



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

MATERIALS MANAGEMENT

TITLE Knife Edge Gate valves (Power Cylinder Operated)	Phone: +91 431 2574087/2574157 Fax : +91 431 252 0233 / 0525 Email : joe@bheltry.co.in
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	Reference Number: MM / PCPS / KEGV	Enquiry Date: 17.03.2012	Due date for submission of quotation: 11.04.2012
You are requested to quote the Enquiry number date and due date in all your correspondences.			

BHEL/Trichy is looking for Supply of **Knife Edge Gate valves (Power Cylinder Operated)** as per the attached Enquiry.no.5101200098 dt.17.03.12

BHEL commercial terms & conditions with Price Bid formats and all annexure can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units) Bharath Heavy Electricals Limited) under reference " MM/ PCPS / KEGV "	
Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.	Yours faithfully, For Bharath Heavy Electricals Limited A.Josephraj SPO / Purchase/ PCPS

**General Note: BHARAT HEAVY ELECTRICALS LIMITED**

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - PCPS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

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PHONE : 91-431-2574072
GRAMS : BHARATELEC
FAX NO: 91-431-2520233
E-mail : ssmci@bheltry.co.in
WEB : <http://mm.bheltry.co.in>

OFFICE COPY	Collective No.	Enquiry Date	Due Date For Quotation
	5101200098	17.03.2012	11.04.2012
Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order			

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	L531614701603001 KNIFE EDGE GATE VALVE AS PER SPECIFICATION FBC &HRSG:48KGV(PC):BECL:REV.00, TDC:TCI:143, TDC:TCI:142, QP: QA:CI:STD:QP:42 & PACKING PROCEDURE QA:CI:STD:PR:03 ENCLOSED KEGV - BED MATERIAL LINE AS PER VAR 10 OF SPECIFICATION NO"FBC& HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
20	L531614701603002 KEGV - LIME STONE LINE AS PER VAR 11 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
30	L531614803303001 KEGV-SEAL POT BLOWER OUTLET AS PER VAR 01 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	16.000	16.00	12.06.12
40	L531614803303002 KEGV-FBHE BLOWERS OUTLET AS PER VAR 02 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	32.000	32.00	12.06.12
50	L531614803303003 KEGV-ASH COOLER BLOWER OUTLET AS PER VAR 03 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
60	L531614803303004 KEGV-PURGE&SEAL BLOWERS OUTLET AS PER VAR 04 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	4.000	4.00	12.06.12
70	L531614803303005 KEGV-FBHE EC CHAMBER WIND BOX INLET AS PER VAR 05 OF SPECIFICATION NO"FBC&HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
80	L531614803303006 KEGV-FBHE BC-I WIND BOX INLET AS PER	NO	8.000	8.00	12.06.12

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED

A. JOSEPH RAJ
Senior Purchase Officer
MANAGER, PURCHASE
Purchase / PCPS


BHEL, TRICHY - 620 014.



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - PCPS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

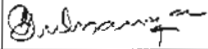
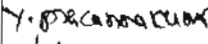
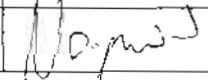
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5101200098 / 17.03.2012					10128
	VAR 06 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"				
90	L531614803303007 KEGV-FBHE BC-II WIND BOX INLET AS PER VAR 07 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
100	L531614803303008 KEGV-FBHE EXIT CHAMBER WIND BOX INLET AS PER VAR 08 OF SPECIFICATION NO"FBC&HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
110	L531614803303009 KEGV-SEAL POT WIND BOX INLET AS PER VAR 09 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	16.000	16.00	12.06.12
120	L531614803303010 KEGV-ASH COOLER EMPTY CHAMBER INLET AS PER VAR 13 OF SPECIFICATION NO"FBC&HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
130	L531614803303011 KEGV-ASH COOLER BC-I INLET AS PER VAR 14 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
140	L531614803303012 KEGV-ASH COOLER BC-II INLET AS PER VAR 15 OF SPECIFICATION NO"FBC &HRSG:48KGV(PC):BECL:Rev00"	NO	8.000	8.00	12.06.12
150	L531614803303013 KEGV-ASH COOLER BLOWERS INTERCONNECTION AS PER VAR 16 OF SPECIFICATION NO"FBC&HRSG:48KGV(PC):BECL:Rev00"	NO	6.000	6.00	12.06.12
General Note:					
1) The above materials are considered as single package and to be despatched to BECL-Bhavnagar site.					
2) Offer should be in Two part bid basis. ie. Technical with commercial terms and priced bid seperately. Unpriced bid only open on the above due date.					
3) Pointwise confirmation on all our specification to be furnished alongwith offer.					
4) Our payment terms shall be 100% after receipt of material (or) 90% against despatch documents and balance after receipt of matl.					
5) If you have not confirm the LD clause, we have taken our standard LD clause of 0.5% per week subject to max of 15%.					
The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.					Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED  A. JOSEPH RAJ Senior Purchase Officer Purchase HRCS BHEL, TRICHY - 620 014.

SPECIFICATION FOR
PC OPERATED KNIFE EDGE GATE VALVE

CONTENTS:

01. Cover Sheet	- Page 1 of 14
02. Specification for PC Operated Knife Edge Gate Valve	- Page 2 of 14 to Page 5 of 14
03. Annexure-A (Design Input Data)	- Page 6 of 14 to Page 7 of 14
04. Annexure-B (Technical Specification Data)	- Page 8 of 14 to page 9 of 14
05. Annexure-C (Check List)	- Page 10 of 14
06. Annexure-D (Lime Stone Analysis)	- Page 11 of 14
07. Annexure-E (Bed Material Analysis)	- Page 12 of 14
08. C&I Specification for Regulating PC operated Knife edge gate valve	- Page 13 of 14
09. C&I Specification for Open/close PC operated Knife edge gate valve	- Page 14 of 14

	NAME	SIGNATURE	DATE
PREPARED	P.SUBRAMANIAN		16-07-2011
CHECKED	Y.PRASANNA KUMAR		16-07-2011
APPROVED	V.RAGHAVENDRAN		16-07-2011

SPECIFICATION FOR PC OPERATED KNIFE EDGE GATE VALVE

1. SCOPE:

1.1. Design, manufacture, testing and supply of power cylinder operated knife edge gate valves along with counter flanges and gaskets.

1.2. Supply of commissioning spares and special tools wherever applicable.

The extent of scope of supply stated herein is not necessarily exhaustive and shall not relieve the vendor from his responsibility to provide goods and services necessary to satisfy the performance criteria and warrantec specified.

2. APPLICATION:

2.1. The valves are envisaged for the following applications

a) To open and close the air from blowers- var 01 to 04:Open/close Pneumatic power cylinder operated valve

b) To regulate the hot air to FBHE wind box-Var 05 to 08: Regulating Pneumatic power cylinder operated valve

c) To regulate the air to Seal pot wind box inlet-var 09: Regulating Pneumatic power cylinder operated valve

d) To open/close the bed material&Limestone from bunkers-var 10 to 11: Open/close Pneumatic power cylinder operated valve

e) To open/close the purging air to Cyclone-var 12:Open/close single solenoid operated valve

f) To regulate the air to Ash cooler inlet-Var 13 to 15: Regulating Pneumatic power cylinder operated valve

g) To Open/close the air from ash cooler blowers to interconnection-var 16: Open/close Pneumatic power cylinder operated valve.

The details of medium, maximum flow rate, temperature and pressure are given in Annexure--A.

3. DESIGN CONSIDERATIONS:

3.1 The pressure drop of the valve should be as low as possible. Vendor to indicate the expected pressure drop in the offer.

3.2. The valves shall be designed to handle the medium at a maximum temperature and maximum pressure specified in the Annexure-A.

3.3. The packing and gasket material shall be selected to withstand the design temperature and pressure specified in the Annexure–A.

3.4. The mating flange (as per ANSI B16.5) shall be selected by considering the line material for welding compatibility.

3.5 Wafer type valve with flanges, gaskets, fasteners may also be offered.

3.6 Flow direction to be marked on the valve body.

3.7 TAG numbers have been mentioned in the Annexure-A against each valve. Each valve is to be tied with 20/80 mm SS tag plate in which TAG number is punched in Block letters.

3.8 Valve spindle/stem is to be covered with dust proof casing.

4. OFFER:

4.1. The offer shall be submitted in two separate sealed covers.

4.2. Part I: For supply of valve with mating flanges, gaskets and commissioning spares.

4.3. Part II: For supply of recommended spares with unit price. (Optional)

5. SPARES:

Vendor to recommend spares required for two years of trouble free operation. A separate offer with unit price shall be submitted. The spares required for commissioning should not be included in this offer and it should be included in the base offer along with valve.

6. INSPECTION & TESTING:

6.1. The valve is to be inspected as per the BHEL approved Quality Plan at vendor's works.

6.2. The hydrostatic test and the seat leak test will be conducted as per class II ANSI/FCI/70 – 2 - 1992 for all valves.

7. DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER:

7.1. Point wise confirmation on the specification.

7.2. General assembly of valve with major dimensional details.

7.3. Component wise materials of construction of valve.

7.4. Approximate weight of the valve.

7.5. Typical quality plan as per BHEL format. It should include material, fabrication, Assembly, hydrostatic test and leak test etc.

7.6. Valve testing procedure and the test rig scheme.

7.7. Valve catalogue.

7.8. List of deviations to the specification.

7.9. Document submission schedule.

- 7.10. Filled in technical specification data sheet as per Annexure-B.
- 7.11. List of start up / commissioning spares.
- 7.12. List of special tools.
- 7.13. List of recommended spares for 2 years of trouble free operation.
- 7.14. Typical O & M manual.
- 7.15. Experience list of vendor relevant to the application for the last 5 years.(for new vendors only).
- 7.16. Checklist in the form of Annexure-C.

All documents submitted under this heading should be submitted in **three sets** unless otherwise stated.

8. DOCUMENTS TO BE FURNISHED AFTER AWARD OF CONTRACT:

- 8.1. Valve assembly drawing with complete dimensions and weight shall be submitted for approval.
- 8.2. Component wise materials of construction of valve for approval.
- 8.3. Quality Plan for purchaser's approval.
- 8.4. Erection & commissioning procedures.
- 8.5. Operation & Maintenance manual.
- 8.6. Number of copies required is 2 hard copies in addition to O & M in CD 2 copies.
- 8.7. Manuals should be in printed form only.
- 8.8. The size of manuals should be in correct A4 size with drawing in A4 / A3 size.
- 8.9. Drawings shall be of printed or laser printed only.
- 8.10. O & M manuals shall be submitted prior to dispatch of valves. O&M Manuals shall be in English language. Manuals generally should contain the following:
 - 8.10.1. Data sheet.
 - 8.10.2. Important instructions (dos & don'ts).
 - 8.10.3. Installation and storage.
 - 8.10.4. Operation.
 - 8.10.5. List of illustrations.
 - 8.10.6. Maintenance and service.
 - 8.10.7. Trouble shooting methods.
 - 8.10.8. Assembly drawings with part list, bill of materials, dimensioned drawings and other applicable details.

8.10.9. Manuals should pertain only to the types or model supplied for the particular contract.

8.10.10. Short term and long term storage instruction manual.

8.10.11. List of commissioning spares.

8.10.12. List of special tools.

8.11. Packing / shipping list as per BHEL format.

8.12. All documents submitted under this heading should be submitted in 6 sets unless noted otherwise.

8.13. Packing / shipping arrangement drawing for review.

9. **Document Submission Schedule:**

9.1 Zero date: Date of placing purchase order.

9.2 Submission of GA Drawing: Within 4 weeks from P.O.

9.3 Approval/clarification on G.A drawing: Within 6 weeks from date of P.O.

9.4 Submission of final G.A drawing: Within 8 weeks from date of P.O.

9.5 Submission of O&M Manual: Within 12 weeks from date of P.O.

10. **PACKING/SHIPPING:**

The valve assembly should be packed in such a way that it should not get damaged during transport. Ends of the valve shall be plugged to avoid settling of dust on the seat as well as gate and to protect from accidental damage. The valve assembly should be properly covered with thick tear proof poly sheets and dispatched in suitable moisture proof and tamper proof wooden crates. Two sets of O&M manuals and approved GA drawings are to be sent to site in the same packing.

11. EXCLUSION & DEVIATIONS:

11.1. Supplier has to indicate clearly the exclusions and deviations in the offer stage itself with specific reasons. No deviation / exclusion will be entertained after the award of contract.

S.No.	Description	Var 01	Var 02	Var 03	Var 04	Var 05	Var 06	Var 07	Var 08
BECL(CUST NO 5316&5317)									
POWER CYLINDER OPERATED KNIFE EDGE GATE VALVE									
01	NAME OF CONTACT								
02	NAME OF EQUIPMENT								
03	APPLICATION								
04	TAG NUMBERS FOR 5316	SEAL POT BLOWER OUTLET 1HLA41AA101, 1HLA55AA101, 1HLA63AA101, 1HLA65AA102, 1HLA44AA101, 1HLA65AA102, 1HLA53AA101, 1HLA65AA103, 1HLA45AA101, 1HLA65AA103, 1HLA45AA102, 1HLA53AA101, 1HLA45AA103, 1HLA53AA104, 1HLA65AA104	FBHE BLOWERS OUTLET 1HLA51AA101, 1HLA55AA101, 1HLA63AA101, 1HLA65AA101, 1HLA65AA102, 1HLA44AA101, 1HLA65AA102, 1HLA53AA101, 1HLA65AA103, 1HLA45AA101, 1HLA65AA103, 1HLA45AA102, 1HLA53AA101, 1HLA45AA103, 1HLA53AA104, 1HLA65AA104	ASH COOLER BLOWERS OUTLET 1ETP11AA101, 1ETP12AA101, 1ETP13AA101, 1ETP14AA101	PURGE&SEAL BLOWERS OUTLET 1QEA01AA101, 1QEA02AA101	EMPTY CHAMBER 1HLA71AA001, 1HLA72AA001, 1HLA73AA001, 1HLA74AA001	FBHE WINDBOX INLET BUNDLE CHAMBER-I 1HLA71AA002, 1HLA72AA002, 1HLA73AA002, 1HLA74AA002	BUNDLE CHAMBER-II 1HLA71AA003, 1HLA72AA003, 1HLA73AA003, 1HLA74AA003	EXIT CHAMBER 1HLA71AA004, 1HLA72AA004, 1HLA73AA004, 1HLA74AA004
05	TAG NUMBERS FOR 5317	2HLA41AA101, 2HLA42AA101, 2HLA43AA101, 2HLA44AA101, 2HLA45AA101, 2HLA46AA101, 2HLA47AA101, 2HLA48AA101, 2HLA49AA101, 2HLA50AA101, 2HLA51AA101, 2HLA52AA101, 2HLA53AA101, 2HLA54AA101, 2HLA55AA101, 2HLA56AA101, 2HLA57AA101, 2HLA58AA101, 2HLA59AA101, 2HLA60AA101, 2HLA61AA101, 2HLA62AA101, 2HLA63AA101, 2HLA64AA101, 2HLA65AA101, 2HLA66AA101, 2HLA67AA101, 2HLA68AA101, 2HLA69AA101, 2HLA70AA101	2HLA51AA101, 2HLA55AA101, 2HLA63AA101, 2HLA65AA101, 2HLA44AA101, 2HLA65AA102, 2HLA53AA101, 2HLA65AA103, 2HLA45AA101, 2HLA65AA103, 2HLA45AA102, 2HLA53AA101, 2HLA45AA103, 2HLA53AA104, 2HLA65AA104	2ETP11AA101, 2ETP12AA101, 2ETP13AA101, 2ETP14AA101	2QEA01AA101, 2QEA02AA101	2HLA71AA001, 2HLA72AA001, 2HLA73AA001, 2HLA74AA001	2HLA71AA002, 2HLA72AA002, 2HLA73AA002, 2HLA74AA002	2HLA71AA003, 2HLA72AA003, 2HLA73AA003, 2HLA74AA003	2HLA71AA004, 2HLA72AA004, 2HLA73AA004, 2HLA74AA004
06	LINE SIZE-OD,THICKNESS(MM)	ø273x6.35	ø457x6.4	ø457x6.4	ø355.6x6.4	ø273x6.35	ø406.4x6.4	ø508x6.4	ø219.1x6.35
07	SEAT BORE SIZE#(MM)	ø260	ø444	ø444	ø343	ø260	ø393	ø495	ø206
08	COUNTER FLANGE ID(MM)	ø275	ø460	ø460	ø358	ø275	ø409	ø510	ø222
09	CONNECTING PIPE MATERIAL	AP15LGrB							
10	VALVE DESIGN PRESSURE(MBAR)	600	800	1000	600	800	800	800	800
11	VALVE DESIGN TEMPERATURE		130(DEGC)		200(DEGC)		300(DEGC)		300(DEGC)
12	MEDIUM HANDLED			Hot Air					
13	QUANTITY PER BOILER	8	16	4	2	4	4	4	4
14	DIRECTION OF FLOW	Uni-Directional (Top to bottom)							
15	SEAT RING TYPE	INTEGRATED							
16	BODY & GATE MATERIAL	Carbon Steel							
17	STEM MATERIAL	Stainless Steel							
18	GLAND PACKING MATERIAL	Suitable to Design Temperature							
19	GASKET MATERIAL	Suitable to Design Temperature							
20	END CONNECTION	Flanged							
21	PRESSURE RATING	Minimum 1.5 Times the Design Pressure							
22	SERVICE	Regulating Pneumatic Power Cylinder							
23	LEAKAGE RATE	Maximum allowable leakage as per class IV of ANSI/FCI 70-2-1992							
24	COUNTER FLANGE MATERIAL	Carbon Steel							
25	FASTENERS MATERIAL	ASTM A 193 GrB7&A194Gr2H							
26	GATE TYPE	KNIFE EDGE GATE(DUAL SOLENOID VALVE)							
27	PAINTING	Surface preparation:Blast cleaning to SA2 1/2,Primer coat:Epoxy Zinc phosphate to 30m per coat,No of coats:2 Second coat:Epoxy MIO to DFT of 100m per coat.No of coats:2,Shade:Smoke Gray,shade number 692 of IS5.							

S.No.	Description	Var 09	Var 10	Var 11	Var 12	Var 13	Var 14	Var 15	Var 16
BECL(CUST NO 5316&5317)									
01	NAME OF CONTACT								
02	NAME OF EQUIPMENT								
03	APPLICATION	POWER CYLINDER OPERATED KNIFE EDGE GATE VALVE							
04	TAG NUMBERS FOR 5316	SEAL POT WINDBOX INLET	BED MATERIAL LINE	LIME STONE LINE	CYCLONE PURGE LINE	EMPTY CHAMBER	ASH COOLER INLET BUNDLE CHAMBER-I	BUNDLE CHAMBER-II	ASH COOLER BLOWERS INTERCONNECTION LINE
		1HLA41AA001 1HLA41AA002 1HLA42AA001 1HLA42AA002 1HLA43AA001 1HLA43AA002 1HLA44AA001 1HLA44AA002	1EMB11AA101 1EMB12AA101 1EMB21AA101 1EMB22AA101	1EMK11AA101 1EMK21AA101 1EMK31AA101 1EMK41AA101	1HDF01AA401 1HDF01AA402 1HDF02AA401 1HDF02AA402 1HDF03AA401 1HDF03AA402 1HDF04AA401 1HDF04AA402	1ETP11AA001 1ETP12AA001 1ETP13AA001 1ETP14AA001	1ETP11AA002 1ETP12AA002 1ETP13AA002 1ETP14AA002	1ETP11AA003 1ETP12AA003 1ETP13AA003 1ETP14AA003	1ETP11AA102 1ETP12AA102 1ETP13AA102
05	TAG NUMBERS FOR 5317	2HLA41AA001 2HLA41AA002 2HLA42AA001 2HLA42AA002 2HLA43AA001 2HLA43AA002 2HLA44AA001 2HLA44AA002	2EMB11AA101 2EMB12AA101 2EMB21AA101 2EMB22AA101	2EMK11AA101 2EMK21AA101 2EMK31AA101 2EMK41AA101	2HDF01AA401 2HDF01AA402 2HDF02AA401 2HDF02AA402 2HDF03AA401 2HDF03AA402 2HDF04AA401 2HDF04AA402	2ETP11AA001 2ETP12AA001 2ETP13AA001 2ETP14AA001	2ETP11AA002 2ETP12AA002 2ETP13AA002 2ETP14AA002	2ETP11AA003 2ETP12AA003 2ETP13AA003 2ETP14AA003	2ETP11AA102 2ETP12AA102 2ETP13AA102
		06	LINE SIZE - OD, THICKNESS(MM)	0406.4x6.4	0406.4x6.4	060.3x3.91	0168.3x7.11	0273x6.35	0323.9x6.4
07	SEAT BORE SIZE#(MM)	0154	0393	0393	052	0154	0260	0311	0444
08	COUNTER FLANGE ID(MM)	0170	0409	0409	065	0170	0275	0326	0460
09	CONNECTING PIPE MATERIAL	SA106Gr.B	AP15LGrB	Carbon Steel	Carbon Steel	SA106Gr.B	AP15LGrB	AP15LGrB	
10	VALVE DESIGN PRESSURE(MBAR)	600	300	150	600	1000			
11	VALVE DESIGN TEMPERATURE(OC)	130(DegC)	300(DegC)	50(DegC)		130(DegC)			
12	MEDIUM HANDLED	HOT AIR	BED MATERIAL	LIME STONE		Hot Air			
13	QUANTITY PER BOILER	8	4	4	8	4	4	4	3
14	DIRECTION OF FLOW					UNI-DIRECTIONAL			
15	SEAT RING TYPE					INTEGRATED			
16	BODY&GATE MATERIAL					CARBON STEEL			
17	STEM MATERIAL					STAINLESS STEEL			
18	GLAND PACKING MATERIAL					SUITABLE TO DESIGN TEMP			
19	GASKET MATERIAL					SUITABLE TO DESIGN TEMP			
20	END CONNECTION					FLANGED			
21	PRESSURE RATING					Minimum 1.5 Times the Design Pressure			
22	SERVICE	Regulating Pneumatic PC	Open/Close Pneumatic Power Cylinder	Single Solenoid	Regulating Pneumatic Power Cylinder	Regulating Pneumatic Power Cylinder	Open/Close Pneumatic Power Cylinder		
23	LEAKAGE RATE					Maximum allowable leakage as per class IV of ANSI/FCI 70-2-1992			
24	COUNTER FLANGE MATERIAL					COMPATIBLE TO LINE MATERIAL			
25	FASTENERS MATERIAL					ASTM A 193 GrB7&A194Gr2H			
26	GATE TYPE					KNIFE EDGE GATE(DUAL SOLENOID VALVE)			
27	PAINTING					Surface preparation: Blast cleaning to SA21/2, Primer coat: Epoxy Zinc phosphate to 30m per coat, No of coats 2 Second coat: Epoxy MiO to DFT of 100m per coat, No of coats: 2, Shade: Smoke Gray, shade number 692 of ISS.			

All the data has to be filled by vendor.

S.No.	Description	Var 01	Var 02	Var 03	Var 04	Var 05	Var 06	Var 07	Var 08
01	NAME OF CONTACT								
02	NAME OF EQUIPMENT	BECL(CUST NO 5316&5317)							
03	APPLICATION	POWER CYLINDER OPERATED KNIFE EDGE GATE VALVE							
04	TAG NUMBERS FOR 5316	SEAL POT BLOWER OUTLET	FBHE BLOWERS OUTLET	ASH COOLER BLOWERS OUTLET	PURGE&SEAL BLOWERS OUTLET	EMPTY CHAMBER	BUNDLE CHAMBER-I	BUNDLE CHAMBER-II	EXIT CHAMBER
05	TAG NUMBERS FOR 5317								
06	LINE SIZE-OD,THICKNESS(MM)								
07	SEAT BORE SIZE#(MM)								
08	COUNTER FLANGE ID(MM)								
09	CONNECTING PIPE MATERIAL								
10	VALVE DESIGN PRESSURE(MBAR)								
11	VALVE DESIGN TEMPERATURE								
12	MEDIUM HANDLED								
13	QUANTITY PER BOILER								
14	DIRECTION OF FLOW								
15	SEAT RING TYPE								
16	BODY & GATE MATERIAL								
17	STEM MATERIAL								
18	GLAND PACKING MATERIAL								
19	GASKET MATERIAL								
20	END CONNECTION								
21	PRESSURE RATING								
22	SERVICE								
23	LEAKAGE RATE								
24	COUNTER FLANGE MATERIAL								
25	FASTENERS MATERIAL								
26	GATE TYPE								
27	PAINTING								

TOLERANCE ON THIS DIMENSION IS +/- 10MM.

S.No.	Description	Var 09	Var 10	Var 11	Var 12	Var 13	Var 14	Var 15	Var 16	
01	NAME OF CONTACT	BECL(CUST NO 5316&5317) POWER CYLINDER OPERATED KNIFE EDGE GATE VALVE								
02	NAME OF EQUIPMENT									
03	APPLICATION									
04	TAG NUMBERS FOR 5316	SEAL POT WINDBOX INLET	BED MATERIAL LINE	LIME STONE LINE	CYCLONE PURGE LINE	EMPTY CHAMBER	ASH COOLER INLET BUNDLE CHAMBER--I	BUNDLE CHAMBER--II	ASH COOLER BLOWERS INTERCONNECTION LINE	
05	TAG NUMBERS FOR 5317									
06	LINE SIZE - OD, THICKNESS (MM)									
07	SEAT BORE SIZE # (MM)									
08	COUNTER FLANGE ID (MM)									
09	CONNECTING PIPE MATERIAL									
10	VALVE DESIGN PRESSURE (MBAR)									
11	VALVE DESIGN TEMPERATURE (OC)									
12	MEDIUM HANDLED									
13	QUANTITY PER BOILER									
14	DIRECTION OF FLOW									
15	SEAT RING TYPE									
16	BODY & GATE MATERIAL									
17	STEM MATERIAL									
18	GLAND PACKING MATERIAL									
19	GASKET MATERIAL									
20	END CONNECTION									
21	PRESSURE RATING									
22	SERVICE									
23	LEAKAGE RATE									
24	COUNTER FLANGE MATERIAL									
25	FASTENERS MATERIAL									
26	GATE TYPE									
27	PAINTING									

ANNEXURE-C

To be filled by the vendor and submit along with the offer

CHECKLIST

The following documents should be checked and signed by the authorised signatory with office seal. Offers not containing any of the documents will be liable for rejection without any further intimation. Vendor in his judgement may add further information, if required.

S.NO.	DOCUMENT DESCRIPTION	STATUS
1.	Point wise confirmation on the specification	
2.	General assembly of valve with major dimensional details	
3.	Component wise materials of construction of valve	
4.	Approximate weight of the valve	
5.	Typical quality plan as per BHEL format	
6.	Valve testing procedure and the test rig scheme	
7.	Valve catalogue	
8.	Document submission schedule	
9.	Filled in technical specification data sheet as per Annexure-B	
10.	Typical erection and commissioning procedure	
11.	List of start up / commissioning spares	
12.	List of special tools.	
13.	List of deviations on the Specification	
14.	List of recommended spares for 2 years of trouble free operation	
15.	Typical O & M manual	
16.	List of codes and standards followed for design, manufacture, testing etc.	
17.	Experience list of vendor for the last 5 years (for new vendors only)	
18.	Checklist in the form of Annexure-C	
19.	Three sets of above documents	

SIGNATURE OF AUTHORISED SIGNATORY WITH OFFICE SEAL.

ANNEXURE -D
LIME STONE ANALYSIS

DESCRIPTION	UNIT	LIME STONE
SORBENT QUALITY REQUIRED AT 8MCR	Kg/hr	1,20,000
NO OF BUNKERS AT BOILER FRONT	Nos.	4
NO OF OUTLETS / FEEDERS ENVISAGED	Nos.	4
STORAGE TIME	hrs	8
COMPOSITION	% wt	
Caco ₃		≥85.23
Mgco ₃		≤1.83
Sio ₂		≤8.00
Moisture		≤2.05
Others		≤2.89
<i>BULK DENSITY</i>	Kg/m ³	1000-1300kg/m ³
SIZE DISTRIBUTION REQUIRED		
100%	mm	<1.00
80%	mm	<0.3
50%	mm	<0.15
90%	mm	>0.03

ANNEXURE –E

BED MATERIAL ANALYSIS

1	Material Handled	Crushed Refractory Grog / Bed Ash
2	SIZE ¹⁾	
	100%	<1 mm
	80%	0.15 mm to 0.21mm
	50%	0.09 mm to 0.15 mm
3	Bulk density ¹⁾	1500-1800kg/m ³
4	Chemical composition (% by weight) as per IS 1355	
	Al ₂ O ₃	30 to 40%
	SiO ₂	50 to 60%
	Alkalis (Na ₂ O+K ₂ O)	Not more than 3%
	Iron Oxide	Less than 3.5%
	Moisture (H ₂ O)	Less than 1%
5.	Initial Deformation Temp.	Greater than 1300°C
6	Quality required for initial fill	610 Tonnes
7.	Bunker Capacity	815 Tonnes
8.	Qty. recommended for stocking	2000 Tonnes

NOTE:

1) Condition to be Strictly Maintained by the Supplier.

BHARAT HEAVY ELECTRICALS LIMITED TRICHY-14

FBC&HRSG

ELECTRICALS, CONTROLS & INSTRUMENTATION

**EC&I SPECIFICATION FOR REGULATING POWER CYLINDER OPERATED KNIFE
EDGE GATE VALVE**

FBC&HRSG: CI: 5316: RGV/Rev00.

A. Regulating power cylinder shall be as per the following specification.

- i.Specification* TDC:TCI:143
ii.Quality Plan QA:CI:STD:QP:42
iii.Packing Procedure QA:CI:STD:PR:03

- B. Position Transmitter shall be Electronic - 2wire system Non-Contact LVDT type with accuracy +/- 0.075%. 24V DC (15 to 50VDC) All accessories shall be SS..**
- C. Air Filter Regulator (AFR): Constant bleed type AFR with an accuracy of +/-0.1%, inlet pressure range of 5-8 kg /sq.cm and suitable spring ranges (AFR) for use with shut off dampers. Filtering particles above five microns having phosphor bronze filter element. Material of accessories shall be SS. Built in blow down valve shall be provided. AFR shall have automatic drain feature. Degree of protection shall be IP65.**
- D. I/P convertor (Enclosure IP65) Input 4-20mA and Output 0.2 – 1 Kg/cm².**
- E. Junction box as per following specn. with required number of double compression cable glands.**

All Wall/column mounted Galvanised iron junction boxes having 32 (2x16) terminals and cable entry only at the bottom and sealed with fire proof compound; Screwed terminal type; IP 65 or equivalent degree of protection for enclosure. Separate Junction boxes shall be used for power and digital signal and also for signals with different voltages..

All JB's shall be provided with individual canopies to avoid ingress of water. Painting RA1. 7036

- F. Vendor to furnish detailed offer with all the required documents viz. Filled up specification/datas, schemes, Catalogues of all accessories & data sheet for all accessories. Also the required protections if any to be taken care by the vendor to protect the equipment.**

G. Customer Approved Makes:

- a. I/P convertor: Rosemount , SHREYAS, ABB (I&B).
b. Air filter Regulator: Placka/ Shavo-Norgan (I) Pvt Ltd/ ABB Ltd/ Bells controls Ltd/ Shrader-Schorill Duncan Ltd/ Veljen-Hydrair Pvt Ltd/ Nucon Industries/ Saga Industries
c. Limit switches: BHEL approved vendors
d. Junction boxes: Flame proof controls, Baliga, Flexpro,

Note: All the above-mentioned specifications are priority over Main specification in case of any conflict.

	PREPARED	CHECKED	APPROVED
NAME	G.J	P.V	A.S
SIGNATURE			
REV00 DATE	30.06.2011	30.06.2011	30.06.2011

BHARAT HEAVY ELECTRICALS LIMITED TRICHY-14
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

EC&I SPECIFICATION FOR POWER CYLINDER OPERATED KNIFE EDGE GATE VALVE
FBC&HRSG: CI: 5316: GV/Rev00.

A. Open/close power cylinder shall be as per the following specification.

- i.Specification* TDC:TCI:142
- ii.Quality Plan* QA:CI:STD:QP:42
- iii.Packing Procedure* QA:CI:STD:PR:03

- H. Solenoid valve voltage rating shall be 24V, DC. Body Material: Brass, Plunger Material SS 316. Enclosure: IP 65, Shut of class (Leakage): VI.**
- I. Air Filter Regulator (AFR): Constant bleed type AFR with an accuracy of +/-0.1%, inlet pressure range of 5-8 kg /sq.cm and suitable spring ranges (AFR) for use with shut off dampers. Filtering particles above five microns having phosphor bronze filter element. Material of accessories shall be SS. Built in blow down valve shall be provided. AFR shall have automatic drain feature. Degree of protection shall be IP65.**
- J. Both open and close position limit switch (Enclosure IP65) and the solenoid valves are to be terminated .(Dual coil SOV). Vendor has to submit similar doc. after placement of order for BHEL's approval.**
- K. Junction box as per following specn. with required number of double compression cable glands.**

All Wall/column mounted Galvanised iron junction boxes having 32 (2x16) terminals and cable entry only at the bottom and sealed with fire proof compound; Screwed terminal type; IP 65 or equivalent degree of protection for enclosure. Separate Junction boxes shall be used for analog and digital signal and also for signals with different voltages..

All JB's shall be provided with individual canopies to avoid ingress of water.Painting RAL 7036

- L. Vendor to furnish detailed offer with all the required documents viz. Filled up specification/datas, schemes, Catalogues of all accessories & data sheet for all accessories. Also the required protections if any to be taken care by the vendor to protect the equipment.**
- M. Customer Approved Makes:**
 - a. Solenoid valve: ASCO / ROTEX
 - b. Air filter Regulator: Placka/ Shavo-Norgan (I) Pvt Ltd/ ABB Ltd/ Bells controls Ltd/ Shrader-Schorill Duncan Ltd/ Veljen-Hydrair Pvt Ltd/ Nucon Industries/ Saga Industries
 - c. Limit switches: BHEL approved vendors
 - d. Junction boxes: Flame proof controls, Baliga, Flexpro.

Note: All the above-mentioned specifications are priority over Main specification in case of any conflict.

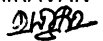
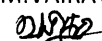

	PREPARED	CHECKED	APPROVED
NAME	G.J	P.V	A.S
SIGNATURE			
REV00 DATE	30.06.2011	30.06.2011	30.06.2011



CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR BOXES AND CABINETS

(JUNCTION BOX, PUSH BUTTON BOX, METAL TEMPERATURE MEASUREMENT JUNCTION BOX,
BT SHEAR PIN FAILURE INDICATION BOX, MARSHALLING BOX.CABINET)

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
00	--	Sd/-	Sd/-	Sd/-	Initial release.
01	03/11/1996	Sd/-	Sd/-	Sd/-	General Revision
02	16/06/1997	Sd/-	Sd/-	Sd/-	Format revised
03	21/03/2002	Sd/-	Sd/-	Sd/-	Dept. name changed CTQ requirements added & General revision.
04	08/01/2004	Sd/-	Sd/-	Sd/-	Revised to include the comments / Feedback of internal discussion
05	01/12/2010	RM.VAIRAVAN 	RM.VAIRAVAN 	N.SRIDHAR 	Routine test modified. Quantum of check included. Format changed



Sl. No	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc. & Acceptance STD	Format of record	AGENCY			REMARKS
					M	B/C			M	B	C	
A	FINISHED PRODUCT INSPECTION											
01	Routine test	a. Material – Steel / Aluminium	Major	CHEM	Sample	Sample	PO spec, Appd. Drg. IS 513,	TC	V	V	-	
		b. Overall dimension including sheet steel thickness, verticality, fixing arrangement	Major	MEAS VISU	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	
		c. Weld slag removal, finish	Critical	MECH	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	Wherever applicable
		d. Painting: Shade, thickness, finish, adhesion by scratch test	Major	MEAS VISU	100%	10%	PO spec, Appd. Drg. IS, RAL	TR	P	W	-	7 tank process for pre-treatment of sheet metal
		e. Provision of gaskets at door and gland plate	Critical	VISU	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	
		f. Door & door locking arrangement	Major	VISU	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	
		g. Powder test for door matching	Major	VISU	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	
		h. Functional check (if applicable)	Major	ELEC	100%	20%	PO spec, Appd. Drg.	TR	P	W	-	
		i. Rating & location of components	Major	VISU	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	
		j. Ferruling, crimping, dressing of cables and wiring continuity	Major	VISU	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	Applicable for Boxes having wiring
		k. Insulation resistance test (Before and after HV test)	Major	ELEC	100%	20%	PO spec, Appd. Drg.	TR	P	W	-	-Do-
		l. High voltage test - 2KV for 1 min.	Major	ELEC	100%	20%	There shall be no break down	TR	P	W	-	-Do-
		m. Provision of label with inscription, earth symbol, earth bolt.	Major	VISU	100%	10%	PO spec, Appd. Drg.	TR	P	W	-	
02	Type tests	a. Enclosure Protection	Critical	ENVI	One of Design	One of Design	Appd. Drg, IS 60947	TC	V	V		
		b. Salt Test on painted plate.	Critical	CHEM	-Do-	-Do-	IS 3618, IS 6005	TC	V	V		

M- MANUFACTURER/ SUB-VENDOR; **B** - BHEL / TPI ; **C** - CUSTOMER / TPI
P - PERFORM ; **W** - WITNESS **V** - VERIFICATION ;



B.NOTES:

1.LEGENDS:

ENVI	:	Environmental	MEAS	:	Measurement
MECH	:	Mechanical	VISU	:	Visual
CHEM	:	Chemical			
TC	:	Test certificate	TR	:	Test Report

- The vendor at their works shall arrange all testing facilities. Tests for which facilities are not available are to be carried out at recognized National Test Houses like ETDC/CIL/NPL/ERTL etc., at vendor cost.
- Through Log Book / any other documents available at the vendor's works, it shall be possible to correlate the finished product with inspection carried out.
- All Measuring and Testing Instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification.
- Test certificates for routine type tests are to be furnished by the vendor.
- Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry.
- Vendor to give tentative inspection program in advance and confirm exact date two weeks in advance for arranging BHEL's inspection.
- Packing shall be as per "PACKING PROCEDURE" indicated in the specification.
- Salt spray test to be conducted on a sample plate, which has been subjected to the same pre-treatment and finish painting process as main box.
- Sample on every gasket lot to be tested for neoprene content as follows:
Burn a small piece of gasket with a match stick. The fire should extinguish on removal of match stick immediately and the residual should be in the powder form.

C. REFERENCE STANDARDS:

(For Indicated Standards Refer the Latest Version)

IS 513	:	Specification for cold rolled low carbon steel
IS 6005	:	Code of practice for phosphate of iron and steel
IS 60947	:	General rules for low voltage switchgear (Specification on degrees of protection offered by enclosures)
IS 4905	:	Methods of random sampling



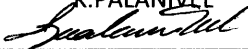
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CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR

PNEUMATIC ACTUATOR (POWER CYLINDER) (OPEN / CLOSE AND REGULATING TYPE)

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
00	14/05/1993	Sd/-	Sd/-	Sd/-	Initial release.
01	16/06/1997	Sd/-	Sd/-	Sd/-	Format Revised.
02	21/06/2002	Sd/-	Sd/-	Sd/-	Department name changed, CTQ requirements added & General revision.
03	08/01/2004	Sd/-	Sd/-	Sd/-	Revised to include the Comments/ Feedback of internal discussion.
04	14/09/2010	RM.VAIRAVAN 	N.SRINIHAR 	K.PALANIVEL 	Format Changed. Revised as per Feedbacks from QC and Engineering during discussion.



BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620014

QUALITY PLAN FOR
PNEUMATIC ACTUATOR (POWER CYLINDER)
(OPEN / CLOSE AND REGULATING TYPE)

QA:CI:STD:QP:42
 Rev: 04 Page: 2 of 4

Sl. No	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc. & Acceptance STD	Format of record	AGENCY			Remarks
					M	B/C			M	B	C	
A RAW MATERIALS & BOUGHT OUT ITEMS INSPECTION												
01	Cylinder Piston rod	a. Material	Critical	CHEM	One of sample	-	Specification, BS 970	TC	V	V	-	
		b. Dimension	Critical	MEAS	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
02	" O " ring	a. Material	Critical	CHEM	-do-	-	Specification	TC	V	V	-	
		b. Dimension	Critical	MEAS	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
		c. Hardness	Critical	MEAS	-do-	-	-do-	TC	V	V	-	
03	Cylinder Barrel & End Cover	a. Material	Critical	CHEM	-do-	-	Specification	TC	V	V	-	
		b. Dimension	Critical	MEAS	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
04	Piston Cylinder	a. Pressure Resistance Test	Major	PHYS	-do-	-	JIS B 8377	IIR/LGB	P	V	-	
05	Air filter Regulator	a. Make & Type	Major	PHYS	100%	-	Specification, Data Sheet	IIR/LGB	P	-	-	
		b. Output Gauge range	Major	PHYS	-do-	-	Specification	IIR/LGB	P	-	-	
		c. Process connection Size	Major	MEAS	-do-	-	-do-	IIR/LGB	P	-	-	
		d. Filter size in Microns	Major	PHYS	-do-	-	-do-	TC	V	V	-	
06	Limit Switches	a. Make & Type	Major	PHYS	-do-	-	Specification, Data Sheet	IIR/LGB	P	-	-	
		b. Functional check	Major	ELEC	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
07	Air Lock Relay	a. Make & Type	Major	PHYS	-do-	-	Specification	IIR/LGB	P	V	-	
		b. Functional check	Major	ELEC	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
08	Solenoid valve (Applicable Only for open / close)	a. Make & Type	Major	PHYS	-do-	-	Specification, Data Sheet	TC	P	-	-	
		b. Coil Voltage	Major	MEAS	-do-	-	-do-	TC	P	-	-	
		c. Class of Insulation	Major	PHYS	-do-	-	-do-	TC	P	-	-	
		d. Duty	Major	VISU	-do-	-	Mfr. Std.	TC	P	-	-	
		e. Functional check	Major	ELEC & MECH	-do-	-	-do-	IIR/LGB	P	-	-	
09	Positioner (Applicable only for regulating power Cylinder)	a. Make & Type	Major	VISU	-do-	-	Data Sheet	IIR/LGB	P	-	-	Performance to be checked during complete assembly testing

M- MANUFACTURER/ SUB-VENDOR; B - BHEL / TPI ; C - CUSTOMER / TPI
P - PERFORM; W - WITNESS V - VERIFICATION;



BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620014

QUALITY PLAN FOR
PNEUMATIC ACTUATOR (POWER CYLINDER)
(OPEN / CLOSE AND REGULATING TYPE)

QA:CI:STD:QP:42
Rev: 04 Page: 3 of 4

Sl. No	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc. & Acceptance STD	Format of record	AGENCY			Remarks
					M	B/C			M	B	C	
B INPROCESS INSPECTION												
01	Complete Assembly	a. Functional check	Major	PHYS & ELEC	100%	-	Mfr. Std.	IIR/LGB	P	-	-	
		b. Leak test	Major	PHYS	-do-	-	JIS B 8377	IIR/LGB	P	-	-	
C FINISHED PRODUCT INSPECTION												
01	Routine Test	a. No Load test	Major	PHYS	100%	20%	Mfr. Std.	IIR/LGB	P	W	-	
		b. Verification of Mounting of Accessories	Major	VISU	-do-	-do-	BHEL App. Drg.	IIR/LGB	P	W	-	
		c. Dimensional check including Process connections	Major	MEAS	-do-	-do-	BHEL App. Drg.	LGB	P	W	-	
		d. Verification of name plate for Type & Model Number	Major	VISU	-do-	-do-	BHEL App. Drg.	IIR/LGB	P	W	-	
		e. Stroke length & Time	Major	MEAS	-do-	-do-	Spec. & BHEL App. Data Sheet	IIR/LGB	P	W	-	
		f. Verification of accessories (Make and Model number)	Major	VISU	-do-	-do-	Spec. & BHEL App. Data Sheet	IIR/LGB	P	W	-	
		g. Performance test (Sensitivity, Hysterisis, Accuracy, Repeatability) Applicable for Regulating duty	Major	MEAS	-do-	-do-	Specification	IIR/LGB	P	W	-	
		h. Stay put device Operation	Major	PHYS	-do-	-do-	Mfr. Std.	IIR/LGB	P	W	-	
		i. Solenoid valve – Coil voltage rating, Insulation & duty (Applicable only for open/ close duty)	Major	VISU & ELEC	-do-	-do-	BHEL App. Data Sheet	IIR/LGB	P	W	-	
		j. Air Filter- Filter Element size in microns	Major	VISU	-do-	-do-	Specification	IIR/LGB	P	W	-	
02	Type Tests	a. Load operation test	Major	PHYS	One of sample	One of sample	Mfr. Std.	TC	P	V	-	
		b. Durability test	Major	PHYS	-do-	-do-	JIS B 8377	TC	P	V	-	

M- MANUFACTURER/ SUB-VENDOR; B - BHEL / TPI ; C - CUSTOMER / TPI
P - PERFORM; W - WITNESS V - VERIFICATION;



D.NOTES:

1.LEGENDS:

MECH	:	Mechanical	MEAS	:	Measurement
ELEC	:	Electrical	TC	:	Test certificate
TR	:	Test Report	CHEM	:	Chemical
VISU	:	Visual	IIR	:	Internal Inspection Report

2. The vendor shall arrange all testing facilities at their works. Tests for which facilities are not available are to be carried out at recognized National Test Houses like ETDC/CIL/NPL/ERTL etc., at vendor cost.
3. Through Log Book / any other documents available at the vendor's works, it shall be possible to correlate the finished products with raw material and in process stage checks / inspection carried out.
4. All Measuring and Testing Instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification.

5. Test reports for routine tests are to be furnished by the vendor.
6. Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry.
7. Vendor to give tentative inspection program in advance and confirm exact date two weeks in advance for arranging BHEL's inspection.
8. Packing shall be as per the "PACKING PROCEDURE" indicated in the specification.

E. REFERENCE STANDARDS:

(For Indicated Standards Refer the Latest Version)

JIS B 8377	:	Specification for Pneumatic Cylinder
BS 970	:	Specification for Wrought Steel for Mechanical end

SQP42R4.DOC

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT ,TIRUCHIRAPPALLI 620 014.

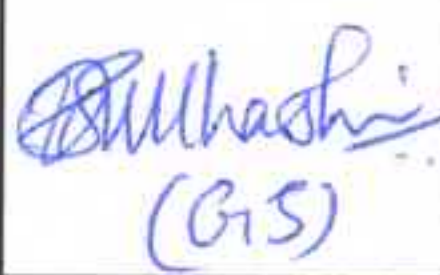
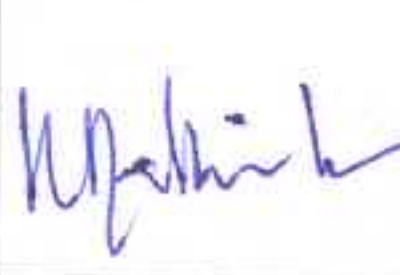


TECHNICAL DELIVERY CONDITIONS

FOR SUB - DELIVERY COMPONENTS OF CONTROLS AND INSTRUMENTATION

TDC : TCI : 142 / REV 03

PAGE 01 OF 05

POWER CYLINDERS - OPEN / CLOSE TYPE

Rev No.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED	
					ENGG	QAC
01	----	General Revisions	Sd/-	Sd/-	Sd/-	Sd/-
02	09.07.93	Page Number added	Sd/-	Sd/-	Sd/-	Sd/-
03		General Revision				
04	10.03.04	Revised to include Revisits comments				

CL. NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
1.0	<u>SITE CONDITIONS</u>		
1.1	Altitude above mean sea level	Actual values are based on site conditions	
1.2	Ambient temperature condition	Mentioned in the contract documents	
1.3	Relative humidity		
1.4	Atmosphere		
2.0	<u>GENERAL</u>		
2.1	Application	For opening / closing of Dampers	
2.2	Air supply pressure	Minimum 3 Kg / sq.cm ; Maximum 7 kg/sq.cm	
2.3	Actuator type	Double acting piston; open – close type	
2.4	Duty cycle	Intermittent	
2.5	Location	Outdoor	
2.6	Mounting	Trunnion mounting	
2.7	Air connection	1/4" NPT (with suitable adopter for accepting 1/4" OD copper tubing)	
2.8	Min. operating time required	Refer Power Cylinder Data Sheet	
2.9	Air filter regulator with output pressure gauge	Required. Calibration shall be 0-10Kg/sq.cm.	
2.10	Action of driving equipment on Power air supply failure.	.	
2.11	Type of stayput device	Stayput Self reset	
2.12	Position indicator	1 No. local mechanical position indicator required	
3.0	<u>MATERIAL</u>		
3.1	Piston rod	Hard chrome plated high strength steel	
3.2	Cylinder barrel	Honed and hard chrome plated	
3.3	Piston & cylinder seals	Viton	
4.0	<u>ACCESSORIES</u>		
4.1.0	<u>Limit Switches:</u>		
4.1.1	Quantity	One for open and one for close	
4.1.2	No. of contacts	2 NO + 2 NC	
4.1.3	Type	Snap action	
4.1.4	Contact rating	5A at 240 V AC / 0.5 A at 220 V DC	

CL. NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
4.1.5	Reset	Self Reset	
4.1.6	Terminal Box	Limit switch contacts to be wired to Integral Terminal box.	
4.2.0	<u>Solenoid Valve:</u>		
4.2.1	Number of coils	Dual , Class – H Insulation Coil	
4.2.2	Voltage rating	Refer Power Cylinder Data Sheet	
4.2.3	Duty cycle	Continuous	
4.2.4	Enclosure	Weather proof	
4.2.5	Position for manual operation	Manual operation knob required for each solenoid coil	
4.2.6	Number of ways / positions	4 Ways/ 2Positions	
4.2.7	Make & Type	As per BHEL/Customer Approved Vendor List	
4.2.8	<u>Material</u>		
4.2.8.1	a. Body	Brass	
4.2.8.2	b. Port	SS 316	
4.2.8.3	c. Stem and rim	SS 316	
4.2.8.4	d. Stem packing	Teflon	
4.2.9	<u>Connection</u>		
4.2.9.1	a. Air	1/4" NPT (F)	
4.2.9.2	b. Electrical	3/4" NPT(F)	
4.2.10	Mounting	On the power cylinder.	
4.2.11	Integral T.B	To be provided (OR) To be wired to common Junction box.	
4.2.12	Internal tubing	Shall be copper with PVC sheathng (or) Shall be SS	
4.3.0	Speed Muffler	To be provided	
4.4.0	<u>Cushion</u>		
4.4.1	Cushion at both ends of cylinder with needle valves for adjusting the cushion effect	Required	
4.5.0	<u>Air Filter cum Regulator:</u>		
4.5.1	Supply air pressure	7 Kg / sq.cm	
4.5.2	Type	Diaphragm	
4.5.3	Pressure rating	15 Kg / sq.cm	
4.5.4	<u>Material</u>		

CL. NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
4.5.4.1	a. Body	Die cast aluminium	
4.5.4.2	b. Inner valve & seating	Stainless steel	
4.5.4.3	c. Spring	Stainless steel	
4.5.5	Output pressure	0 - 7 Kg / sq. cm	
4.5.6	Filter quality	To suit power cylinder requirement, but less than 25 micron.	
4.5.7	<u>Output gauge:</u>		
4.5.7.1	a. Dial	50 mm Diameter	
4.5.7.2	b. Type	Bourdon	
4.5.7.3	c. Material	Phosphor Bronze (Bourdon)	
4.5.7.4	d. Range	0 - 10 Kg / sq. cm	
4.5.7.5	e. Accuracy	(+ or -) 5%	
4.5.8	Air connection inlet	1/4 " NPT with suitable adopter to receive 1/4" OD copper tube	
4.5.9	Air connection outlet	1/4 " NPT with suitable adopter to receive 1/4" OD copper tube	
4.5.10	Type of mounting	To be mounted on the power cylinder , if not, suitable mounting accessories to be supplied.	
5.0	Painting	Corrosive resistance, epoxy based resin	
6.0	<u>INSPECTION & TESTING</u>	As per quality plan QA:CI:STD:QP:42 (Latest revision)	
7.0	<u>DOCUMENTS</u>		
7.1	Along with Technical offer:	<ol style="list-style-type: none"> 1. Dimensional drawings of assembled power cylinder. 2. Power air consumption of power cylinder in scfm. 3. Weight of each power cylinder in Kg 4. Separate offer for <ol style="list-style-type: none"> i. Commissioning spares ii. Maintenance spares for two years operation 5. Torque at various air pressures 6. Material of Construction of each part. 	
7.2	After placement of Order;	7. Data Sheet.	

CL. NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
8.0	<u>PACKING</u>	1. O & M manual (25 Sets) 2. Test certificates. Sea worthy packing, Vendor standard packing procedure and as per packing procedure QA:CI:STD:PR 03 (Latest revision)	

NOTE :

1. Refer current valid list for revision status of Quality Plan , Drawing No. & Packing Procedure.
2. In `Vendor Compliance' column vendor to indicate `Yes' , `No' or `Not Applicable'.

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT , TIRUCHIRAPPALLI 620 014.

TECHNICAL DELIVERY CONDITIONS

FOR SUB-DELIVERY COMPONENTS OF
CONTROLS AND INSTRUMENTATION

TDC : TCI : 143 / REV 06

PAGE 01 OF 05

POWER CYLINDERS - REGULATING TYPE

Rev. No.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED	
					ENGG	QAC
01,02	----	General Revisions	Sd/-	Sd/-	Sd/-	Sd/-
03	09.07.93	Page Number added & QP included	Sd/-	Sd/-	Sd/-	Sd/-
04	16.6.97	General Revision				
05	17.02.99	Spec. revised as apart of special Improvement projects.	Sd/- <i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
06	12.03.04	Revised after revist				

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note:2)
1.0	<u>SITE CONDITIONS</u>		
1.1	Altitude above mean sea level	Actual values are based on site conditions .	
1.2	Ambient temperature condition	Mentioned in the contact documents	
1.3	Relative humidity		
1.4	Atmosphere		
2.0	<u>GENERAL</u>		
2.1	Application	For controlling & regulating vanes / dampers	
2.2	<u>Air supply</u>		
2.2.1	a. Power air	Minimum 3 Kg/sq.cm; Maximum 7 Kg/sq.cm (Cylinder to be sized for minimum air pressure)	
2.2.2	b. Signal air	0.2 - 1.0 Kg / sq.cm	
2.3	Actuator type	Double acting piston, modulating type	
2.4	Duty cycle	Continuous	
2.5	Location	Outdoor	
2.6	Mounting	Foot mounted, weather proof conforming to IP 55 with output lever having an angular movement	
2.7	Air connection/Internal tubing	1/4" NPT or 3/8" NPT (with suitable adopter for accepting 1/4" OD PVC sheathed copper tubing or SS tubing)	
2.8	Min. operation time required.	Refer Power Cylinder Data Sheet.	
2.9	Air filter regulator with output gauge	Required. Calibration shall be 0 - 10 Kg / sq.cm	
2.10	Action of driving equipment on Power Air Supply failure.	Stayput	
2.11	Type of stayput device	Self reset	
2.12	Position indicator	1 No. local mechanical position indicator required	
2.13	Movement of piston	Piston moves outward & opens the vane on increase of signal	
2.14	Provision for reversal of action	Required	
3.0	<u>MATERIAL</u>		

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note:2)
3.1	Piston rod	Hard chrome plated high strength steel	
3.2	Cylinder barrel	Hone and hard chrome plated	
3.3	Piston & cylinder seals	Viton	
4.0	<u>ACCESSORIES</u>		
4.1	<u>LIMIT SWITCHES</u>		
4.1.1	Quantity	One for open and one for close	
4.1.2	Number of contacts	2 NO + 2 NC	
4.1.3	Type	Snap action	
4.1.4	Contact Rating	5A at 240 V AC / 0.5A at 220 V DC	
4.1.5	Reset	Self Reset	
4.2	<u>POSITIONER</u>		
4.2.1	Position by pass for Local	Required (With power air)	
4.2.2	Manual operation.		
4.2.2	Mounting	Integrally mounted suitable for both direct and reverse loading. Changing over from direct to reverse loading shall not pose any problem. Details for the same are to be furnished by the vendor. Each positioner shall be provided with 3 pressure gauges. One for Control Air and one each on either side of cylinder for power air supply suitably mounted. Positioner shall be suitable for working air pressure of 7 kg/sq.cm (maximum)	
4.2.3	Cam characteristics	One linear cam to be fitted. 1 No. equal percentage, 1 No. square root and one blank cam to be supplied extra along with positioner in a separate pack. (Refer to Note-3)	
4.3	<u>Air Filter cum Regulator</u>		
4.3.1	Supply air pressure	7 Kg / sq.cm	
4.3.2	Type	Diaphragm	
4.3.3	Pressure rating	15 Kg / sq.cm	
4.3.4	Material		
	a. Body	Die-cast aluminium	
	b. Inner valve and seating	Stainless steel	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note:2)
4.3.5	c. Spring Output pressure	Stainless steel 0 - 7 Kg / sq.cm	
4.3.6	Filter quality	To suit power cylinder requirement . (Minimum 25 microns)	
4.3.7	<u>Output gauge</u> a. Dial b. Type c. Material d. Range e. Accuracy	50 mm Diameter Bourdon Phosphor bronze (Bourdon) 0 - 10 Kg / sq.cm $\pm 5\%$	
4.3.8	Air connection inlet	1/4" NPT with suitable adopter to receive 1/4" OD copper tube	
4.3.9	Air connection outlet	To suit power cylinder requirement	
4.3.10	Type of mounting	To be mounted on the power cylinder	
4.4	<u>Position Transmitter</u> a. Type b. Output c. Power supply d. Enclosure e. Linearity	Electronic, Non-Contact type, one number, 2 wire 4-20 mA, DC output 24VDC Die-cast aluminium, weatherproof $\pm 1\%$ of span or better	
4.5	<u>Hand wheel / Lever</u>	To be provided along with power cylinder with Manual declutching facility	
4.6	<u>Painting</u>	Corrosion resistant, Epoxy based resin.	
4.7	I/P convertor	Refer Data Sheet	
5.0	<u>CHARACTERISTICS</u> (Power cylinder with positioner)		
5.1	Sensitivity	$\pm 0.5\%$ of input span under no load.	
5.2	Repeatability	$\pm 0.3\%$ of output span under no load.	
5.3	Accuracy	$\pm 0.3\%$ of output span under no load	
5.4	Hysterisis	$\pm 1\%$ of output span under no load.	
6.0	<u>INSPECTION & TESTING</u>	As per quality plan CI:QAC:STD:QP:42	
7.0	<u>DOCUMENTS</u> Along with Technical offer:	1. Dimensional Drawing of assembled power	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note:2)
		cylinder 2. Air consumption of PC in scfm. 3. Weight of power cylinder in Kg. with all accessories mounted 4. Offer for I. Commissioning spares ii. Maintenance spares for two years operation 5. Torque at various pressures 6. Material of construction of each part 7. Data Sheet.	
7.2	After placement of order:	1. Instruction manual (25 Set) 2. Test certificates 3. Method of calibration, recommended by vendor.	
8.0	<u>PACKING</u>	As per packing procedure No. CI : QAC : PR : 03.	

NOTE:

1. Refer current valid list for revision status of Quality Plan, Drawing No & Packing Procedure.
2. In Vendor Compliance column - vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE'
3. Foundation bolts, Fasteners & positioner cams shall be identified separately in shipping list / delivery chalan.

:TCI143.DOC

BHARAT HEAVY ELECTRICALS LIMITED
FBC & HRSG / PURCHASE

Ref: MM/FBC & HRSG/Web Tender

SPECIAL CONDITIONS

1. This tender is for the supply as per the enclosed Enquiry and specification.
2. The vendor shall have adequate experience in manufacturing of this item.
3. The tender is in TWO parts. One part consisting of Technical Bid with Commercial Terms & Conditions along with Quality Plan for supply in-line with our requirements and another Part containing Price Bid. Techno-Commercial bid and price bids are to be submitted in separate sealed covers. In addition to Technical & Commercial conditions, vendors, who are not registered vendor of BHEL, Trichy have to submit the filled in "Supplier Registration Forms" (available in www.bhel.com website) along with the technical bid. Based on this and other conditions, as well as capacity and capability and approval by customer vendors will be short-listed. Both these covers are to be put in a single cover duly super scribing the Enquiry Number. The technical bid with Commercial Terms & Conditions will be opened on the due date and based on the acceptance of techno-commercial bid and vendor evaluation, the price bid of the qualified vendors will be opened on a suitable date with due intimation.

Following will be the criteria for short-listing the vendors.

- Evaluation of the duly filled Supplier Registration Forms.
 - Availability of minimum manufacturing, handling, testing and measuring facilities as detailed in the Supplier Registration Form.
 - BHEL will have the right for spot assessment of the facilities.
 - Meeting our techno-commercial requirements of the enquiry.
 - Customer approval for the vendors before ordering.
4. BHEL reserves the right to negotiate with the L-1 vendor.
 5. BHEL reserves the right to re-float the tender opened, if L1 price is not the lowest acceptable price to them inter-alia other reasons.
 6. The materials are to be dispatched to site with normal packing in case of indigenous vendors and with sea worthy packing for foreign vendors.
 7. For the delayed delivery, LD is applicable at 0.5% per week, subject to a max. of 15% on undelivered portion.

8. Indigenous vendor shall quote for Ex works basis.
9. Foreign vendor shall quote for FOB seaport.
10. Performance Bank Guarantee for 10% value of the order shall be submitted, valid for 24 months from the date of dispatch or 18 months from the date of commissioning.
11. Applicable Commercial Terms & Conditions shall be clearly spelt out in the offer.



SPO/PURCHASE/FBC & HRSG