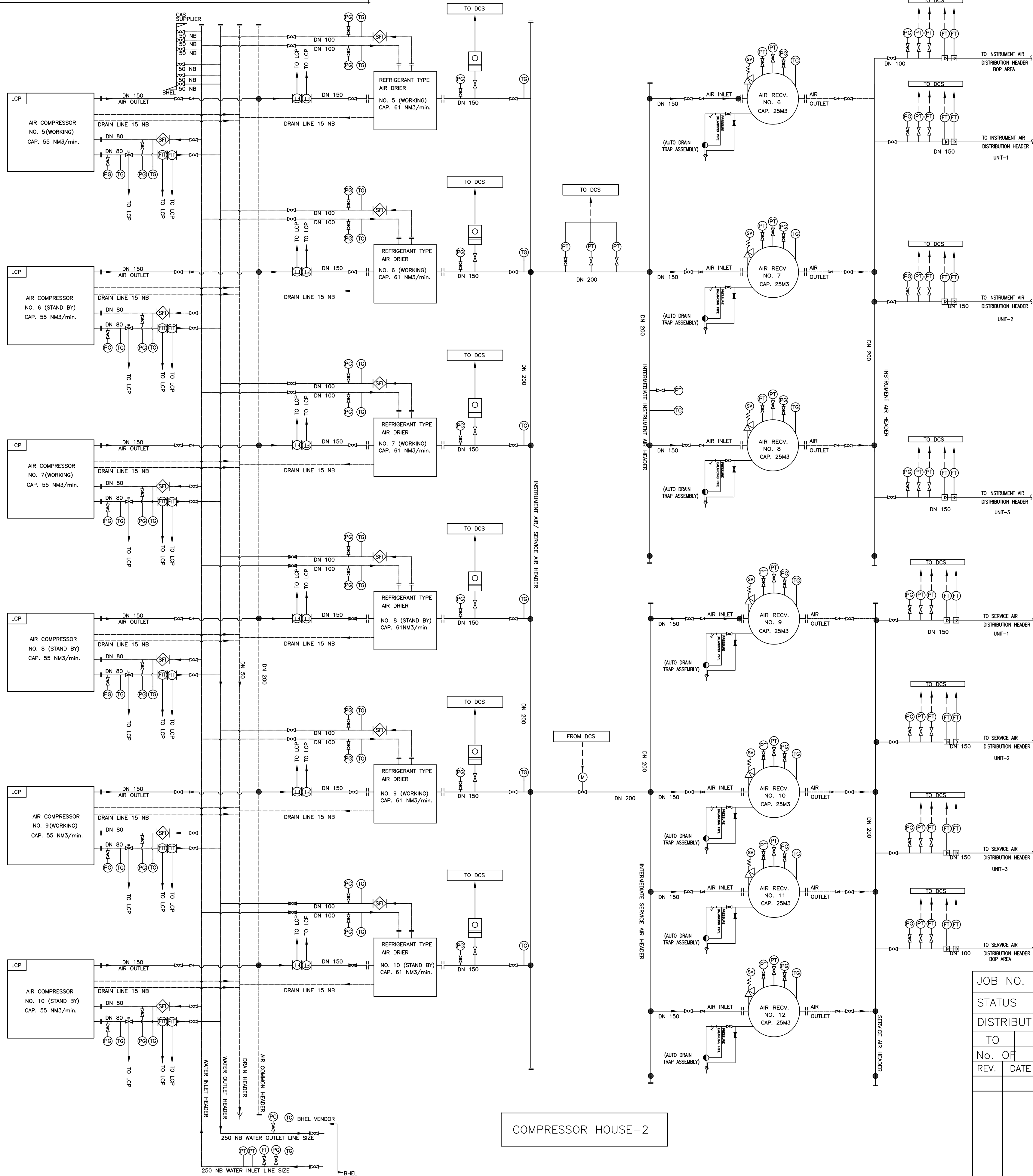
- NOTES :-
1. THE GIVEN P&ID IS CONFINED TO INSTRUMENTS AND PIPING FOR COMPRESSOR HOUSE AREA ONLY.
 2. ALL INTERCONNECTING COMPRESSED AIR PIPING SHALL BE OF STAINLESS STEEL AS PER ASTM-A312 GR. 304 SCHEDULE 40S. ANSI - B36.19 UPTO 50 MM NB AND AS PER SCHEDULE 10S ANSI B 36.19 FOR SIZES EQUAL TO GREATER THAN 65 MM NB.
 3. FITTING FOR INTERCONNECTING COMPRESSED AIR PIPELINE SHALL BE STAINLESS STEEL AS PER ASTM A-182 F304.
 4. ALL COOLING WATER PIPING WILL BE CONFORMING TO IS:1239 (HEAVY GRADE) UPTO 150 MM NB AND IS-3589 FOR SIZES ABOVE 150 MM WITH MINIMUM PIPE THICKNESS OF 6 MM.
 5. FITTING FOR COOLING WATER PIPING SHALL BE AS PER ASTM A234 GR WPB FOR SIZING INCLUDING 65 MM NB AND ABOVE AND ASTM 105 FOR SIZES UPTO 50 NB
 6. ALL AIRLINE VALVES SHALL BE BALL VALVE TYPE FOR COMPRESSED AIR APPLICATION VALVE MATERIAL SHALL BE OF STAINLESS STEEL. VALVES SHALL BE AS PER BS-5351.
 7. ALL WATER LINE VALVES SHALL BE BALL VALVE TYPE FOR COOLING WATER LINE APPLICATION VALVE MATERIAL SHALL BE OF CARBON STEEL.
 8. INSTRUMENTS ON AIR RECEIVER SHALL BE MOUNTED LOCALLY AT ACCESSIBLE ELEVATION.
 9. DUAL REDUNDANCY FOR ALARM/ANNUNCIATION AND TRIPLE REDUNDANCY FOR TRIP/SHUTDOWN WITHIN THE COMPRESSOR AND DRYER SKID SHALL BE PROVIDED. IN CASE, ADDITIONAL SET OF INSTRUMENTS IS NOT POSSIBLE NOT POSSIBLE TO ACCOMMODATE WITHIN SKID DUE TO SPACE CONSTRAIN, THE SAME SHALL BE SUPPLIED AS LOOSE ITEMS.
 10. INDIVIDUAL COMPRESSOR CONTROL SHALL BE THROUGH REDUNDANT MICROPROCESSOR BASED CONTROL SYSTEM. IF MANUFACTURER UNABLE TO PROVIDE REDUNDANT MICROPROCESSOR CONTROL, THEN ONLY MICROCONTROLLERS SHALL BE SUPPLIED AS LOOSE ITEMS.

LEGEND	
SYMBOL	DESCRIPTION
	NON RETURN VALVE
	BALL VALVE (OPEN)
	BALL VALVE (CLOSED)
	GLOBE VALVE (OPEN)
	GLOBE VALVE (CLOSED)
	RELIEF/SAFETY VALVE (OPEN)
LCP	LOCAL CONTROL PANEL
	SOLENOID VALVE
	'Y' TYPE FUNNEL
	DEW POINT METER
	WATER LINE
	DRAIN LINE
	AIR LINE
	FLOW INDICATOR TRANSMITTER
	FLOW SWITCH
TG	TEMP. GAUGE
PG	PRESSURE GAUGE
PT	PRESSURE TRANSMITTER
FI	FLOW INDICATOR
	VORTEX TYPE FLOW TANSMITTER
	SIGHT FLOW INDICATOR
	FLOW TRANSMITTER
	MOTORISED VALVE

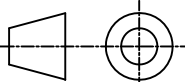
CUSTOMER		TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA STATE, INDIA 5x800 MW TSGENCO YADADRI TPS,			
CONSULTANT:		TATA CONSULTING ENGINEERS LIMITED BANGALORE			
		BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA			
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		DESIN	MK	Sd/-	01.08.2018
		CHD	SR	Sd/-	01.08.2018
		APPD	HK	Sd/-	01.08.2018
TITLE P & ID OF COMPRESSED AIR SYSTEM WITHIN COMPRESSOR HOUSE					
		DEPT.	SCALE	DRAWING No. PE-DG-417-555-A018	
		SIGN			
		DATE		SHEET 01 OF 02 REV 01	

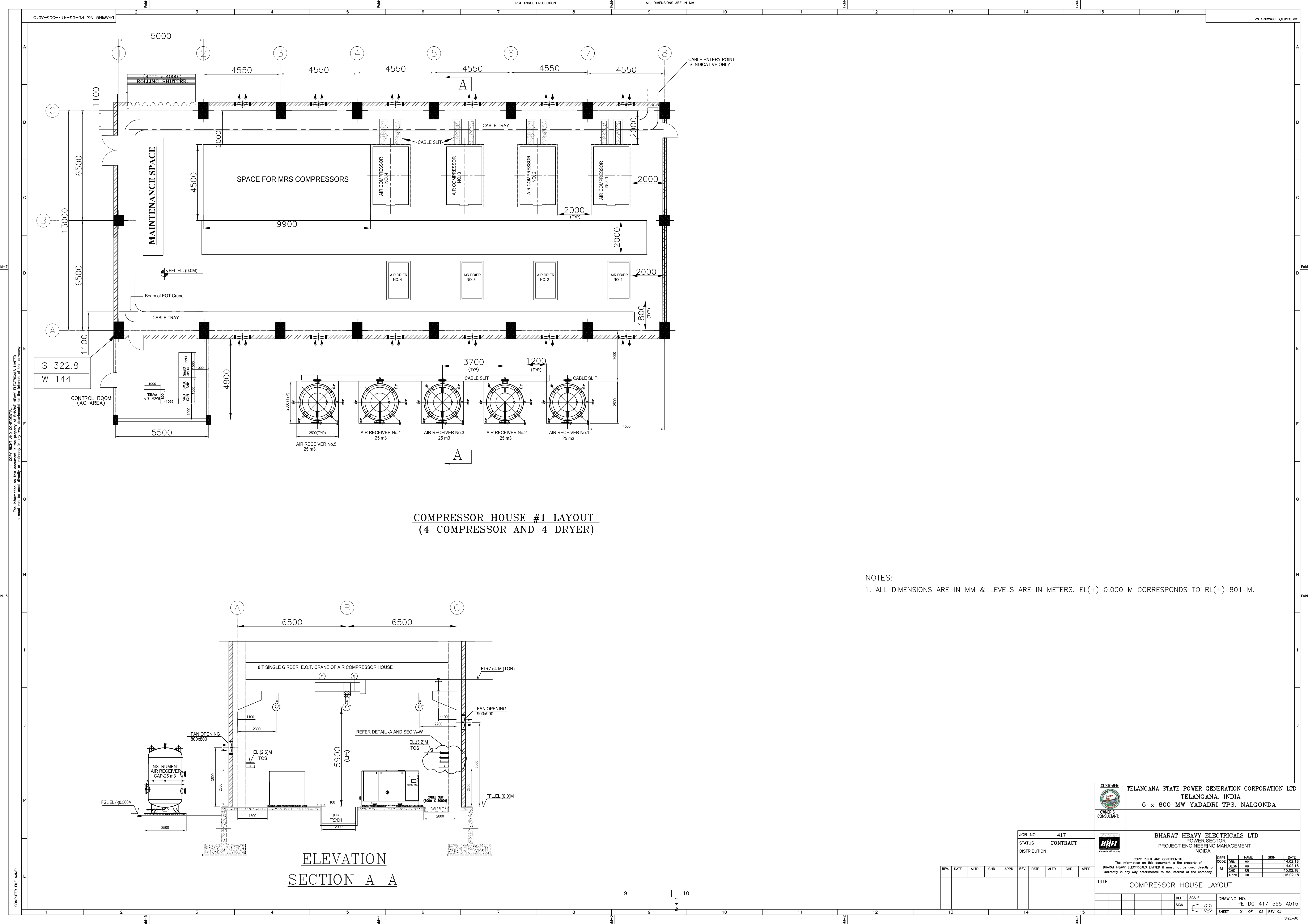
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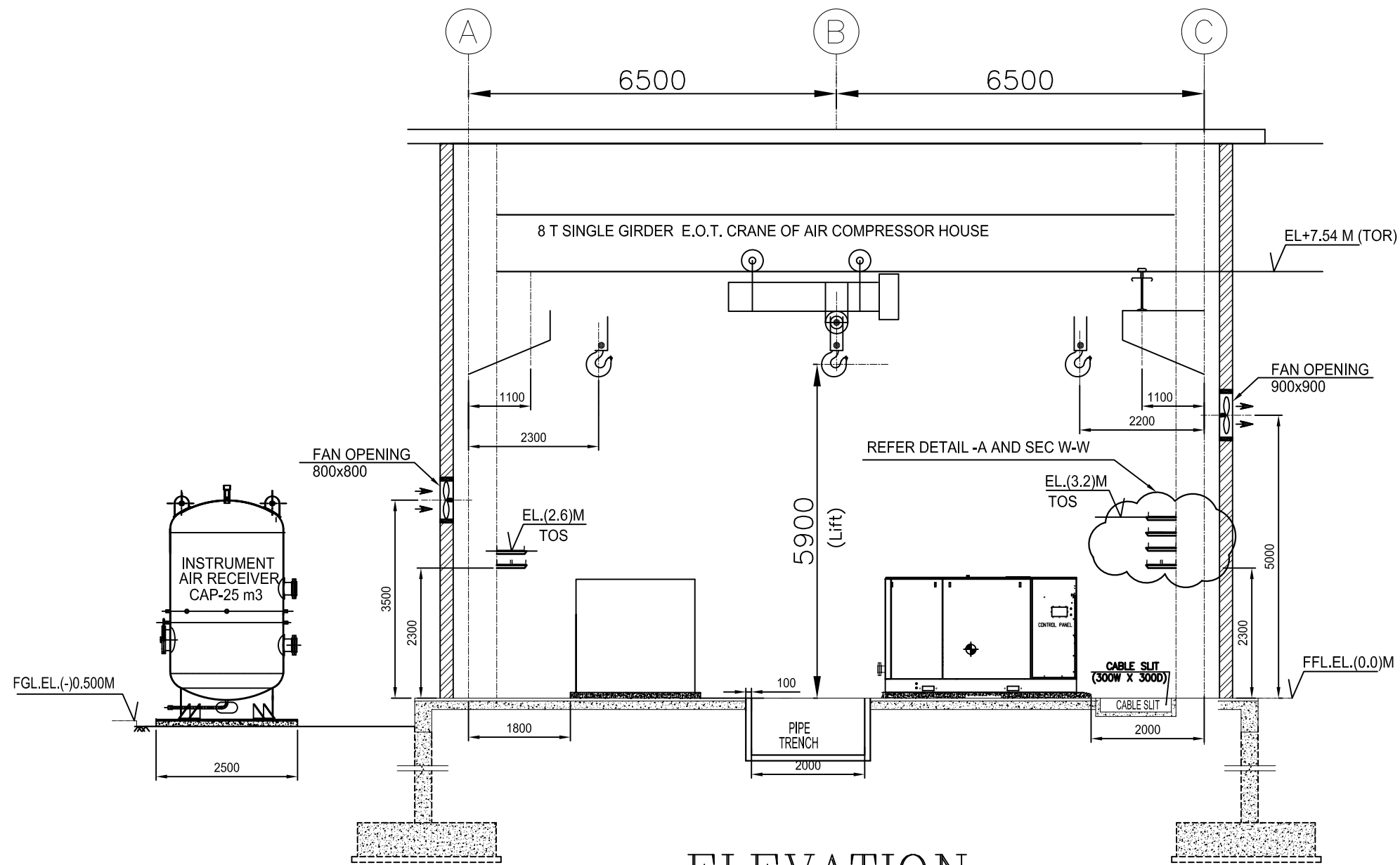
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 11. ALL PIPING AND EQUIPMENT EXPOSED TO 60DEG AND ABOVE SHALL BE PROVIDED WITH SUITABLE INSULATION

CUSTOMER		TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA STATE, INDIA 5x800 MW TSGENCO YADADRI TPS,							
CONSULTANT:									
 TSGENCO		भारत भारती  Maharatna Company BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA							
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			DESN	MK	Sd/-	01.08.2018			
			CHD	SR	Sd/-	01.08.2018			
			APPD	HK	Sd/-	01.08.2018			
TITLE P & ID OF COMPRESSED AIR SYSTEM WITHIN COMPRESSOR HOUSE									
							DEPT.	SCALE 	DRAWING No. PE-DG-417-555-A018
						SIGN			
						DATE	SHEET 02 OF 02		



COMPRESSOR HOUSE #1 LAYOUT
(4 COMPRESSOR AND 4 DRYER)

NOTES:-
1. ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METERS. EL(+) 0.000 M CORRESPONDS TO RL(+) 801 M.



ELEVATION
SECTION A-A

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD

JOB NO.	417
STATUS	CONTRACT
DISTRIBUTION	

DEPT.	SCALE	DRAWING NO.
CHD	1:1	PE-DG-417-555-A015
APPD		

OWNER'S CONSULTANT:	TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA, INDIA 5 x 800 MW YADADRI TPS, NALGONDA
OWNER'S CONSULTANT:	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT Noida

DEPT.	NAME	SIGN	DATE
CHD	MK		14.02.18
CHD	MK		14.02.18
CHD	SR		15.02.18
APPD	HK		15.02.18

TITLE	COMPRESSOR HOUSE LAYOUT

DEPT.	SCALE	DRAWING NO.
CHD	1:1	PE-DG-417-555-A015
APPD		

SHEET	01	OF	02	REV.	01
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SIZE-A0

25 m3

COMPRESSOR HOUSE #2 LAYOUT
(6 COMPRESSOR AND 6 DRYER)

ELEVATION
SECTION A-A

					TELANGANA STATE POWER GENERATION CORPORATION LTD		
					TELANGANA, INDIA		
					5 x 800 MW YADADRI TPS, NALGONDA		
				OWNER'S CONSULTANT:			
					BHARAT HEAVY ELECTRICALS LTD		
					POWER SECTOR		
					PROJECT ENGINEERING MANAGEMENT		
					Noida		
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					DEPT CODE	NAME	SIGN
					M	DRN MK	DATE 14.02.18
						SR	DATE 14.02.18
						APPD HK	DATE 15.02.18
							DATE 16.02.18
				TITLE	COMPRESSOR HOUSE LAYOUT		
				DEPT. SCALE	DRAWING NO.		
				SIGN	PE-DG-417-555-A015		
					SHEET	OF	REV. 01
					SIZE-A0		

ANNEXURE-B



5X800 MW TSGENCO YADADRI TPS

**DESIGN MEMORANDUM OF
COMPRESSED AIR SYSTEM**

BHEL Doc No: PE-DC-417-555-A001

REV 01

DATE 15.06.18

INDEX

- 1. INTENT**
- 2. GENERAL DESCRIPTION**
- 3. DESIGN CRITERIA**
- 4. LAYOUT CONSIDERATIONS**
- 5. OPERATION, CONTROL & INSTRUMENTATION**
- 6. POWER SUPPLY ARRANGEMENT**
- 7. SITE DEMONSTRATION TESTS**



5X800 MW TSGENCO YADADRI TPS

DESIGN MEMORANDUM OF COMPRESSED AIR SYSTEM

BHEL Doc No: PE-DC-417-555-A001

REV 01

DATE 15.06.18

1. INTENT

1.1 The purpose of this document is to bring out clarity with regard to the following:

- System description and Basic operation & Control Philosophy
- Major technical requirements of various items covered under this package
- Layout requirement

1.2 The compressed air system will be designed to meet the requirements of contract technical specification (as a minimum) and for safe & trouble free operation of the system.

2. GENERAL DESCRIPTION

The compressed air system is comprised of the instrument air system and the service air system. Instrument air is required for the various pneumatically operated valves and instruments in the power plant, while service air is required for general plant services.

3. DESIGN CRITERIA

3.1 SYSTEM DESIGN CRITERIA

Compressed air system includes the following:

Two (2) nos. (1W + 1S) air compressors (common for instrument air and service air) for each unit including drives, suction filter, intercoolers, after coolers, moisture separators, step up gearbox, silencer and other accessories. i.e. total four (4) no's of air compressor for compressor house-1(for 2 units) and Six (6) no's of air compressors for compressor house-2 (for 3 units).

Two (2) nos. (1W + 1S) air-drying plants (ADP) for each unit each suitable for connecting to individual air compressor. i.e. total four (4) no's of air drying plants for compressor house-1(for 2 units) and (six) 6 no's of air drying plants for compressor house-2 (for 3 units). Air Drying Plant shall be of Refrigerant type. Dew point of air after ADP shall be suitable for instruments air. Air-drying plant capacity shall be 61 Nm³/Min (i.e. 1.1 times the rated capacity of instrument air compressor).

Seventeen (17) nos. air receivers, each of 25 M³ capacity, i.e five (5) no's air receivers near compressor house-1, seven (7) no's air receivers for compressor house-2 and five (5) nos. unit air receivers i.e one no. air receiver in each unit (Refer air receiver capacity calculation in Annexure-I).

All interconnecting piping, valves, fittings, supports/hangers, complete drive unit, with protecting guards, device for adjustment, control panel, etc. shall be supplied with each compressor.

Controls & interlocks.

All instruments including the electronic on line dew point meter with suitable sampling connection and isolation valve at the common outlet of the Air Drying Plants.

Crane of 8T capacity. The heaviest part to be lifted is compressor motor of approx. 3.6 ton.



5X800 MW TSGENCO YADADRI TPS

DESIGN MEMORANDUM OF COMPRESSED AIR SYSTEM

BHEL Doc No: PE-DC-417-555-A001

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3.2

EQUIPMENT DESIGN CRITERIA

AIR COMPRESSORS

The capacity of air compressors shall be 55 NM³/min (Refer Compressor capacity calculation in Annexure-II). Delivery pressure will be 8.5 Kg/cm² (g) at outlet of IA compressor & 8.0 Kg/cm² (g) at ADP outlet. Each compressor will be designed to deliver the nominal capacity at the required delivery pressure.

Air compressors will be multi stage oil free, screw type.

The compressor's capacity will be designed for 50° C DBT and 85% RH at atmospheric pressure at site & at MSL of 85 m.

Testing of compressor will be as per ISO: 1217 and ISO 5167.

Air compressors will be designed for continuous operation with high efficiency to satisfy the performance requirement.

Satisfactory operation in parallel will be ensured without any uneven load sharing, undue vibration, noise etc.

Noise level shall not exceed 85 dBA under free field condition when measured at a distance of 1.5 meter above the floor. The discharge blow off silencer and intake silencers shall be designed to meet the above noise limitation level. A background correction factor of +/- 8 dBA shall be applicable while testing of compressors at site/manufacturer's works.

The velocity of compressed air in pipe shall be limited to 30 m/sec. The velocity in the cooling water pipes shall be limited to 2.0 m/sec.

The motor rating shall be at least 110% of the power required at design condition of compressors (HT Motors) and shall not be less than the power required at any other ambient conditions.

Notch shall be provided in the HT motor for the air compressors to accommodate key phasor probes for vibration monitoring.

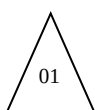
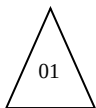
The HT motors shall be of BHEL make only. Further, performance testing and inspection of the compressors with job motors would be done as per approved QAP and manufacturer's test certificate shall be furnished.

Compressor and air dryer shall be designed for cooling water from DMCW system. Quantity of cooling water for cooling of air compressors & air dryers to be considered 140 m³/hr. (min.) for compressor house-1 (2 working compressors +2 working air driers) and 210 m³/hr. (min.) for compressor house-2 (3 working compressors + 3 working air driers) for all working drives. Pressure drop across the cooling water circuit to be considered as 10 MWC. The max temp of hot water from compressor shall be 10 deg. C higher cooling water inlet temp.

For intermittent requirement diversity factor is taken for capacity calculation. However, under no circumstance diversity factor less than 0.4 is considered.

The materials of various components for air compressors shall conform to the applicable BIS / BS / ASTM/ DIN standard.

- i) Compressor chamber: Cast iron coated with corrosion resistant material.
- ii) Rotors: Forged carbon steel coated with corrosion resistant material
- iii) Timing Gear: Low Alloy Steel.





5X800 MW TSGENCO YADADRI TPS

DESIGN MEMORANDUM OF COMPRESSED AIR SYSTEM

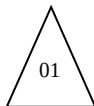
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- iv) Inlet throttle valve & Housing: Aluminium
- v) Shaft / shaft seals: High alloy steel / Stainless Steel.
- vi) Safety valves: Brass / Bronze / Gun metal / SS
- vii) Water separator: Cast Iron
- viii) Non-return valves: Stainless steel spring loaded type.
- ix) Blow off valve: Stainless steel.
- x) Unloading Cylinder header: Aluminium
- xi) Tube of Blow off cooler / oil cooler: SS / Cupro-Nickel / Copper
- xii) Outer casing of coolers: Carbon Steel
- xiii) Gear box: Cast Iron
- xiv) Gears: Alloy Steel.

MOC for Compressor components within compressor skid shall be as per OEM practice, since air end of compressors are imported by all compressor suppliers.



INTAKE FILTER

Heavy duty dry type suction air filters will be provided at the compressor inlet to prevent dust and dirt from entering the cylinders. The filtering efficiency shall be 99.9% up to particle size of 1 micron. Sound suppressing characteristics will be considered in the filter design. Max. pr. drop across filter at design flow rate in new condition shall be limited to 150mmWC.

AIR DRYING PLANT

Air-drying plant shall be of Refrigerant type. Capacity of each Air drying plant shall be such as to match air compressor capacity.

Quality of outlet air from ADP shall be in accordance to Instrument Society of American Standard S7.3 "Quality Standard for Instrument Air" as follows:

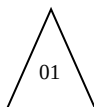
- a) Dew point at outlet of the air drying plant will be minus (-) 20° C at atmospheric pressure.
- b) The quality of air at the outlet of air drier shall be class – 1 as per ISO 8573.
- c) Oil content 0.01 ppm (maximum tolerable) or oil free.
- d) Dust - Practically dust free but maximum particle size 1 micron

Material of Construction (MOC) of Refrigerant dryer shall be as per reputed manufacturer standard.

Moisture load & temperature for designing ADP as applicable shall be submitted during detail engineering. For calculating moisture load, relative humidity and dry bulb temperature at ADP inlet shall be taken as 95% & 34°C respectively.

Dew point meter shall have 4-20 mA output, which shall be connected to DCS.

Type of Refrigerant used shall be R 407C/R404A/R22.





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DESIGN MEMORANDUM OF COMPRESSED AIR SYSTEM

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AIR RECEIVER

The air receivers will be vertical cylindrical with torispherical ends and with supporting legs for resting on their foundation.

Design Pressure for the air receiver shall be 10.0 kg/cm² (g) and 50 deg C respectively. The hydraulic test pressure shall be 15 Kg/cm² (g).

Receivers shall be designed in accordance with IS: 2825 or section VIII, Division 1 of ASME Code or equivalent.

The material of construction of shell, dished ends, flanges etc. of the air receivers shall be as per IS-2002/SA 516 Gr70/ equivalent. The corrosion allowance shall be 2.0mm.

The air receiver drain connection shall be provided with automatic drain valve for automatic removal of drain consisting of valve, strainer, double isolation & bypass valve. The set pressure of the relief valve shall be at least 10% above the working pressure.

Air receiver shall be provided with nozzles, air release vents, safety valve, pressure gauge, temperature gauge, minimum 450 mm dia. manhole for inspection.

PIPING, FITTINGS & VALVES (WITHIN COMPRESSOR HOUSE)

PIPING and FITTING

All interconnecting compressed air piping shall be of Stainless steel as per ASTM-A312 GR.304. Size – as per schedule 40S. ANSI-B36.19 up to 50 mm NB and as per schedule 10S. ANSI – B36.19 for sizes equal to & greater than 65 mm NB. Fittings shall be as per Stainless steel as per ASTM A-182 F304.

All cooling water piping will be IS-1239 (Heavy grade) upto 150 NB. IS-3589 for sizes above 150 NB with minimum pipe thickness of 6 mm. Fittings shall be as per ASTM A-234 Gr. WPB for sizing including 65 mm NB and above. ASTM A105 for sizes upto 50 mm NB.

Compressed air piping from air compressor to after cooler and other lines handling hot air will be suitably insulated so as to restrict surface temperature to 60 deg. C. The insulating material shall be glass or mineral wool as per IS-3690/IS-3677/equivalent with chicken wirenet and 22 gauge aluminium cladding.

The pipe joints will be screwed coupling type for sizes up to 50 NB and above 50 NB the same will be flanged.

All the distribution valves shall be ball valve type. Necessary auto drain shall also be provided at strategic points.

Valves

a) Compressed Air Services:

Description	Details
Type	Ball valve
Design	BS – 5351
Material	Stainless steel
Construction	Forged body up to 50mm NB and Cast body above that
Body & Bonnet/ cover	A351 CF8M for cast body, A

**5X800 MW TSGENCO YADADRI TPS****DESIGN MEMORANDUM OF
COMPRESSED AIR SYSTEM****BHEL Doc No: PE-DC-417-555-A001****REV 01****DATE 15.06.18**

	182 F304 for forged body.
Trim / Disc.	ASTM-A-182 F304 for Gate, Globe, Check valves and 351CF 8M for Ball valves.
Seating surface	For Ball valves PTFE seats and seals.
End Preparation	Socket welded for size equal to and below 50mm NB and flanged with counter flanges for 65mm NB and above.

b) Water Service:

Description	Details
Type	Gate/Globe/Check Valve/Ball Valve
Material	carbon steel.
Construction	Forged body up to 50mm NB and Cast body above that.
Body & Bonnet/ cover	ASTM-A-216 Gr. WCB for cast body & ASTM-A-105 for forged body.
Trim / Disc.	13% Cr Steel as per ASTM-A-182 Gr. F6 heat treated and hardened (min 250 HB) for cast body and ASTM-A-105 Hard faced with Stellite (min 350 HB) for forged body.
Seating surface	13% Cr. Steel as per ASTM-A-182 Gr. F6.
End Preparation	Socket welded for size equal to and below 50mm NB and flanged with counter flanges for 65mm NB and above.

Auto drain trap for each air receiver shall be provided.

Moisture traps at strategic locations shall be provided in the distribution network.

Vortex type flow meter shall be provided at the outlet of instrument and service air distribution header.

All traps shall be float operated.

4. LAYOUT CONSIDERATIONS

Air compressors will be located indoor in a separate compressor room and EOT crane (under slung crane) with pendant control arrangement will be provided so that the heaviest component can be handled during maintenance.

The air receivers will be located outdoors adjacent to the compressor room and inside TG hall of each unit.

Complete ADP equipment shall be mounted on a skid and located indoor.

5. OPERATION, CONTROL & INSTRUMENTATION

The necessary instrumentation and control has been provided for safe and trouble free operation of compressed air system.

Individual compressor control shall be through microprocessor based control system as per manufacturer's standard.

Depending upon operational requirement each compressor can be selected and operated in following mode:



5X800 MW TSGENCO YADADRI TPS

DESIGN MEMORANDUM OF COMPRESSED AIR SYSTEM

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- Local Mode: Individual compressor is operated from Local Integral Control System.
- Remote Mode: Individual compressor is operated (start / stop) through DDCMIS OWS.

All the process inputs (digital or analog), other than specific to compressors are taken directly to DDCMIS. Detail of process input shall be furnished in a separate document control & operation philosophy of Compressed Air system.

The connectivity of Integral compressor control system with DDCMIS shall be provided through Hardwired / Soft link depending upon manufacturer's product standard.

Control, Protection & interlocking system for individual compressors shall be achieved through skid mounted proprietary microprocessor based controllers with Graphic User Interface (GUI) with LCD screen based display unit, control switches and other operational keys. These individual controllers shall be hooked-up to Plant DDCMIS. Air Dryer logics shall directly be implemented in DDCMIS.

The standby compressor can also be started depending on the running hours of running compressors. The Logic for same can be envisaged in DCS considering the running hours.

Individual compressor control shall be through redundant microprocessor based control system. If manufacturer unable to provide redundant microprocessor control, then only microcontrollers shall be supplied as loose items for each compressor.

The connectivity of integral air compressor control system to DCS can be both software /hardwired. But in toto all the signal which are connected to Microcontroller shall also be transmitted to DCS, so as to have complete information DCS in CCR. This transfer can be soft or hard as decided in engineering meeting.

The I/Os of air dryer PLC shall be hooked to DDCMIS, so as to monitor the status of air dryer through DCS OWS in CCR.

Compressed Air System shall be controlled and monitored from plant DDCMIS.

To achieve these operational & functional requirements, Remote Terminal Units (RTU) shall be considered as an extended node of DDCMIS. One (1) no.

operator cum engineering workstations with 24" TFT LCD monitors along with one no. A4/A3 size laser printer, keyboard, mouse shall be provided with the RTU for the local control and monitoring of the above system.

Air Distribution shall be through Stainless Steel manifolds only.

6. POWER SUPPLY ARRANGEMENT

The power supply (rated voltage, frequency, phase) of the equipment's will be 3.3 KV/ 415 V +/- 10%, 3ph, 50 Hz +3% to -5%.

7. SITE DEMONSTRATION TESTS

At site:

1. Parallel operations of air compressors.
2. Dew point of air at the outlet of air drying plants of instrument air compressors.
3. Pressure drop across the air drying plants of air compressors.

**5X800 MW TSGENCO YADADRI TPS****DESIGN MEMORANDUM OF
COMPRESSED AIR SYSTEM****BHEL Doc No: PE-DC-417-555-A001****REV 01****DATE 15.06.18**

For inspection at shop separate Quality Assurance Plans for compressors, driers and receivers shall be submitted during detail engineering.

ANNEXURE-C

S. No.	DRAWING NO.	DRAWING TITLE	SUBMISSION DATE
1	PE-V0-417-555-A001	QUALITY PLAN OF AIR COMPRESSOR FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
2	PE-V0-417-555-A002	QUALITY PLAN OF AIR DRYING PLANT FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
3	PE-V0-417-555-A003	QUALITY PLAN OF AIR RECEIVER FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
4	PE-V0-417-555-A005	TDS OF INSTRUMENT AIR & SERVICE AIR COMPRESSORS	4 Weeks from the date of LOI
5	PE-V0-417-555-A006	TDS OF AIR DRYING PLANT FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
6	PE-V0-417-555-A008	TDS & GA OF VALVES FOR COMPRESSED AIR SYSTEM	6 Weeks from the date of LOI
7	PE-V0-417-555-A009	TDS OF PIPES & FITTINGS FOR COMPRESSED AIR SYSTEM	6 Weeks from the date of LOI
8	PE-V0-417-555-A010	TDS OF INSTRUMENTS FOR COMPRESSED AIR SYSTEM	6 Weeks from the date of LOI
9	PE-V0-417-555-A011	GA DRAWING OF INSTRUMENT & SERVICE AIR COMPRESSOR	4 Weeks from the date of LOI
10	PE-V0-417-555-A012	GA DRAWING OF AIR DRYER FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
11	PE-V0-417-555-A014	GA DRAWING OF AIR RECEIVER FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
12	PE-V0-417-555-A016	P & I DIAGRAM OF AIR COMPRESSOR FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
13	PE-V0-417-555-A017	P&I DIAGRAM OF AIR DRYER FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
14	PE-V0-417-555-A019	OPERATION & CONTROL PHILOSOPHY OF COMPRESSED AIR SYSTEM	6 Weeks from the date of LOI
15	PE-V0-417-555-A020	ELECTRICAL & INTERNAL WIRING DIAGRAM FOR COMPRESSOR PANEL FOR COMPRESSED AIR SYSTEM.	4 Weeks from the date of LOI
16	PE-V0-417-555-A021	ELECTRICAL FEEDER LIST FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
17	PE-V0-417-555-A022	CONTROL CABLE SCHEDULE FOR COMPRESSED AIR SYSTEM	6 Weeks from the date of LOI
18	PE-V0-417-555-A023	PG TEST PROCEDURE FOR COMPRESSED AIR SYSTEM	8 Weeks from the date of LOI
19	PE-V0-417-555-A024	O&M MANUAL-COMP AIR SYSTEM	10 Weeks from the date of LOI
20	PE-V0-417-555-A025	QUALITY PLAN OF INSTRUMENTS FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
21	PE-V0-417-555-A027	QUALITY PLAN OF BROUGHT OUT ITEMS (BOI) FOR COMPRESSED AIR SYSTEM	4 Weeks from the date of LOI
22	PE-V0-417-555-A029	SUB-VENDOR LIST WITH INSPECTION CATEGORISATION PLAN FOR COMPRESSED AIR SYSTEM	2 Weeks from the date of LOI

ANNEXURE-D



**TECHNICAL SPECIFICATION FOR
COMPRESSED AIR SYSTEM
5 X 800 MW YADADRI TPS**

SPECIFICATION NO. PE-TS-417-555-A001

SECTION IIIA

REV – 00

DATE -

LIST OF DOCUMENTS TO BE SUBMITTED WITH THE BID

Bidder shall submit following drawings / documents along with their bid:

- a. Copy of pre-bid clarification, if any, duly signed and stamped.
- b. Copy of electrical scope between BHEL & vendor duly signed and stamped.
- c. Electrical equipment specification for Compressed air system duly signed and stamped.
- d. Electrical load list duly filled
- e. Deviation schedule with reference to specific clauses of the specification along with reason for such deviation.
- f. Copy of unpriced price bid indicating “QUOTED / NOT QUOTED” / “NOT APPLICABLE” as the case may be.
- g. Copy of drwg/doc schedule duly signed and stamped.
- h. Compliance cum confirmation certificate
- i. Guarantee power consumption (section IIIG) duly filled and stamped.

NOTES:

OFFER WILL BE CONSIDERED AS INCOMPLETE IN ABSENCE OF ANY OF THE ABOVE DOCUMENTS.

DOCUMENTS OTHER THAN ABOVE, IF ANY, SUBMITTED WITH THE OFFER WILL NOT FORM PART OF CONTRACT AND ACCORDINGLY WILL NOT BE CONSIDERED FOR BID EVALUATION.

ANNEXURE-E

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BO AR D NO.	CABLE		BLOCK CABLE DRG. No.	CONTRO L CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOs				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
AIR COMPRESSORS MOTORS (COMMON FOR INSTRUMENT AND SERVICE AIR)	530 KW		S	5	5	C	U	N	C		(2W+2S) at compressor house #1 & (3W+3S) at Compressor House #2						HT motors to be supplied by BHEL	
AIR COMPRESSORS- AUXILIARY SUPPLY	5 KW		S	5	5	D	S	N	C		(2W+2S) at Compressor house #1 & (3W+3S) at Compressor House #2							
AIR COMPRESSOR- (MICRO CONTROLLER)	400 VA		S	5	5	E	S	N	C		(2W+2S) at Compressor house #1 & (3W+3S) at Compressor House #2						UPS FEEDER REQUIRED	
AIR DRYERS	20 KW		S	5	5	D	S	N	C		(2W+2S) at Compressor house #1 & (3W+3S) at Compressor House #2							
CONTROL PANEL FOR AIR DRYERS	1 KW		S	5	5	E	S	N	C		(2W+2S) at Compressor house #1 & (3W+3S) at Compressor House #2							
AUTO DRAIN TRAP	10 W		S	17	-	E	S	N	I		5 nos. at compressor house#1,7 nos. at CompressorHouse#2 and 5 nos near TG hall (1 near each unit).							
MOTORIZED VALVE	2 KW		S	2	-	D	S	N	I		1 no. at compressor house #1 & 1 no. at compressor house #2							
Any other power supply as required by bidder	To be filled by bidder																	
Note:																		
NOTES: 1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)/ CUSTOMER 2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (cc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V : ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)																		
	LOAD DATA (ELECTRICAL)	JOB NO.		417		ORIGINATING AGENCY				PEM (ELECTRICAL)								
		PROJECT TITLE		5 x 800 MW YADADRI TPS				NAME				DATA FILLED UP ON						
		SYSTEM		COMPRESSED AIR SYSTEM				SIGN.				DATA ENTERED ON						
		DEPTT. / SECTION		MAX				SHEET 1 OF 2		REV. 00		DE'S SIGN. & DATE						

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BO AR D NO.	CABLE		BLOCK CABLE DRG. No.	CONTRO L CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOs				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

1. Bidder to confirm that the system provided by them would be catered by the above loads considered by BHEL. In case there is any variation, the same should be clearly stated in the technical offer. No changes would be admissible during detailed engineering stage.
2. Bidder to note that for the system being supplied by them, only the above loads will be provided. In case any other load is required, the same would be derived / multiplied by bidder on their own from these feeders only.
3. Any change in the electrical load list shall be entertained only subject to its feasibility, and BHEL reserves the right to debit the vendor cost of any changes necessitated in the switch gear /MCC on account of changed loads.

NOTES: 1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)/ CUSTOMER
2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (cc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V
: ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)

LOAD DATA (ELECTRICAL)	JOB NO.	417	ORIGINATING AGENCY		PEM (ELECTRICAL)	
	PROJECT TITLE	5 x 800 MW YADADRI TPS	NAME		DATA FILLED UP ON	
	SYSTEM	COMPRESSED AIR SYSTEM	SIGN.		DATA ENTERED ON	
	DEPTT. / SECTION	MAX	SHEET 2 OF 2	REV. 00	DE'S SIGN. & DATE	