NTPC LIMITED

1 X 500 MW FEROZ GANDHI UNCHAHAR TPP STAGE IV

TECHNICAL SPECIFICATION

FOR CONTROL VALVES WITH ACCESSORIES

(Pneumatically operated)

JOB NO. 401	TITLE: TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH ACCESSORIES (Pneumatically operated)	DOC. NO. PE-TS-401-145-I801
BHEL	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	DEPT CODE: I

	NAME	SIGN	DATE
DESN	MG		21.07.14
CHD	AT/MK		21.07.14
APPD	BS		21.07.14

NTPC LIMITED

1 X 500 MW FGUTPP STAGE IV

TECHNICAL SPECIFICATION
FOR

CONTROL VALVE

WITH ACCESSORIES

(Pneumatically Operated)

VOLUME II-B & III

SPECIFICATION No: **PE-TS-401-145-I801**

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT DIVISION
NOIDA, INDIA

1.0 The tender document contains three (3) volumes. The bidder shall meet the requirements of all the three volumes.

1.1 **Volume-I (CONDITIONS OF CONTRACT)**

This consists of four parts as below :-

Volume-IA : This part contains instructions to bidders for making bids to BHEL.

Volume-IB : This part contains general commercial conditions of the tender & includes provision that vendor is responsible for the quality of item supplied by their sub-vendors.

Volume-IC : This part contains special conditions of contract.

Volume-ID : This part contains commercial conditions for erection & commissioning site work, as applicable.

1.2 **Volume-II TECHNICAL SPECIFICATIONS**

Technical requirements are stipulated in Volume-II which comprises of :-

Volume-IIA : General Technical Conditions

Volume-IIB : Technical Specification including Drawings, if any.

1.2.1 **Volume-IIB**

This volume is sub-divided into following sections :-

Section-A : This section outlines the scope of enquiry.

Section-B : This section provides "Project Information".

Section-C : This section indicates technical requirements specific to the contract, not covered in Section-D.

Section-D : This section comprises of technical specifications of equipments complete with data sheet A, B and C.

Data Sheet - A specifies data and other requirements pertaining to the Equipment.

Data Sheet - B Specifies data to be filled by the bidder (Data Sheet-B is contained in Volume-III).

Data Sheet - C Indicates data/documents to be furnished after the award of contract as per agreed schedule by the vendor (as applicable).

1.2.2 **Volume-III TECHNICAL SCHEDULES**

This volume contains technical schedules and Data Sheets-B, which are to be duly filled by the bidder and the same shall be furnished with the technical bid as per instructions given in Document No. PE-SS-999-100-Q-002 in Volume-III.

2.0 The requirements mentioned in Section-C / Data Sheets- A of section-D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section-D.

NTPC LIMITED

1 X 500 MW FGUTPP STAGE IV

TECHNICAL SPECIFICATION
FOR

CONTROL VALVE

WITH ACCESSORIES

(Pneumatically Operated)

VOLUME II-B

SPECIFICATION No: **PE-TS-401-145-I801**

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT DIVISION
NOIDA, INDIA

CONTENTS

VOL-II B

SECTION – A

SCOPE OF ENQUIRY

SCOPE OF ENQUIRY

1.0 SCO PE

.1 This sp ecification co vers t he Design, Manufacture, In spection an d T esting at m anufacturer's works, proper packing f or tr ansportation and delivery t o s ite of th e Control V alves with Pneu matic A ctuator along with Ac cessories, Start-up/Commissioning and M andatory S pares a s men tioned i n differen t sections of this specification for **1 X 500 MW FGUTPP, STAGE IV.**

.2 The qu ality plan enclosed for ms the minimum requirement but not limited to b e a dhered to by the bidder.

.3 The e nquiry shall be ope rated in '" **COMPLAINCE MOD E**" means bid der to c omply with t he requirement of specification, quality plan, delivery schedule, quantities, start-up/commissioning spares, mandatory s pares, r ecommended spares e tc, and a s a to ken of a cceptance of the s ame, following formats to be signed, stamped with company seal and submitted for the project.

a) Compli ance certificate
b) Q uality plan
c) Schedule of price, unit prices, inspection schedule
d) Schedule of submission of drawings / documents, equipment manufacture inspection and dispatch

.4 **No separate technical offer, data sheets to be submitted with the bid. Any such document shall not be taken cognizance of, and document (Compliance certificate) at 3 above shall be final and binding. Data sheets shall be furnished by the successful bidder (vendor), only after the award of contract & shall be subject to Purchaser's Approval.**

.5 **Bidder to note that CV test is required to be conducted on one type per size, CV value. Bidder to group such valves and indicates the same along with the price bid. Unpriced portion to be submitted to engineering.**

2.0 GENERAL TECHNICAL INSTRUCTIONS

1 It is no t th e intent her e to specify all the d etails of d esign and manufacture. However, the equipment shall conform in all respects to high s tandard of d esign, engineering and workmanship and s hall be capable of performing th e re quired d uties in a m anner acceptable to the customer / consultant, who will interpret the meaning of drawing and specification and shall be entitled to reject any component or material which in his judgment is not in full accordance herewith.

2 The omis sion of specific r eference to any component / accessory necessary for the pro per performance of the equipments shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.

3 BHEL's / Customer's representatives shall be given access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to them.

4 The Eq uipment covered und er this s pecification shall n ot be dispatched u nless the s ame have been finally inspected, accepted and Material Dispatch Clearance Certificate (MDCC) is issued by BHEL / CUSTOMER.

SECTION – B

PROJECT INFORMATION

1.00.00 BACKGROUND

Feroze Gandhi Unchahar Thermal Power Station, FGUTPS was conceived as a Load Centre coal based Power Station of 1050 MW capacity by UPSEB. The land for the project was acquired and stage-I (2x210MW) was implemented by UPSEB. The 2x210 MW Unchahar station was taken over by NTPC from Uttar Pradesh Rajya Vidyut Utpadan Nigam of Uttar Pradesh in 1992. Thereafter, NTPC implemented Stage- II (2x210 MW) and Stage-III (1X 210 MW).

The present expansion proposal is to install one additional unit of 500 MW under Stage-IV thus making the ultimate capacity of the FGUTPP 1550 MW.

1.01.00 LOCATION AND APPROACH

The plant is located in Raebareli district of Uttar Pradesh, having latitude and longitude of 25°54'50"N and 81°19'50"E respectively. It is bounded by villages Khnapur, Faridpur and Khaliqpur Khurd. Mustafabad town is located at a distance of about 3 Kms from the plant. Unchahar railway station on Allahabad-Raebareli broad gauge (BG) section of Northern Railway (NR) is 2 Kms away. The nearest airport is located at Lucknow a distance of approximately 110 km from the project site.

Vicinity Plan of the project is placed at **Annexure-I**

1.02.00 LAND REQUIREMENT

During the implementation of FGUTPS, Stage-I, II & III total area of about 2203 acres of land was acquired. The plant facilities, ash disposal and township for this expansion Stage-IV (1x500 MW) would be accommodated within the available land with dismantling and relocation of some buildings. No additional land has been envisaged to be acquired for this expansion project.

1.03.00 WATER

As per agreement between NTPC & Irrigation department, 105 Cusec of water is supplied through S.S Canal to NTPC-Unchahar. The Stage-IV (500MW) consumptive water requirement shall be accommodated within the existing commitment of water to FGUTPP. Sharda sahayak canal and Dalmau Pump House (DPH) on Purwa Branch Canal are available sources of water for the project and therefore, the make up water requirement for the plant is proposed to be drawn from these sources.

1.04.00 COAL AVAILABILITY AND TRANSPORTATION

1.04.01 Coal Availability

The coal requirement shall be about 2.7 Million tonnes per year.

The matter has been taken up with Ministry of Coal, Govt. of India for Long Term Coal Linkage for Stage-IV (1x500 MW)..Coal requirement for FGUTPP, Stage-I ,II & III is being met from North Karanpura Coal fields of CCL. For FR purposes, coal from North Karanpura Coal fields of CCL has been considered.

1.04.02 **Coal Transportation**

The envisaged mode of coal transportation from the coal mines to the power plant is by Indian Railways rakes. The rakes shall be unloaded at the track hopper.

1.04.03 **Coal Quality Parameters and Fuel Oil Characteristics**

The Coal quality parameters and Fuel Oil Characteristics are enclosed as **Annexures-II-1 and II-2** to this subsection.

1.05.00 **CAPACITY & POWER EVACUATION**

Stage- I	:	2x210 MW	Under Commercial Operation
Stage-II	:	2x210 MW	Under Commercial Operation
Stage-III	:	1x210 MW	Under Commercial Operation
Stage-IV		1x 500 MW	Present proposal

The existing capacity of plant is 1050 MW Step up/ power evacuation voltage for station is 220 KV. Presently 1000 MW is already being evacuated at 220 KV, addition of another 500 MW at 220 KV may cause overloading of 220 KV systems and lead to increase in fault levels at 220 KV system. Considering this 400 KV has been considered as step-up/power evacuation voltage for Stage-IV. Power Generated from FGUTPP- Stage IV, 500 MW unit would be stepped up to the evacuation voltage level through suitably rated Generator Transformer.

The power generated from Stage-IV is envisaged to be absorbed by Northern Region beneficiaries. For finalisation of Associated Transmission System (ATS) of the project, the matter would be taken up with Power Grid Corporation of India Ltd. (PGCIL)/CEA/appropriate authority depending on the various routes/options of power sale envisaged for the project.

1.06.00 **METEOROLOGICAL DATA**

Important meteorological data from nearest observatory at **Allahabad** is placed at **Annexure - III.**

1.07.00 **PLANT WATER SCHEME**

The Plant water scheme is described below.

1.07.01 **Source of Water**

The source of water for the project is normally from the Allahabad branch canal of the Sharda Sahayak link canal. During the canal closure period, water will be drawn from the Dalmau canal.

1.07.02 **Water Requirement**

Normal Make up water requirement for this project would be about 2000 Cu.M/hr with ash water re-circulation system in operation. However, whenever ash water system needs to be operated in once thru mode, water drawl shall be of the order of 3300 cum/hr.

1.07.03 **Raw Water System**

Raw water shall be drawn from the source by a gravity channel upto raw water pump house located inside the plant. It is envisaged to provide three (3) numbers (3 x 50 % Capacity) of raw water pumps for supplying water to Water PT Plant in the raw water pump house. In addition two (2) numbers (2 x 100% capacity) of pumps shall be provided to supply raw water for ash handling plant which shall be operated as and when required. Separate set of pipelines of carbon steel construction shall be provided from respective raw water pumps to Water treatment plant and Ash Water tanks.

1.07.04 The quality of Raw water and Clarified water is enclosed with this sub-section

1.08.00 **Criteria for Wind Resistant Design of Structures and Equipment**

All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given in Sub-Section- D-01, Part-B, Section-VI, i.e. Technical Specification for Civil and Structural Works.

1.09.00 **Criteria for Earthquake Resistant Design of Structures and Equipment**

All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in Sub-Section- D-01, Part-B, Section-VI, i.e. Technical Specification for Civil and Structural Works.

DESIGN RAW WATER ANALYSIS

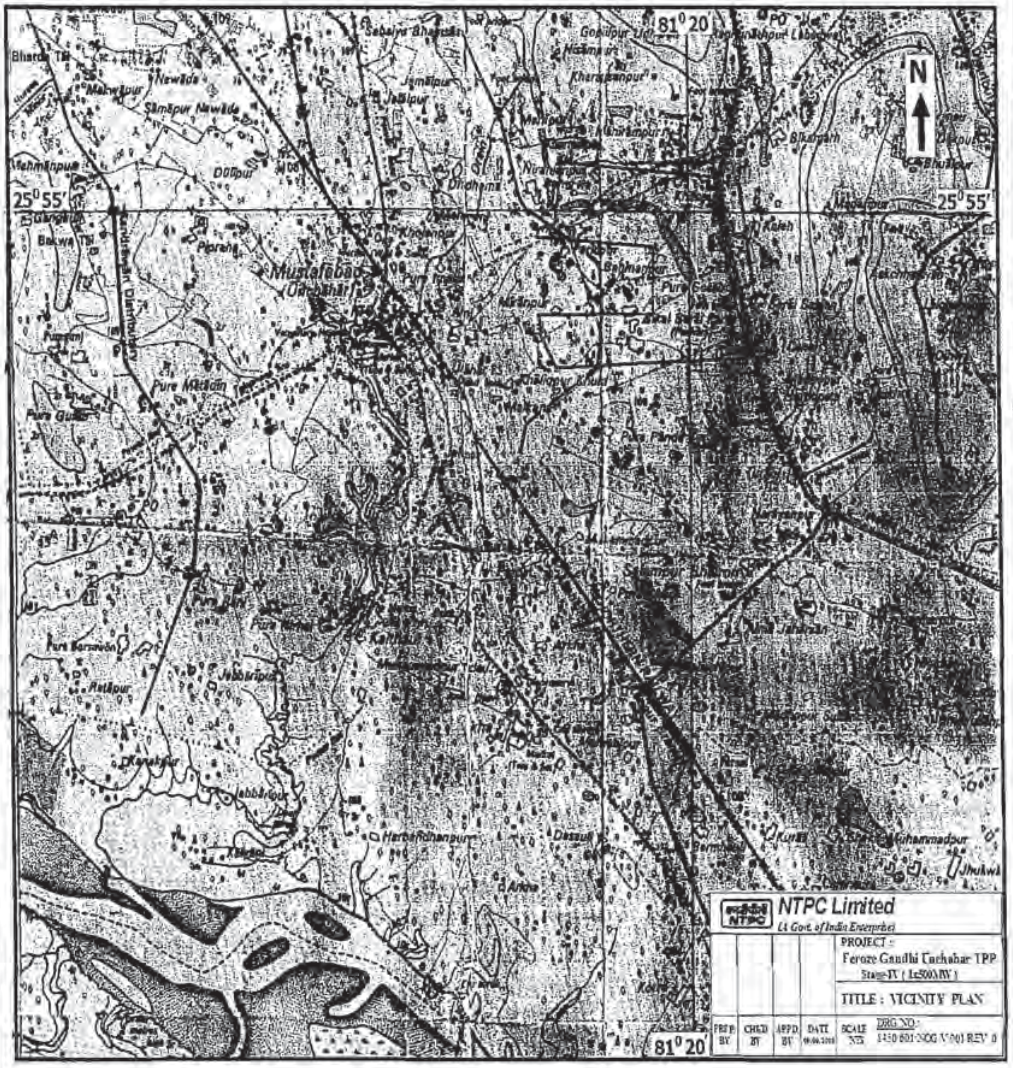
S.No	Constituent	As	mg/l
1	Calcium	CaCo3	110
2	Magnesium	CaCo3	95
3	Sodium+ Potassium	CaCo3	130
4	Total cations	CaCo3	335
5	Bicarbonates	CaCo3	250
6	Chloride	CaCo3	50
7	Sulphate	CaCo3	35
8	Total Anions	CaCo3	335
9	Silica	As SiO2	12
10	Iron	Fe	1
11	pH Value	-	7.7-8.3
12	Turbidity (NTU)	NTU	Upto 700
13	Organic Matter(As per KMnO4 method)	Number	7.2

DESIGN CLARIFIED WATER ANALYSIS FOR DM PLANT

S.No	Constituent	As	mg/l
1	Calcium	CaCo3	135.2
2	Magnesium	CaCo3	95
3	Sodium+ Potassium	CaCo3	130
4	Total cations	CaCo3	360.2
5	Bicarbonates	CaCo3	245.7
6	Chloride	CaCo3	57
7	Sulphate	CaCo3	57.5
8	Total Anions	CaCo3	360.2
9	Silica	As SiO2	12
10	Iron	Fe	0.3
11	pH Value	-	7.0-8.2
12	Turbidity (NTU)	NTU	10

VICINITY PLAN

ANNEXURE- I



ANNEXURE-II-1 (PAGE 1 OF 2)

TABLE – 1 COAL CHARACTERISTICS

Sl. No.	Description	Unit	Range of 95% coal Supplies			Range of Adequacy
			Design Coal	Worst Coal	Best Coal	
1	2	3	4	5	6	7
A.	**PROXIMATE ANALYSIS (As received basis)**					
1.	Total Moisture	%	13.00	15.00	10.00	16 - 9
2.	Ash	%	40.00	45.00	38.00	46 - 37
3.	Volatile matter	%	22.00	19.00	25.00	18 - 26
4.	Fixed carbon	%	25.00	21.00	27.00	20 - 28
B.	**ULTIMATE ANALYSIS (As received basis)**					
1.	Carbon	C%	34.6	30.00	40.39	29-41.39
2.	Hydrogen	H2%	3.1	2.42	3.2	2.32-3.3
3.	Nitrogen	N2%	1.2	0.47	0.63	0.37 – 0.73
4.	Oxygen	O2%	7.31	6.25	7.23	6.15 - 7.33
5.	Sulphur	S%	0.4	0.6	0.36	0.6 - 0.36
6.	Carbonates	CO3%	0.2	0.21	0.1	0.21 - 0.1
7.	Phosphorous	P2%	0.19	0.05	0.09	0.05 - 0.09
8.	Total Moisture	H2O%	13	15	10	15.3 – 9.7
9.	Ash	%	40	45	38	46-37
10.	Total	%	100	100	100	
11.	Gross Calorific Value	KCal/Kg	3400	3000	4000	2800 - 4200
12.	Hard grove index		55	50	60	48 – 62
C.	**ASH ANALYSIS**					
1.	Silica	(SiO2)%	58.58	59.15	58.1	59.15-58.1
2.	Alumina	(Al2O3)%	28.87	28.95	28.2	28.95-28.2
3.	Iron Oxide	(Fe2O3)%	5.5	6.9	4.5	6.9-4.5
4.	Titania	(TiO2)%	1.8	1.1	2.2	1.1 – 2.2

Sl. No.	Description	Unit	Range of 95% coal Supplies			Range of Adequacy
			Design Coal	Worst Coal	Best Coal	
1	2	3	4	5	6	7
5.	Phosphoric Anhydride	(P2O5)%	0.7	0.5	1.2	0.5-1.2
6.	Lime	(CaO)%	1.5	1	2.35	1.0 – 2.35
7.	Magnesia	(MgO)%	1.3	1.1	1.4	1.1-1.4
8.	Sulphuric Anhydride	(SO3)%	0.5	0.4	0.6	0.4 - 0.6
9.	Alkalies (By diff.)	Na2O + K2O%	1.25	0.9	1.45	0.9 – 1.45
D.	**ASH FUSION RANGE (Under reducing atmosphere)**					
a)	Initial Deformation Temperature	(IDT) °C	1100	1100	1100	1100
b)	Hemispherical temperature	°C	1300	1300	1300	1300
c)	Fusion temperature	°C	1400	1400	1400	1400
E.	ASH FUSION RANGE (Under oxidising atmosphere)					
a)	Initial Deformation Temperature	(IDT) °C	1100	1100	1100	1100
b)	Hemispherical temperature	°C	1300	1300	1300	1300
c)	Fusion temperature	°C	1400	1400	1400	1400-1450

ANNEXURE-II-2 (PAGE 1 OF 2)

FUEL OIL CHARACTERISTICS

Sl. No.	Characteristics	Heavy Furnace Oil Grade HV IS-1593-1982	Low Sulphur Heavy Stock (LSHS) IS-11489-1985	Heavy Petroleum Stock (HPS) IS-11489-1985
1.	Total sulphur content	4.5% Max.	1.0% Max.	4.5% Max.
2.	Gross calorific value (KCal/kg)	of the order of 10,000	of the order of 10,000	of the order of 10,000
3.	Flash Point (Min)	66 deg C	66 deg C	72 deg C
4.	Water content by volume (Max)	1.0%	1.0%	1.0%
5.	Sediment by weight (Max)	0.25%	0.25%	0.25%
6.	Asphaltene content by weight (Max.)	2.5%	2.5%	2.5%
7.	Kinematic viscosity in Centistokes at - (Max)	370 at 50deg C	100 at 100deg C	100 at 100deg C
8.	Ash Content by weight (Max.)	0.1%	0.1%	0.1%
9.	Acidity (inorganic)	Nil	Nil	Nil
10.	Pour Point (Max.)	57 deg C	66 deg C	72 deg C
11.	Sodium content	—	—	100 ppm
12.	Vanadium content	25 ppm	25 ppm	25 ppm
13.	Specific heat below pour point (KCal/Kg °C)		0.65	

ANNEXURE-II-2 (PAGE 2 OF 2)

LIGHT DIESEL OIL CHARACTERISTICS

AS PER IS 1460-2000

	Characteristics	LDO
1.	Pour Point (max)	21 °C & 12°C for Summer and Winter respectively
2.	Kinematic viscosity in centistokes at 40 deg.C	2.5 to 15.7
3.	Sediment percent by mass (max)	0.10
4.	Total sulphur percent by mass (max)	1.8
5.	Ash percentage by mass (max)	0.02
6.	Carbon residue (Rans bottom) percent by pass (max.)	1.50
7.	Acidity inorganic	Nil
8.	Flash point (Min.) - Pensky Martens	66 deg.C
9.	Copper strip corrosion for 3 hours at 100°C	Not worse than No. 2
10.	Water content, % by volume (max)	0.25

CLIMATOLOGICAL TABLE

ANNEXURE-III (PAGE 1 OF 2)

जलवायवी सारणी
CLIMATOLOGICAL TABLE

इलाहाबाद / STATION :Allahabad — अक्षांश LAT 25°27' N — देशांतर LONG 81°44' E — समुद्री तल माध्य से ऊँचाई HEIGHT ABOVE M. S. L. 98 मीटर METRES

1951 से 1980 तक के प्रेक्षणों पर आधारित
BASED ON OBSERVATIONS FROM 1951 TO 1980

Month		स्टेशन का सतह दाब STATION LEVEL PRESSURE	शुष्क बल्ब DRY BULB	नम बल्ब WET BULB	दैनिक अधिकतम DAILY MAX	दैनिक न्यूनतम DAILY MIN	माह में उच्चतम HIGHEST IN THE MONTH	माह में निम्नतम LOWEST IN THE MONTH	उच्चतम HIGHEST	दिनांक और वर्ष DATE AND YEAR	निम्नतम LOWEST	दिनांक और वर्ष DATE AND YEAR	सापेक्ष आर्द्रता RELATIVE HUMIDITY	वाष्प दाब VAPOUR PRESSURE	समस्त मेघ ALL CLOUDS	निम्न मेघ LOW CLOUDS	मासिक योग MONTHLY TOTAL	वर्षा के दिनों की संख्या NO. OF RAINY DAYS	वर्षा सहित सबसे नम महीने का योग TOTAL IN WETTEST MONTH WITH YEAR	वर्षा सहित शुष्कतम महीने का योग TOTAL IN DRIEST MONTH WITH YEAR	24 घंटों की सबसे भारी वर्षा HEAVIEST FALL IN 24 HOURS	दिनांक और वर्ष DATE AND YEAR	माध्य पवन गति MEAN WIND SPEED
		AIR TEMPERATURE (वायु तापमान)											HUMIDITY (आर्द्रता)		CLOUD AMOUNT (मेघ की मात्रा)		RAINFALL (वर्षा)						
			MEAN (माध्य)						EXTREMES (चरम)														
		एच. पी. ए. hPa	डि.सें. °C	डि.सें. °C	डि.सें. °C	डि.सें. °C	डि.सें. °C	डि.सें. °C	डि.सें. °C		डि.सें. °C		प्रतिशत %	एच.पी.ए. hPa	आकाश के अष्टमांश Oktas of sky		मि.मि. mm		मि.मि. mm	मि.मि. mm	मि.मि. mm		कि.मी. प्र. घं. Km/h
[illegible]	I	1006.2	12.5	10.6	23.8	8.7	27.9	4.5	31.1	29 1934	2.0	07 1972	78	11.3	2.1	0.7	19.2	1.6	126.0 1900	0.0	70.9	24 1900	3.6
	II	1003.1	20.8	15.0									53	12.7	2.0	0.5							
[illegible]	I	1003.8	16.0	12.5	27.2	11.2	32.4	6.1	36.1	27 1896	1.1	02 1905	66	11.9	1.7	0.6	15.6	1.4	103.9 1929	0.0	51.3	11 1898	4.1
	II	1000.8	24.8	16.5									40	12.1	1.8	0.8							
[illegible]	I	1000.8	23.0	16.0	33.6	16.5	39.0	10.9	42.5	30 1973	7.2	02 1906	46	12.6	1.8	0.4	9.2	0.9	81.0 1944	0.0	35.5	11 1978	4.8
	II	996.9	31.4	18.5									25	10.8	2.0	0.5							
[illegible]	I	996.5	30.2	19.1	39.4	22.5	43.5	17.3	45.1	29 1979	12.7	01 1965	32	13.1	1.5	0.2	6.7	0.5	43.7 1933	0.0	28.8	01 1965	5.9
	II	992.3	37.3	20.5									18	10.6	1.9	0.5							
[illegible]	I	991.8	33.5	22.2	42.3	26.7	45.9	22.5	47.3	28 1950	17.2	11 1924	38	17.4	1.4	0.5	9.9	0.7	62.3 1971	0.0	54.0	18 1971	7.0
	II	987.4	40.1	22.8									20	13.8	1.5	0.6							
[illegible]	I	988.0	32.8	25.3	40.1	28.5	45.2	24.0	48.8	06 1979	19.4	21 1930	55	25.9	3.8	1.4	85.4	4.4	520.5 1916	0.0	176.0	23 1916	8.0
	II	984.2	37.3	25.6									41	23.2	4.2	2.1							
[illegible]	I	988.0	29.2	26.4	34.1	26.4	39.3	23.5	45.6	01 1901	22.0	22 1975	80	32.1	6.4	3.0	300.1	12.8	782.1 1925	20.2 1918	229.4	15 1963	7.4
	II	985.0	31.5	27.0									71	32.0	6.5	3.7							
[illegible]	I	989.7	28.3	26.3	32.7	25.7	38.5	23.6	42.7	03 1972	21.1	23 1953	85	32.5	6.6	3.9	307.6	14.4	914.7 1953	53.3 1883	335.3	20 1953	6.2
	II	986.5	30.2	26.9									77	32.7	6.6	3.8							
[illegible]	I	993.8	28.2	25.5	33.2	24.7	36.2	22.3	39.6	11 1968	18.3	22 1912	80	30.4	4.8	2.8	189.8	8.7	781.5 1970	0.5 1907	266.2	04 1938	5.7
	II	990.6	30.4	26.1									71	30.4	5.0	2.9							
[illegible]	I	1000.0	25.8	21.8	33.1	20.6	35.8	15.8	40.6	03 1896	11.7	31 1898	69	23.1	1.9	0.8	40.1	2.2	576.8 1894	0.0	163.3	04 1894	3.4
	II	996.7	28.7	22.9									55	22.5	2.0	1.0							
[illegible]	I	1004.6	19.8	15.8	29.7	13.8	32.7	9.6	35.9	07 1965	5.6	30 1941	65	15.0	1.3	0.2	11.7	0.5	118.1 1956	0.0	96.0	01 1950	2.4
	II	1001.4	25.2	18.4									49	15.8	1.4	0.3							
[illegible]	I	1006.6	14.0	11.7	24.8	9.3	28.4	5.3	31.1	02 1946	-0.7	26 1961	75	12.1	1.8	0.3	3.4	0.5	68.3 1885	0.0	54.6	11 1886	2.6
	II	1003.5	20.7	15.6									56	13.8	1.7	0.3							
योग [illegible]	I	997.5	24.5	19.4	32.8	19.5	48.1	3.0	48.8		-0.7		64	19.8	2.9	1.3	1017.7	48.6	1935.5	410.5	335.3		5.1
	II	994.0	29.9	21.3									48	19.2	3.1	1.4			1894	1968			
[illegible] YEARS	I	30	30	30	30	30	30	30	100		100		30	30	30	21	29	29	99	98	98		24
	II	30	30	30									30	30	30	21							

CLIMATOLOGICAL TABLE

ANNEXURE-III (PAGE 2 OF 2)

जलवायवी सारणी
CLIMATOLOGICAL TABLE

स्टेशन : इलाहाबाद
STATION : Allahabad

मौसम परिघटना / WEATHER PHENOMENA — के साथ दिनों की संख्या / No. OF DAYS WITH

मास MONTH	वर्षण 0.3 मि.मि. या अधिक PPT 0.3mm or more	ओले HAIL	गर्जन THUNDER	कुहरा FOG	धूल भरी आंधी DUST STORM	चंड वात SQUALL
जनवरी JAN	3.0	0.2	1.3	4.5	0.1	0.1
फरवरी FEB	2.8	0.1	2.3	1.3	0.0	0.2
मार्च MAR	1.7	0.0	2.9	0.1	0.4	0.7
अप्रैल APR	1.0	0.1	2.3	0.0	0.9	0.4
मई MAY	1.3	0.0	2.7	0.0	1.5	0.5
जून JUN	6.5	0.0	8.0	0.0	2.7	1.1
जुलाई JUL	16.8	0.0	12.0	0.0	0.2	0.4
अगस्त AUG	18.2	0.0	12.0	0.0	0.5	0.4
सितम्बर SEP	11.5	0.0	8.4	0.1	0.0	0.6
अक्तूबर OCT	3.5	0.0	2.7	0.4	0.1	0.2
नवम्बर NOV	0.8	0.0	0.2	0.4	0.0	0.0
दिसम्बर DEC	0.9	0.0	0.4	3.7	0.0	0.0
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	68.0	0.4	55.2	10.5	6.4	4.6
वर्षों की सं। NUMBER OF YEARS	26					

पवन / WIND

No. OF DAYS WITH WIND SPEED (Km. p. h.) — पवन की गति के साथ दिनों की संख्या (कि. मी. प्र. घं.); PERCENTAGE No. OF DAYS WIND FROM — पवन की दिशा के दिनों की संख्या का प्रतिशत

MONTH		62 or more	20-61	1-19	0	N	NE	E	SE	S	SW	W	NW	CALM
जनवरी JAN	I	0	0	19	12	2	5	6	4	5	16	25	3	31
	II	0	0	18	13	6	11	6	2	0	1	21	16	35
फरवरी FEB	I	0	0	19	9	4	4	6	4	4	18	29	5	26
	II	0	1	22	5	9	9	5	1	2	2	31	25	16
मार्च MAR	I	0	1	25	5	4	4	8	5	8	19	30	7	15
	II	0	2	26	3	12	6	3	1	1	2	29	30	6
अप्रैल APR	I	0	2	24	4	2	5	10	6	6	16	32	10	11
	II	0	4	24	2	13	8	3	1	1	2	26	45	2
मई MAY	I	0	2	24	5	5	10	19	5	6	9	27	9	11
	II	0	3	26	2	16	15	5	1	2	3	16	38	2
जून JUN	I	0	4	23	3	3	11	21	6	5	12	25	9	6
	II	0	5	24	1	12	19	14	3	3	6	18	21	4
जुलाई JUL	I	0	3	25	3	2	8	23	6	10	17	21	4	9
	II	0	2	25	4	5	12	18	6	8	13	20	8	10
अगस्त AUG	I	0	2	25	4	2	9	23	7	7	12	19	6	15
	II	0	1	25	5	7	14	17	4	5	9	23	8	13
सितम्बर SEP	I	0	2	24	4	4	9	20	6	6	11	23	7	14
	II	0	1	22	7	10	13	18	3	2	6	17	15	18
अक्तूबर OCT	I	0	0	20	11	3	7	10	6	6	10	20	8	32
	II	0	1	14	16	11	9	7	1	0	2	7	14	49
नवम्बर NOV	I	0	0	15	15	2	3	3	3	3	11	28	5	42
	II	0	0	10	20	9	4	2	0	0	0	8	12	65
दिसम्बर DEC	I	0	0	17	14	1	2	5	2	3	13	29	3	42
	II	0	0	10	21	6	6	4	0	0	0	12	9	63
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	0	16	260	89	3	6	13	5	6	14	28	8	21
	II	0	20	246	99	10	11	8	2	2	4	18	21	23
वर्षों की सं। NUMBER OF YEARS	I	24				30								
	II	24				30								

मेघ / CLOUD and दृश्यता / VISIBILITY

No. OF DAYS WITH CLOUD AMOUNT (ALL CLOUDS) OKTAS — मेघ मात्रा (सभी मेघ) सहित दिनों की संख्या – अष्टमांश; No. OF DAYS WITH LOW CLOUD AMOUNT OKTAS — निम्न स्तरी मेघ मात्रा सहित दिनों की संख्या – अष्टमांश; No. OF DAYS WITH VISIBILITY — दृश्यता सहित दिनों की संख्या

MONTH		All 0	All T-2	All 3-5	All 6-7	All 8	Low 0	Low T-2	Low 3-5	Low 6-7	Low 8	FOG 8	UP TO 1 Km	1-4 Kms	4-10 Kms	10-20 Kms	OVER 20 Kms
जनवरी JAN	I	16	5	4	3	3	25	2	2	1	1	0	1.8	12.7	14.8	0.5	1.2
	II	15	7	4	4	1	24	4	2	1	0	0	0.1	2.0	26.9	2.0	0.0
फरवरी FEB	I	16	4	4	3	1	23	2	2	1	0	0	0.9	6.3	20.7	0.4	0.0
	II	15	5	4	3	1	22	3	2	1	0	0	0.0	1.3	20.3	5.2	1.2
मार्च MAR	I	16	6	5	3	1	26	3	2	0	0	0	0.0	2.0	27.0	2.0	0.0
	II	14	6	5	5	1	25	4	2	0	0	0	0.0	1.3	21.0	8.7	0.0
अप्रैल APR	I	16	5	4	3	0	27	2	1	0	0	0	0.0	3.0	24.7	2.3	0.0
	II	15	6	5	3	1	23	5	2	0	0	0	0.0	1.9	22.5	5.0	0.6
मई MAY	I	18	6	4	3	0	26	3	2	0	0	0	0.0	3.7	22.5	3.6	1.2
	II	9	10	6	4	2	20	6	5	0	0	0	0.1	3.6	23.8	3.5	0.0
जून JUN	I	7	5	7	7	4	15	7	5	2	1	0	0.1	2.2	24.7	3.0	0.0
	II	0	4	10	11	5	10	5	10	1	0	0	0.3	3.1	23.1	3.5	0.0
जुलाई JUL	I	0	2	6	13	11	5	7	11	7	1	0	0.0	0.9	24.5	5.6	0.0
	II	0	1	5	16	9	1	7	17	5	1	0	0.2	1.8	22.1	6.9	0.0
अगस्त AUG	I	0	1	4	15	11	4	5	12	9	1	0	0.0	1.3	23.1	0.4	0.2
	II	1	0	5	16	9	1	7	17	5	1	0	0.0	0.9	19.6	10.4	0.1
सितम्बर SEP	I	4	4	6	10	6	9	6	8	6	1	0	0.0	0.8	21.7	7.3	0.2
	II	2	4	8	11	5	3	10	12	4	1	0	0.0	0.8	17.5	10.6	1.1
अक्तूबर OCT	I	16	6	4	3	2	24	3	3	1	0	0	0.0	1.2	23.7	6.1	0.0
	II	12	9	5	3	2	16	10	4	1	0	0	0.0	0.2	21.2	8.9	0.7
नवम्बर NOV	I	19	5	3	2	1	28	1	1	0	0	0	0.0	7.6	21.5	0.9	0.0
	II	17	7	3	2	1	27	2	1	0	0	0	0.0	1.3	26.5	2.2	0.0
दिसम्बर DEC	I	19	5	3	3	1	29	1	1	0	0	0	1.3	15.7	13.9	0.1	0.0
	II	16	7	4	3	1	28	2	1	0	0	0	0.0	2.8	25.9	2.2	0.0
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	149	54	53	68	41	241	42	50	27	5	0	3.8	57.4	262.8	38.2	2.6
	II	116	86	54	61	38	200	69	75	18	3	0	0.7	21.1	270.4	69.1	3.7
वर्षों की सं। NUMBER OF YEARS	I	27					27						27				
	II	27					27						27				

34

SECTION – C

SPECIFIC TECHNICAL REQUIREMENTS

CONTENTS

VOL-II B
(SECTION-C)

SPECIFIC TECHNICAL REQUIREMENTS

The requirements in this section are specific for this project and shall over-ride the specification under section-D in case of any contradiction.

1. **All the formats in Volume-III, SCHEDULE OF SUBMISSION OF DRG./DOC. and QUALITY PLAN (BHEL Format) should filled-up and furnished with the bid, complete in all respect. In the absence of those, the bid would be considered incomplete and liable for rejection.** Catalogue, Leaflets related with the models of Control Valves as well as each Accessory must be furnished with the offer.

2. The Hook-up diagram for Control valve, attached in Section-C. the scope demarcation as indicated should be adhered. The connection details at Instrument Air valve shall be furnished to successful bidder after the award of contract.

3. Valve Body Sizes shall be quoted to take care of the specification requirements like parameters, and limitations of Fluid outlet velocities, Noise Level etc. **However Port (Trim) Sizes shall be selected to suit CV requirement for achieving percentage valve lift as per Technical Specification.**

4. Bidder to note that, **wherever downstream side of the valve is subjected to the Vacuum service, bidder to offer double Gland packing, and in that case, flow direction of working fluid shall be to close the valve**. Separate indication for the same has not been made in the data sheets-A.

5. For valves subjected to cavitation service, anti-cavitation trim shall be provided.

6. In case during erection/commissioning of the control valve, any spares are required which have not been specified in the Start-up/commissioning spares list, the same will have to be supplied by the bidder free of cost

7. Facility to adjust the maximum travel of the stem & starting point of travel shall be incorporated.

8. SS nameplate to control valve shall include Tag no./ KKS no./ Sl. No./ Body material/ size/ Press Rating/ Trim material/ Trim type/ action on air failure/ diaphragm air press at full open and close condition

9. Hand wheel shall have open/ close direction.

10. Limit switch shall be designed for 1,00,000 operations.

11. JB shall be 36 ways as per enclosed hook-up diagram.

12. The material of filter for Air Filter Regulator shall be Sintered bronze.

13. Bidder to indicate pick-up & drop out voltage for all solenoid valves.

14. Protection class for Limit switches, I/P converter and Position transmitter shall be IP-65 only.

15. All JBs and valves shall be with double compression type Ni plated brass cable glands.

16. Solenoid valve class of protection shall be IP-65.

17. All local cabling upto JBs shall be in Conduit (Flexible/Rigid).

18. The smart positioner provided with Control Valves shall be compatible with Universal Hart Calibrator.

19. In order to interface with METSO system , the smart positioner of Control Valves has to be HART Compatible. Vendor to provide DTM(devise type manager) / DTD(device type description) files for engineering.

20. Positioner shall have both fail freeze and fail safe feature.

21. SPARES: The following spares are required to be offered

(A) Mandatory Spares:

The items listed in list of mandatory spares attached at section-D, of this specification, are the essential spares required to be offered by the bidder, and the price for which (Lump sum as well as individual) for each item to be quoted separately under the separate heading. The format for price schedule to be filled-up by the bidder is enclosed in Volume-III

The prices for Mandatory spares indicated by the bidder shall be used for bid evaluation purposes.

Each Case / Container containing Mandatory spares shall be clearly marked or labelled on the outside with the description of the spares contained in it. When more than one items of spare parts are packed in a single Case / Carton, a general description of the contents shall be shown outside of such case, and detailed list enclosed. All Cases, Containers and Packages must be suitably marked and numbered for the purpose of identification.

(B) Recommended Spares:

In addition to the Mandatory spares mentioned, the bidder shall also furnish a List of Recommended spares for 3 years of normal operation of the Control valves / Accessories. The BHEL/Customer reserves the right to buy any or all of the recommended spares.

The prices of these spares will remain valid for a period of minimum 6 months after the placement of order.

(C) Start-up & Commissioning Spares:

Start-up and Commissioning spares are those spares, which may be required during the start-up and commissioning of the Control Valves. All start-up spares, which are supplied under this contract, shall be strictly interchangeable with the parts for which they are intended for replacements. The format for price schedule to be filled-up by the bidder is

enclosed in Volume-III

The Start-up and commissioning spares indicated by the bidder shall be a part of the main Control valves supply. However bidder to indicate prices separately. The list of these spares required is enclosed in the section-D of this specification.

Bidder to indicate the service life expectancy period for the spare parts under normal working conditions. The spares shall be treated and packed for long storage, under climatic conditions prevailing at site. Small items shall be packed in sealed transparent plastic bags with desiccator's packs as necessary.

20. Documentation:

(A) Along with the bids: following documents for the project

a) Signed and stamped compliance certificates in attached format(VOL.-III).

b) "Schedule of prices" and "Schedule of unit Prices" in attached format (VOL.-III).

c) Schedule of submission of Drg. / Doc, Equip. Manufacture, Inspection and Dispatch.

d) Inspection schedule

e) Quality Plan Duly signed and Stamped

(B) After the award of contract:

The documentation as listed below for the project
6 sets of the following documents + 3 sets of CDs to be enclosed with the bids for Approval:

a. Assembly (dimensional) drawings.

b. Valve Edge preparation details.

c. Data sheet-C completely filled-up.

d. Hook-up diagram of Control Valve with Actuator & Accessories.

e. Valve & Actuator assembly dimensional drawings with weights.

f. Quality Plan duly signed and stamped.

g. All calculations like CV, Noise Level, Valve Outlet Velocity, Actuator sizing etc.

h. All relevant catalogues for the models of the valves as well as accessories finalised.

i. Bar chart to indicate the time schedule for procurement, manufacture, testing and dispatch.

(B) Final documentation:

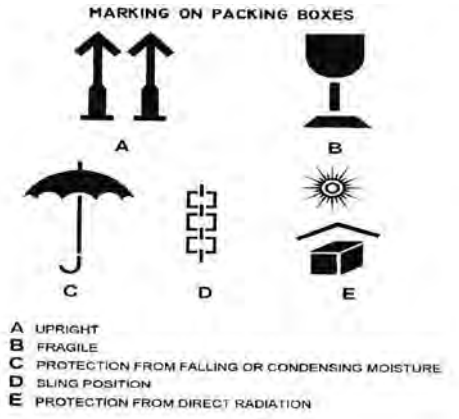
The documentation as listed below will separate for respective projects

1. Category –I & IV Approved final drawings/data sheets, – 20 sets with 4 CD-ROMS
   Valve sizing calculations, Noise level calculations and
   Valve Outlet Velocity calculations.
2. Test certificates – 20 sets.
3. Operation & Maintenance Manuals for Control Valve, Actuator and all the Accessories. – 20 sets with 4 CD-ROMS

The sub vendor for the following items shall be as follows
1. Copper Tubing/ Brass connectors : Main contractor approved sources.
2. HHC : Main contractor approved sources.
3. AFR : Shavo Norgen- Mumbai
   Placka - Chennai
   Fair Child - USA
   SMC Pneumatics - NOIDA

Guidelines for Packing

- ✓ After inspection of control valves assembly. Smart Positioner along with Pressure Gauge shall be disassembled & packed separately.
- ✓ Threaded connection of Smart Positioner & Pressure Gauge shall be shipped with the end caps fitted to avoid any damage.
- ✓ Instructions with sketch for mounting the Smart Positioner & Pressure Gauge shall be sent along with the aforesaid accessories.
- ✓ Packing of the control valves and Smart Positioner along with Pressure Gauge shall be done in separate wooden boxes/cases in order to avoid damage during transit and also during storage at site in tropical climatic conditions for a period of 18-24 months.
- ✓ All valves & smart positioner along with pressure gauges shall be packed properly with quality wooden planks with proper wooden frame support. Moreover the valves are internally covered with polythene sheets to protect from the water and moisture entry.
- ✓ Stronger shock absorbing cover material like expanded Polyurethane which can take any direct impact on it shall be used for packing
- ✓ Proper reaper support to be provided in the packing and Valve assembly to be aligned properly to avoid the damage of accessories during transit due to vibration effect.
- ✓ Marking for Fragile & Condensing environment shall be done on the packing box.



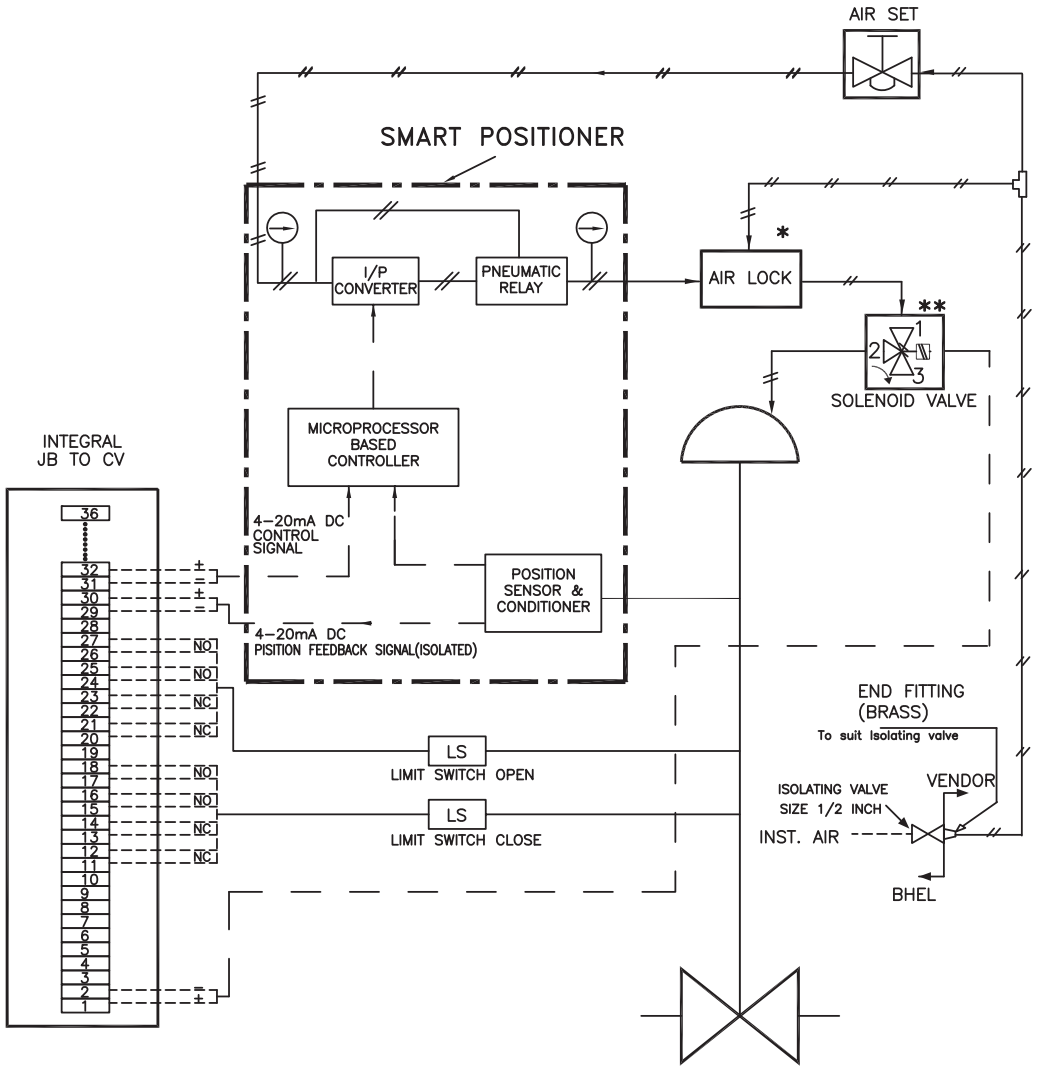
<u>The Following Details are to be marked on the Packing Cases</u>

- ✓ Address of consignee
- ✓ Purchase order no.
- ✓ Description of items or title of packing list
- ✓ Weight
- ✓ Dimension of the Box
- ✓ Marking showing upright position
- ✓ Marking showing sling position
- ✓ Marking showing umbrella (i.e. for machines/components to be stored under covered storage)

TITLE

CONTROL VALVE HOOK-UP DIAGRAM WITH SMART POSITIONER

1 X 500 MW FGUTPP



NOTE:-

1. SOLENOID VALVE WILL BE PROVIDED ONLY FOR ON/OFF DUTY VAVLVES & FOR CONTROL VALVES WHERE OPEN/CLOSE INTERLOCK IS REQUIRED AND INDICATED IN RESPECTIVE DATA SHEETS.
2. SOLENOID VALVES PORT CONDITION:
   PORT 1 & 2 SHAL BE CONNECTED UNDER DE-ENERGISED CONDITION.
   PORT 2 & 3 SHAL BE CONNECTED UNDER ENERGISED CONDITION.
3. FOR ON/OFF DUTY PNEUMATIC CONTROL VALVE,SMART POSITIONER SHALL NOT BE APPLICABLE.
4. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE.
5. 15 METERS 1/4 " PVC COATED COPPER TUBING AND 1 SET OF FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VALVE AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END.
6. VOLUME BOOSTER IF REQUIRED SHALL BE PROVIDED.

** APPLICABLE TO VALVES WHERE OPEN/CLOSE ACTION REQUIRED ON INTERLOCK CONDITION

* APPLICABLE AS PER REQUIRED VALVE POSITION IN DATA SHEETS ON SIGNAL AIR FAILURE & Valve Position Electric Signal Failure (4-20mA).

CUSTOMER SPECIFICATION

SUB – SECTION

CONTROL VALVES, ACTUATORS & ACCESSORIES

TECHNICAL SPECIFICATION
SECTION - VI PART-B

CONTROL VALVES AND ACTUATORS

1.00.00 CONTROL VALVES, ACTUATORS & ACCESSORIES

1.01.00 **General Requirements**

1.01.01 The control valves and accessories equipment furnished by the Bidder shall be designed, constructed and tested in accordance with the latest applicable requirements of code for pressure piping ANSI B 31.1, the ASME Boiler & pressure vessel code, Indian Boiler Regulation (IBR), ISA, and other standards specified elsewhere as well as in accordance with all applicable requirements of the "Federal Occupational Safety and Health Standards, USA" or acceptable equal standards. All the Control Valves, their actuators and accessories to be furnished under this Sub-section will be fully suitable and compatible with the modulating loops covered under the Specification.

1.01.02 All the control valves and accessories offered by the Bidder shall be from reputed, experienced manufacturers of specified type and range of valves.

1.01.03 This specification does not cover special type of control valves such as combined pressure and temperature control valve for Aux PRDS applications, Separator Drain Control Valves etc.

1.02.00 **CONTROL VALVE SIZING & CONSTRUCTION**

1.02.01 The design of all valve bodies shall meet the specification requirements and shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.

1.02.02 The valve sizing shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel. All the valves shall be capable of handling at least 120% of the required maximum flow. Further, the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50% of the total valve stem travel. The sizing shall be in accordance with the latest edition of ISA handbook on control valves. While deciding the size of valves, Bidder shall ensure that valves trim exit outlet velocity as defined in ISA handbook does not exceed 8 m/sec for liquid services, 150 m/sec. for steam services and 50% of sonic velocity for flashing services. Bidder shall furnish the sizing calculations clearly indicating the outlet velocity achieved with the valve size selected by him as well as noise calculations, which will be subject to Employer's approval during detailed engineering.

1.02.03 Control valves for steam and water applications shall be designed to prevent cavitation, wire drawing, flashing on the downstream side of valve and down stream piping. Thus for cavitation/flashing service, only valve with anti cavitation trim shall

	be provided. Detailed calculations to establish whether cavitation will occur or not for any given application shall be furnished.
1.02.04	Control valves for application such as HP/LP heater Emergency level control, Emergency Make-up to Condenser hotwell, GSC minimum flow, Deaerator Drain to condenser hotwell, condensate spill to condensate reserve tank, condenser normal make-up and valve gland sealing supplying pressure control, CEPS minimum flow control, BFP recirculation control valve shall have permissible leakage rate as per leakage Class V. All other control valve shall have leakage rate as per leakage Class-IV.
1.02.05	The control valve induced noise shall be limited to 85 dBA at 1 meter from the valve surface under actual operating conditions. The noise abatement shall be achieved by valve body and trim design and not by use of silencers.
2.00.00	**VALVE CONSTRUCTION**
2.01.00	All valves shall be of globe body design & straightaway pattern with single or double port, unless other wise specified or recommended by the manufacturer to be of angle body type. Rotary valve may alternatively be offered when pressure and pressure drops permit.
2.02.00	Valves with high lift cage guided plugs & quick-change trims shall be supplied.
2.03.00	Cast Iron valves are not acceptable.
2.04.00	Bonnet joints for all control valves shall be of the flanged and bolted type or other construction acceptable to the Employer. Bonnet joints of the internal threaded or union type will not be acceptable.
2.05.00	Plug shall be of one-piece construction cast, forged or machined from solid bar stock. Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems.
2.06.00	All valves connected to vacuum on down stream side shall be provided with packing suitable for vacuum applications (e.g. double vee type chevron packing)
2.07.00	Valve characteristic shall match with the process characteristics.
2.08.00	Extension bonnets shall be provided when the maximum temperature of flowing fluid is greater than 280 deg. C.
2.09.00	Flanged valves shall be rated at no less then ANSI press class of 300 lbs.

3.00.00 VALVE MATERIALS

Sr. No.	Service	Body material	Trim Material
1	Non-corrosive, non-flashing and non-cavitation service except DM service	Carbon steel ASTM-A216 Gr. WCB for fluid temperature below 275 Deg. C Alloy steel ASTM-A217Gr. WC9 for fluid temperature above 275 Deg. C	316SS stellited with stellited faced guide posts and bushings.
2.	Severe flashing/cavitation services	Alloy steel ASTM-A217 Gr. WC9	440 C
3.	Low flashing/cavitation service	Alloy steel ASTM-A217 Gr. WC6	17-4 PH SS
4.	DM water service	316 SS	316 SS

NOTE Valve body rating shall meet the process pressure and temperature requirement as per ANSI B16.34.

However, Bidder may offer valves with body and trim materials better than specified materials and in such cases Bidder shall furnish the comparison of properties including cavitation resistance, hardness, tensile strength, strain energy, corrosion resistance and erosion resistance etc. of the offered material vis-a-vis the specified material for Employer's consideration and approval.

4.00.00 END PREPARATION

Valve body ends shall be either butt welded/socket welded, flanged (Rubber lined for condensate service) or screwed as finalised during detailed engineering and as per Employer's approval. The welded ends wherever required shall be butt welded type as per ANSI B 16.25 for control valves of sizes 65 mm and above. For valves size 50 mm and below welded ends shall be socket welded as per ANSI B 16.11. Flanged ends wherever required shall be of ANSI pressure-temperature class equal to or greater than that of the control valve body.

5.00.00 VALVE ACTUATORS

All control valves shall be furnished with pneumatic actuators. The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60 deg.C continuously.

Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 Kg/sq.cm. per linear millimeter of seating surface, shall be provided in the selection of the actuator to ensure tight seating unless otherwise specified.

The travel time of the pneumatic actuators shall not exceed 10 seconds.

6.00.00 CONTROL VALVE ACCESSORY DEVICES

6.01.00 All pneumatic actuated control valve accessories such as air locks, hand wheels/hand-jacks, limit switches, microprocessor based electronic Positioner, diffusers, external volume chambers, position transmitters (capacitance or resistance type only), reversible pilot for Positioner, tubing and air sets, solenoid valves and junction boxes etc. shall be provided as per the requirements.

7.00.00 SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER

Electrical	Input Signal	4-20 mA
	Power Supply	Loop Powered from the output card of Control System.
	Hart Protocol	Compatibility For Remote Calibration & Diagnostics (Super-Imposed HART signal on Input Signal 4-20 mA)
	Valve Position Sensing	Position Sensing (Non Contact-Type), 4-20 mA O/P Signal For Control System to be provided
Environment	Operating Temp	(-)30 To 80 Deg. C
	Humidity	0-95 %
	Protection Class	IP-65 Minimum
Remote Configuration and Diagnostics	a. The following functions shall be provided in the positioner: Remote Configuration, Calibration and Testing of the Actuator and advanced Diagnostic Features Like Stroke Counter or	

	Travel Counter, Leakage In Actuators, On Line Partial Closure Test, Valve Signature Analysis, Step Response Test, Valve Friction/ Jamming Detection etc. (See Note* below) b. Factory Valve Signature Tests Reports (Pr Vs Valve Travel And Travel Vs I/P Signal) are to be provided.		
Tests Certificates	Test certificates as per Manufacturer Standard/Relevant Standard are to be submitted		
Configuration/	Remote Calibration, Auto & Manual Calibration Shall Be Possible		
Operating	Operating Range	Full Range & Split Range Signal Range	
Modes	Valve Action	Direct & Reverse. Valve Action	
	Flow Characterisation	Possible To Fit Valve Characteristic Curve Linear & Equal Percentage	
Fail Safe/Fail Freeze	Fail Safe/Fail Freeze Feature is to Be Provided.		
Pneumatic	Air Capacity	Sufficient To Handle The Valves Selected/Boosters To Be Supplied If required.	
	Air Supply Pressure	To Suit The Air Supply Pressure/Quality Available.	
	Process Connection	1/4 Inch NPT	
Performance	Characteristic Deviation	<=0.5 % Of Span	
	Ambient Temp Effect	<=0.01 %/Deg C Or Better	
EMC & CE Compliance	Required To International Standard Like EN/IEC.	En50081-2 & En50082 Or Equivalent	
Accessories	In Built Operator Panel	Display With Push Buttons For Configuration And Display On The Positioner Itself (Password Protected/Hardware Lock)	
	Hand Held Hart Calibrator	Universal Hart Calibrator To Be Provided, One Per Unit	

	Press Gauge Block	For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As On Required Basis For Making System Complete.
	Electrical Cable Entry	1/2-Npt,Side Or Bottom Entry To Avoid Water Ingress
	Valves Mounting Assembly	For Sliding Stem/Rotary/Single Acting/Double Acting On Required Basis

*** Note**:

Employer is providing a centralized HART management system including the HART multiplexing/interfacing system. The HART signals shall be picked up from marshalling terminals of DDCMIS (SG/TG DDCMIS as well as BOP DDCMIS), as applicable. The details of the above mentioned employer's HART management system are as below:

The following functionalities are provided through software of the HART management system:

1. For electronic transmitters, temperature transmitters and analysers:
   a. Constant scanning to monitor faults or changes to instrument configuration.
   b. Employer-defined and standard calibration and configuration procedures for all transmitters.
   c. Constant signal data collection facilities to maintain continuously updated records.
   d. Automatic tracking of configuration changes made in the field, such as may be introduced by hand-held communicator. All configuration function associated with hand-held communicators shall be available in the system.
   e. Event and log reports on screen as well as on printer.
   f. Any addition/deletion of transmitter will be reported on printer and logged in hard disk.

Above functionalities are achieved by the Employer's HART management system by providing industry standard softwares.

Further, the positioners shall be monitored from the above described HART management system. To achieve this, Bidder shall provide the necessary software to achieve the functionalities described above under "Remote Configuration and

	Diagnostics", and this software shall be loaded in the Employer's HART management system. Bidder has to list out in his bid the softwares that are compatible with his electronic positioners.
8.00.00	**TEST AND EXAMINATION** All valves shall be tested in accordance with the quality assurance programme agreed between the Employer and Contractor, which shall meet the requirements of IBR and other applicable codes mentioned elsewhere in the specifications. The tests shall include but not be limited to the following:
8.01.00	Non Destructive Test as per ANSI B-16.34.
8.02.00	Hydrostatic shell test in accordance with ANSI B 16.34 prior to seat leakage test.
8.03.00	Valve closure test and seat leakage test in accordance with ANSI-B 16.34 and as per the leakage class indicated above.
8.04.00	Functional Test: The fully assembled valves including actuators control devices and accessories shall be functionally tested to demonstrate times from open to close position. CV Test: Please refer Sub-section-IV:I10. (Type test requirements).
8.05.00	CONTROL VALVE QUANTITIES Bidder shall furnish all the control valves under this main plant package as finalised during detailed engineering stage without any price repercussions whatsoever depending on the process requirements. All the control valves provided by the Bidder for this project shall meet the specifications requirements specified herein. Specification for control valves in this Sub-section has to be read in conjunction with other relevant Sub-sections of this specification.

CLAUSE NO.	TECHNICAL REQUIREMENTS
13.00.00	**TYPE TESTS**
13.01.01	The contractor shall carry out the type tests as listed in the "TYPE TEST(S) TO BE CONDUCTED" on the equipment mentioned therein. The Bidder shall indicate the charges for each of these type tests separately in the relevant schedule of BPS and the same shall be considered for the evaluation of the Bids. The type test charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the Owner's Engineer.
13.01.02	The type tests shall be carried out in presence of the Owner's representative, for which minimum 15 days notice shall be given by the Contractor. The Contractor shall obtain the Owner's approval for the type test procedure before conducting the type test. The type test procedure shall clearly specify the test set-up, instruments to be used, procedure, acceptance norms, recording of different parameters, interval of recording, precautions to be taken etc. for the type test(s) to be carried out.
13.01.03	Irrespective of the requirement of conducting the type tests under this contract, the Contractor shall submit the reports of the type tests listed in the "TYPE TEST(S) TO BE CONDUCTED" and carried out within last five years from the date of bid opening. These reports should be for the tests conducted on the equipment same (model / type / size / rating) to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. The Owner reserves the right to waive conducting of any or all of the specified type tests under this contract, in which case the type test charges shall not be payable for the type tests waived by the Owner.
13.01.04	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
14.00.00	**PAINTING** a) All un-insulated equipments, pipes, valves etc covered in this sub-section shall be painted with paint not inferior to Epoxy resin based paints with minimum DFT of 150 micron. The paint shall be applied in three stages i.e primer, intermediate and finish coats in following manner. - Primer coat -Epoxy based Zinc phosphate - Intermediate- Epoxy based TiO2 pigmented coat - Finish Coat- Epoxy based Finish coat. b) Equipment, pipes etc with high temperature shall be painted with Heat Resistant Aluminium Paint (to be selected based on the service condition of component as per IS-13183). Two coats of paint shall be applied with total DFT 40 microns. c) Surface Preparation before painting shall be carried out according to requirement indicated in Sub Section A-9 (Power Cycle Piping) of Part-B and international standard.

APPLICABLE FOR 1 X 500 MW FGUTPP, STAGE IV

(e.) Each unit shall be provided with a skid of hydrazine & ammonia dosing comprising of metering pumps (2x100%), strainer (2x100%), piping, valves, instrumentation etc. for both normal operation dosing as well as dosing required for wet laying of boiler The capacity of tanks and parameters of pumps given are indicative & minimum. Final parameters shall be as per system requirements.

Note: Capacity of various tanks and pumps are tentative. It is contractor's responsibility to design/size these tanks and pumps depending upon system requirement/design and submit the same to Employer for approval

15.01.00 Control and Instrumentation Requirements

(a.) The bidder shall supply all necessary Instrumentation for satisfactory operation of dosing system. The control of the system shall be through BOP C&I part of DDCMIS under Employer's scope.

(b.) The bidder shall supply all field instruments, devices as per the approved schemes as a minimum. These field instruments should confirm to requirements specified in the control and instrumentation section of this volume.

(c.) It is intended to control dosing system from BOP C&I part of DDCMIS (under Employer's scope), including ON/OFF command of individual pumps. However Bidder shall provide local prewired control panel complete with i) Start/stop push buttons ii) Indicating lamps iii) Local/Remote selection iv) Stroke position indicator v) Rise/Lower push buttons for sroke position vi) Local LED based annunciation driven by BOP C&I part of DDCMIS (under Employer's scope) vii) Stroke position indicator on the panel.

(d.) The normal mode of operation of dosing system shall be through BOP C&I part of DDCMIS (under Employer's scope). Local/Remote selection is to be done from Remote (CR) and indication for the same is to be provided on local panel.

(e.) The ON/OFF commands for individual pumps from local push buttons shall act on the respective drives through BOP C&I part of DDCMIS (under Employer's scope).

15.02.00 The stroke position and adjustment will be done by 4-20 mA D.C. signal from BOP C&I part of DDCMIS (under Employer's scope) and the pumps stroke actuation should be suitable for accepting 4-20 mA D.C. signal. The pumps are to be provided with 24 V DC, two wire LVDT type position feed back transmitter which will generate 4-20 mA signal indicating stroke position

16.00.00 SPECIFICATION FOR SURFACE PREPARATION & PAINTING

16.01.00 Surface preparation methods and paint/primer materials shall be of the type specified herein. If the contractor desires to use any paint/primer materials other than that specified, specific approval shall be obtained by the contractor in writing from the employer for using the substitute material.

CLAUSE NO.	TECHNICAL REQUIREMENTS
16.02.00	All paints shall be delivered to job site in manufacturers sealed containers. Each container shall be labelled by the manufacturer with the manuacturer's name, type of paint, batch number and colour.
16.03.00	Unless specified otherwise, paint shall not be applied to surfaces of insulation, surfaces of stainless steel/nickel/ copper/brass/ monel/ aluminum/ hastelloy/lead/ galvanized steel items, valve stem, pump rods, shafts, gauges, bearing and contact surfaces, lined or clad surfaces.
16.04.00	All pipelines shall be Colour coded for identification as per the NTPC Colour-coding scheme, which will be furnished to the contractor during detailed engineering..
16.05.00	**SURFACE PREPARATION**
16.05.01	All surfaces to be painted shall be thoroughly cleaned of oil, grease and other foreign matter. Surfaces shall be free of moisture and contamination from chemicals and solvents.
16.05.02	The following surface schemes are envisaged here. Depending upon requirement any one or a combination of these schemes may be used for surface preparation before application of primer. SP1 Solvent cleaning SP2 Application of rust converter (Ruskil or equivalent grade) SP3 Power tool cleaning SP4 Shot blasting (shot blasting shall be used as surface preparation method for hot worked pipes prior to application of primer) SP4* Shot blast cleaning/ abrasive blast cleaning to SA21/2 (near white metal) 35-50 microns SP5 Phosphating SP6 Emery sheet cleaning/Manual wire brush cleaning.
16.06.00	**APPLICATION OF PRIMER/PAINT**
16.06.01	The paint/primer manuacturer's instructions covering thinning, mixing, method of application, handling and drying time shall be strictly followed and considered as part of this specification.The Dry film thickness (DFT) of primer/paint shall be as specified herein.
16.06.02	Surfaces prepared as per the surface preparation scheme indicated herein shall be applied with primer paint within 6 hours after preparation of surfaces.
16.06.03	Where primer coat has been applied in the shop, the primer coat shall be carefully examined, cleaned and spot primed with one coat of the primer before applying intermediate and finish coats. When the primer coat has not been applied in the shop, primer coat shall be applied by brushing, rolling or spraying on the same day

as the surface is prepared. Primer coat shall be applied prior to intermediate and finish coats.

16.06.04 Steel surfaces that will be concealed by building walls shall be primed and finish painted before the floor is erected. Tops of structural steel members that will be covered by grating shall be primed and finish painted before the grating is permanently secured.

16.06.05 Following are the Primer/painting schemes envisaged herein:

PS3 - Zinc Chrome Primer (Alkyd base) by brush/Spray to IS104.

PS3* - Zinc Chrome primer (Alkyd base) by dip coat.

PS4 - Synthetic Enamel (long oil alkyd) to IS2932.

PS5 - Red oxide zinc phosphate to IS-12744.

PS9 - Aluminum paint to IS 2339.

PS9* - Heat resistant Aluminum paint to IS-13183 Gr.-I (for temperature above 400 ^{o}C) and to IS-13183 Gr.-II (for temperature 200 ^{o}C - 400 ^{o}C)

PS13 - Rust preventive fluid by spray, dip or brush.

PS14 - weldable primer-Deoxaluminate or equivalent.

PS16 - High Build Epoxy CDC mastic `15' .

PS17 - Aliphatic Acrylic Polyurethane CDE134 ,%V=40.0(min.)

PS18 - Epoxy based TiO2 pigmented coat

PS19 - Epoxy based Zinc phosphate primer (92% zinc in dry film (min.), %VS=40.0(min.).

PS20 - Epoxy based finish paint.

16.06.06 All weld edge preparation for site welding shall be applied with one coat of weldable primer.

16.06.07 For internal protection of pipes/tubes, VCI pellets shall be used at both ends after sponge testing and ends capped. VCI pellets shall not be used for SS components and composite assemblies.

16.07.00 Primer/Painting Schedule

Sl. No	Description		Surface Preparation	Primer Coat			Intermediate Coat			Finish Coats			Total Min. Painting DFT (Microns)	Colour Shade
				System	Coat	Min. DFT / coat (Micron)	System	Coat	Min. DFT/ Coat (Microns)	System	Coat	Min. DFT/ Coat (Microns)		
1.	**All insulated Pipings**, fittings/ components, Pipe clamps, Vessels/Tanks, Equipments etc.		SP3/SP4	PS 5	2	25	-	-	-	PS 4	1	25	75	As per NTPC Colour shade/ coding scheme
2.	**All un-insulated Piping,** fittings/ components, Pipe clamps, Vessels/Tanks, Equipments etc.	Design temperature <95 °C	SP3/SP4	PS 5	2	25	-	-	-	PS 4	3 $	35 $	155 $	
		Design temperature 95 °C-200 °C	SP3/SP4	PS 9	1	20				PS 9	1	20	40	
		Design temperature > 200 °C	SP3/SP4	PS9*	1	20	-	-	-	PS9*	1	20	40	
3	Constant Load **Hanger** (CLH), Variable Load Hanger (VLH) and other supports		SP4*	PS19	1	40	-	-	-	PS17	1	30	70	
4.	**Valves**													
	Cast	Design temperature <95 °C	SP1/SP2/SP3	PS4/PS9	1	40	Polyamid Epoxy	1	100	PS 17	1	40	180	
		Design temperature 95 °C-200 °C	SP1/SP2/SP3	PS9	1	20	-	-	-	PS9	1	20	40	
		Design temperature > 200 °C	SP1/SP2/SP3	PS9*	1	20				PS9*	1	20	40	

	Forged	Design temperature <95 °C	SP1 & SP5	PS13/ Phenolic fortified alkyd	1	40	Polyamid Epoxy	1	100	PS17	1	40	180	
		Design temperature 95 °C-200 °C	SP1 & SP5	PS9	1	20	-	-	-	PS9	1	20	40	
		Design temperature > 200 °C	SP1 & SP5	PS9*	1	20				PS9*	1	20	40	
5.	All Structural Steel components	Outside TG building and in SG envelope	SP4*	Inorganic Ethyl Zinc Silicate	1	75	PS18	1	75	a))Epoxy coat b)Final coat of paint PS17	2 1	35 30	250	
		Within TG building	SP4*	-do-	1	35	PS18	1	35	a))Epoxy coat b)Final coat of paint PS17	2 1	25 30	150	
6.	Weld Edges		SP6 (Hand cleaning by wire bursting)	PS13 (Weldable primer)	1	25	-	-	-	-	-	-	-	

$ The first 2 finished coats (total min.DFT of 70 microns) shall be done at shop and the 3rd finish coat (min.DFT 35 Microns) shall be applied at site.

15.00.00 Testing Requirements:

The detailed testing requirements for power cycle piping and its components are given in the subsection for Quality Assurance(QA) .The requirements pertaining to testing given in this subsection if in variance with that given in QA subsection, then the more stringent of the two shall be followed.

SECTION-D

EQUIPMENT SPECIFICATION
DATA SHEETS - A&B
DATA SHEETS - C
QUALITY PLAN
BILL OF QUANTITY
SPARES

SECTION – D

EQUIPMENT SPECIFICATION

1.0 SCOPE

This specification covers the Design, Manufacture, Inspection and Testing at the manufacturer's works, proper packing for transportation and delivery to site of Control valve (with Pneumatic/Electric Actuator) for use in Utility/Captive Power Station/Combined Cycle Station.

2.0 CODES AND STANDARDS

2.1 All the equipments specified herein shall comply with the requirements of the latest issue of the relevant National and International standards.

2.2 The Design and Materials used for the components shall also comply with the relevant National and International standards.

2.3 As a minimum requirement, the following standards shall be complied with :

Indian Boiler Regulation (IBR)		
Allowable Seat leakage	:	ANSI-B16.104 / FCI-70.2
Pressure & Temperature ratings	:	ANSI-B16.34
Enclosure class	:	IEC-144 / NEMA / IS-13947
Control Valves	:	ISA S-75
Electric Motor operated Actuators	:	IS-9334

3.0 TECHNICAL REQUIREMENTS

The Control valve, Actuator and the accessories shall be suitable for continuous operation under an ambient temperature of 0-55°C and Relative Humidity of 0-95% unless specified otherwise in volume IIB Section-B or Section-C.

3.1 Control Valve

The control valve shall be suitably designed for the operating conditions and system characteristics as specified in the Data Sheet-A.

3.1.1 The control valve shall be of globe body design with single port. The valve trim, shall be suitable for quick removal without any cutting or welding.

3.1.2 The material of body, internals and packing shall be as specified in the data sheets. Alternatives, considered more suitable for service specified may be given as alternative offer, along with adequate justification. However main offer shall totally meet specification requirements. Asbestos shall not be used for the packing or any other component.

3.1.3 The valve bonnet and packing shall be suitable for the service conditions as in Data Sheet-A. Gland sealed type bonnets are not acceptable. Double packing is mandatory for applications involving vacuum service. Bonnets having teflon packing shall have valve stem finished to 2-4 microns. Packing material requiring lubrication will not be acceptable. Justification for proper selection of bonnet & packing shall be furnished in the bid.

3.1.4 The valve end connection as specified in Data Sheet-A shall conform to ANSI B16.25 for Butt Weld connection and ANSI B16.5 for flanged ends. End to end dimension shall be as per ANSI 16.10.

3.1.5 The valve seat leakage shall be as per ANSI B16.104 / FCI-70.2. The leakage class shall be as per Data Sheet-A.

3.1.6 The valve body shall have the direction of flow embossed on all valves.

3.1.7 The sizing shall conform to the requirements of ANSI/ISA(S75- 01), and the valve capacity shall be selected so as to meet the following:

Valve with Linear characteristic.	-	Normal Flow (Design Point)	:	70-75% valve lift.
	-	Max. Flow	:	90% valve lift.
	-	Min. Flow	:	>10% valve lift.
Valve with Equipercentage Characteristic	-	Normal Flow (Design Point)	:	75-85% valve lift.
	-	Max. Flow	:	90% valve lift.
	-	Min. Flow	:	>10% valve lift.
ON/OFF Quick open Characteristic	-	1.1 times the CV calculated on the basis of maximum flow condition.		

3.1.8 Calculation for valve sizing, velocity and noise shall be subject to purchaser's approval during contract stage. However responsibility of proper selection and design for the duties specified lies with the vendor. Any modifications required to be done on the valves or actuators & accessories to achieve satisfactory performance of the control system shall be done without any commercial implication.

3.1.9 Suitable justification and evidence shall be furnished regarding proper selection of the valve.

3.1.10 The valve outlet velocities shall be limited to the following values, unless otherwise specified in the Data sheet-A.

i)	Liquid service	<=	7 Metres/Sec.
ii)	Steam service	<=	1/3 Sonic velocity in the flow medium.

3.1.11 For flashing duty, the trim design shall be such that the vapour bubbles are kept away from valve body.

3.1.12 For cavitation service, the trim design shall be of multistage pressure drop type, so as to avoid cavitation altogether, instead of keeping cavitation away from valve parts.

3.1.13 In case of predicted noise level above 85 dBA, suitable low noise trim or inbuilt diffusers shall be provided to bring down the noise level below 85dBA.

3.1.14 The equivalent weighted sound level measured at 1.5M. above floor level in elevation and one metre horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not exceed 85 dBA (without pipe insulation). The offer shall include noise prediction calculations for each valve.

3.1.15 In case of wrong selection/mal operation of valve and for associated actuator during guarantee period, the vendor shall replace the valve suitably with a modified/new valve of design as approved by purchaser and all the expenses for replacement, rectification/modification including transportation both ways will be at vendor's expenses.

3.2 Pneumatic Actuator

The pneumatic actuators shall be employed for modulating or open/close duty, as specified in Data Sheet-A. The bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drops and shut off pressure.

3.2.1 The pneumatic spring opposed diaphragm actuator for modulating duty shall be capable of positioning the associated valve at desired opening for all the operating conditions specified.

3.2.2 The pneumatic actuator for open/close duty shall be suitable for fast opening/closing of the associated valve.

3.2.3 The actuator design shall allow valve assembly to be mounted at 45° inclination on either side in the vertical plane.

3.2.4 The actuators shall be suitably sized to ensure that the associated valve travel time from full open to full closed position and vice versa is less than 20 seconds under the most stringent service conditions.

3.2.5 The actuator shall be painted with epoxy based paint.

3.3 Accessories for Control valve with Pneumatic Actuator

The bidder shall offer all the accessories as specified in the Data Sheet - A for the Pneumatic Actuators under modulating or OPEN/CLOSE duty. The accessories specified shall be supplied duly mounted on the valve actuator and piped with PVC covered copper tube and flare less brass fittings (Refer typical hook up diagram in sheet 12 of 12).

3.3.1 Hand wheel

Hand wheel shall have OPEN & CLOSE direction marking and clockwise rotation as viewed from front shall close the valve. The hand wheel shall have a circular stainless steel plate with Tag number and service.

3.3.2 Local Position Indicator

Each actuator shall be provided with a mechanical pointer attached to stem, moving over a graduated scale with markings, for OPEN, 25%, 50%, 75%, CLOSE positions.

3.3.3 Position Transmitter

The position transmitter shall be supplied as indicated in Data Sheet-A. The electronic position transmitter shall be non-contact type with 4-20 mA DC 2-wire output suitable for 12-50V DC supply. The resistance type position transmitter shall have 0-100 ohm variation for valve position change of 0-100%. The position transmitters of both types shall have accuracy and enclosure class. Necessary cable glands shall be supplied.

3.3.4 Air Filter Regulator

Instrument quality air at suitable pressure of 5 .5 Kg/Cm2(g) to 7 Kg/Cm2(g) s hall be supplied to each valve through air filter regulator. The filter regulator shall include an inbuilt blow-down valve, 5 micron size filter. The design pressure for regulator shall be 7 Kg /cm2g. The Air filter regulator shall be selected to meet the r equirements of positioner/actuator, E/P c onvertor and air-lock. The f low capacity of th e A ir filter regulator shall be v ariable with a k nob. O utput gau ge s hall b e provided wherever pneumatic positioner is not specified for the valve.

3.3.5 Air Lock Relay

Air lock relay shall re tain t he valve p osition stayput, in ca se of a ir supply failure a nd sh all re set automatically on res umption o f a ir supply. Air lo ck s hall hav e a thr eaded plug for e vacuating diaphragm air if required for local manual operation.

3.3.6 Sole noid Valves

Solenoid valves are meant for interlock & protection purposes overriding the controller signal, and/or to result stayput action on controller signal failure. The Solenoid valve shall be 3-way Universal type and the valve internals shall be of stainless steel. The coil shall have class-H insulation and rated for continuous AC/DC duty as specified in Data sheet-A. The enclosure shall be to I P-55. Cable gland shall be pr ovided for c able e ntry. The s olenoid shall in g eneral c onform to IS -8935. Th e s olenoid operation shall be universal type. The solenoid shall be suitable for 24V DC supply, unless specified otherwise in Data Sheet-A.

3.3.7 Limit Switches

Limit switches are required as specified in the data sheet-A. Each limit switch shall have 2NO+2NC contacts with c ontact r ating o f 5A at 2 40V AC/0.2A at 2 20V DC unless o therwise s pecified. The switch enclosure shall conform to IP-55. Each limit switch shall be supplied with cable glands.

3.3.8 I/P Converter

I/P Converters shall preferably be of force balance type and shall produce pneumatic output signal corresponding to i nput c urrent s ignal, also s pecified i n D ata S heet. Conv ertor el ectronics shall be protected against reverse connection of signal polarities and a separate external connection shall be provided to facilitate groun ding of instrument casing. Cable g lands with neoprene gro mets suitable for P VC c ables shall b e provided. I/P c onvertor s hall have span a djustment facility. I/P con vertor enclosure shall conform to IP-55 enclosure class.

3.3.9 Pos itioner

Positioner shall be suitable for accepting controller output signal 0 .2-1.0 Kg/cm2, 0.2-0.6 Kg/cm2 or 0.6-1.0 Kg/cm2 as specified and give an output suitable for the actuator. P neumatic positioner shall have 3 gauges. All g auges shall have metric scales. The po sitioner inp ut s ignal r ange s hall be adjustable. Wherever applicable, it shall be possible to bypass the positioner by means of a switch. Linearity and Hysterisis shall be as indicated in Data sheet-A

3.3.10 Elec tro pneumatic Positioner

In p lace of separate E/P Conv erter and pneumatic p ositioner a c ombined el ectro pneumatic positioner can also be supplied. The electro pneumatic positioner shall have 2 gauges.

3.3.11 J unction Box

Wherever specified, an i ntegral junc tion box with all electrical accessories conduited up to JB s hall be supplied. The junc tion box s hall h ave tw o (2) cable glands for o utgoing cables. Junction box shall have enclosure class of IP-55.

3.4 Guara ntee & Performance

3.4.1 The overall performance of the control valve with pneumatic actuator assembly shall be as follows:-

i)	Hysteresis	:		± 1% of span
ii)	Linearity	:		± 2% of span
iii)	Sensitivity		:	± 0.5% of span.
iv)	Repeatability	:		± 1% of span
v)	Accuracy (Overall)		:	± 2% of span

3.4.2 The gu arantee f or th e c ontrol v alve, p neumatic ac tuator & ac cessories s hall be for 12 m onths continuous operation f rom the date of commissioning, u nless s pecified otherwise i n VOL-IIB Section-B or Section-C.

3.5 Elec tric Actuator

The electric actuator shall be employed for modulating duty.

3.5.1 The actuator assembly shall be complete with drive motors, gears, hand wheel, signaling & switching units, associated control, integral starter, (when specified) and other accessories as required.

3.5.2 The Electric Actuator shall be capable of positioning the associated valve at the desired opening for all the operating conditions.

3.5.3 The motor shall meet the requirements of Current, torque, Axial thrust, Accelerating & stall time as imposed by the driven equipment.

3.5.4 The motor shall be suitable for direct on line starting.

3.5.5 Motors shall be suitable for inching & plugging duty operations.

3.5.6 The motors shall be capable of starting and accelerating to rated speed at 85% of rated voltage.

3.5.7 The motors shall be rated for continuous operations for modulating duty.

3.5.8 The motor shall operate satisfactorily under the following conditions:

i) ±10% supply voltage variation at rated frequency.

ii) -5% to + 3% variation in frequency at rated supply voltage.

iii) Simultaneous va riation i n voltag e an d frequency, t he sum of absolute percentage not exceeding 10%.

3.5.9 The Actuator shall be suitable for mounting directly on the valve and shall be suitable for mounting in any position. Supports required for inclined mounting shall form part of supply of valve assembly.

3.5.10 The actuator s hall be c apable of producing th e r equired torque and thrust at the outp ut sha ft for satisfactory operation of the associated valve.

3.5.11 Each actuator shall have a hand wheel for emergency operation. The hand wheel shall be designed such that it is declutched automatically when the power supply to the motor is restarted.

3.5.12 The hand wheel shall be so arranged that when looking from hand wheel, the valve is closed by rotating the hand wheel in clockwise direction.

3.5.13 Motor shall be totally enclosed conforming to IP-65 or better as per data sheet. The enclosure shall be suitable to protect the motor from leakage steam, water or oil from valve joints and glands.

3.5.14 Where flameproof enclosures are specified, it shall meet the specification IS-2148.

3.5.15 Insulation shall be at least class-B or better and shall be tropicalised to withstand the atmospheric condition.

3.5.16 The actuator shall be provided with antifriction bearing in grease filled cartridge.

3.5.17 Each actuator shall be provided with a mechanical position indicator to indicate accurately the valve position.

3.5.18 The integral starter, if specified in data sheet-A, shall be provided in weatherproof enclosure with protection class not less than IP-65 or better as per data sheet.

The integral starter shall consist of:

i) Mechanical & Electrically interlocked reversing contractors suitable for class AC4 duty or Thyristor as pet data sheet.

ii) Thermal overload relay.

iii) Step down control transformer with fuses.

iv) Interposing relay.

v) Monitoring relay..

vi) Open, Close & Stop push buttons.

vii) Indicating lamps.

viii) Local-Remote lockable selector switch with spare potential free contacts, wired for remote interface.

ix) A potential free contact shall be provided for remote annunciation of power failure/overload condition. The contact shall be SPDT, rated for at 5A 240V AC or 0.2A at 220V DC.

3.5.19 The actuator shall be suitably time rated for the duty cycle involved with the necessary number of starts per hour, but in no case, less than 1200 starts per hour.

3.5.20 The actuator shall be provided with a suitable control unit for receiving 4-20 mA signal from remote controller.

3.5.21 The servomotor gear should have self locking or suitable brake so as to maintain it's last position as and when the motor power is switched off.

3.5.22 Thermostat/Thermistor as specified in the data sheet shall be provided for sensing the winding temperature and giving trip command. The trip contact shall be change over type. The contact shall be wired up to the actuator terminal box.

3.6 Accessories for Control Valve with Electric Actuator

3.6.1 Torque Switches

i) Each actuator shall be provided with at least one open and one close torque switches each with 2 NO+2 NC contacts. The contacts shall be rated for 5A at 240V AC or 0.2A at 220V DC.

ii) The torque switches shall have a minimum accuracy $\pm$ 3% of set value.

iii) The torque switches shall be provided with calibrated knobs for setting desired torque. Separate knobs shall be provided for close and open torque switches.

iv) The torque switches shall be provided with mechanical latching device to prevent operation when unsealing from the positions. The latching device shall unlatch as soon as the valve leaves the end position. If such provision is not possible, the torque switches shall be bypassed by end position limit switches, which open on valve leaving end position. These limit switches are additional to the number of limit switches specified elsewhere.

v) The torque switches or worm gear shall be self-locking type so that when torque switch operates it remains operated until the actuator is operated in the reverse.

vi) The torque switch enclosure shall conform to IP-55.

3.6.2 Limit Switches

Each limit switch shall have 2NO+2NC contact with contacts rated for 5A 240V AC/0.2A 220V DC unless otherwise specified. The switch enclosure shall conform to IP-55. Each limit switch shall be supplied with cable glands.

3.6.3 Space Heater

A space heater shall be provided in limit switch and starter compartments to prevent condensation. This shall be suitable for the power supply specified in the data sheet. Where integral starters are provided the space heaters shall be wired to control supply within the actuator.

3.6.4 Remote Position Transmitter

The position transmitter shall be supplied as indicated in Data Sheet-A. The electronic position transmitter shall be non-contact type with 4-20mA DC 2-wire output suitable for 12-50V DC supply. The resistance type position transmitter shall have 0- 100 ohm variation for valve position change of 0-100%. The position transmitters of both types shall have ± 1% accuracy. The enclosure shall conform to IP-55. Necessary cable glands shall be supplied.

3.6.5 Wiring

i) The actuator and the accessories will be neatly wired up to the terminal boxes.
ii) The internal wiring shall be minimum of 1 mm^2 stranded PVC insulated copper conductor.
iii) The wiring shall be identified by means of numbered ferrules on both ends of all wires.

3.7 Terminal and Terminal boxes

3.7.1 Motor Terminal Box

i) The terminals, terminal boards, terminal boxes, winding tails and associated equipment shall be suitable for connection to supply system having short circuit capacity specified in data sheet and clearance time determined by the associated fuses.

ii) The terminals shall be stud type insulated from the frame. The insulation shall not be porcelain. The studs shall be of brass or stainless steel or phosphor bronze of adequate size.

iii) The terminal box shall be totally enclosed conforming to degree of protection IP-65.

3.7.2 Actuator Terminal Box

i) All terminals of limit and torque switches, space heater, position transmitters, thermostat/thermister shall be brought to a common terminal box. The enclosure shall be to degree of protection IP-65.

ii) Terminal board with plug in connector shall be provided. Alternatively stud type or insertion type may be considered. Pinch screw type however will not be accepted. All terminals shall be shrouded to prevent accidental contact. Where stud type terminals are offered, it shall be as per clause 3.7.1 (ii).

iii) There shall be at least five terminals spare to terminate spare cores of cable.

3.7.3 Cable Glands

The motor terminal box and actuator terminal box shall be provided with required number of double compression nickel plated brass cable glands to suit cable type and associated size.

3.7.4 Earthing Terminal

Two earthing terminal shall be provided on either side of motor and actuator terminal box.

3.7.5 Painting

The Actuator shall be painted with epoxy-based paint.

4.0 TESTING AND INSPECTION

4.1 The bidder shall adopt suitable quality assurance plan to ensure that the equipments offered will meet the specification requirements in full.

4.2 The bidder shall furnish the Quality Plan in the format enclosed in volume-III. In case the Quality Plan(s) is/are included in volume-IIB, the bidder shall furnish his Quality Plan strictly in line with the same. The Quality Plan shall be discussed and finalised with the technically accepted bidders before opening the price bid. The stages where purchaser would like to be associated for witnessing or verification of tests would be indicated by the purchaser in the Quality Plan before approval.

4.3 The following test shall be conducted as a minimum requirement.

4.3.1 Control Valve

i) Radiographic tests on castings.
ii) Dye penetrant tests on machined surface.
iii) Ultrasonic tests for the forgings & bars of all valves with 60 Kg/cm^2 & higher ratings.
iv) Hydrostatic tests as per ANSI B 16.34 prior to seat leakage tests.
v) Valve closure and seat leakage tests as per ANSI B 16.104 / FCI-70.2.

4.3.2 Pneumatic Actuators

Functional test of actuator and each accessory.

4.3.3 Electric Actuator

i) Routine tests on motors as per IS: 325.
ii) Functional test on actuator and each accessory.
iii) Insulation resistance and high voltage test.
iv) Stall current & Stall torque test.
v) Output shaft speed and torque of actuator and corresponding current tests.

4.3.4 Control valve with Actuator & Accessories fully assembled

i) Functional tests of control valve operation along with actuator & accessories.
i) Dimension checks.

4.3.5 Type tests or Test Reports

i) Valve lift vs. Flow test (Cv Test)
ii) Degree of protection tests for the enclosures
ii) Temperature rise test (applicable for Electrical Actuator only).
iii) Type test for motor as per IS: 325.

4.4 Inspection will be conducted by BHEL and/or their authorised representatives as per the agreed inspection schedule. The inspection schedule will be submitted by the bidder, for BHEL's approval at contract stage. The cost of all tests and inspections will be deemed to have been included in the bid. For all the type tests covered under 4.3.5 above, "Type Test Certificates" as per agreed Quality Plan shall be furnished. In the absence of the same, such Type Tests shall be arranged at the Vendor's works in the presence of BHEL and/or their authorised representatives or in independent Test House/Laboratory approved by BHEL.

4.5 The Standard QP is included in this specification to enable bidder to understand the extent of inspection and testing requirements to execute this job. The successful bidder has to follow the agreed QP, taking care of customer requirements mentioned in Sec-C and submit QP for final approval by BHEL / Customer.

5.0 SPARES AND CONSUMABLES

5.1 Commissioning Spares and consumables

As part of the main equipment supply, the bidder shall supply all commissioning spares and consumables required during Start-up,

5.2 Mandatory Spares

The bidder shall offer along with main offer, the Mandatory Spares as specified in Volume IIB Section-C of the specification. The Mandatory Spares offered shall be of the same make and type as the main equipment.

5.3 Recommended Spares

The bidder shall furnish a list of Recommended Spares along with the normal service expectancy period and frequency of replacement; quantities recommended for 3 years operation along with unit rate against each item to enable BHEL / BHEL's Customer to place a separate order later, if required.

5.4 Special Tools & Tackles

The bidder shall furnish a list of Special Tools & Tackles included in the bid.

6.0 DRAWINGS AND DOCUMENTS

6.1 The bidder shall furnish the following documents in required number of copies along with the bid:

6.1.1 Data sheet-B, completely filled-up along with all enclosures.

6.1.2 Wiring diagrams for Electrical Actuators.

6.1.3 Hook up diagrams of Control Valve with Actuator & accessories.

6.1.4 Valve & actuator assembly dimensional drawings with weights.

6.1.5 Quality Plan

6.1.6 All relevant Catalogs with detailed technical information.

6.1.7 Bar-chart to indicate the time schedule for procurement, manufacture, testing and despatch.

6.2 The successful bidder shall furnish the following documents in required number of copies to BHEL during the contract stage:

6.2.1 For approval

i) Dimensional drawings.

ii) Installation drawings with overall dimensions of the completed equipment and clearances for operation and maintenance.

iii) Data sheet-C, completely filled-up along with all the enclosures including the sizing calculations & noise calculations.

iv) Quality Plan.

v) Te st Certificates.

6.2.2 Fin al / As-built Drawings

Final / As-built drawings / CDs in required number of copies shall be submitted.

6.3 Operation & Maintenance Manuals

O&M Manuals in required number of copies shall be submitted. O &M manuals shall also contain storage and commissioning instructions.

7.0 MARKING AND PACKING

7.1 Ma rking

A stainless steel metal nameplate should be permanently fixed on each equipment giving its tag number and technical specifications.

7.2 Pa cking

All equipment / ma terials shall be suitably packed and protected for the entire p eriod of dispatch, storage and erection against impact, abrasion, corrosion, incidental damage due to vermin, sunlight, high temperature, rain, moisture, humidity, dust, sea water spray (where applicable) as well as rough handling and delays in transit and storage in open.

8.0 APPLICABLE DATA SHEET FORMS

This document shall be read with one or more of the following data sheet forms :

- Data sheet A&B for Control Valve with Pneumatic Actuator : Data sheet no. PES-145-06-DS1-1
- Data sheet C for Control Valve with Pneumatic Actuator : Data sheet no . PE S-145-06-DS2-1
- Data sheet A&B for Control Valve with Electric Actuator : Data sheet no. PES-145-06-DS3-1
- Data sheet C for Control Valve with Electric Actuator : Data sheet no. PES-145-06-DS4-1

1.0 Electrical :

Input Signal	4-20mA
Power Supply	Loop Powered from the output card of Control System (12-30 V DC)
Hart Protocol	Compatibility for Remote Calibration & Diagnostic (Super-Imposed HART Signal on Input Signal to positioner (4-20mA)
Valve Position Feedback	4-20mA output signal for Position Feedback is to be provided to control system.

2.0 Environment :

Operating Temperature	(-) 30 To 80 Deg.C
Humidity	0-95%
Protection Class	IP-65 (Minimum)

3.0 Diagnostic Features :

Diagnostic / Test Features (to be available in Smart Positioner and shall be accessible through any HMS software)	**Minimum Diagnostic Features Like** • Measurement of Valve positioning timing, • Detection of actuator leakage, • Display of fault alarm. • Logging of alarms and history. • Valve friction/jamming detection. • Detection of valve wear & tear, • Valve stroke length and timing.
	Advanced Diagnostic Features Like (OPTIONAL, if specified in customer's specification) • On line partial closure test. • Valve signature analysis (online graphical/tabular representation of input signal Vs valve travel). • Step response test.

4.0 Software :

Software (to be supplied alongwith smart positioner)	• Windows based software to meet the requirement for configuration, diagnostics, calibration and testing of Valve and actuator. • Easily up-gradable with same hardware and compatible with any Hart Management Systems (HMS). • Shall be capable to cater to all the tags in the specification at the same time.

5.0 Hardware :

Hardware (As required)	1. PC with software for configuring and accessing diagnostic features of the positioners.
	2. Multiplexers for interfacing smart positioner with PC.
	3. Communication cable for interconnecting multiplexers with PC.
	4. RS232/RS485 converter (if required)

Note : Power supply for Multiplexer shall be arranged by the owner.

6.0 Valve Action :

Valve Action	**Direct & Reverse.** (Same positioner for Single Acting or Double Acting And no separate relays required for changing from Single acting to double).
	During Failure of input Electrical signal (4-20 mA), valve to attain fail Freeze position without any external hardware. (Sol valve, Power Supply etc.)

7.0 Flow Characterization :

Flow Characterization	Possible to fit valve characteristic curve linear & Equal percentage

8.0 Performance:

Characteristic Deviation	<=0.75% of span
Ambient temp effect	<=0.01%/Deg C or better.
Dead Band	Adjustable 0.1 to 10%.
Scan Time	10ms
Resolution	<=0.05%
Sensitivity/Linearity	0.3-0.4% of FS
Repeatability	0.32% of FS

9.0 Test Certificates:

Test Certificates/Test Reports for degree of protection, Accuracy and calibration test (as a minimum) to be submitted as per Manufacture Standard / Relevant Standard.

10.0 EMC & CE compliance

International Standard Like EN/IEC. To EN 50081-2 & EN 50082 or equivalent

11.0 Accessories

In Built Operator Panel	Display with push buttons for Configuration and display on the positioner itself
Hand Held Hart Calibrator (Optional)	Universal Hart Calibrator To Be Provided, One Per Unit.
Press Gauge Block	For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As per Control valve hook-up diagram.
Electrical cable entry	½ - NPT, side or bottom entry to avoid water Ingress.

SECTION – D

DATA SHEETS – A & B

Notes:

1. All general technical requirements including material & construction, leakage class, body sizing and Cv sizing etc. shall be as per customer specifications.
2. Type of bonnet shall be according to the service condition. Extension bonnets shall be provided when the maximum temperature of the flowing fluid is greater than 280 ^{o}C.
3. If the downstream is subjected to vacuum, flow direction of the fluid shall be to close. Separate indication for the same has not been made in the data sheet.
4. Valve and actuator shall be designed for full differential pressure (Max. shut-off pressure).
5. Mandatory spares for control valves, shall be as per contract.
6. Testing & other requirements shall be as per customer's specifications.
7. Quantity indicated is for one unit.
8. Tolerances on end to end, center to center, center to face shall be in accordance with ASME B16.10.
9. For valves subjected to cavitation service, anti cavitation trim shall be provided.

INDEX

Tag No. :…ASV-8… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	D/A PEGGING FROM AUX. STEAM HEADER	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	273 x 6.35 | 508 x 9.53	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[■] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[] <7 M/SEC(WATER) |[■] MAC NO. < 1/3 (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…ASV-8… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	7.5% BMCR	12.8	18	1.65	240			
	2.	15% BMCR (COLD)	25.5	18	1.7	240			
	3.	15% BMCR (HOT)	36.7	18	3.7	240			

VALVE TYPE	[] CAVITATION [] FLASHING [■] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2g) 22 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 22 | 260 * IBR FORM III-C [■] REQUIRED [] NOT REQUIRED	…… ……|…… ……
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITION INDICATED AT SL. NO. 3 AND SHALL BE CHECKED FOR ALL SPECIFIED CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…CRHV-6… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	D/A PEGGING FROM CRH LINE	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	323.9 x 10.31 | 813 x 23	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C | SA 672 GR B70	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC9 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[] <7 M/SEC(WATER) |[■] MAC NO. < 1/3 (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 | 1.0	.....|.....
	*TRAVEL TIME FOR	<10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…CRHV-6… Qty.: …1 per Unit… Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)									DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%							…… …… …… ……
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	15% BMCR	37.5	12	3.65	240			
	2.	60% BYPASS MDBFP	141.26	31.32	3.8	326.7			
	VALVE TYPE						[] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 54 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 54 | 360 * IBR FORM III-C [■] REQUIRED [] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. : CDV-10, CDV-12 CDV-14 Qty.: 3 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	CEP A/B/C MINIMUM RECIRCULATION	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1 x 8.18 | 219.1 x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[] GLOBE [■] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : CDV-10, CDV-12 Qty.: 3 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0
CDV-14

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	....

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MIN.	30	24 TO 35	0.6	46.5 TO 50			
	2.	NORMAL	300	24 TO 35	0.6	46.5 TO 50			
	3.	MAX.	310	26 TO 37	1.5	46.5 TO 50			
	VALVE TYPE						[■] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 39 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 39/VACUUM | 55 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						.....		

TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	.....

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. : CDV-22 & CDV-25 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	MAIN CONDENSATE CONTROL	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	406.4 x 12.7 | 406.4 x 12.7	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[■] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [■] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 : 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[] TO OPEN [■] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : CDV-22 & CDV-25 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)									DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)								…… …… …… ……
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	DESIGN POINT	1555	20.8	18.85	50			
	2.	60% LOAD	747.75	26.02	10.1	47.4			
	3.	100% MCR	1191.64	21.53	14.8	47			
	4.	VWO	1247.4	20.81	15.8	46.9			
	5.	MIN. (10% LOAD)	119	31.0	7.9	50.6			
	VALVE TYPE								[] CAVITATION [] FLASHING [■] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 39 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 39 | 55 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED								…… ……|…… ……
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…CDV-39… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	GSC MIN. FLOW RECIRCULATION	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 7.11 | 168.3 x 7.11	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO OPEN	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…CDV-39… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MIN.	22	24 TO 33.5	0.3	46.9			
	2.	MAX	220	24 TO 33.5	0.7	50.7			

VALVE TYPE	[■] CAVITATION [] FLASHING [■] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2g) 39 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 39/VACUUM | 55 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED	…… ……|…… ……
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…CDV-43… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	EXCESS RETURN TO CST	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1 x 8.18 | 219.1 x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…CDV-43… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MIN.	30	34	4.0	46.9			
	2.	MAX	300	34	5.0	50.7			
	VALVE TYPE						[■] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 39 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 39 | 55 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…CDV-67… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	CONDENSATE SPRAY TO SD FLASH TANK	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[■] ON/OFF [] MODULATING	.....
	PIPE SIZE (inlet / outlet)	33.4 x 4.55 | 33.4 x 4.55	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[] BWE [■] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [] EQ. PERCENTAGE	.....
		[■] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	<10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	[] REQUIRED [■] NOT REQUIRED	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	[] REQUIRED [■] NOT REQUIRED	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…CDV-67… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 5% # ± 5% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MAX.	10	34	0.5	50.7			
	VALVE TYPE						[■] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 39 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 39/VACUUM | 55 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						……		

TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___1____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.
3. # WITHOUT POSITIONER, LINEARITY SHALL BE ± 5% ONLY.

Tag No. :…CDV-72… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	1x500 MW FGUTPP-IV STPP CONDENSATE FOR VALVE GLAND SEALING [■] INDOOR [] OUTDOOR [] ON/OFF [■] MODULATING 60.3 x 5.54 | 60.3 x 5.54 SA 106 GR B | SA 106 GR B	…… …… …… …… …… ……|……
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE BIDDER TO SPECIFY [■] BWE [] SWE [] FLANGED *[■] A216 WCB [] A217 WC6 [] SS [] A217 CS [] A351 CF8M ** REFER NOTE 3* [] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE [] STD [] EXTENDED [] FINNED [] LINEAR [■] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) 17-4 PH SS | 17-4 PH SS 17-4 PH SS | 17-4 PH SS BIDDER TO SPECIFY [■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM) [] II [] III [] IV [■] V [] VI LESS THAN 85 dBA [] YES [■] NO [] YES [■] NO	…… ……|……|……|…… ……|……|…… …… …… ……|…… …… …… ……|…… ……|…… …… …… …… …… …… ……
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN ***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)** *VALVE POSN. ON SUPPLY AIR FAILURE	BIDDER TO SPECIFY 1.0 | 0.2 < 10 SEC BIDDER TO SPECIFY [■] TO OPEN [] STAYPUT [] TO CLOSE [■] STAYPUT	……|…… ……|…… …… …… …… ……
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	[■] REQUIRED (WITH HART PROTOCOL) [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [■] REQUIRED [] REQUIRED [■] NOT REQUIRED	…… …… …… …… …… …… …… …… …… …… ……

Tag No. :…CDV-72… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MAX.	4	34	3.5	46.9			
	VALVE TYPE						[] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 39 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 39 | 55 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___1____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.
3. VALVE MATERIAL SHALL BE A217WC6 AND ANTI-CAVITATION TYPE TRIM IN CASE THE VALVE IS SUBJECTED TO CAVITATION FOR THE GIVEN CONDITION.

Tag No. :…DRV-2… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	HPH-6A NORMAL DRAIN TO HPH-5A	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 7.11 | 168.3 x 7.11	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 | 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO CLOSE	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-2… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	40% MCR	24	16.2	7.0	166.2			
	2.	60% MCR	39.06	27	11.2	188.6			
	3.	100% MCR	77.4	42.4	17.6	209.0			
	4.	VWO	82.8	44.3	18.4	211.2			
	5.	BMCR / VWO	85.26	43.9	18.2	210.4			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 54 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 54 | 220 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-8… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	1x500 MW FGUTPP-IV STPP HPH-6B NORMAL DRAIN TO HPH-5B [■] INDOOR [] OUTDOOR [] ON/OFF [■] MODULATING 168.3 x 7.11 | 168.3 x 7.11 SA 106 GR B | SA 106 GR B	…… …… …… …… …… ……|……
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE BIDDER TO SPECIFY [■] BWE [] SWE [] FLANGED [] A216 WCB [■] A217 WC6 [] SS [] A217 CS [] A351 CF8M [] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE [] STD [] EXTENDED [] FINNED [■] LINEAR [] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) 17-4 PH SS | 17-4 PH SS 17-4 PH SS | 17-4 PH SS BIDDER TO SPECIFY [■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM) [] II [] III [■] IV [] V [] VI LESS THAN 85 dBA [] YES [■] NO [] YES [■] NO	…… ……|……|……|…… ……|……|…… …… …… …… ……|…… …… …… ……|…… ……|…… …… …… …… …… …… ……
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN ***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)** *VALVE POSN. ON SUPPLY AIR FAILURE	BIDDER TO SPECIFY 0.2 | 1.0 < 10 SEC BIDDER TO SPECIFY [] TO OPEN [] STAYPUT [■] TO CLOSE [] STAYPUT [■] TO CLOSE	……|…… ……|…… …… …… …… ……
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	[■] REQUIRED (WITH HART PROTOCOL) [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [■] REQUIRED [] REQUIRED [■] NOT REQUIRED	…… …… …… …… …… …… …… …… …… …… ……

Tag No. :…DRV-8… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	40% MCR	24	16.2	7.0	166.2			
	2.	60% MCR	39.06	27	11.2	188.6			
	3.	100% MCR	77.4	42.4	17.6	209.0			
	4.	VWO	82.8	44.3	18.4	211.2			
	5.	BMCR / VWO	85.26	43.9	18.2	210.4			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 54 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 54 | 220 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-5… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	HPH-6A ALT. DRAIN TO HP DRAIN F/T	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 7.11 | 219.1 x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC9 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	440 C | 440 C	.....|.....
	: CAGE | GUIDE BUSH	440 C | 440 C	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO OPEN	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-5… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	40% MCR	24	17.3	0.3	200.9			
	2.	60% MCR	39.06	27.8	0.3	226.9			
	3.	100% MCR	77.4	43.1	0.3	252.7			
	4.	VWO	82.8	45.0	0.3	255.4			
	5.	MAX. (HPH-5 OUT)	114.5	37.0	0.5	243.8			
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 54 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 54/VACUUM | 280 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-11… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	HPH-6B ALT. DRAIN TO HP DRAIN F/T	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 7.11 | 219.1 x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC9 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	440 C | 440 C	.....|.....
	: CAGE | GUIDE BUSH	440 C | 440 C	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO OPEN	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-11… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	24	17.3	0.3	200.9			
	2.	60% MCR	39.06	27.8	0.3	226.9			
	3.	100% MCR	77.4	43.1	0.3	252.7			
	4.	VWO	82.8	45.0	0.3	255.4			
	5.	MAX. (HPH-5 OUT)	114.5	37.0	0.5	243.8			
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 54 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 54/VACUUM | 280 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						……		

TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-15… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	HPH-5A NORMAL DRAIN TO DEAERATOR	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1 x 6.35 | 219.1 x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 | 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO CLOSE	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-15… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	34.8	5.0	4.2	144.2			
	2.	60% MCR	64.98	9.1	4.8	149.6			
	3.	100% MCR	122.36	15.2	7.1	168.4			
	4.	VWO	130.2	16.0	7.4	170.5			
	5.	BMCR / VWO	133.86	15.7	7.2	169.8			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 22 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 22 | 180 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-22… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	HPH-5B NORMAL DRAIN TO DEAERATOR	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1 x 6.35 | 219.1 x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 | 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO CLOSE	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-22… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	34.8	5.0	4.2	144.2			
	2.	60% MCR	64.98	9.1	4.8	149.6			
	3.	100% MCR	122.36	15.2	7.1	168.4			
	4.	VWO	130.2	16.0	7.4	170.5			
	5.	BMCR / VWO	133.86	15.7	7.2	169.8			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 22 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 22 | 180 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-18… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	1x500 MW FGUTPP-IV STPP HPH-5A ALT. DRAIN TO HPD F/T [■] INDOOR [] OUTDOOR [] ON/OFF [■] MODULATING 219.1 x 6.35 | 273 x 9.27 SA 106 GR B | SA 106 GR B	…… …… …… …… …… ……|……
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE BIDDER TO SPECIFY [■] BWE [] SWE [] FLANGED [] A216 WCB [■] A217 WC9 [] SS [] A217 CS [] A351 CF8M [] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE [] STD [] EXTENDED [] FINNED [■] LINEAR [] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) 440 C | 440 C 440 C | 440 C BIDDER TO SPECIFY [■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM) [] II [] III [] IV [■] V [] VI LESS THAN 85 dBA [■] YES [] NO [■] YES [] NO	…… ……|……|……|…… ……|……|…… …… …… …… ……|…… …… …… ……|…… ……|…… …… …… …… …… …… ……
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN ***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)** *VALVE POSN. ON SUPPLY AIR FAILURE	BIDDER TO SPECIFY 1.0 | 0.2 < 10 SEC BIDDER TO SPECIFY [■] TO OPEN [] STAYPUT [] TO CLOSE [] STAYPUT [■] TO OPEN	……|…… ……|…… …… …… …… ……
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	[■] REQUIRED (WITH HART PROTOCOL) [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [■] REQUIRED [] REQUIRED [■] NOT REQUIRED	…… …… …… …… …… …… …… …… …… …… ……

Tag No. :…DRV-18… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)									DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)		± 1% ± 1% ± 0.5% ± 2%						…… …… …… ……
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	34.8	7.9	0.3	162.9			
	2.	60% MCR	64.98	12	0.3	182.8			
	3.	100% MCR	122.36	18	0.3	204.0			
	4.	VWO	130.2	18.8	0.3	206.2			
	5.	BMCR / VWO	133.86	18.6	0.5	205.5			
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 22 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 22/VACUUM | 225 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-25… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	1x500 MW FGUTPP-IV STPP HPH-5B ALT. DRAIN TO HPD F/T [■] INDOOR [] OUTDOOR [] ON/OFF [■] MODULATING 219.1 x 6.35 | 273 x 9.27 SA 106 GR B | SA 106 GR B	…… …… …… …… …… ……|……
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE BIDDER TO SPECIFY [■] BWE [] SWE [] FLANGED [] A216 WCB [■] A217 WC9 [] SS [] A217 CS [] A351 CF8M [] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE [] STD [] EXTENDED [] FINNED [■] LINEAR [] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) 440 C | 440 C 440 C | 440 C BIDDER TO SPECIFY [■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM) [] II [] III [] IV [■] V [] VI LESS THAN 85 dBA [■] YES [] NO [■] YES [] NO	…… ……|……|……|…… ……|……|…… …… …… …… ……|…… …… …… ……|…… ……|…… …… …… …… …… …… ……
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN ***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)** *VALVE POSN. ON SUPPLY AIR FAILURE	BIDDER TO SPECIFY 1.0 | 0.2 < 10 SEC BIDDER TO SPECIFY [■] TO OPEN [] STAYPUT [] TO CLOSE [] STAYPUT [■] TO OPEN	……|…… ……|…… …… …… …… ……
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	[■] REQUIRED (WITH HART PROTOCOL) [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [■] REQUIRED [] REQUIRED [■] NOT REQUIRED	…… …… …… …… …… …… …… …… …… …… ……

Tag No. :…DRV-25… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)									DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)								…… …… …… ……
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	34.8	7.9	0.3	162.9			
	2.	60% MCR	64.98	12	0.3	182.8			
	3.	100% MCR	122.36	18	0.3	204.0			
	4.	VWO	130.2	18.8	0.3	206.2			
	5.	BMCR / VWO	133.86	18.6	0.5	205.5			
	VALVE TYPE								[■] CAVITATION [■] FLASHING [] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 22 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 22/VACUUM | 225 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED								…… ……|…… ……
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg									……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-28… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	LPH-3 NORMAL DRAIN TO LPH-2	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 7.11 | 168.3 x 7.11	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 | 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO CLOSE	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-28… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	40% MCR	15.6	1.1	0.8	86.9			
	2.	60% MCR	23.74	1.7	1.2	97.5			
	3.	100% MCR	42.16	2.4	1.7	110.4			
	4.	VWO	44.7	2.4	1.8	111.7			
	5.	LPH-1 OUT	50	2.1	1.6	105.8			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/VACUUM | 120 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						……		

TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-31… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	LPH-3 ALT. DRAIN TO LP DRAIN F/T	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 7.11 | 219.1 x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC9 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	440 C | 440 C	.....|.....
	: CAGE | GUIDE BUSH	440 C | 440 C	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	<10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO OPEN	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-31… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)									DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)								…… …… …… ……
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	15.6	1.6	0.3	101.9			
	2.	60% MCR	23.74	2.0	0.3	114.5			
	3.	100% MCR	42.16	2.9	0.3	128.6			
	4.	VWO	44.7	3.1	0.3	129.33			
	5.	LPH-2 OUT	81.6	2.0	0.5	116			
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/VACUUM | 140 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-34… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	LPH-2 NORMAL DRAIN TO LPH-1	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	273 x 6.35 | 323 x 9.53	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 | 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[] STAYPUT [■] TO CLOSE	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…DRV-34… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	40% MCR	45.6	0.7	0.3	53.3			
	2.	60% MCR	64.45	0.8	0.4	63.4			
	3.	100% MCR	116.0	1.2	0.5	72.7			
	4.	VWO	123.2	1.2	0.55	73.5			
	5.	BOTH HPH OUT	127.4	1.2	0.55	74.5			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/VACUUM | 75 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-37… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	1x500 MW FGUTPP-IV STPP LPH-2 ALT. DRAIN TO LP DRAIN F/T [■] INDOOR [] OUTDOOR [] ON/OFF [■] MODULATING 273 x 6.35 | 323 x 9.53 SA 106 GR B | SA 106 GR B	…… …… …… …… …… ……|……
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE BIDDER TO SPECIFY [■] BWE [] SWE [] FLANGED [] A216 WCB [■] A217 WC9 [] SS [] A217 CS [] A351 CF8M [] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE [] STD [] EXTENDED [] FINNED [■] LINEAR [] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) 440 C | 440 C 440 C | 440 C BIDDER TO SPECIFY [■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM) [] II [] III [] IV [■] V [] VI LESS THAN 85 dBA [■] YES [] NO [■] YES [] NO	…… ……|……|……|…… ……|……|…… …… …… …… ……|…… …… …… ……|…… ……|…… …… …… …… …… …… ……
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN ***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)** *VALVE POSN. ON SUPPLY AIR FAILURE	BIDDER TO SPECIFY 1.0 | 0.2 < 10 SEC BIDDER TO SPECIFY [■] TO OPEN [] STAYPUT [] TO CLOSE [] STAYPUT [■] TO OPEN	……|…… ……|…… …… …… …… ……
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	[■] REQUIRED (WITH HART PROTOCOL) [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [■] REQUIRED [] REQUIRED [■] NOT REQUIRED	…… …… …… …… …… …… …… …… …… …… ……

Tag No. :…DRV-37… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	40% MCR	45.6	1.1	0.3	85.2			
	2.	60% MCR	64.45	1.3	0.3	95.5			
	3.	100% MCR	116.0	1.7	0.3	108.3			
	4.	VWO	123.2	1.7	0.3	109.6			
	5.	LPH-1 OUT	149.5	1.4	0.5	104.4			
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/VACUUM | 115 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DRV-48… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	1x500 MW FGUTPP-IV STPP DEAERATOR OVERFLOW TO LP DRAIN F/T [■] INDOOR [] OUTDOOR [■] ON/OFF [] MODULATING 168.3 x 7.11 | 273 x 9.27 SA 106 GR B | SA 106 GR B	…… …… …… …… …… ……|……
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE BIDEER TO SPECIFY [■] BWE [] SWE [] FLANGED [] A216 WCB [■] A217 WC9 [] SS [] A217 CS [] A351 CF8M [] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE [] STD [] EXTENDED [] FINNED [] LINEAR [] EQ. PERCENTAGE [■] QUICK OPEN (ON/OFF) 440 C | 440 C 440 C | 440 C BIDDER TO SPECIFY [■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM) [] II [] III [] IV [■] V [] VI LESS THAN 85 dBA [■] YES [] NO [] YES [■] NO	…… ……|……|……|…… ……|……|…… …… …… …… ……|…… …… …… ……|…… ……|…… …… …… …… …… …… ……
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN ***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)** *VALVE POSN. ON SUPPLY AIR FAILURE	BIDDER TO SPECIFY 1.0 | 0.2 < 10 SEC BIDDER TO SPECIFY [■] TO OPEN [] STAYPUT [] TO CLOSE [■] STAYPUT	……|…… ……|…… …… …… …… ……
ACCESSORIES	POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [] REQUIRED [■] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [] REQUIRED [■] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [■] REQUIRED [] REQUIRED [■] NOT REQUIRED	…… …… …… …… …… …… …… …… …… …… ……

Tag No. :…DRV-48… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 5% # ± 5% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	MAX.-1 10% BMCR	162.5	9.3	0.3	161.8			
	2.	MAX.-2 10% BMCR	162.5	6.3	0.5	138.2			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 11 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 11/VACUUM | 175 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___1____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.
3. # WITHOUT POSITIONER, LINEARITY SHALL BE ± 5% ONLY.

Tag No. :…DMV-2… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	DM NORMAL MU TO HOTWELL	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	114.3 x 3.05 | 114.3 x 3.05	.....
	PIPE MATERIAL (inlet / outlet)	SA 312 TP 304 (ERW) | SA 312 TP 304 (ERW)	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[■] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [■] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [■] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[■] YES [] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-401-145-I801	
		VOLUME IIB	
		SECTION D	
		REV. NO. 01	DATE :21.07.2014
		SHEET 46 OF 54	

Tag No. :…DMV-2… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	MIN. (1% MU)	17	8.0	0.5	33			
	2.	NORMAL (3% MU)	49	7.5	0.55	33			
	3.	MAX. (5% MU)	82	6.5	0.6	33			
	4.	NORMAL (3% MU)	49	7.5	1.6	33			
	VALVE TYPE						[■] CAVITATION [] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 10 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 10/VACUUM | 50 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…DMV-9… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	1x500 MW FGUTPP-IV STPP DM EMERGENCY MU TO HOTWELL [■] INDOOR [] OUTDOOR [] ON/OFF [■] MODULATING 273 x 4.19 | 273 x 4.19 SA 312 TP 304 (ERW) | SA 312 TP 304 (ERW)	…… …… …… …… …… ……|……
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE BIDDER TO SPECIFY [■] BWE [] SWE [] FLANGED [] A216 WCB [] A217 WC6 [] SS [] A217 CS [■] A351 CF8M [] PTFE [■] GRAFOIL [■] DOUBLE [] SINGLE [] STD [] EXTENDED [] FINNED [] LINEAR [■] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) SS 316 STELLITED | SS 316 STELLITED SS 316 STELLITED | SS 316 STELLITED BIDDER TO SPECIFY [■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM) [] II [] III [] IV [■] V [] VI LESS THAN 85 dBA [■] YES [] NO` [■] YES [] NO	…… ……|……|……|…… ……|……|…… …… …… …… ……|…… …… …… ……|…… ……|…… …… …… …… …… …… ……
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN ***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)** *VALVE POSN. ON SUPPLY AIR FAILURE	BIDDER TO SPECIFY 0.2 | 1.0 < 10 SEC BIDDER TO SPECIFY [] TO OPEN [■] STAYPUT [] TO CLOSE [■] STAYPUT	……|…… ……|…… …… …… …… ……
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	[■] REQUIRED (WITH HART PROTOCOL) [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED PART OF POSITIONER [■] REQUIRED [] NOT REQUIRED [■] REQUIRED [■] REQUIRED [] REQUIRED [■] NOT REQUIRED	…… …… …… …… …… …… …… …… …… …… ……

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-401-145-I801	
		VOLUME IIB	
		SECTION D	
		REV. NO. 01	DATE :21.07.2014
		SHEET 48 OF 54	

Tag No. :…DMV-9… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	MIN. (5% MU)	82	10.0	0.45	33			
	2.	NORMAL (10% MU)	163	9.5	0.5	33			
	3.	CT PUMP DESIGN FLOW	300	7.5	0.8	33			
	4.	NORMAL (10% MU)	163	9.5	1.5	33			

VALVE TYPE	[■] CAVITATION [] FLASHING [] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2g) 10 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 10/VACUUM | 50 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED	…… ……|…… ……
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	……

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. :…FDV-14… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	1x500 MW FGUTPP-IV STPP	.....
	SERVICE	LOW LOAD FEED CONTROL	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	273 x 40 | 273 x 40	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C | SA 106 GR C	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [■] A217 WC9 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [■] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	17-4 PH SS | 17-4 PH SS	.....|.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] <7 M/SEC (WATER) | [] MAC NO. <1/3(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[■] YES [] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	***VALVE POSN ON ELEC SIGNAL FAILURE(4-20 mA)**	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :…FDV-14… Qty.: …1 per Unit … Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	5% MCR (MIN.SPEED)	83	31	24	111			
	2.	30% MCR	500	183.2	178.2	138 TO 197			
	3.	15% MCR	250	189	56.8	111			
	4.	25% MCR	416	195	77.5	111 TO 138			
	VALVE TYPE						[■] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 320 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 320 | 260 * IBR FORM III-C [■] REQUIRED [] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ___2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

Tag No. : PGB93AA101 Qty.:1 No Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

	DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	NTPC–1x500 MW FGUTPP	.....
	SERVICE	ECW SYSYTEM FOR SG AUX'S	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1X6 | 219.1X6	.....
	PIPE MATERIAL (inlet / outlet)	CS IS 2062 | CS IS 2062	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[■] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[■] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] < 7 M/SEC(WATER) | [] MAC NO. < 1/3 (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 : 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] STAYPUT	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : PGB93AA101 Qty.:1 No Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	....

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	NORMAL	270	10	3.0	38			
	2.	MIMIMUM	180	10.0	3.0	38			
	VALVE TYPE						[] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 10 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 12 | 60 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						....|.....		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						.....		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITION INDICATED AT SL. NO. 3 AND SHALL BE CHECKED FOR ALL SPECIFIED CONDITIONS AS PER SPECIFICATION .

Tag No. : PGB04AA101 Qty.:1 No Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	NTPC–1x500 MW FGUTPP	.....
	SERVICE	ECW SYSYTEM FOR TG AUX'S	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1X6 | 219.1X6	.....
	PIPE MATERIAL (inlet / outlet)	CS IS 2062 | CS IS 2062	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[■] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[■] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	FLOW	BIDDER TO SPECIFY	.....
	OUTLET VELOCITY	[■] < 7 M/SEC(WATER) | [] MAC NO. < 1/3 (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 : 1.0	.....|.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	BIDDER TO SPECIFY	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] STAYPUT	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED (WITH HART PROTOCOL)	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : PGB04AA101 Qty.:1 No Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 2%	....

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	NORMAL	300	8.0	3.0	38			
	2.	MIMIMUM	200	8.0	3.0	38			
	VALVE TYPE						[] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 10 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 10 | 60 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						....|.....		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						.....		

NOTES:

1. * TO BE FILLED BY MSE
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITION INDICATED AT SL. NO. 3 AND SHALL BE CHECKED FOR ALL SPECIFIED CONDITIONS AS PER SPECIFICATION .

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated) **1 X 500 MW FGUTPP, STAGE IV**	SPEC NO.: **PE-TS-401-145-I801** VOLUME **II-B** SECTION **D** REV. NO. 00 DATE: 19.04.2014 SHEET OF

Tag No..... Quantity..... Data Sheet No. PES-145-06-DS1-1

APPLICABLE FOR TAG Nos.WHEREVER STATEMENT "REQUIRED" INDICATED IN THE INDIVIDUAL CV DATA SHEETS

DATA SHEET – A& B for ACCESSORIES

	DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED-UP BY BIDDER)
POSITIONER (SMART) WITH HART PROTOCOL	MFR. & MODEL NUMBER	Bidder To Specify	
	BYPASS GAUGE / S ENCL. / CLASS	☐ YES ■ NO / ☐ THREE ■ TWO / ■ IP-65	
	INPUT SIGNAL (Kg / Cm^2)	■ 0.2 – 1.0 ☐ 0.2 – 0.6 ☐ 0.6 – 1.0	
	OUTPUT SIGNAL (Kg / Cm^2) TO	SUIT ACTUATOR	
AIR FILTER REGULATOR TWO (2) Nos. PER CV	MFR. & MODEL NUMBER	Bidder To Specify	
	AIR SUPPLY PRESS (Kg / Cm^2 g)	■ 7.0	
	OUTPUT PRESS (Kg / Cm^2 g)	TO SUIT ACTUATOR	
	FILTER SIZE	5 MICRON	
	OUTPUT GAUGE	■ REQUIRED ☐ NOT REQUIRED	
AIR LOCK	MFR. & MODEL NUMBER	Bidder To Specify	
	SET PRESS (Kg / Cm^2)	Bidder To Specify	
	SUPPLY PRESS (Kg / Cm^2)	■ 7.0	
	RESET TYPE	AUTO	
	VENT PLUG	REQUIRED	
	ENCLOSURE CLASS	■ IP 65	
LIMIT SWITCH	MFR. & MODEL NUMBER	Bidder To Specify	
	OPEN posn / INT posn / CLOSE posn	**1 NO.** / **---** / **1 NO.**	
	CONTACT TYPE	SPDT 2 NO + 2 NC	
	RATING (AC / DC)	5A 240V AC AND 0.2A 220V DC	
	ENCLOSURE CLASS	■ IP 55 ☐	
POSITION TRANSMITTER **(PART OF POSITIONER)**	MFR. & MODEL NUMBER	**PART OF POSITIONER**	
	TYPE		
	SUPPLY		
	OUTPUT RATING		
	ACCURACY		
	ENCLOSURE CLASS		
SOLENOID VALVE	MFR. & MODEL NUMBER	Bidder To Specify	
	RATING	■ 24V DC ☐ 220V DC ☐ 240V AC ☐	
	TYPE	3-WAY (UNIVERSAL OPERATION TYPE)	
	OPERATION QUANTITY	☐ Stayput ■ Interlock / ■ 1 ☐ 2	
	COIL INSULATION CLASS	CLASS - H	
	ENCLOSURE CLASS	■ IP 65	
HANDWHEEL	ORIENTATION	☐ TOP MOUNTED ■ SIDE MOUNTED	
JUNCTION BOX	NO. OF WAYS	☐ 24-WAYS ☐ AS REQUIRED ■ 36-Ways	
	SIZE AS	REQUIRED	
	CABLE GLANDS (Size / Quantity)	AS REQUIRED (Double Compression Type).	
	ENCLOSURE CLASS	■ IP 65	
I/P CONVERTER **(PART OF POSITIONER)**	INPUT SIGNAL / POWER SUPPLY	**PART OF POSITIONER**	
	SPLIT RANGE		
	ENCLOSURE CLASS		
	LINEARITY		
	HYSTERISIS		
Cu. Tubing & Fittings / per CV	**This is in addition to cu. Tubing and fittings which are integral part of CV**	20 Meters of ¼ " PVC coated Cu. Tubing, with 1 set of Fittings for each CV for connection to IA Header on one end and accessories on another end of CV.	

COMPANY SEAL

NAME

SIGNATURE

DATE

SECTION – D

DATA SHEET – C

NAME	
SIGNATURE	
DATE	

Tag No…… Quantity…… Data Sheet No. PES-145-06-DS2-0

DATA SHEET C

DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)

GENERAL*	PROJECT	
	SERVICE	
	LOCATION	
	DUTY	
	PIPE SIZE (inlet / outlet)	
	PIPE MATERIAL (inlet / outlet)	
BODY	MODEL NUMBER	
	TYPE OF BODY : GUIDING : NO. OF PORTS	
	BODY SIZE : PORT SIZE : DESIGN DV	
	END CONNECTION & RATING (ANSI)	
	BODY MATERIAL	
	PACKING MATERIAL SINGLE / DOUBLE	
	BONNET TYPE	
	TRIM FORM	
	TRIM MATERIAL : SEAT | PLUG	
	TRIM MATERIAL : CAGE | GUIDE	
	FLOW	
	OUTLET VELOCITY	
	REQUIRED LEAKAGE CLASS	
	NOISE LEVEL (dBA) (Spec. 3.1.14)	
	VACUUM SERVICE	
	ANTI CAVITATION TRIM	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	
	CLOSE AT : OPEN AT (Kg / Cm^2g)	
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	
	*VALVE POSN. ON SIGNAL AIR FAILURE	
	*VALVE POSN. ON SUPPLY AIR FAILURE	
ACCESSORIES	POSITIONER (SMART)	
	AIR FILTER REGULATOR	
	AIR LOCK RELAY	
	POSITION LIMIT SWITCH	
	POSITION TRANSMITTER	
	SOLENOID VALVE	
	E / P CONVERTER	
	JUNCTION BOX	
	HAND WHEEL (SIDE MOUNTED)	
	LOCAL POSITION INDICATOR	

Tag No…… **Quantity**…… Data Sheet No. PES-145-06-DS2-0

DATA SHEET C

DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)

PERFORMANCE OF VALVE	LINEARITY	
	HYSTERISIS	
	SENSITIVITY	
	ACCURACY (OVERALL)	

SERVICE CONDITION*	**SL. NO.**	**LOAD**	**FLOW (T/HR)**	**INLET PR. (KG/CM^2 (A)**	**OUTLET PR. (KG/CM^2 (A)**	**TEMP DEG. C**	**CALCULATED CV**	**% VALVE LIFT**	**VALVE O/L VELOCITY**

	VALVE TYPE
	* MAX SHUT OFF PRESS ((**KG/CM^{2}g)**
	* BODY DESIGN : PRESS ((**KG/CM^{2}g)** | **TEMP (DEG. C)**
	* IBR FORM III-C

TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.

Tag No…… Quantity…… Data Sheet No. PES-145-06-DS2-1

DATA SHEET C

DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)

POSITIONER (SMART) WITH HART PROTOCOL	MFR. & MODEL NUMBER	
	BYPASS GAUGE | S ENCL. | CLASS	
	INPUT SIGNAL (Kg / Cm^2)	
	OUTPUT SIGNAL (Kg / Cm^2)	
AIR FILTER REGULATOR TWO (2) Nos. PER CV	MFR. & MODEL NUMBER	
	AIR SUPPLY PRESS (Kg / Cm^2 g)	
	OUTPUT PRESS (Kg / Cm^2 g)	
	OUTPUT GAUGE	
	FILTER SIZE	
AIR LOCK	MFR. & MODEL NUMBER	
	SET PRESS (Kg / Cm^2)	
	SUPPLY PRESS (Kg / Cm^2)	
	RESET TYPE	
	VENT PLUG	
LIMIT SWITCH	MFR. & MODEL NUMBER	
	OPEN posn | INT posn | CLOSE posn	
	CONTACT TYPE	
	RATING (AC / DC)	
	ENCLOSURE CLASS	
POSITION TRANSMITTER (PART OF POSITIONER)	MFR. & MODEL NUMBER	PART OF POSITIONER
	TYPE	
	SUPPLY	
	OUTPUT RATING	
	ACCURACY	
	ENCLOSURE CLASS	
SOLENOID VALVE	MFR. & MODEL NUMBER	
	RATING	
	OPERATION QUANTITY	
	COIL INSULATION CLASS	
	ENCLOSURE CLASS	
HANDWHEEL	ORIENTATION	
JUNCTION BOX	NO. OF WAYS	
	SIZE	
	CABLE GLANDS (Size / Quantity)	
	ENCLOSURE CLASS	
I/P CONVERTER (PART OF POSITIONER)	INPUT SIGNAL | POWER SUPPLY	PART OF POSITIONER
	SPLIT RANGE	
	ENCLOSURE CLASS	
	LINEARITY	
	HYSTERISIS	
Cu. Tubing & Fittings / per CV	20 Meters of ¼ " PVC coated Cu. Tubing, with 1 set of Fittings for connection to IA Header on one end and accessories on another end of CV	

COMPANY SEAL
NAME
SIGNATURE
DATE

SECTION – D

QUALITY PLAN

PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-999-145-I 006**
VOLUME I IB
SECTION D
REV. NO. 06 DATE: 05.09.2013
SHEET 1 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W	V	Remarks
1.0 M	**ATERIAL**											
1.1	Body & Bonnet casting / forgings, plug, valve stem, seat ring/cage.	1. Ph ysical, Chemical properties	MA	Ph ysical, Chemical tests	One/ Heat(HT Batch)	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3 ---		2,1	
		2. Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3/2 2		1	IBR Certification (if applicable) to be verified by BHEL
		3. Internal quality of castings	MA	RT for Body & UT for Bonnet(NDT)	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	3/2 2		1	Only for rating ANSI 900 and above. Applicable for Body an d Bonnet o nly. For L ower rating o nly if called for in specification.
	4.	Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2 ---		2,1	
				2. MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	3 2		1	After Machining on machined surface only

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
RT- Radiographic Test; UT – Ultrasonic Test; PT – Dye penetrant Test; MT- Magnetic Test
$ P - Agency Performing the Test.; W - Agency Witnessing the Test.; V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor

PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-999-145-I 006**
VOLUME I IB
SECTION D
REV. NO. 06 DATE: 05.09.2013
SHEET 2 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W	V	Remarks
		5. Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	2	2	1	For Body & Bonnet after machining
1.2	Diaphragm	1. Surface Quality	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2,1	
		2. Hardness	MA	Measurement	100%	Mfr. standard M	fr. standard Te	st Certificate	3/2	---	2,1	
		3. Endurance / Life cycle	MA	Cyclic test 10,000 cycles	One / Type	10,000 cycles/ Mfr. standard.	No damage	Test Certificate	3/2		2,1	
1.3 Sp	ring	1. Composition	MA	Chemical-Analysis	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
		2. M ech. Properties	MA	Mech. Test	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
		3. Perfor mance	MA	1. Stiffness ratio	100% M	aterial spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				2. Scragging	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				3. Cyclic test (Endurance)	One / type	10,000 cycles	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				4. Dimension (Measurement)	One sample/ Lot	Mfr. standard	Appd Drg	Record	3	---	2,1	

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PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-999-145-I 006**
VOLUME I IB
SECTION D
REV. NO. 06 DATE: 05.09.2013
SHEET 3 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
1.4	Electrical items [Limit switches, Solenoids, Position Transmitter(if provided externally)]	1. R outine Test	MA	HV, IR, Continuity function	100%	Rele. Standards	Rele. Standards	Test Certificate	3	---	2,1	In case TC is not available, Actual test shall be conducted
		2. Degree of protection	MA	IP/NEMA Tests	One sample / type	Approved Data sheet	Approved Data sheet	Test Certificate	3 ---		2,1	
1.5 Press	ure Gauges	1. Performance	MA	Review of calibration certificates	100% M	fr. Standard	Mfr. Standard	Test Certificate	3 ---		2,1	
		2. Marking	MA	Visual	100%	Mfr. standard	Mfr. standard	Records	3	---	2,1	
2.0 I	**N PROCESS INSPECTION**											
2.1 Aft	er machining, i, Body ii Bonnet iii Plug iv Valve Stem v seat ring/cage	1. Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	ASME B 16.34	ASME B 16.34	Test Records	2 ---		1	Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	Mfr. Standard	Mfr. Standard	Records	2	---	1	
		3. Hard facing (wherever applicable)	MA	Ha rdness Measurement	One sample/Lot	Mfr. Standard	Mfr. Standard	Records	2 ---		1	
2.2	Lapping	Machining surface contact	MA	Blue Matching	One sample/lot	------ Proper	Physical Contact	--- 2		---	---	
3.0	**TESTS ON COMPLETED VALVE**											

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PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-999-145-I 006**
VOLUME I IB
SECTION D
REV. NO. 06 DATE: 05.09.2013
SHEET 4 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.2	Body	Leakage and Pressure test (Body Mount Leakage)	MA	Hydro test	100%	ISA - S-75.19	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.3	Seat leakage test for completed valve	Seat Leakage	MA	Pneumatic Test	100%	FCI-70.2	FCI-70.2	Test Certificate	2	1	1	Refer Note-4
4.0 OPER ATION TEST ON COMPLETED VALVE (Final inspection)		1. Valve Travel	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		3. Linearity/cam characteristic	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		4. Repeatability	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		8. Control Valve characteristics / CV Test	MA	♦Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	As per specs/ Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2	--	1	♦Size = Body & port size Or Body size & CV for non std port. Refer Note 1.

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W	V	Remarks
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Report	2	1	1	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Records 2		1	1	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	As per spec & Appd drg	As per spec & Appd drg	Test Certificate	2 1		1	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2 1		1	
5.0	**AUXILIARY ITEMS (Performance test of auxiliary items shall be performed on the completely assembled valve)**											
5.1	Positioner	Overall leakage after assembly including Nozzles leakage	MA	Leak Test (in the steady state input signal)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2 ---		1	Overall leakage including tubing
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	Mfr. Standard	No leakage	Test Certificate	3/2 ---		1	
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2 ---		1	
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	3/2 ---		1	
5.4	Electronic position transmitter(not applicable if provided integral to smart positioner)	1. Accuracy	MA	Operation	100%	Approved data sheet /	Approved data sheet /	Test Certificate	2 1		1	

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PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-999-145-I 006**
VOLUME I IB
SECTION D
REV. NO. 06 DATE: 05.09.2013
SHEET 6 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W	V	Remarks
5.5	Current to Pneumatic converter(not applicable for smart positioner)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
5.6	Smart Positioner (As Applicable)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Approved data sheet / Mfr. Standard	Approved data sheet / Mfr. Standard	Test Certificate	2	1	1	
6.0	**PAINTING**	Soundness of Painting	MA	Visual and Measurement	100%	BHEL specn. / Mfr. Standard	BHEL specn. / Mfr. Standard	Inspection Report	2	---	---	Refer Note-2
7.0	**PACKING**	Soundness of Packing against transit damage	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-3

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PEM :: C&I	STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)	QUALITY PLAN NO.: **PE-QP-999-145-I 006**
		VOLUME I IB
		SECTION D
		REV. NO. 06 DATE: 05.09.2013
		SHEET 7 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	

NOTES:

1. In case valid CV test certificate for a similar control valve(Same type, Same size, Same CV) is not submitted to BHEL by the vendor, CV test shall be conducted at FCRI/Any govt. approved laboratory/ BHEL approved Laboratory.
2. In the absence of BHEL spec. for painting, vendor to obtain BHEL's approval on their painting specification / procedure.
3. Sea worthy packing shall be provided, if applicable.
4. The quantum of check shall be 100% for manufacturer and 10% for BHEL/BHEL nominated inspection agency.
5. IBR certificates in Form III-C shall be submitted if called for in the specification/datasheet.
6. Copies of all TC's(Test Certificates) for materials duly correlated with Heat Nos., TC's for electrical items and mechanical tests(Leak/Operation) shall be submitted to BHEL for verification and acceptance.

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SECTION – D

BILL OF QUANTITY

BILL OF QUANTITY

[A] CONTROL VALVES COMPLETE WITH PNEUMATIC ACTUATOR AND ALL ACCESSORIES MOUNTED, PIPED AND TERMINATED ON JB

S.NO	ITEM DESCRIPTION		Qty/Unit
S. No.	TAG NO.	SERVICE	
1	ASV-8	D/A Pegging from Aux. Steam Header	1
2	CRHV-6	D/A Pegging from CRH Line	1
3	CDV-10	CEP-A Minimum Recirculation	1
4	CDV-12	CEP-B Minimum Recirculation	1
5	CDV-14	CEP-C Minimum Recirculation	1
6	CDV-22	Main Condensate Control	1
7	CDV-25	Main Condensate Control	1
8	CDV-39	GSC Min Flow Re-circulation	1
9	CDV-43	Excess Return To CST	1
10	CDV-67	Condensate for SD F/T	1
11	CDV-72	Condensate for Valve Gland Sealing	1
12	DRV-2	HPH-6A Drain to HPH-5A	1
13	DRV-8	HPH-6B Drain to HPH-5B	1
14	DRV-5	HPH-6A Drain to HP Drain F/T	1
15	DRV-11	HPH-6B Drain to HP Drain F/T	1
16	DRV-15	HPH-5A Drain to Deaerator	1
17	DRV-22	HPH-5B Drain to Deaerator	1
18	DRV-18	HPH-5A Drain to HP Drain F/T	1
19	DRV-25	HPH-5B Drain to HP Drain F/T	1
20	DRV-28	LPH-3 Drain to LPH-2	1
21	DRV-31	LPH-3 Drain to LP Drain F/T	1
22	DRV-34	LPH-2 Drain to LPH-1	1
23	DRV-37	LPH-2 Drain to LP Drain F/T	1
24	DRV-48	Deaerator Overflow	1
25	DMV-2	DM Normal Make-Up to Hotwell	1
26	DMV-9	DM Emergency MU to Hotwell	1
27	FDV-14	Low Load Feed Control	1
28	ECW-20	ECW Syatem for TG AUX	1
29	ECWSG-15	ECW Syatem for SG AUX	1

[B]	20 Meters of 10mm OD x 1.5mm thick PVC Coated annealed Cu. Tubing **(for each CV) (To be supplied Loose)**		580 METERS
[C]	**FITTINGS: for each CV (To be Supplied Loose)**	**(i)** BRASS FITTING-Double Compression Type for Connection to Air Filter Regulator	1 LOT
		(ii) BRASS FITTING- Double Compression Type for Connection to Solenoid Valve	1 LOT
		(iii) BRASS FITTING- Double Compression Type for Connection to IA Header isolation vlv.	1 LOT
		(iv) BRASS TEE	1 LOT
		(v) Cu connector for connection between tubing & IA HDR isolation valve	1 LOT
[D]	**START-UP/COMMISSIONING SPARES :** (TOTAL PRICE FOR 1 SETS OF BODY AND BONNET GASKET & 1 SETS OF GLAND PACKINGS PER CV)		1 LOT
[E]	**MANDATORY SPARES**		1 LOT
[F]	**DIAGNOSTIC SOFTWARE**: Software for diagnostic & configuration with facility of configuring all valve tags in a unit through polling & without any change in wiring.		1 LOT
[G]	**UNIVERSAL HAND HELD CALIBRATOR**		1 Nos.

SECTION – D

SPARES

[A] LIST OF COMMISSIONING SPARES

S.No.	ITEM DESCRIPTION	QUANTITY REQUIRED
1	Gaskets	One (1) set with each control valve Tag
2	Gland Packing	One (1) set with each control valve Tag

[B] LIST OF MANDATORY SPARES

S. NO	ITEM DESCRIPTION	QUANTITIY
1.	Position feedback transmitter	10% or 2 NOS. of each type whichever is more. (1 LOT)
2.	Valve Trim(including cage, plug, stem, seat rings, guide bushings, etc)	1 set for each type of control Valve, whichever is more. (1 LOT)
3.	Diaphragms, O Rings, seals, etc.	100 % of all types , make ,etc. (1 LOT)
4.	Pressure gauges of all types, make, rating ,etc.	10% or 2 NOS. of each type whichever is more. (1 LOT)
5.	Solenoid Valve	10% or 2 NOS. of each type whichever is more. (1 LOT)
6.	Positioners Unit	20% or 2 NOS. of each type whichever is more. (1 LOT)
7.	Pneumatic and electro-hydraulic actuator assembly.	10% or 2 NOS. of each type, model & rating whichever is more. (1 LOT)

NOTE : - The Actual Quantity shall be worked out during detailed Engineering.

NTPC LIMITED

1 X 500 MW FGUTPP STAGE IV

TECHNICAL SPECIFICATION
FOR

CONTROL VALVE

WITH ACCESSORIES

(Pneumatically Operated)

VOLUME III

SPECIFICATION No: **PE-TS-401-145-I801**

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT DIVISION
NOIDA, INDIA

CONTENTS

VOL- III

COMPLIANCE CERTIFICATE
For
Control Valve with accessories
(To be Signed & Stamped by the Bidder)

Project: 1 X 500 MW FGUTPP, STAGE IV

Specification no.: PE-TS-401-145-I801

We shall comply with the following:-

1. All the requirements as stated in Technical Specification / Specific Technical requirement / Data sheets / Drawings, BHEL quality plan etc as enclosed in the tender, shall be fully complied **without any deviation**.

2. BHEL Quality Plan (enclosed with the specification) duly signed and stamped is submitted herewith **without any deviation.**

3. Calculation of Cv, Noise level, Valve outlet velocity, Trim exit velocity, Actuator sizing, Data sheet-C in line with Data sheet-A of specification, dimensional drawings / edge preparation details, etc shall be submitted for BHEL/Customer review and approval, to reach BHEL within 15 days after receipt of LOI.

4. Selection of valves and Actuators are our (bidder's) responsibility. Any change in selection of type of valve and Actuators / Sizing / percentage opening, calculations, QP, etc., if desired by BHEL / Customer during approval of the documents after award of contract, without major changes in process parameters as per tender Specification, shall be carried out without any commercial implication and time delay.

5. Body material and Trim material combinations offered will be equivalent or better than the material specified in data sheet-A. Wherever Trim material combinations offered differ from the specification, its superiority shall be authenticated with documentary evidence and justification produced for BHEL / Customer's concurrence. BHEL / Customer reserve the right to accept/rejects any variation to the specification.

Signature with date	
Name	
Company seal	

SCHEDULE OF PRICES

S.NO	ITEM DESCRIPTION		UNIT PRICE (Ex-Works)
[A]CONTROL VALVES COMPLETE WITH PNEUMATIC ACTUATOR AND ALL THE ACCESSORIES			
S. No.	**TAG NO.**	**SERVICE**	
1	ASV-8	D/A Pegging from Aux. Steam Header	
2	CRHV-6	D/A Pegging from CRH Line	
3	CDV-10	CEP-A Minimum Recirculation	
4	CDV-12	CEP-B Minimum Recirculation	
5	CDV-14	CEP-C Minimum Recirculation	
6	CDV-22	Main Condensate Control	
7	CDV-25	Main Condensate Control	
8	CDV-39	GSC Min Flow Re-circulation	
9	CDV-43	Excess Return To CST	
10	CDV-67	Condensate for SD F/T	
11	CDV-72	Condensate for Valve Gland Sealing	
12	DRV-2	HPH-6A Drain to HPH-5A	
13	DRV-8	HPH-6B Drain to HPH-5B	
14	DRV-5	HPH-6A Drain to HP Drain F/T	
15	DRV-11	HPH-6B Drain to HP Drain F/T	
16	DRV-15	HPH-5A Drain to Deaerator	
17	DRV-22	HPH-5B Drain to Deaerator	
18	DRV-18	HPH-5A Drain to HP Drain F/T	
19	DRV-25	HPH-5B Drain to HP Drain F/T	
20	DRV-28	LPH-3 Drain to LPH-2	
21	DRV-31	LPH-3 Drain to LP Drain F/T	
22	DRV-34	LPH-2 Drain to LPH-1	
23	DRV-37	LPH-2 Drain to LP Drain F/T	
24	DRV-48	Deaerator Overflow	
25	DMV-2	DM Normal Make-Up to Hotwell	
26	DMV-9	DM Emergency MU to Hotwell	
27	FDV-14	Low Load Feed Control	
28	ECW-20	ECW Syatem for TG AUX	
29	ECWSG-15	ECW Syatem for SG AUX	

[B]	20 Meters of 10mm OD x 1.5mm thick PVC Coated annealed Cu. Tubing **(for each CV) (To be supplied Loose)**		
[C]	**FITTINGS : for each CV (To be Supplied Loose)**	**(i)** BRASS FITTING-Double Compression Type for Connection to Air Filter Regulator	
		(ii) BRASS FITTING- Double Compression Type for Connection to Solenoid Valve	
		(iii) BRASS FITTING- Double Compression Type for Connection to IA Header isolation vlv.	
		(iv) BRASS TEE	
		(v) Cu connector for connection between tubing & IA HDR isolation valve	
[D]	**START-UP/COMMISSIONING SPARES :** (TOTAL PRICE FOR 1 SETS OF BODY AND BONNET GASKET & 1 SETS OF GLAND PACKINGS PER CV)		
[E]	**MANDATORY SPARES**		
[F]	**DIAGNOSTIC SOFTWARE**: Software for diagnostic & configuration with facility of configuring all valve tags in a unit through polling & without any change in wiring.		
[G]	**UNIVERSAL HAND HELD CALIBRATOR**		
[H]	**CV TEST CHARGES (ONE PER TYPE PER SIZE, CV VALUE. TAG NOS. TO BE GROUPED ACCORDINGLY AND INDICATED.)**		
[I]	**DTM(DEVISE TYPE MANAGER)/ DTD(DEVICE TYPE DESCRIPTION) FILES FOR ENGINEERING.**		
[J]	**DOCUMENTATION CHARGES FOR THE FINAL DOCUMENTS & SOFT COPIES.**		

TOTAL PRICE: A+B+C+D+E+F+G+H+I+J

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

UNIT PRICES

CONTROL VALVE ACCESSORIES

S. No.	ITEMS	UNIT PRICE (Ex-Works)
1.	SMART POSITIONER (EACH TYPE)	
2.	VALVE TRIM OF EACH TYPE (Separate list to be attached if required)	
3.	DIAPHRAGMS,O-RINGS,SEALS ETC OF ALL TYPE,MAKE ETC	
4.	AIR FILTER REGULATORS	
5.	AIR LOCK RELAY	
6.	POSITION LIMIT SWITCH	
7.	VOLUME BOOSTER	
8.	PNEUMATIC RELAY	
9.	SOLENOID VALVE	
10.	E/P CONVERTER	
11.	PRESSURE GAUGES OF EACH TYPE	
12.	JUNCTION BOX (24 WAYS)	
13.	HANDWHEEL	
14.	HART CALIBRATOR	
15.	PERSONAL COMPUTER (INDUSTRIAL GRADE)	
16.	SOFTWARE FOR POSITIONER(DIAGONOSTIC)	
17.	CU CONNECTOR ½ INCH TO ¼ INCH	
18.	ACTUATOR OF EACH TYPE (Separate list to be attached if required)	
19.	BRASS FITTING FOR CONNECTION TO AIR FILTER REGULATOR	
20.	BRASS FITTING FOR CONNECTION TO SOLENOID VALVE	
21.	BRASS FITTINGS FOR CONNECTING TO AIR HEADER	
22.	EQUAL COPPER TEE	
23.	BRASS TEE	
24.	COPPER TUBING PER METRE	
25.	POSITION FEEDBACK TRANSMITTERS	
26.	DTM(Devise type manager)/DTD(devise type description) Files for engineering.	

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

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CV TEST CHARGES

S.NO	ITEM DESCRIPTION		QTY	CV TEST CHARGES (Ex-works)
	TAG NO.	SERVICE		
1	ASV-8	D/A Pegging from Aux. Steam Header	01	
2	CRHV-6	D/A Pegging from CRH Line	01	
3	CDV-10	CEP-A Minimum Recirculation	01	
4	CDV-12	CEP-B Minimum Recirculation	01	
5	CDV-14	CEP-C Minimum Recirculation	01	
6	CDV-22	Main Condensate Control	01	
7	CDV-25	Main Condensate Control	01	
8	CDV-39	GSC Min Flow Re-circulation	01	
9	CDV-43	Excess Return To CST	01	
10	CDV-67	Condensate for SD F/T	01	
11	CDV-72	Condensate for Valve Gland Sealing	01	
12	DRV-2	HPH-6A Drain to HPH-5A	01	
13	DRV-8	HPH-6B Drain to HPH-5B	01	
14	DRV-5	HPH-6A Drain to HP Drain F/T	01	
15	DRV-11	HPH-6B Drain to HP Drain F/T	01	
16	DRV-15	HPH-5A Drain to Deaerator	01	
17	DRV-22	HPH-5B Drain to Deaerator	01	
18	DRV-18	HPH-5A Drain to HP Drain F/T	01	
19	DRV-25	HPH-5B Drain to HP Drain F/T	01	
20	DRV-28	LPH-3 Drain to LPH-2	01	
21	DRV-31	LPH-3 Drain to LP Drain F/T	01	
22	DRV-34	LPH-2 Drain to LPH-1	01	
23	DRV-37	LPH-2 Drain to LP Drain F/T	01	
24	DRV-48	Deaerator Overflow	01	
25	DMV-2	DM Normal Make-Up to Hotwell	01	
26	DMV-9	DM Emergency MU to Hotwell	01	
27	FDV-14	Low Load Feed Control	01	
28	ECW-20	ECW Syatem for TG AUX	01	
29	ECWSG-15	ECW Syatem for SG AUX	01	

NOTE:

a) CHARGES TO BE INDICATED AGAINST EACH TAG NO.

b) CV TEST TO BE CONDUCTED FOR ONE PER TYPE PER SIZE, CV VALUE. TAG NOS. TO BE GROUPED ACCORDINGLY AND INDICATED.

INSPECTION SCHEDULE

(PLACE & ADDRESS OF TESTING/ INSPECTION AND ITS SCHEDULE DATE & DURATION IN NUMBER OF DAYS ITEM/COMPONENTWISE TO BE LISTED)

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

SCHEDULE OF SUBMISSION OF DRAWINGS / DOCUMENTS, EQUIPMENT MANUFACTURE INSPECTION AND DESPATCH

1.	**ZERO DATE**	**DATE of LOI / FOI / TOI**
2.	Submission of Data Sheets / documents / catalogues / Valve sizing calculations / Noise calculations for approval.	2 Weeks from the Zero date.
3.	Technical finalisation, freezing of inputs of manufacture by way of vetting of documents and technical discussions and resubmissions of documents (if required)	8 Weeks from the Zero date.
4.	Inspection of Equipment as per Approved (Category-I) drawings / documents.	24 Weeks from the Zero date.
5.	Release of MDCC by BHEL	26 Weeks from the Zero date.
6.	Dispatch (Packaging & Dispatch)	26 Weeks from the Zero date.
7.	Final documents submission as per Contract	28 Weeks from the Zero date.

NOTE: Delays due to non-fulfillment of the requirements of approved Quality Plan and approved Data sheets; Drawings, Catalogues and Sizing Calculations observed during inspection shall be to the Vendor's account.

Delays due to INCOMPLETE (Partly) submission of Data sheets, Drawings, Catalogues and Sizing Calculations also be considered as **"DOCUMENTS NOT SUBMITTED"**

(Signature and Stamp of the Bidder)