RAICHUR POWER CORPORATION LTD.

2 X 800 MW YERMARUS TPS

VOLUME IIB & III

TECHNICAL SPECIFICATION

FOR

CONTROL VALVES WITH ACCESSORIES

(Pneumatically Operated)

SPECIFICATION No: **PE-TS-362-145-I104A**

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

	PREAMBLE	SPECIFICATION NO. PE-TS-362-145-1104A
		VOLUME
		SECTION
		REV. NO. 00 DATE 01.10.2011
		SHEET 1 OF 1

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.

PARTICULARS	PREPARED BY	APPROVED BY
NAME	V M RAO	C L ABBEY
DESIGNATION	DGM	AGM & MR
SIGN. & DATE		

TABLE OF CONTENTS

VOLUME - II B

VOLUME - III

RAICHUR POWER CORPORATION LTD.
2 X 800 MW YERMARUS TPS

VOLUME IIB

TECHNICAL SPECIFICATION
FOR
CONTROL VALVES WITH ACCESSORIES
(Pneumatically Operated)

SPECIFICATION No: **PE-TS-362-145-I104A**

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

TABLE OF CONTENTS

VOLUME - II B

SECTION – A

SCOPE OF ENQUIRY

SCOPE OF ENQUIRY

1. SCOPE

1.1. This specification covers the Design, Manufacture, Inspection and Testing at manufacturer's works, proper packing for transportation and delivery to site of the Control Valves (Critical) with Pneumatic Actuator along with Accessories, Start-up/Commissioning & Mandatory Spares as mentioned in different sections of this specification for 2X800MW RPCL TPS at Yermarus.

1.2. The quality plan enclosed forms the minimum requirement but not limited to be adhered to by the bidder. Quality plan (attached) is same and applicable for all units covered in enquiry.

1.3. The enquiry shall be operated in **"COMPLAINCE MODE"** means bidder to comply with the requirement of specification, quality plan, delivery schedule, quantities, start-up/commissioning, mandatory spares etc, and as a token of acceptance of the same, following formats to be signed, stamped with company seal and submitted separately for each units.

a. Compliance certificate
b. Schedule of submission of drawings / documents, equipment manufacture inspection and dispatch
c. Schedule of price, unit prices, inspection schedule
d. Quality plan

1.4. 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 4a above shall be final and binding. Data sheets shall be furnished by the successful bidder (vendor), only after the award of contract.

1.5. Bidder to note that CV tests required being conducted one type per size, CV value bidder to group such value and indicate the same along with the price bid. Unpriced portion to be submitted to engineering.

2. GENERAL TECHNICAL INSTRUCTIONS

2.1. It is not the intent here to specify all the details of design and manufacture. However, the equipment shall conform in all respects to high standard of design, engineering and workmanship and shall be capable of performing the required duties in a manner 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.

2.2. The omission of specific reference to any component / accessory necessary for the proper performance of the equipment's shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.

2.3. BHEL's / RPCL representatives shall be given access to the shop in which the equipment's are being manufactured or tested and all test records shall be made available to him.

2.4. The Equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and Material Dispatch Clearance Certificate (MDCC) is issued by BHEL / RPCL.

SECTION – B

PROJECT INFORMATION

	RAICHUR POWER CORPORATION LTD	
	TITLE **PROJECT INFORMATION**	SHEET 1

1.0	Owner	:	Raichur Power Corporation Ltd 22/23, Sudarshan Complex, IInd floor, Sheshadri Road, Bangalore–560 009 Karnataka, India
2.0	Consultant	:	M/s Evonik Energy Services (I) Pvt. Ltd.,A-29, Sector 16 Noida-201301(UP), India
3.0	Project Title	:	2x800 MW Yermarus Thermal Power Station
4.0	Location	:	Yermarus Raichur Dist Karnataka State, INDIA It is situated at about 8 Kms from Raichur on the Raichur-Hyderabad State Highway-13 and 12 kms away from Bank of river Krishna and about 5 kms from Raichur Thermal Power Station
5.0	Nearest Railway	:	Chicksugur Railway Station which is about 2 kms from site.
6.0	Nearest Airport	:	Hyderabad around 200 kms
7.0	Nearest Port		Chennai around at about 470 kms from site.
8.0	Latitude and Longitude	:	Latitude – 16° 16' 55.9"N Longitude – 77° 20' 38.6"E
9.0	Elevation above mean sea level	:	350-375 meters
10.0	Climatic Conditions		
	(a) Ambient Temperature		
	i. maximum temperature	:	45° C
	ii. minimum temperature	:	6° C

iii. Design Temperature for all Electrical/ Mechanical Equipment : 50° C Ambient

(b) Relative Humidity

i. Maximum during monsoon : 85%

ii. Minimum : 20%

iii. Average : 65%

(c) Rainfall

Annual average rain : 720 mm
Max. for one day : 115 mm
Max. intensity : 38 mm/hr
Period : June to September

(d) Wind Speed

i. Prevailing wind direction : West, South-East, North-West, South-West

ii. Maximum mean wind speed : 15.9 Kms / hr (4.42 m/s)

iii. Average : 9.61 Km/hr (2.67 m/s)

11.0 Wind Load

Calculations for wind effect shall be in accordance with IS:875- (Part-3) latest revision taking into account the following :

(a) Basic wind speed of 39 m/sec as given in Fig.1 of the code.

(b) Factor K1 shall be taken as 1.06

(c) Terrain category shall be 2 and corresponding values shall be taken for K2

(d) Factor K3 shall be taken as 1.0

12.0 Wind Loading for Stack

(a) For wind pressure as per clause 11.0 above
(b) For RC stacks as per IS: 4998

13.0	Seismic data (as per IS:1893 latest issue)			
	(a)	Zone	:	Zone III (as per IS:1893- latest)
	(b)	Importance factor (I)	:	1.75
14.0	Auxiliary power supply		:	Auxiliary electrical equipment to be supplied against this specification shall be suitable for operation on the following supply system.
	(a)	For motors rated above 1500 kW	:	11000V, 3 phase, 3 wire, 50Hz medium earthed AC
	(b)	For motors rated 175KW and above and below 1499KW.		3300V, 3 phase, 3 wire, 50Hz medium earthed AC
	(c)	For motor rated 174 kW and below	:	415, 3 phase, 3 wire solidly earthed AC
	(d)	For motor control centre	:	415V, 3 phase, 3 wire solidly earthed AC
	(e)	DC. motor starters, DC solenoids, DC alarm, control and protections	:	220 V DC, 2 wire, unearthed DC
	(f)	AC control & protective devices	:	110 V 1 phase, 50Hz, 2 wire AC supply. The single-phase 110V AC supply shall be derived by Contractor by providing 415V/110V control transformers of adequate rating with MCCB /MCB on both the primary and secondary sides.
	(g)	Uninterrupted power supply	:	240 V, 1 phase, 50Hz, 2 wire AC supply from UPS system for I&C (including indicator recorders) and UCMS only

(h)	AC solenoids, indicators/recorders, space heaters (for motors rated 30KW and above)	:	240V 1 phase, 2 wire, 50Hz AC system with effectively earthed neutral. The power supply shall be derived by CONTRACTOR by providing 415V/ 240V transformer of adequate rating with MCCB/MCB on primary/secondary sides.
(i)	Winding heating of motors below 30kW	:	24 V 1 phase,50Hz, AC with one point earthed. This shall be derived by CONTRACTOR by providing 415V 3 phase, 3 wire, AC supply through an adequately rated step-down transformer of adequate rating with MCCB / MCB on primary/secondary sides.
(j)	Solid state controls (including solenoid valves)	:	24 V DC, 2 wire, supply from Battery chargers for instrumentation system only.
(k)	Lighting fixtures	:	240 V, 1 phase, 2 wire, 50Hz system.
(l)	Lighting fixtures and space heaters in panels	:	240 V, 1 phase, 2 wire, 50Hz system.
(m)	Construction supply	:	415 V, 3 phase, 4 wire, 50 Hz AC supply with neutral lead solidly earthed.

(n) The above voltages may vary as follows :

All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without any change in their performance.

i.	AC supply	:	Voltage variation ±10% Frequency variation ± 5% Combined voltage & frequency variation ± 10%
ii.	DC supply	:	Voltage variation +10% -20%

SECTION – C

SPECIFIC TECHNICAL REQUIREMENTS

	Technical specification for **Control Valves with Accessories** (Pneumatically Operated) **2X800MW YERAMARUS STPP**	SPECIFICATION NO. **PE-TS-362-145-I104A**
		VOLUME **II-B**
		SECTION **C**
		REV. NO. 00 | DATE:
		SHEET 1 OF 5

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 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.**
2. **Data sheet - B need not be furnished with bid.**
3. 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.
4. 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 15% at min flow condition and 85% at max flow condition.**
5. Either Extended type bonnet or cooling fin type bonnet shall be provided for service above 200 Deg C and for other service standard.
6. 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.
7. Control valves shall be sized to have an opening of 15% at minimum flow condition and 85% at maximum flow condition. Noise level shall not exceed 85 dB at a distance of about 1.5 M from the valve. In case of predicted noise level above 85dBA, suitable low noise trim shall be provided.
8. Leakage class for double seated valve shall not exceed 0.05%, and single seated valve shall not exceed 0.01%. Either extended type bonnet or cooling fin type bonnet shall be provided for service above 200°C and for other service the bonnet type shall be standard.
9. **Flanged connection** shall be provided **for DM water services**, with suitable rubber lined interfaces. Water seal shall be provided for valves that could be subjected to below atmospheric conditions.
10. Generally stem and guide material (trim) shall be SS 316 sterlited, and plug and seat material will be 17-4 PH SS, except for specific applications like DM water.

11. The noise abatement shall be obtained by valve body and trim design and not by use of silencer. The trims supplied shall be suitable for quick changing. Actuator housing shall be of pressed steel construction.

12. In Vibration prone areas, positioners shall be located away from the control valve/damper and location shall be approved by OWNER/ENGINEER. Position transmitter shall be non-contact type.

13. All actuators would be sized so that the final control elements operate properly even when the upstream pressure exceeds 110% of maximum value.

14. For the services in heat prone area Integral type positioners shall be offered.

15. **SPARES:** The following spares are required to be offered

    (A) 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.

    (B) 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.

16. 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.

17. **Documentation:**

    (A) Along with the bids: following documents for respective projects separately

    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:

6 sets of the following documents + 2 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.

(C) Final documentation:

The documentation as listed below will separate for respective projects

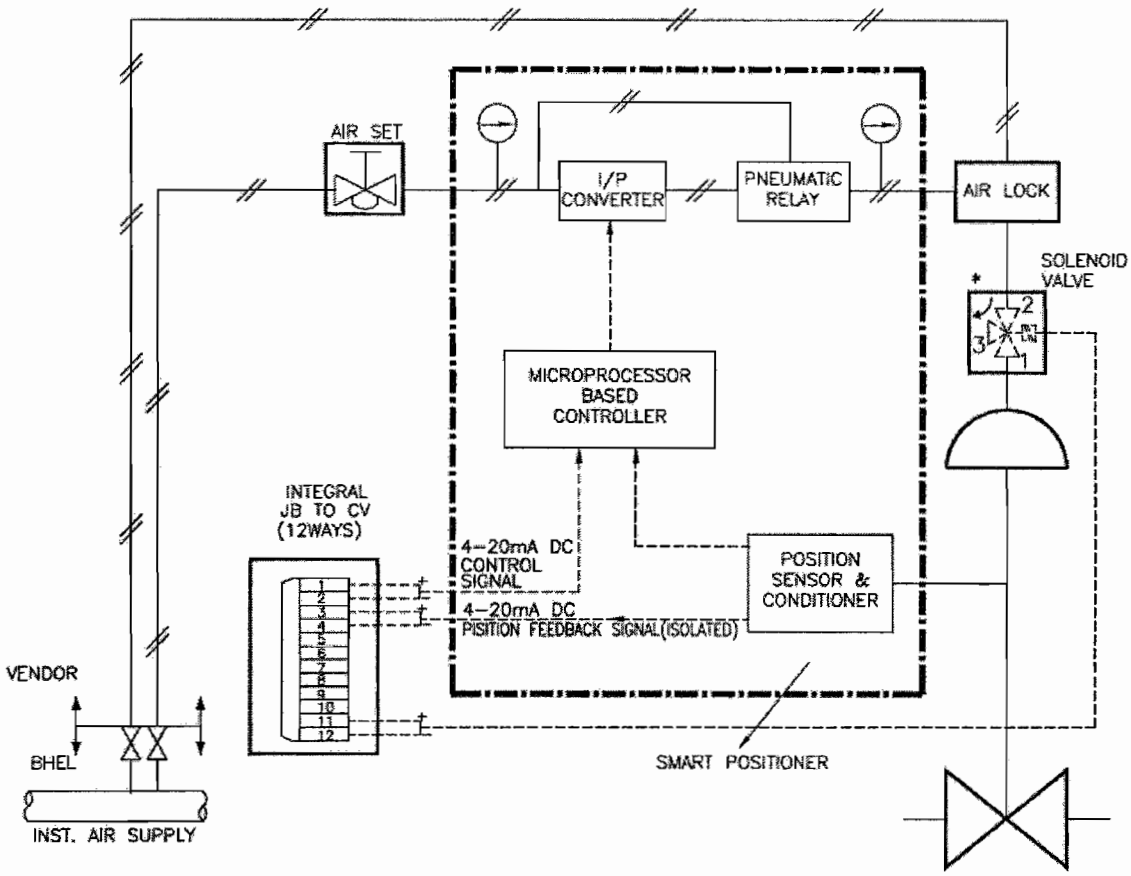
1. Category -I & IV Approved final drawings/data sheets, - 20 sets with 4 CD-ROMS
   Valve sizing calculations, Noise level calculations and
   Valve Outlet Velocity calculations.

2 Test certificates - 20 sets.

3. Operation & Maintenance Manuals - 20 sets with 4 CD-ROMS
   for Control Valve, Actuator and all the
   Accessories.

HOOKUP DIAGRAM

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated) **2X800MW YERAMARUS STPP**	SPECIFICATION NO. **PE-TS-362-145-I104A** VOLUME **II-B** SECTION **C** REV. NO. 00 | DATE: SHEET 5 OF 5



NOTE:-

1. FACILITY REQUIRED FOR VALVE STAYPUT ON AIR SUPPLY FAILURE.
2. GAUGES REQUIRED FOR AIR SUPPLY & OUTPUT(S).
3. MOUNTING ACCESSORIES AS REQUIRED.
4. POSITION FEEDBACK SIGNAL SHALL BE 4-20mA (ISOLATED SIGNAL)
5. FOR ON/OFF DUTY PNEUMATIC CONTROL VALVE THE FOLLOWING ACCESSORIES SHALL NOT BE APPLICABLE:-
   a) POSITIONER
   b) POSITION TRANSMITTER
   c) AIR LOCK

SECTION – D

SPECIFICATION FOR CONTROL VALVES

TABLE OF CONTENTS

SECTION – D

PART - 1

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
Pressure & Temperature ratings	:	ANSI-B16.34
Enclosure class	:	IEC-144
Control Valves	:	BS-5793
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. 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)	:	75% valve lift.
	-	Max. Flow	:	90% valve lift.
	-	Min. Flow	:	25% valve lift.
Valve with Equipercentage Characteristic	-	Normal Flow (Design Point)	:	90% valve lift.
	-	Max. Flow	:	95% valve lift.
	-	Min. Flow	:	25% 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 Meters/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 meter 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 thrust shall be 150% of maximum thrust required by the associated valve under the maximum load.

3.2.4 The actuator design shall allow valve assembly to be mounted at 45° inclination on either side in the vertical plane. Supports required for inclined mounting shall form part of supply of valve assembly.

3.2.5 The diaphragm shall be designed for 200% of Maximum operating pressure.

3.2.6 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.

3.2.7 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 flareless 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 0.5% resolution and $\pm$ 2% accuracy. The enclosure shall conform to IP-55. Necessary cable glands shall be supplied.

3.3.4 Air Filter Regulator

Instrument quality air at suitable pressure of 5.5 Kg/Cm^2 (g) to 7 Kg/Cm^2 (g) shall 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 requirements of positioner/actuator, E/P convertor and air-lock. The flow capacity of the Air filter regulator shall be variable with a knob. Output gauge shall be provided wherever pneumatic positioner is not specified for the valve.

3.3.5 Air Lock Relay

Air lock relay shall retain the valve position stay put, in case of air supply failure and shall reset automatically on resumption of air supply. Air lock shall have a threaded plug for evacuating diaphragm air if required for local manual operation.

3.3.6 Solenoid Valves

Solenoid valves are meant for interlock & protection purposes overriding the controller signal, and/or to result stay put action on controller signal failure. The Solenoid valve shall be 3-way 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 IP-55. Cable gland shall be provided for cable entry. The solenoid shall in general conform to IS-8935. The solenoid 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 contact rating of 5A at 240V AC/0.2A at 220V DC unless otherwise specified. The switch enclosure shall conform to IP-55. Each limit switch shall be supplied with cable glands.

3.3.8 I/P Convertor

I/P Convertors shall preferably be of force balance type and shall produce pneumatic output signal corresponding to input current signal, also specified in Data Sheet. Convertor electronics shall be protected against reverse connection of signal polarities and a separate external connection shall be provided to facilitate grounding of instrument casing. Cable glands with neoprene grommets suitable for PVC cables shall be provided. I/P convertor shall have span adjustment facility. I/P convertor enclosure shall conform to IP-55 enclosure class.

3.3.9 Positioner

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. Pneumatic positioner shall have 3 gauges. All gauges shall have metric scales. The positioner shall have facility for changing the direction of action at site. Positioner shall have enclosure class to IP- 55. The positioner input signal range shall be adjustable. Wherever applicable, it shall be possible to bypass the positioner by means of a switch.

3.3.10 Electro pneumatic Positioner

In place of separate E/P Convertor and pneumatic positioner a combined electro pneumatic positioner can also be supplied. The electro pneumatic positioner shall have 2 gauges.

3.3.11 Junction Box

Wherever specified, an integral junction box with all electrical accessories conduited up to JB shall be supplied. The junction box shall have two (2) cable glands for outgoing cables. Junction box shall have enclosure class of IP-55.

3.4 Guarantee & 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) Changein output due to supply pressure change	:	0.25% per Kg/cm^2g change.

3.4.2 The guarantee for the control valve, pneumatic actuator & accessories shall be for 12 months continuous operation from the date of commissioning, unless specified otherwise in Vol-IIB Section-B or Section-C.

3.5 Electric 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, signalling & 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 variation in voltage and frequency, the 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 shall be capable of producing the required torque and thrust at the output shaft 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 handwheel, the valve is closed by rotating the handwheel 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 flame proof 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 locakable 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 its 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 opens 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 0.5% resolution and $\pm$ 2% 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/thermistor 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 of approved finish.

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 finalized with the technically accepted bidders before opening the price bid. The stages where the purchaser would like to be associated for witnessing or verification 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.

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.
ii) Valve lift vs. Flow test.
iii) Dimension checks.

4.3.5 Type tests or Test Reports

i) Degree of protection tests for the enclosures
ii) Temperature rise test.
iii) Type test for motor as per IS: 325.

4.4 Inspection will be conducted by BHEL and/or their authorized 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 authorized representatives or in independent Test House/Laboratory approved by BHEL.

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 dispatch.

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 of vendor/sub-vendor.
v) Test Certificates.

6.2.2 Final/As-built Drawings

Final/As-built drawings/RTFs 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 Marking

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

7.2 Packing

All equipment/materials shall be suitably packed and protected for the entire period 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-DS1-0
- Data sheet C for Control Valve with Pneumatic Actuator : Data sheet no. PES-145-06-DS2-0
- Data sheet A&B for Control Valve with Electric Actuator : Data sheet no. PES-145-06-DS3-0
- Data sheet C for Control Valve with Electric Actuator : Data sheet no. PES-145-06-DS4-0

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated) **RPCL 2X800 MW YERMARUS TPS**	SPECIFICATION NO: PE-TS-362-145-I104A VOLUME II-B SECTION D REV. NO. 00 DATE: 01.10.2011 SHEET 1 OF 1

SECTION – D

PART - 2

DATA SHEETS A & B FOR CONTROL VALVES

CONTROL VALVE DATA SHEET

OWNER:	RAICHUR POWER CORPORATION LTD.
CONSULTANT:	EVONIK ENERGY SERVICES (INDIA) PVT. LTD. NOIDA
PROJECT:	2X800 MW YERAMARUS STPS

JOB NO. 362

STATUS CONTRACT

PRINT SCALE

REV.	DATED.	ALTD	CHKD	APPD

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE: I

	NAME	SIGN	DATE
DRN	GA		07.03.2011
DSGN	VS		07.03.2011
CHD	MAM		07.03.2011
APPD	AK		07.03.2011

TITLE: CONTROL VALVE DATA SHEET

SCALE

DRAWING NO. PE-TS-362-145-I104

SHEET 1 OF 49 REV 00

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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	D/A PEGGING FROM AUX. STEAM HEADER	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	323.9 x 9.53 | 559 x 10	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 672 GR B70	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART 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	21	16	1.65	210			
	2.	15% BMCR (COLD)	42	16	1.7	210			
	3.	15% BMCR (HOT)	60	16	3.7	210			
	4.	NEXT UNIT START UP W/O RC PUMP	110	16	2	210			
	VALVE TYPE								[] CAVITATION [] FLASHING [■] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 20 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 20 | 240 * 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.

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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	D/A PEGGING FROM CRH LINE	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	406.4 x 16 | 965 x 34	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C | SA 106 GR C	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

BHEL	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-362-145-I104 VOLUME SECTION REV. NO. 00 DATE :07.03.11 SHEET 6 OF 49

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	42	14.4	3.65	341			
	2.	30% BMCR	120	20	3.65	347			
	3.	60% BYPASS	233	30	6	346			

VALVE TYPE	[] CAVITATION [] FLASHING [■] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2g) 73.5 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 73.5 | 365 * 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. 3 AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS.

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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	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 C | SA 106 GR C	.....|.....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[] GLOBE [■] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV		.....|.....|.....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)		.....|.....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART 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	42.8	0.6	49.7			
	2.	NORMAL	300	42	0.6	43.5			
	3.	MAX.	315	41.8	1.5	51.3			
	VALVE TYPE								[■] CAVITATION [] FLASHING [■] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47/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.

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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	MAIN CONDENSATE CONTROL	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	457 x 12.7 | 457 x 12.7	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C | SA 106 GR C	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR	|	.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART 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)	± 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.	DESIGN POINT	1987	29	27	50			
	2.	60% LOAD	1259.3	33	21	43.1			
	3.	100% MCR	1564.4	32	25	44			
	4.	VWO	1669.9	31	26	44.7			
	5.	MIN. (10% LOAD)	156.5	35	8	49			

VALVE TYPE	[] CAVITATION [] FLASHING [■] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47 | 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.

Tag No. :...CDV-40... 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	GSC MIN. FLOW 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 C | SA 106 GR C	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 12 OF 49	

Tag No. :...CDV-40... 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.	32.4	42.5	0.3	49			
	2.	MAX	324	40.5	0.7	50			
	VALVE TYPE								[■] CAVITATION [] FLASHING [■] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47/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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 13 OF 49	

Tag No. :...CDV-46... 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	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 C | SA 106 GR C	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[] GLOBE [■] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :...CDV-46... 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.	40	36.5	4.0	49			
	2.	MAX	415	32.5	5.0	50			
	VALVE TYPE						[■] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47 | 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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 15 OF 49	

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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	CONDENSATE SPRAY TO FLASH TANK=B	.....
	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.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	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	35.0	0.5	50			
	VALVE TYPE								[■] CAVITATION [ ] FLASHING [■] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) * IBR FORM III-C					47 47/VACUUM | 55 [ ] 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.
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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	CONDENSATE FOR VALVE GLAND SEALING	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	60.3 x 5.54 | 60.3 x 5.54	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	*[■] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M *REFER NOTE 3*	.....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] 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	31	3.0	50			

	VALVE TYPE	[] CAVITATION [] FLASHING [■] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47 | 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.
3. VALVE MATERIAL SHALL BE A217WC6 AND ANTI-CAVITATION TYPE TRIM IN CASE THE VALVE IS SUBJECTED TO CAVITATION FOR THE GIVEN CONDITION.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 19 OF 49	

Tag No. : DRV-14 & DRV-20 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	HPH-7A/7B NORMAL DRAIN TO HPH-6A/6B	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	323.9 x 12.7 | 323.9 x 12.7	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C | SA 106 GR C	.....|.....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|....
	BODY SIZE: PORT SIZE: DESIGN CV		.....|.....|.....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	|	.....|.....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : DRV-14 & DRV-20 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)	± 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	46.3	24	10	183			
	2.	60% MCR	127.4	34.5	14.5	214			
	3.	100% MCR	181.2	59	24	225.5			
	4.	VWO '	200.4	63	25.5	229			
	5.	BMCR	206.6	62.5	25.2	228			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 70 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 70 | 235 * 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.

BHEL	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-362-145-I104
		VOLUME
		SECTION
		REV. NO. 00 | DATE :07.03.11
		SHEET 21 OF 49

Tag No. : DRV-17 & DRV-23 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	HPH-7A/7B ALT. DRAIN TO F/T-A	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	323.9 x 12.7 | 323.9 x 12.7	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C | SA 106 GR C	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : DRV-17 & DRV-23 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)		± 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	46.3	24.7	0.3	221			
	2.	60% MCR	127.4	35.5	0.3	241			
	3.	100% MCR	181.2	60	0.3	273.5			
	4.	VWO	200.4	64	0.3	228			
	5.	BMCR	206.6	63	0.5	227			
	VALVE TYPE								[■] CAVITATION [■] FLASHING [] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) * IBR FORM III-C					70 70/VACUUM | 235 [] 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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 23 OF 49	

Tag No. : DRV-27 & DRV-34 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	HPH-6A/6B NORMAL DRAIN TO DEAERATOR	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	273 x 6.35 | 273 x 6.35	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR	|	.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : DRV-27 & DRV-34 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)		± 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	60.7	7.5	6	160.9			
	2.	60% MCR	104.5	12	8.5	176.6			
	3.	100% MCR	228.9	21.5	12.5	197.3			
	4.	VWO	252.2	23	12.6	200.4			
	5.	BMCR	260.4	22.5	12.3	199.3			
	VALVE TYPE								[] CAVITATION [■] FLASHING [] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 28 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 28 | 210 * 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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 25 OF 49	

Tag No. : DRV-30 & DRV-37 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	HPH-6A/6B ALT. DRAIN TO F/T-A	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	273 x 6.35 | 323.9 x 9.53	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. : DRV-30 & DRV-37 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)		± 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	60.7	10.5	0.3	179			
	2.	60% MCR	104.5	15	0.3	195.5			
	3.	100% MCR	228.9	24.5	0.3	220.5			
	4.	VWO	252.2	26	0.3	224			
	5.	BMCR	260.4	25.5	0.5	223			
	VALVE TYPE								[■] CAVITATION [■] FLASHING [] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 28 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 28/ VACUUM | 210 * 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.

BHEL	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 27 OF 49	

Tag No. :...DRV-58... 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	LPH-3 ALT. DRAIN TO F/T-B	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	273 x 6.35 | 323.9 x 9.53	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 28 OF 49	

Tag No. :...DRV-58... 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	70.9	1.5	0.3	106			
	2.	60% MCR	112.2	2	0.3	116.5			
	3.	100% MCR	205.2	3	0.3	130			
	4.	VWO	222.6	3.2	0.3	132			
	5.	LPH-1/2 & DC-1/2 OUT	290	2.3	0.5	130			
	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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 29 OF 49	

Tag No. :...DRV-73... 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	DEAERATOR OVERFLOW TO F/T-B	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[■] ON/OFF [] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1 x 6.35 | 323.9 x 9.53	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 30 OF 49	

Tag No. :...DRV-73... 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% BMCR	260	16.5	0.3	189.2			
	VALVE TYPE								[] CAVITATION [■] FLASHING [] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 15 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 15/ VACUUM | 200 * 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.
3. # WITHOUT POSITIONER, LINEARITY SHALL BE ± 5% ONLY.

Tag No. : DRV-2 & DRV-8 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	HPH-8A/8B NORMAL DRAIN TO HPH-7A/7B	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 10.97 | 168.3 x 10.97	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)		..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART 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 & DRV-8 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)	± 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	10.9	32.3	24.2	226.2			
	2.	60% MCR	21.4	46.3	35	246.5			
	3.	100% MCR	49.8	76.6	59.3	278.8			
	4.	VWO	55.9	82	63.3	283.5			
	5.	BMCR	57.9	81.4	62.7	282.8			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 88 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 88 | 290 * 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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 33 OF 49	

Tag No. : DRV-5 & DRV-11 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	HPH-8A/8B ALT. DRAIN TO F/T-A	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 10.97 | 219.1 x 12.7	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART 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 & DRV-11 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)		± 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	10.9	32.8	0.3	235			
	2.	60% MCR	21.4	46.8	0.3	257			
	3.	100% MCR	49.8	77	0.3	290			
	4.	VWO	55.9	82.5	0.3	294.5			
	5.	BMCR	57.9	81.8	0.5	294			
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 88 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 88/VACUUM | 290 * 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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 35 OF 49	

Tag No. :...DRV-40... 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	LPH-4 NORMAL DRAIN TO LPH-3	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 7.1I | 219.1 x 6.35	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)		..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

BHEL	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-362-145-I104 VOLUME SECTION REV. NO. 00 DATE :07.03.11 SHEET 36 OF 49

Tag No. :...DRV-40... 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	23.5	2.6	1.3	107.7			
	2.	60% MCR	37.8	3.6	1.9	118.4			
	3.	100% MCR	70.9	5.4	2.8	132.4			
	4.	VWO	77.2	5.7	3	134.4			
	5.	LPH-3 OUT	TBD	TBD	TBD	TBD			
	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.
3. TBD TO BE DECIDED LATER.

Tag No. :...DRV-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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	LPH-4 ALT. DRAIN TO F/T-B	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219.1 x 6.35 | 273 x 6.35	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR	|	.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :...DRV-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.	40% MCR	23.5	2.6	0.3	126			
	2.	60% MCR	37.8	3.6	0.3	138			
	3.	100% MCR	70.9	5.5	0.3	153			
	4.	VWO	77.13	5.8	0.3	155.5			
	5.	LPH-3 OUT	TBD	TBD	TBD	TBD			
	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.
3. TBD TO BE DECIDED LATER.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 39 OF 49	

Tag No. :...DMV-21... 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	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.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)		..... | .....
	*TRAVEL TIME FOR	|	.....
	OPEN TO CLOSE, CLOSE TO OPEN		.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 40	OF 49

Tag No. :...DMV-21... 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. (0.5% MU)	13	6.5	0.5	33			
	2.	NORMAL (1% MU)	26	6	0.55	33			
	3.	HW MU PUMP DESIGN FLOW	50	5.5	0.6	33			
	4.	NORMAL (1% MU)	26	6	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 | 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.

BHEL	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-362-145-I104
		VOLUME
		SECTION
		REV. NO. 00 | DATE :07.03.11
		SHEET 41 OF 49

Tag No. :...DMV-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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	DM EMERGENCY MU TO HOTWELL	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	168.3 x 3.4 |168.3 x 3.4	.....
	PIPE MATERIAL (inlet / outlet)	SA 312 TP 304 (ERW) | SA 312 TP 304 (ERW)	.....|.....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV		.....|.....|.....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)		.....|.....
	*TRAVEL TIME FOR	|	.....
	OPEN TO CLOSE, CLOSE TO OPEN		.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :...DMV-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)	± 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. (1% MU)	26	4	0.45	33			
	2.	NORMAL (5% MU)	130	3.5	0.5	33			
	3.	CT PUMP DESIGN FLOW	170	3	0.8	33			
	4.	NORMAL (5% MU)	130	3.5	1.5	33			

VALVE TYPE	[■] CAVITATION [] FLASHING [] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/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.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 43 OF 49	

Tag No. :...FDV-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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	LOW LOAD FEED CONTROL	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	406.4 x 70 | 406.4 x 70	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C | SA 106 GR C	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE :07.03.11
		SHEET 44	OF 49

Tag No. :...FDV-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.	5% MCR (MIN.SPEED)	130	167	21	111			
	2.	15% MCR	390	165	72	111			
	3.	30% MCR	780	172	105	111 TO 138			
	4.	40% MCR	896	185	148	157			
	5.	40% Boiler Min R/c	1040	143	20	111			
	VALVE TYPE						[■] CAVITATION [] FLASHING [■] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 450# * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 450# | 200 * IBR FORM III-C [■] REQUIRED [] NOT REQUIRED								....
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								.....

NOTES:

1. * TO BE FILLED BY MSE. PARAMETERS LIKELY TO CHANGE ON RECEIPT OF PUMP INPUTS FROM BHEL-HYD.
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. 2 AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS.

Tag No. :...DRV-52... 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	**RPCL – 2X800 MW YERMARUS STPS**	.....
	SERVICE	DRIP PUMP DISCHARGE CONTROL	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	219x 8.18 | 219x 8.18	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	..... | .....
BODY*	MODEL NO.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	..... | ..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF SMART POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [■] NOT REQUIRED	.....
	E/P CONVERTER	PART OF SMART POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

Tag No. :... DRV-52 ... 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	70.9	32	14	106			
	2.	60% MCR	112.2	30	16.5	116.5			
	3.	100% MCR	205.2	28.5	20.5	130			
	4.	VWO	222.6	28	21.5	132			
	5.	PUMP DESIGN	250	27.5	22.5	132			
	VALVE TYPE								[] CAVITATION [] FLASHING [] HIGH DP
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47/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.

Tag No. :…DRV-78 …. … 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	RPCL – 2X800 MW YERMARUS STPS	……
	SERVICE	LPH-2A&2B NORMAL DRAIN TO DC-1	……
	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.		……
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	……|……|……|……
	BODY SIZE: PORT SIZE: DESIGN CV		……|……|……
	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	[] BELOW SEAT [] ABOVE SEAT	……
	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	|	……|……
	CLOSE AT : OPEN AT (KG/CM2g)		……|……
	*TRAVEL TIME FOR	|	……
	OPEN TO CLOSE, CLOSE TO OPEN		……
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [■] TO CLOSE	……
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	……
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	……
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	……
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	……
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	……
	POSITION TRANSMITTER	Part of Smart Positioner	……
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	……
	E/P CONVERTER	Part of Smart 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)**	SPEC. NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 03	DATE : 13.01.2012
		SHEET 48 OF 50	

Tag No. :… DRV-78 ……. 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	16.6	0.55	0.15	83.2			
	2.	60% MCR	27.9	0.65	0.2	87.5			
	3.	100% MCR	53.1	0.85	0.3	94.6			
	4.	VWO	57.6	0.87	0.3	95.2			
	5	Max	62	0.9	0.35	96.1			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/VACUUM | 100 * 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.

Tag No. :…DRV-81 …. … 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	RPCL – 2X800 MW YERMARUS STPS	.....
	SERVICE	LPH-2A&2B ALT. DRAIN TO F/T-B	.....
	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.		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV		.....|.....|.....
	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	[] BELOW SEAT [] ABOVE SEAT	.....
	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	|	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	|	.....|.....
	*TRAVEL TIME FOR		.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	SMART POSITIONER	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	Part of Smart Positioner	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	Part of Smart 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)**	SPEC. NO.: PE-TS-362-145-I104	
		VOLUME	
		SECTION	
		REV. NO. 03	DATE : 13.01.2012
		SHEET 50 OF 50	

Tag No. :… DRV-81 ….. … 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	16.6	0.65	0.2	87.5			
	2.	60% MCR	27.9	0.75	0.2	91.2			
	3.	100% MCR	53.1	0.95	0.2	97.6			
	4.	VWO	57.6	0.97	0.2	98.2			
	5	Max	62	1	0.25	99			
	VALVE TYPE						[] CAVITATION [■] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/VACUUM | 100 * 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.

SECTION – D

PART - 3

DATA SHEETS A & B FOR ACCESSORIES

Tag No.: **Applicable to all Tag Nos.** Qty.: **As required** Data 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)

SMART POSITIONER	MFR. & MODEL No. BYPASS: GAUGES : ENCLOSURE CLASS INPUT SIGNAL OUTPUT SIGNAL	VENDOR DATA [] YES : [√] THREE : IP-55 4-20 mA TO SUIT ACTUATOR
AIR FILTER REGULATOR	MFR. & MODEL NO. BOWL MATERIAL AIR SUPPLY PRESS (KG/CM2) OUTPUT PRESS (KG/CM2) OUTPUT GAUGE TYPE ACCURACY FILTER ELEMENT / ACCESSORIES MAT. FILTER SIZE ENCLOSURE TYPE MATERIAL AUTOMATIC DRAIN FEATURE BUILT-IN BLOW DOWN VALVE DEGREE OF PROTECTION	VENDOR DATA METALLIC 5.0 TO 8.0 TO SUIT ACTUATOR [√] REQUIRED [] NOT REQUIRED CONSTANT BLEED TYPE ±0.1% PHOSPHER BRONZE / SS 5 MICRONS WEATHERPROOF & WATERPROOF SS REQUIRED REQUIRED IP-65
AIR LOCK	MFR. & MODEL No. SET PRESS (Kg/Cm2) SUPPLY PRESS (Kg/Cm2) RESET TYPE VENT PLUG	VENDOR DATA VENDOR DATA 3.0 to 5.0 AUTO [√] REQUIRED
LIMIT SWITCH	MFR. & MODEL No. OPEN : INT : CLOSE CONTACT TYPE RATING (AC/DC) ENCLOSURE CLASS	VENDOR DATA 1 NO. : --- : 1 No. SPDT 2 NO + 2 NC 5A 240V AC and 0.2A 220V DC [√] IP65
POSITION TRANSMITTER	MFR. & MODEL No. TYPE SUPPLY OUTPUT RATING ACCURACY ENCLOSURE CLASS	**IN BUILT IN SMART POSITIONER** [√] ELECTRONIC (2-WIRE) CONTACTLESS (LVDT TYPE) [] OTHER 24V DC [√] 4-20 ma [] 0-100 Ohms +/- 1% FS [√] IP65
DIAPHRAGM	MATERIAL	NYLON REINFORCED NEOPRENE

Tag No.: **Applicable to all Tag Nos.** Qty.: **As required** Data Sheet No. PES-145-06-DS1-0

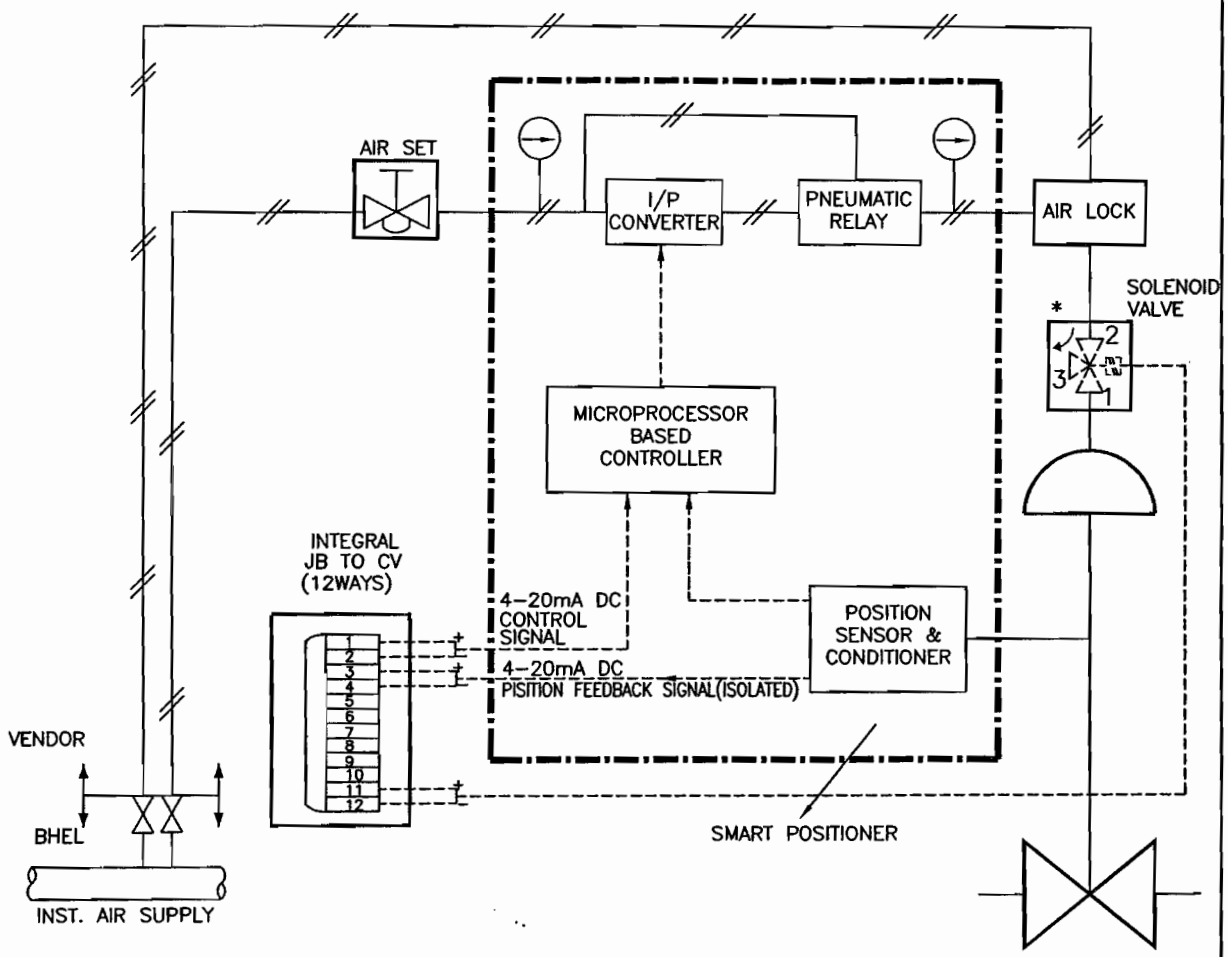
DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY PURCHASER)

VOLUME BOOSTER		BIDDER TO SPECIFY
JUNCTION BOX	MFR. & MODEL NO. NO. OF WAYS SPECIAL REQUIRMENT TERMINAL BLOCKS INSIDE PAINTING OUTSIDE PAINTING ACCESSORIES SHIELD BUS FOR SCREW CONNECTION SIZE CABLE GLANDS (SIZE / QUANTITY) ENCLOSURE CLASS	VENDOR DATA THIRTY SIX SHALL BE SUPPLIED WITH DOUBLE DOORS AND INDIVIDUAL CANOPIES, THE CASE COVER /DOOR CONSTRUCTED FROM COLD ROLLED SHEET STEEL OF 3MM THICK AND SHALL HAVE GLAND PLATE OF 3MM CRCA AT THE BOTTOM. VERTICAL GLOSSY WHITE IS-5 SHADE 631 METAL TAG(SS), CLAMPS, FIXTURES, BOLTS(SS),NUTS(SS), GASKETS(NEOPRENE) LOCK & KEY REQUIRED AS REQUIRED AS REQUIRED AS REQUIRED IP-65
Cu TUBING & FITTING PER CV.	FULLY ANEALED SOFT PVC COATED	12 METER FROM INST. AIR HEADER ISOLATING VALVE TO THE CONTROL VALVE
SOLENOID VALVE	MFR. & MODEL No. RATING OPERATION | QTY COIL INSULATION CLASS ENCLOSURE CLASS MANUAL OPERATION MATERIAL	VENDOR DATA [√] 24V DC [] 220V DC [] 240V AC [] STAYPUT [√] INTERLOCK | [√] 1 [] 2 CLASS-H [√] IP65 [] NEMA 4 YES / INBUILT 316SS

2X800MW YERAMARUS STPP

HOOK–UP DIAGRAM WITH ELECTRONIC POSITIONER



NOTE:–

1. FACILITY REQUIRED FOR VALVE STAYPUT ON AIR SUPPLY FAILURE.
2. GAUGES REQUIRED FOR AIR SUPPLY & OUTPUT(S).
3. MOUNTING ACCESSORIES AS REQUIRED.
4. POSITION FEEDBACK SIGNAL SHALL BE 4–20mA (ISOLATED SIGNAL)
5. FOR ON/OFF DUTY PNEUMATIC CONTROL VALVE THE FOLLOWING ACCESSORIES SHALL NOT BE APPLICABLE:–
   a) POSITIONER
   b) POSITION TRANSMITTER
   c) AIR LOCK

SECTION – D

PART - 4

DATA SHEET C FOR CONTROL VALVES

	Technical specification for **Control Valves with Accessories** (Pneumatically Operated) **RPCL 2 X 800 MW YERMARUS TPS**	SPECIFICATION NO. **PE-TS-362-145-I104A**
		VOLUME **II-B**
		SECTION **D**
		REV. NO. 00 / DATE: 01.10.2011
		SHEET 2 OF 4

	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)L	
	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	
	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	

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	
	HYTERSIS	
	SENSITIVITY	
	ACCURACY	

SERVICE CONDITION*	**SL.+ NO.**	**LOAD**	**FLOW (T/HR)**	**INLET PR. (KG/CM² (A)**	**OUTLET PR. (KG/CM² (A)**	**TEMP DEG. C**	**CALCULATED CV**	**% VALVE LIFT**	**VALVE O/L VELOCITY**

	VALVE TYPE
	* MAX SHUT OFF PRESS ((KG/CM²g)
	* BODY DESIGN : PRESS ((KG/CM²g) | TEMP (DEG. C)
	* IBR FORM III-C

TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG

FORM NO. PEM-6666-0

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated) **RPCL 2 X 800 MW YERMARUS TPS**	SPECIFICATION NO. **PE-TS-362-145-1104A** VOLUME **II-B** SECTION **D** REV. NO. 00 / DATE: 01.10.2011 SHEET 4 OF 4

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)

POSITIONER	MFR. & MODEL NUMBER			
	BYPASS	GAUGES	ENCL. CLASS	
	INPUT SIGNAL (Kg / Cm^2)			
	OUTPUT SIGNAL (Kg / Cm^2)			
AIR FILTER REGULATOR	MFR. & MODEL NUMBER			
	AIR SUPPLY PRESS (Kg / Cm^2 g)			
	OUTPUT PRESS (Kg / Cm^2 g)			
	OUTPUT GAUGE			
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	MFR. & MODEL NUMBER			
	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	INPUT SIGNAL	POWER SUPPLY		
	SPLIT RANGE			
	ENCLOSURE CLASS			
Cu. Tubing & Fittings / per CV	25 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

PART-5

QUALITY PLAN

PEM :: C&I

QUALITY PLAN
FOR
CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	PE-QP-999-145-I 006
VOLUME	IIB
SECTION	D
REV. NO.	03 DATE: 15-05-2007
SHEET	2 OF 5

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	
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	Mfr. standard	--- do ---	3/2	---	2,1	
		3. Endurance / Life cycle	MA	Cyclic test 10,000 cycles	One / Type	10,000 cycles	No damage	--- do ---	3	2	2,1	Refer Note-1
1.3	Spring	1. Composition	MA	Chemical-Analyses	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	--- do ---	3	---	2,1	Refer Note-1
		2. Mech. Properties	MA	Mech. Test	One sample/ Heat	--- do ---	--- do ---	--- do ---	3	---	2,1	Refer Note-1
		3. Performance	MA	1. Stiffness ratio	100%	--- do ---	--- do ---	--- do ---	3	---	2,1	Refer Note-1
				2. Scragging	100%	--- do ---	--- do ---	--- do ---	3	---	2,1	Refer Note-1
				3. Cyclic test (Endurance)	One / type	10,000 cycles	--- do ---	--- do ---	3	---	2,1	Refer Note-1
1.4	Electrical items (Limit switches, Solenoids)	1. Routine Test	MA	HV, IR, Continuity function	100%	Rele. Standards	Rele. Standards	--- do ---	3	---	2,1	
		2. Degree of protection	MA	IP/NEMA Tests	One sample / type	Approved Data sheet	Approved Data sheet	--- do ---	3	---	2,1	
1.5	Pressure Gauges	1. Performance	MA	Verification of calibration certificates	100%	Mfr. Standard	Mfr. Standard	--- do ---	3	---	2,1	
		2. Marking and Dimensions		Visual and Measurement	100%	Mfr. standard	Mfr. standard	Log sheets	3	---	2,1	

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

QUALITY PLAN
FOR
CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	PE-QP-999-145-I 006
VOLUME	IIB
SECTION	D
REV. NO.	03 DATE: 15-05-2007
SHEET	3 OF 5

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
2.0	**IN PROCESS**											
2.1	Body & Bonnet after machining & Plug, stem	1. Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	ANSI-B-16.34	ANSI-B-16.34	Test Records	2	---	1	Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	Mfr. Standard / approved data sheet / drgs	Mfr. Standard / approved data sheet / drgs.	Log sheets	2	---	1	
		3. Hard facing (wherever applicable)	MA	Hardness Measurement	Sample pads	--- do ---	--- do ---	Records	2	---	1	
		4. Hard facing	MA	DP Test	100 %	ANSI-B-16.34	ANSI-B-16.34	Test Records	2	---	1	
2.2	Guide Bush (Wherever applicable)	Physical / Chemical properties	MI	Physical / Chemical Test	100%	Material specification / Mfr standard	Material specification / Mfr standard	Test Certificates	2	---	2	
3.0	**TESTS ON COMPLETED VALVE**											
3.1	Actuator Chamber	Leakage	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	2	1	1	
3.2	Body	Leakage and Pressure test	MA	Hydro test	100%	ISA - S-75.19	--- do ---	--- do ---	2	1	1	
3.3	Seat leakage test for completed valve	Seat Leakage	MA	Pneumatic Test	100%	ANSI-B-16-104 / FCI-70.2	ANSI-B-16-104 / FCI-70.2	Test Certificate	2	1	1	
4.0	**OPERATION 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	
		2. Opening/Closing time	MA	Measurement	100%	--- do ---	--- do ---	Test Report	2	1	1	
		3. Linearity/cam characteristic	MA	Measurement	100%	--- do ---	--- do ---	Test Report	2	1	1	

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

QUALITY PLAN
FOR
CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	PE-QP-999-145-I 006
VOLUME	IIB
SECTION	D
REV. NO.	03 DATE: 15-05-2007
SHEET	4 OF 5

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	
		4. Repeatability	MA	Measurement	100%	--- do ---	--- do ---	Test Report	2	1	1	
		5. Hysterisis	MA	Measurement	100%	--- do ---	--- do ---	Test Report	2	1	1	
		6. Sensitivity	MA	Measurement	100%	--- do ---	--- do ---	Test Report	2	1	1	
		7. Accuracy (Overall)	MA	Measurement	100%	--- do ---	--- do ---	Test Report	2	1	1	
		8. Control Valve characteristics / CV Test	MA	♦Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	Each type (Model / size)	--- do ---	--- do ---	Test Certificate	2	1	1	♦ Size = Body & port size Or Body size & CV for non std port. Refer note 2.
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Approved drg. / data sheet	--- do ---	Test Report	2	1	1	
		10. Overall dimensions	MI	Visual and dimensional	100%	--- do ---	--- do ---	Records	2	1	1	
		11. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional	100%	--- do ---	--- do ---	--- do ---	2	1	1	
5.0	AUXILIARY ITEMS											
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	
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	--- do ---	--- do ---	--- do ---	3/2	---	1	
		2. Overall leakage	MA	Visual (soap solution)	100 %	--- do ---	--- do ---	--- do ---	3/2	---	1	

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

QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	PE-QP-999-145-I 006
VOLUME	IIB
SECTION	D
REV. NO.	03 DATE: 15-05-2007
SHEET	1 OF 5

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
1.0	MATERIAL											
1.1	Body & Bonnet casting / forgings, plug, stem.	1. Physical, Chemical properties	MA	Physical, Chemical tests	One/ Heat	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3	---	2,1	Refer Note-1
		2. Heat Treatment	MA	Review of H.T.	Each H.T.	--- do ---	--- do ---	--- do ---	3/2	2	1	IBR Certification (if applicable) to be verified by BHEL
		3. Internal quality of castings	MA	RT	100%	ANSI-B-16.34	ANSI-B-16.34	Test Report / FILM	3/2	2	1	Only for rating ANSI 900 and above. Applicable for Body and Bonnet only. For Lower rating only if called for in specification.
		4. Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2	
				2. MT/PT	100%	ANSI-B-16.34	ANSI-B-16.34	--- do ---	3	2	1	After Machining on machined surface only
		5. Pressure test for shell	MA	Hyd. Test	100%	ANSI-B-16.34	ANSI-B-16.34	--- do ---	2	2	1	

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

QUALITY PLAN
FOR
CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	PE-QP-999-145-I 006
VOLUME	IIB
SECTION	D
REV. NO.	03 DATE: 15-05-2007
SHEET	5 OF 5

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	
5.3	Air lock relay	1. Leakage Test	MA	Leakage test	100%	--- do ---	--- do ---	--- do ---	3/2	---	1	
		2. Performance	MA	Function	100%	--- do ---	--- do ---	--- do ---	3/2	---	1	
5.4	Electronic position transmitter	1. Accuracy	MA	Operation	100%	Approved data sheet /	--- do ---	--- do ---	2	1	1	On completed valve
		2. Cyclic test	MA	10,000 operation cycles	1 per Type	--- do ---	--- do ---	--- do ---	3	---	2,1	Test conduc ted should not be more than 5 years older
5.5	Current to Pneumatic converter	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet / BHEL specn. / Mfr. Standard	Approved drg. / data sheet / BHEL specn. / Mfr. Standard	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	--- do ---	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%	--- do ---	--- do ---	--- do ---	2	---	1	
6.0	**PAINTING**	Soundness of Painting	MA	Visual and Measurement	100%	Approved drg. / data sheet / BHEL specn. / Mfr. Standard	Approved drg. / data sheet / BHEL specn. / Mfr. Standard	Inspection Report	2	---	1	Refer Note-3
7.0	**PACKING**	Soundness of Packing		Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	

NOTES:

1. Relevant compliance certificate to be verified by BHEL.
2. Cv test will be conducted if Test Certificate for a similar Model / Size / Cv is not available. Validity of the certificate considered as last 3 years.
3. In the absence of BHEL spec. for painting, vendor to obtain BHEL's approval on their painting specification / procedure.

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

SECTION – D

PART - 6

BILL OF QUANTITY

FOR

CONTROL VALVES AND ACCESSORIES

ANNEXURE-I

BILL OF QUANTITY

S.NO.	ITEM DESCRIPTION		Qty/Unit	Total Qty (Unit 1&2)
[A]	CONTROL VALVES COMPLETE WITH SMART POSITIONER AND ALL ACCESSORIES MOUNTED, PIPED AND TERMINATED ON JB			
S. No.	TAG NO.	SERVICE		
1.	ASV-8	D/A Pegging from Aux. Steam Header	1	2
2.	CRHV-6	D/A Pegging from CRH Line	1	2
3.	CDV-10, CDV-12 & CDV-14	CEP A/B/C Minimum Recirculation	3	6
4.	CDV-22 & CDV-25	Main Condensate Control	2	4
5.	CDV-40	GSC min. flow recirculation	1	2
6.	CDV-46	Excess Dump Control	1	2
7.	CDV-67	Condensate for F/T-B	1	2
8.	CDV-72	Condensate for Valve Gland Sealing	1	2
9.	DRV-14 & DRV-20	HPH-7A/7B Drain to HPH-6A/6B	2	4
10.	DRV-17 & DRV-23	HPH-7A/7B Drain to F/T-A	2	4
11.	DRV-27 & DRV-34	HPH-6A/6B Drain to Deaerator	2	4
12.	DRV-30 & DRV-37	HPH-6A/6B Drain to F/T-A	2	4
13.	DRV-58	LPH-3 Drain to F/T-B	1	2
14.	DRV-73	Deaerator Overflow	1	2
15.	DRV-2 & DRV-8	HPH-8A/8B Drain to HPH-7A/7B	2	4
16.	DRV-5 & DRV-11	HPH-8A/8B Drain to F/T-A	2	4
17.	DRV-40	LPH-4 Drain to LPH-3	1	2
18.	DRV-43	LPH-4 Drain to F/T-B	1	2
19.	DMV-21	DM Normal Makeup to Hotwell	1	2
20.	DMV-48	Emergency MU to Hotwell	1	2
21.	FDV-8	Low Load Feed Control	1	2
22.	DRV-52	Drip Pump Discharge Control	1	2
23.	DRV-78	LPH-2A & 2B Normal Drain to DC-1	1	2
24.	DRV-81	LPH-2A & 2B Alt Drain to F/T-B	1	2
25.	PC		01 No.	02 No.
26.	DIAGNOSTIC SOFTWARE		01 No.	02 No.
27.	HANDHELD CALIBRATOR		01 No.	02 No.
28.	Cu TUBING		396 Meters	792 Meters
29.	BRASS FITTINGS		1 Lot	2 Lots

SECTION – D

PART-7

LIST OF COMMISONING SPARES

LIST OF COMMISIONING SPARES

Sl. No.	ITEM DESCRIPTION	QUANTITY REUIRED
1	Gasket	One (1) set with each control valve tag
2	Gland Packing	One (1) set with each control valve tag

SECTION – D

PART - 8

SCHEDULE OF LANDMARKS

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

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

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

RAICHUR POWER CORPORATION LTD.
2 X 800 MW YERMARUS TPS

VOLUME III

TECHNICAL SPECIFICATION
FOR
CONTROL VALVES WITH ACCESSORIES
(Pneumatically Operated)

SPECIFICATION No: **PE-TS-362-145-I104A**

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

VOL-III

TABLE OF CONTENTS

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

Project: RPCL-2X800 MW TPS AT YERMARUS
Specification no.: PE-TS-362-145-I104A

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 / 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 are 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/RPCL reserves the right to accept/rejects any variation to the specification.

Signature with date	
Name	
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 finalization, freezing of inputs of manufacture by way of vetting of documents and technical discussions and resubmissions of documents (if required)	6 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 to be considered as **"DOCUMENTS NOT SUBMITTED".**

(Signature and Stamp of the Bidder)

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

SCHEDULE OF PRICES

CONTROL VALVES COMPLETE WITH SMART POSITIONER AND ALL ACCESSORIES MOUNTED, PIPED AND TERMINATED ON JB

S.NO.	ITEM DESCRIPTION		Total Qty (Unit 1&2)	Total Price
S. No.	TAG NO.	SERVICE		
1.	(ASV-8)	D/A Pegging from Aux. Steam Header	2	
2.	(CRHV-6)	D/A Pegging from CRH Line	2	
3.	(CDV-10, CDV-12 & CDV-14)	CEP A/B/C Minimum Recirculation	6	
4.	(CDV-22 & CDV-25)	Main Condensate Control	4	
5.	(CDV-40)	GSC min. flow recirculation	2	
6.	(CDV-46)	Excess Dump Control	2	
7.	(CDV-67)	Condensate for F/T-B	2	
8.	(CDV-72)	Condensate for Valve Gland Sealing	2	
9.	(DRV-14 & DRV-20)	HPH-7A/7B Drain to HPH-6A/6B	4	
10.	(DRV-17 & DRV-23)	HPH-7A/7B Drain to F/T-A	4	
11.	(DRV-27 & DRV-34)	HPH-6A/6B Drain to Deaerator	4	
12.	(DRV-30 & DRV-37)	HPH-6A/6B Drain to F/T-A	4	
13.	(DRV-58)	LPH-3 Drain to F/T-B	2	
14.	(DRV-73)	Deaerator Overflow	2	
15.	(DRV-2 & DRV-8)	HPH-8A/8B Drain to HPH-7A/7B	4	
16.	(DRV-5 & DRV-11)	HPH-8A/8B Drain to F/T-A	4	
17.	(DRV-40)	LPH-4 Drain to LPH-3	2	
18.	(DRV-43)	LPH-4 Drain to F/T-B	2	
19.	(DMV-21)	DM Normal Makeup to Hotwell	2	
20.	(DMV-48)	Emergency MU to Hotwell	2	
21.	(FDV-8)	Low Load Feed Control	2	
22.	(DRV-52)	Drip Pump Discharge Control	2	
23.	(DRV-78)	LPH-2A & 2B Normal Drain to DC-1	2	
24.	(DRV-81)	LPH-2A & 2B Alt Drain to F/T-B	2	
25.	Hand held Universal HART Calibrator		2	
26.	Industrial PC		2	
27.	Diagnostic Software		2	
[B]	¼" COPPER TUBING (PVC COATED) (To be supplied Loose)		792METERS	

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

SCHEDULE OF UNIT PRICES

CONTROL VALVE ACCESSORIES

S. No.	ITEMS	UNIT PRICE
1.	Positioner (smart) of each model and type	
2.	Air filter regulators	
3.	Air lock relay	
4.	Position limit switch of each model and type	
5.	Electronic position transmitter of each model and type	
6.	Solenoid valve	
7.	Volume booster (pneumatic relay)	
8.	Pressure gauges of each type	
9.	Junction box (36 ways)	
10.	Hand wheel	
11.	ACTUATOR OF EACH TYPE (Separate list to be attached if required)	
12.	Brass fitting for connection to air filter regulator	
13.	Brass fitting for connection to air lock relay	
14.	Brass fittings for connecting to air header	
15.	Equal copper tee	
16.	Copper tubing per meter	
17. $	Valve stem with plug & seat ring each size & type	
18. $	Gasket of each size and type	
19. $	Body seal gaskets of each size and type	
20. $	Cage of each size and type	
21. $	Gland packing each size and type	
22. $	Valve trim of each size and type	
23. $	Diaphragm of each size and type	
24. $	Seal box "o" ring of each type and size	
25. $	Color "o" ring of each type and size	
26.	Hand held Universal HART Calibrator	
27.	Industrial PC	
28.	Diagnostic Software	

NOTE: $: Separate list to be attached for each size and type of these control valve accessories.

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

TEST CHARGES

SL. No.	TAG No.	SERVICE	CV TEST CHARGES
1.	(ASV-8)	D/A Pegging from Aux. Steam Header	
2.	(CRHV-6)	D/A Pegging from CRH Line	
3.	(CDV-10, CDV-12 & CDV-14)	CEP A/B/C Minimum Recirculation	
4.	(CDV-22 & CDV-25)	Main Condensate Control	
5.	(CDV-40)	GSC min. flow recirculation	
6.	(CDV-46)	Excess Dump Control	
7.	(CDV-67)	Condensate for F/T-B	
8.	(CDV-72)	Condensate for Valve Gland Sealing	
9.	(DRV-14 & DRV-20)	HPH-7A/7B Drain to HPH-6A/6B	
10.	(DRV-17 & DRV-23)	HPH-7A/7B Drain to F/T-A	
11.	(DRV-27 & DRV-34)	HPH-6A/6B Drain to Deaerator	
12.	(DRV-30 & DRV-37)	HPH-6A/6B Drain to F/T-A	
13.	(DRV-58)	LPH-3 Drain to F/T-B	
14.	(DRV-73)	Deaerator Overflow	
15.	(DRV-2 & DRV-8)	HPH-8A/8B Drain to HPH-7A/7B	
16.	(DRV-5 & DRV-11)	HPH-8A/8B Drain to F/T-A	
17.	(DRV-40)	LPH-4 Drain to LPH-3	
18.	(DRV-43)	LPH-4 Drain to F/T-B	
19.	(DMV-21)	DM Normal Makeup to Hotwell	
20.	(DMV-48)	Emergency MU to Hotwell	
21.	(FDV-8)	Low Load Feed Control	
22.	(DRV-52)	Drip Pump Discharge Control	
23.	(DRV-78)	LPH-2A & 2B Normal Drain to DC-1	
24.	(DRV-81)	LPH-2A & 2B Alt Drain to F/T-B	

NOTE: 1. Charges to be indicated against each TAG NO.
2. CV Test to be conducted for one per type per size, CV value TAG NO. to be grouped accordingly and indicated.

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

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

DEVIATION SCHEDULE

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