

**BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620014**

FUEL SYSTEMS/PRODUCT ENGINEERING (FOSSIL BOILERS)

TITLE SHEET



**SPECIFICATION FOR
POWER OPERATED SHUT OFF GATE
- KNIFE EDGE GATE VALVE WITH
PNEUMATIC ACTUATOR**

SPECIFICATION NUMBER: TCC 1041 / REVISION NO.03

REVISION STATUS

03	08-07-15	NFPA clause updated and Gasket material options revised (CL.5.6).	M.V	GSK & MTP
02	16-06-14	GASKET MATERIAL SELECTION (CL.5.6)ADDED	MCHSG	GSK & MTP
01	16-09-08	SPECIFICATION UPDATED	CSS	MTP
Rev.No.	Date	Description	Altered	Checked & Approved

	NAME	SIGNATURE	DATE
PREPARED	G.SARAVANAKUMAR	-Sd-	21.03.2007
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	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 02/09
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1.0 SCOPE

The scope covers the design, supply, manufacture, testing, certification, marking and identification and packing for shipment of Round port Knife Edge Gate Valve assembly with Pneumatic Actuator for the specified duty conditions in Annexure.

The accessories those are to be supplied with gate, are tabulated in this document. This list is to be considered as non-exhaustive. The supplier is requested to state the items that has to be supplied to meet the intent of the requirements, which will be used during the evaluation of all potential suppliers.

The use of Supplier references, catalogue numbers shall not be deemed to supersede the performance requirements of the purchase order.

2.0 EXTENT OF SUPPLY

The following extent of supply given is not necessarily exhaustive and shall not relieve the contractor of his responsibility to provide plant, equipment and services necessary to satisfy the performance criteria and guarantees specified, safely and efficiently.

Provide 6 numbers of Operation and Maintenance (O&M) instructions.

2.1 EXCLUSIONS

None.

3.0 TERMINAL POINTS

The terminal points for the extent of supply of the valves shall be,

- Fuel inlet elbow flange at valve inlet
- Coal nozzle flange at valve outlet
- All terminals connected to JUNCTION BOX (JB) & JB shall be on supplier's scope
- Single instrument air connection to air filter regulator (interconnecting pipes by Supplier)

	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 03/09
---	---	---	------------------------------

4.0 TECHNICAL REQUIREMENTS

This knife edge gate valve is mounted between the fuel inlet elbow of coal – air piping and coal burner nozzle. One valve per coal pipe is envisaged. Pulverized coal – air mixture at a temperature of 90°C to 120°C flows through these gates at a velocity of 25 m/sec. The leading edge of the valve blade shall contain a 45° chamfer to eject out the accumulated dust and clean the blade guides during closing. Vendor shall include necessary provision in the valve to prevent ingress of dust and ensure friction free movement. The supplier has to ensure that the valves are suitable for operation in the specified conditions.

The supplier shall provide suitable body tapping for air to purge out the dust collected in the dead space between the body inner faces when the blade is retracted. To the body tapping supplier shall provide means for an air purge prior to valve closing. All valves shall be capable of safe, reliable operation and shall comply with the requirements of NFPA 85 / 2015 in particular to the sub-section 9.4.6.13 and 9.4.5.1.6 of less than 13.8 KPa gauge pressure for dust tight valve application.

As the coal particles are highly erosive, the valve supplier shall provide measures to combat erosion of valve internals. Vendor shall indicate the details in the offer.

Proper cable glands and tube fittings, for taking out/in cables and air tubing shall be provided. The limit switches shall be mounted on to gate valve to give signal for valve open/close condition. Overall dimensions of the gate shall be as per the attached drawing 2-47-003-01439 or 2-47-200-01750 whichever is asked for in the enquiry.

4.1 VALVE OPERATION

During service the valve is always in opened condition and will be closed only during pulveriser maintenance. The valves are remote operated by a double acting pneumatic actuator with limit switch indicating the open & closed position of the valve. Each valve shall be provided with one solenoid valve. The solenoid valve shall be energized to open and energized to close.

4.2 OPERATING ENVIRONMENT

The equipment will be required to operate in dust laden pulverized coal-air mixture, which can be expected to settle on the valve components during normal operation. The coal-air mixture is very erosive in nature and hence the interior surfaces of the valve shall be protected suitably.

	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 04/09
---	--	---	------------------------------

5.0 ACCESSORIES

The following accessories shall be assembled with Knife edge gate valves. The valve shall be integral part of the assembly with the power cylinder, limit switches, solenoid valve and air filter regulator and shall be supplied in fully piped up condition. Purchaser to provide only inlet air connection to the Air filter regulator.

5.1 AIR CYLINDER

The air cylinder shall be of double acting type and of heavy duty. The cylinder body shall be corrosion resistant and shall have a fine finish preferably honed that ensures minimum friction and long seal life. A self-centering cushion sleeve shall be provided at both sides of the piston. The piston rod shall be covered with leather gaiter to prevent dust and water intrusion for smooth operation.

The power cylinder shall be capable of stroking the valve to full travel on load at an air pressure of 3.0 Kg/Sq.cm (g). The material of gland seal/piston shall be suitable to withstand temperature of 120°C and a pressure of 7.0 Kg/Sq.cm (g).

5.2 SOLENOID VALVE (SV)

The heavy-duty dual coil solenoid valve shall be of ASCO make or ROTEX make with 5 ports, 2 way type and shall be as per Clause 11.3.3 of data sheet. The Solenoid valve shall be mounted at upstream side of the valve to enable easier approach at site.

5.3 AIR FILTER CUM REGULATOR (AFR)

A suitably sized air filter cum regulator of make of PLACKA / AIRMATIC / NUCON / FESTO shall be provided. The filter cum regulator shall be of metallic bowl only. The air filter cum regulator shall have the range of regulation from 6.0 kg/sq.cm (g) to 1.0 kg/sq.cm (g).

5.4 LIMIT SWITCH (LS)

Two numbers heavy duty limit switches of OMRAN or HONEYWELL make with DPDT contacts to indicate open/closed position of the valve with rating of 5A 230V AC / 0.5A 220V DC shall be provided. The enclosure shall be of IP55 class with ¾" NPT conduit for cable entry. The limit switch shall be firmly fixed on to a mounting plate.

	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 05/09
---	--	---	-----------------------

5.5 COPPER TUBING & FITTINGS

Necessary PVC sheathed copper tubing of sufficient wall thickness and good quality of fittings shall also form part of the assembly.

5.6 COMPRESSION GASKET SELECTION

Gasket shall be selected to withstand the higher compression load at elevated temperatures. These gaskets shall be selected for minimum design strength of 4000psi and continuous operating temperature not less than 120° C. Preferable material of gaskets is Silicone Rubber 60/70A shore a durometer or harder rated to +232°C to +260°C or Non-asbestos gasket of aramid fiber with a NBR Binder or higher grade meeting the design requirement said above. Two gaskets per gate shall be supplied.

6.0 INSPECTION AND TESTING

Supplier shall submit QP for Purchaser's review and approval. It is expected that Quality plan shall encompass the Supplier's standard inspection to satisfy all applicable design code and its testing requirements and will involve, as a minimum, the examination of material certificates, dimensional checks on parts and sub-assemblies, examination by visual or other methods for welds and material surfaces. The Purchaser's inspecting authority is to be allowed reasonable access to the Supplier's works during manufacture/ testing before delivery, in accordance with the approved Quality plan.

6.1 TESTING

1. The smooth operation of the valve shall be tested for an instrument air pressure of 3.0 kg/sq.cm.
2. Body and seat shall be tested accordingly as called for in API or MSS or any other equivalent standard.
3. Each valve shall be tested for leak as per API or MSS or any other equivalent standard for **"no visual leak"** condition.

7.0 CODES AND STANDARDS

The Supplier is required to list all the standards applicable to the equipment covered in this specification. To be provided and agreed before manufacture proceeds. Where the Supplier considers that the standards used in the design, manufacture or operation of the equipment may vary with the contents of this specification, then the matter shall be immediately brought to the written attention of Purchaser.

	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 06/09
---	--	--	--------------------------------------

8.0 DOCUMENTATION

- 8.1 Technical offer shall contain complete details as called for specification confirming the requirements point by point.
- 8.2 Completely filled in data sheet CLAUSE 11.0.
- 8.3 Supplier shall submit the dimensional drawing giving details of MOC, accessories, dimensions, pneumatic hook up diagram, actuator selection data, and valve test parameters. Drawings shall be submitted in AutoCAD format and legible hard copies.
- 8.4 Confirmation for BHEL dimensional drawing as per enquiry.
- 8.5 Supplier may separately quote for the list of spares for two years of trouble free operation.
- 8.6 Supplier to quote for commissioning spares along with the main offer.
- 8.7 Reference list.

9.0 GUARANTEE

The performance guarantee shall be given for minimum a period of 12 months from the date of commissioning or 18 months from the date of shipment whichever is earlier.

10.0 PACKING AND DESPATCH

After inspection, the assembly shall be cleaned, prepared and suitably protected for despatch in such a way as to minimize the possibility of damage and deterioration during transit and storage.

	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 07/09
---	--	---	-----------------------

11.0 DATA SHEET

BHEL MATERIAL CODE:

11.1 VALVE DATA SHEET

	BHEL SPECIFICATION	VENDOR CONFIRMATION
DESIGN PRESSURE	To comply with NFPA 85, Valve body/ flanges shall be designed for 250 class.	
NORMAL WORKING PRESSURE	300-400 mm WC	
Design temperature	120°C	
Normal working temperature	90°C	
Indoor or outdoor installation	Outdoor	
Design pressure drop	Vendor to furnish	
Maximum pipe velocity	25 m/s	
Operation/frequency of use	Normally open. Closed during mill maintenance	
Flow medium	Hot air and coal particles	
Coal particle size	75 µm and less – 75% through 200 Mesh	
Erosion	The coal particles are highly erosive and the supplier shall provide measures to combat erosion of valve internals	

11.2 Mechanical Data sheet for Power operated shut-off gate

Model No.	Supplier to furnish	
Service	Coal pipe shut-off	
Valve performance code	NFPA 85 – Dust tight Valve	
Size	Valve ID = 737 mm Ref: 2-47-200-01750/rev 02	
End Connection - Flanged	Flange details as per enclosed drawing	
Body Tapping (Yes/No)	Yes	
Remote Operation Details	Double acting pneumatic actuator, energized to open and energized to close	
Maximum Leakage Rate	“No Visual leak” as per API/MSS or equivalent specification	
Quality Plan	Supplier to furnish	
Painting Details	As per approved QP	

	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 08/09
---	--	---	-----------------------

BHEL MATERIAL CODE:

	BHEL SPECIFICATION	VENDOR CONFIRMATION
Body Ends Sealed (Yes/No)	Yes	
Joining Surfaces Protected (Yes/No)	Yes	
MATERIAL SELECTION		
Body	Carbon steel (Specify grade)	
Slide	Stainless Steel (Specify grade)	
Seals	Supplier to furnish	
Body Connector	Supplier to furnish	
Insert	Supplier to furnish	
Cover	Supplier to furnish	
Gasket	Silicone Rubber 60/70A shore a durometer or harder rated to +232°C to +260°C or Non-asbestos gasket of aramid fiber with a NBR Binder or higher grade to meet design criteria	
Fasteners	SA193 GRB7 or higher strength	

11.3 ACCESSORIES

11.3.1 POWER CYLINDER

BHEL SPECIFICATION	VENDOR CONFIRMATION
Type	
Make	
Size – Diameter x Stroke	
Selection criteria of Power cylinder	Attach calculation sheet
End Connection details (Air entry)	
Bellows provided for air cylinders - Required	
Air consumption per stroke	Nm ³ /Hr

11.3.2 LIMIT SWITCH

Type	
Make & Model	
Contact	
Rating	
Enclosure IP55 Class	
Cable entry Conduit size	

	SPECIFICATION FOR POWER OPERATED SHUT-OFF GATE /KNIFE EDGE GATE VALVE WITH PNEUMATIC ACTUATOR	SPECN.NO. TCC-1041 REV-03	PAGE 09/09
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BHEL MATERIAL CODE:

BHEL SPECIFICATION	VENDOR CONFIRMATION
11.3.3 Solenoid valve	5 Port-2way Dual coil
Type	
Make & Model	
Power supply / Coil Rating	24V DC ± 10%
11.3.4 Air Filter Cum Regulator	
Make	
Size	
End Connection size at BHEL TP	NPT (F)
11.3.5 Copper Tubing & Fitting provided	YES
11.3.6 Housing for accessories	Required
Confirm provision of box housing filter/regulator & solenoid valves	
11.4 Commissioning Spares Quoted with Offer	YES / NO
11.5 2/3 Years operational Spares Quoted with Offer	YES / NO
11.6 General Arrangement Drawing No.	

NOTE:

Vendor shall fill-up the valve data sheet, Mechanical data sheet, Data sheets for accessories and others (Clause 11), submit along with the offer duly signing the same.