



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA


MATERIALS MANAGEMENT

TITLE	Phone: +91 431 2574087/2574157 Fax : +91 431 252 0233 / 0525 Email : joe@bheltry.co.in
Bunker Isolation Gate (Coal valve)	

	Reference Number: MM/FBC&HRSG/BIG (Coal Valve)	Enquiry Date: 22.02.2010	Due date for submission of quotation: 17.03.2010
You are requested to quote the Enquiry number date and due date in all your correspondences.			

BHEL/Trichy is looking for Supply of **Bunker Isolation Gate (Coal valve)**

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/FBC&HRSG/ GUILLATINE GATE ”	
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 SPO / Purchase/ FBC&HRSG

	BHARAT HEAVY ELECTRICALS LIMITED A Government of India Undertaking High Pressure Boiler Plant, Tiruchirappalli 620 014, INDIA Department: : FBC & HRSG / Commercial, Building No.79 Telephone : 91-(0431) – 2574109, Fax : 91-(0431) – 2520233, e-Mail : kuppurajah@bheltry.co.in	Vendor Document No. FBC&HRSG:47BIG:010	Rev. 00	Page 1 of 24
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This document is for further engineering by M/s HT

SPECIFICATION FOR BUNKER ISOLATION GATE (COAL VALVE)

PROJECT : KONIAMBO NICKEL PROJECT, NEW CALEDONIA
2X135 MW CFBC BOILER
l'Usine du Nord
Nouvelle-Calédonie



Requisition Number:	319000-00420-PO-0150-0003	Stamp			
Purchase Order Number:	319000-00420-PO-0150-0003-0006				
Equipment / Item Tag:	----				
Equipment / Item Description:	SPECIFICATION FOR BUNKER ISOLATION GATE				
HT Document Number:	319000-00420-B1203-0150-0003-0143				
Document Category:	Information	Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.			
OB	16-FEB-2010	P.Subramanian	V.Raghavendran	M.Madhappan	Coal bunker gate spec is separated
OA	26-SEP-2008	S.Behera	V.Raghavendran	M.Madhappan	
Rev	Date DD-MMM-YYYY	Written By (name)	Check By (name)	Approved By (name)	Status

   			
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COVER SHEET

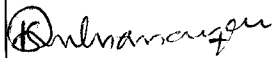
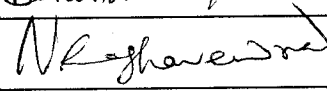

1.CONTENTS:

1.1. SPEC OF BUNKER ISOLATION GATE (COAL VALVE) - 3/24 to 9/24

1.2. SPEC FOR ELECTRICAL ACTUATOR

Ref: FBC&HRSG:CI:111/Rev.01

- 10/24 to 24/24

	NAME	SIGNATURE	DATE
PREPARED	P.Subramanian		15.10.2010
CHECKED	V.RAGHAVENDRAN		15.10.2010
APPROVED	M.MADHAPPAN		15.10.2010

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SPECIFICATION FOR COAL BUNKER ISOLATION GATE (COAL VALVE)

1. SCOPE:

1.1. Design, manufacture, testing and supply of Motor operated Coal Valve.

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 service necessary to satisfy the performance criteria and warrantee specified.

2. APPLICATION:

The coal valves are envisaged for open and close the flow of coal from upstream coal bunker to the downstream drag link chain feeder in the coal feeding system of CFBC boiler. The operating parameters are given in Annexure-A AND Layout drawings.

3. DESIGN CONSIDERATIONS:

3.1. The valves shall be designed to handle the medium at a maximum operating conditions as specified in the Annexure-A.

3.2. Operation of valves is (1) with motor and (2) with chain wheel and chain (for manual operation, disengaging the motor). The length of chain shall be in such a way, that the operation shall be possible to do from the operation floor level given in Annexure A.

3.3 The valve shall be completely enclosed.

3.4 Self cleaning rack and pinion gear design is to be offered.

3.5 Valve blade shall be of stainless steel material (SA240 Type 304) with required thickness to take the overburden of coal in the bunker.

3.6 Accesses with gasket are to be located at both ends of the valves. Gate blade shall be easily removable opening the retract enclosure end of valve.

3.8 Gate rollers and pinions shaft shall be fitted with heavy duty ball bearings. Grease fittings are to be given for lubrication.

3.9 Gate blade shall be of deep "U" shaped design. It shall have punched ladder racks at the top.

3.10 Racks shall be driven by stainless steel pinions with self cleaning drive assembly.

3.11 Inlet configuration shall be in such a way that the rack and pinion drive assembly is kept out of material.

To prevent wedging of material between gate leading edge and housing, "displacement pockets" are to be provided.

3.12 Coal valve shall be of asbestos free design.

3.13 The flange dimensions of coal valve, to match with the upstream and downstream system will be given by the purchaser at the time of approval of Coal Valve G.A. drawing.

4. OFFER:

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

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4.2. Part I: For supply of valve with motor actuator including commissioning spares.

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

5. SPARES:

Vendor to recommend spares required for three 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.

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 and cross sectional 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. List of startup / commissioning spares.
- 7.11. List of special tools.
- 7.12. List of recommended spares for 2 years trouble free operation.
- 7.13. Filled in Check list as per Annexure-B.

All documents submitted under this heading should be submitted in **two 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.
- 8.9. O & M manuals generally should contain the following:
 - 8.9.1. Data sheet.
 - 8.9.2. Important instructions (dos & don'ts).
 - 8.9.3. Installation and storage.

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8. 9.4. Operation.
8. 9.5. List of illustrations.
8. 9.6. Maintenance and service.
8. 9.7. Trouble shooting methods.
8. 9.8. Assembly drawings with part list, bill of materials, dimensioned drawings and other applicable details.
- 8. 9.9. Manuals should pertain only to the types or model supplied for the particular contract.**
8. 9.10. Short term and long term storage instruction manual.
8. 9.11. List of commissioning spares.
8. 9.12. List of special tools.
- 8.10. Packing / shipping list as per BHEL format.
- 8.11. Packing / shipping arrangement drawing for review.
- 8.12 All final documents are to be submitted both in French & English languages.**

ANNEXURE – A

- Application : To admit Coal particles from bunker into the feeding system of the boiler.
 - Material to be handled : Indonesian/Australian Coal
 - Design pressure : Atmospheric.
 - Service temperature : 60°C
 - Tightness : Vendor to suggest the detail the tightness of their design.
 - Operation : Motor (additional provision for manual operation with chain wheel and chain)
 - Mounting position : Horizontal
 - Data for Lignite
 - Opening width : 1150 x 4500 mm (is to be split into 2 compartments)
 - Stroke of the gate valve plate : 2250 mm
 - Overall height : 650 mm.
 - Bunker height : 17.5 m
 - Bulk density of coal : 900 kg/m³ for volume & 1800 kg/m³ for weight.
 - Elevation of top of coal gate : 28350 mm.
 - Elevation of operating floor level : 25700 mm.
 - Frequency of operation : 10 times per day TO once in an year.
- Remark:** 1) The gate shall be opened and closed even when the bunker is at full level.
- 2) **During closing, the blade has to pierce the coal column. Blade, motor, hand wheel are to be designed to suit this condition.**
- 3) **Special Note: The BIG & its components shall be supplied with CE Marking.**

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ANNEXURE-B

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

CHECKLIST

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

S.NO	DOCUMENT DESCRIPTION	Status
1.	Point wise confirmation of the specification	
2.	General arrangement of feeder with dimensional details	
3.	Approximate weight of the feeder	
4.	Quality Plan as per BHEL format.	
5.	Experience list of vendor.	
6.	Typical erection and commissioning procedure.	
7.	List of commissioning spares.	
8.	List of recommended spares	
9.	Typical O & M manual.	
10.	Catalogues for bought out items	
11.	Schedule of deviations	
12.	Materials of construction item wise	
13.	Checklist in the form of Annexure-B	
14.	Three sets of above documents	

SIGNATURE OF AUTHORISED SIGNATORY WITH OFFICE SEAL

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ANNEXURE-F

FUEL ANALYSIS

SL.NO.	DESCRIPTION	UNIT	Design	Worst	Range
1.0	Fuel	Australion/Indonesion (Medium to High Volatile Bituminous Coal)			
1.1	Proximate Analysis:				
	Fixed Carbon	%	41.5	-	26.3-63.7
	Volatile Matter	%	35.1	-	15.0-44.1
	Moisture	%	12.0	24.0	2.25
	Ash	%	11.4	20.0	6-19.6
	HHV	%	6138	4538	4538-7165
1.2	Ultimate Analysis:				
	Carbon	%	62.13	43.00	48.8-86.2
	Hydrogen	%	4.54	4	2.63-6.86
	Sulphur	%	0.40	0.80	0.08-0.79
	Oxygen (by diff)	%	8.68	6.35**	3.00-14.70
	Nitrogen	%	0.87	1.85	0.74-2.45
	Moisture	%	12.00	24.00	2.00-25.00*
	Ash	%	11.38	20.00	6.00-19.60
1.3	Sieve Analysis:				
	100%		<6mm		
	80%		<1.1 TO 2.6mm		
	50%		<0.6 TO 0.9mm		

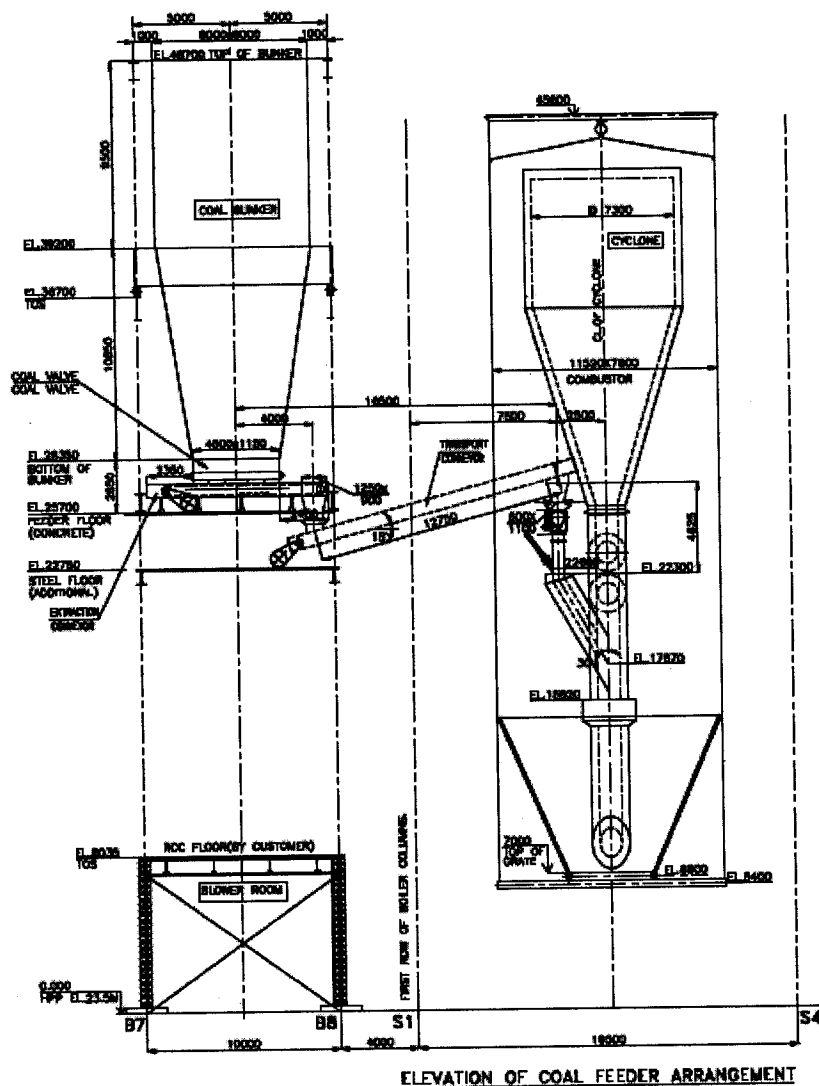
*Surface Moisture Maximum is 8%

**Includes 0.04% Chlorine

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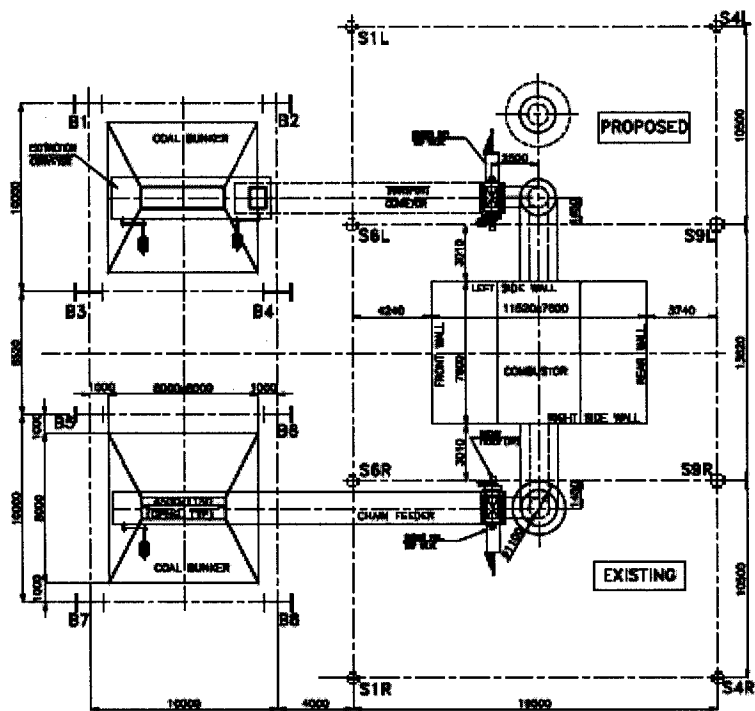


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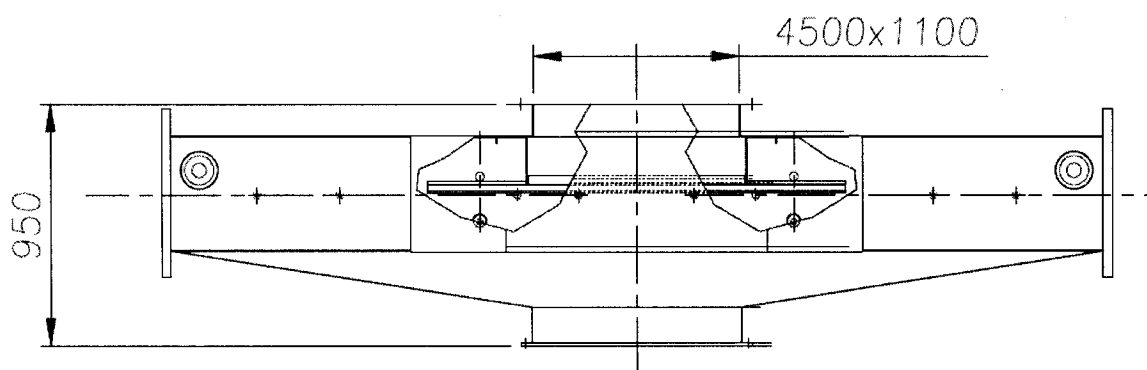


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PLAN OF COAL FEEDER ARRANGEMENT



ELEVATION OF COAL VALVE

STROKE = 2250 mm.

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BHARAT HEAVY ELECTRICALS LIMITED
TRICHY - 620 014

FBC & HRSG

ELECTRICAL, CONTROLS & INSTRUMENTATION

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SPECIFICATION FOR ELECTRICAL ACTUATORS

REV NO	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	03.07.04	INITIAL ISSUE	P.S.P	P.S.P	K.S.K
01	10.01.06	REVISED	P.S.P	P.S.P	S.J.P

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SL.NO. SPECIFICATION CONDITION ACTUATOR SL.NO

TECHNICAL CONFIRMATIONS

(Fill up YES / NO take plain paper copies furnish along with offer)

THE ACTUATOR SHALL COMPLY/BE SUITABLE FOR

1.0	MOTOR MOTOR SUITABLE FOR 415V, 3 ϕ , 50Hz, 3WIRE, UNGROUNDED SUPPLY.	
1.1	MOTOR CONFIRMS TO IS 325 OR BS 5000 PART 99	
1.2	MOTOR PAINTED WITH CORROSION RESISTANT EPOXY RESIN PAINT	
1.3	MOTOR INSULATION MINIMUM CLASS B (NON HYGROSCOPIC INSULATION WITH TROPICALISATION SUITABLE FOR CL.3.8)	
1.4	MOTOR SHOULD BE RATED AS FOLLOWS: A. FOR INCHING APPLICATION MIN. 150 START/HR. B. FOR OPEN/CLOSE APPLICATION S2-15 DUTY i.e., 15 MIN.DUTY.	
1.5	MOTOR SUITABLE FOR DIRECT ON LINE START.	
1.6	STARTING CURRENT LIMITED TO 6 TIMES FULL LOAD CURRENT.	
1.7	TWO EARTH TERMINALS PROVIDED.	
1.8	ATLEAST ONE THERMOSTAT PROVIDED FOR MOTOR WINDING PROTECTION.	
1.9	MOTOR WINDING CONNECTION BROUGHT TO COMMON TERMINALS.	
2.0	ACTUATOR+ SECONDARY GEAR BOX ACTUATOR + SY.GB. CAN START AT 80% RATED VOLT AND RUN AT 75% VOLT AT SPECIFIED RUN TORQUE FOR 5 Min.	

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SL.NO.	SPECIFICATION CONDITION	ACTUATOR SL .NO
2.1	ACTUATOR + SY.GB CAN OPERATE AT SPECIFIED RUN TORQUE FOR THE FOLLOWING CONDITIONS: A. AT $\pm 10\%$ RATED VOLTAGE (415 V). B. AT $\pm 5\%$ RATED FREQUENCY (50 Hz). C. AT 10% RATED VOLTAGE + FREQUENCY ABSOLUTE.	
2.2	ACTUATOR + SY.GB CAPABLE OF MEETING TOTAL TURNS INDICATED IN "ACTUATOR DATA SHEET" AND LIMIT SWITCHES SET ACCORDINGLY.	
3.0	ACTUATOR (BASIC ACTU + SY. GEAR BOX) AS A WHOLE SHOULD MEET IP 55 DEGREE OF PROTECTION.	
3.1	NAME PLATE FOR TORQUE SWITCH CALIBRATION SHALL BE PROVIDED WITH TORQUE VALUE IN KGM.	
3.2	ACTUATOR HAND WHEEL DE-CLUTCH AUTOMATICALLY UPON POWER SUPPLY RESTORATION.	
3.3	COUNTER CLOCKWISE ROTATION LOOKING AT ACTUATOR DRIVING END SHALL RESULT IN CLOSE.	
3.4	ACTUATOR WILL MEET SPECIFIED RUN TORQUE FOR THE DUTY MENTIONED IN I.4.	
3.5	FOUR LIMIT SWITCHES, TORQUE SWITCHES RATED FOR 5 AMPS AT 250V AC / 0.5 AMPS AT 220V DC AND EACH SWITCH SHALL HAVE 2NO + 2NC INDEPENDENT CONTACTS.	
3.6	ACTUATOR PROVIDED WITH MECHANICAL POSITION INDICATOR FOR 0 TO 100% ADJUSTABLE WITHIN 360° ROTATION.	

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SL.NO.	SPECIFICATION CONDITION	ACTUATOR SL.NO
3.7	POSITION INDICATOR PROVIDED WITH ADJUSTABLE GEAR SETS & CHARTS.	
3.8A	ACTUATOR PROVIDED WITH SPACE HEATER SUITABLE FOR 240V AC, 1 ϕ , 50Hz IN LIMIT SWITCH COMPARTMENT.	
3.8B	ACTUATOR SUITABLE FOR OPEN IN DAMP DUSTY POLLUTED, ATMOSPHERES OF 100% RELATIVE HUMIDITY AND AMBIENT TEMP.OF - 20°C TO +50°C.	
3.9A	ACTUATOR PROVIDED WITH COMMON TERMINALS AND EACH TERMINAL SUITABLE FOR 2X2.5 SQ MM WIRE.	
3.9B	INTERNAL WIRING IS DONE AS PER BHEL DIAGRAM 4-V-MISC-90271. WIRING DIAGRAM SHALL BE PASTED INSIDE TB COMPARTMENT.	
4.0	ACTUATOR SHALL BE PROVIDED WITH TWO POTENTIOMETER TYPE POSITION INDICATORS FOR OPEN & CLOSE.	
4.1	ONE NO. ELECTRONIC POSITION TRANSMITTER SUITABLE FOR 24V DC, 2 WIRE, 4-20mA SHALL BE PROVIDED FOR INCHING DUTY ACTUATORS.	
5.0	ACTUATOR + SY.GB SHALL MEET ALL THE CONDITIONS MENTIONED IN ACTUATOR DATA SHEET (APPLICABLE FOR BHEL DAMPERS/ VALVES).	
6.0	EVERY ACTUATOR, ESPECIALLY SY.GB SHALL HAVE SELF LOCKING WORM GEARS.	
7.0	STARTING TORQUE FOR LOUVER SHALL BE MINIMUM 4 TIMES THE RUN TORQUE AND FOR GATE SHALL BE MINIMUM 5 TIMES THE RUN TORQUE (APPLICABLE FOR BHEL DAMPERS).	

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SL.NO.	SPECIFICATION CONDITION	ACTUATOR SL. NO
8.0	GATE ACTUATORS SHALL BE CAPABLE OF RUNNING AT TWICE THE SPECIFIED RUN TORQUE VALUES FOR MINIMUM 6 MINUTES. (APPLICABLE FOR BHEL DAMPERS).	
9.0	NECESSARY NUMBER OF CD COATED FASTENERS (OR) MOUNTING BOLTS, NUTS WITH SPRING WASHERS PROPERLY FIXED OR SCREWED ON SECONDARY GEAR BOX SHALL BE FURNISHED WITH EVERY ACTUATOR (TO CALCULATE LENGTH OF FASTENERS, DAMPER FLANGE THICKNESS CAN BE CONSIDERED AS 20 mm). THE FASTENERS TO BE IDENTIFIED SEPARATELY IN SHIPPING LIST.	
10.0	ACTUATOR + SY. GB PAINTED WITH CORROSION RESISTANT EPOXY RESIN PAINT.	
11.0	APART FROM KEYWAY, KEYS SHALL ALSO BE PROVIDED WITH EVERY ACTUATOR (DEPTH OF KEY SHALL BE AS PER STDS).	
12.0	ALL LOUVERS 90° MOVEMENT ACTUATORS SHALL HAVE SPLINED REMOVABLE BUSH PROPERLY MACHINED AND DRILLED TO THE DIMENSIONS MENTIONED IN ACTUATOR DATA SHEET (APPLICABLE FOR BHEL DAMPERS).	
13.0	ACTUATORS OFFERED SHALL HAVE RPM OF AROUND 0.5 FOR LOUVER AND 1.9 FOR GATE. (APPLICABLE FOR BHEL DAMPERS).	
14.0	EVERY ACTUATOR SHALL BE SUPPLIED WITH ONE NO. ¾", TWO NOS. 1" & ONE NO. 1½" ET THREAD CABLE ENTRY WITH DOUBLE COMPRESSION CABLE GLANDS WITH METAL THREADED PLUGS FOR ALL ENTRIES.	

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SL.NO.	SPECIFICATION CONDITION	ACTUATOR SL.NO
15.0	ACTUATOR NAME PLATE SHALL HAVE THE MINIMUM OF FOLLOWING: A. STANDARD MOTOR DETAILS. B. RATED CURRENT (PROPORTIONAL TO RUN TORQUE). C. TAG.NO. AS SPECIFIED BY BHEL. D. DIRECTION OF ROTATION FOR CLOSING OF LOAD (DAMPER). E. SECONDARY GEAR BOX TYPE. F. 90° OR 360°. G. TORQUE CAPACITIES.	
16.0	SECONDARY GEAR BOX SHALL BE PROVIDED WITH SEPARATE NAME PLATE	
17.0	ACTUATOR (BASIC) AND SY. GEAR BOX SHALL PROPERLY COUPLE AND SHALL BE DESPATCHED AS SINGLE UNIT.	
18.0	ACTUATOR + SY. GEAR BOX SHALL HAVE PROPER SEALS TO PREVENT LEAKAGE OF OIL TO OTHER COMPARTMENTS UNDER ANY POSITION OF MOUNTING.	
19.0	SECONDARY GEAR BOX CONTINUOUS TORQUE CAPACITY SHALL BE GREATER THAN OR EQUAL TO STARTING TORQUE OF ACTUATOR.	
20.0	COLOUR OF THE ACTUATOR SHALL BE ADMIRALITY GREY SHADE 632 OF IS-5.	
21.0	REQUIRED DOCUMENTS (ALONG WITH OFFER): A. DRAWINGS FILLED UP TECHNICAL INFORMATION DATA SHEET & CATALOGUES IN 4 SETS EACH. B. OFFER IN QUADRUPLICATE. C. COMMISSIONING SPARES D. SPARES FOR 2 YEARS TORQUE FREE OPERATION. E. SPECIAL TOOLS.	

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SL.NO.	SPECIFICATION CONDITION	ACTUATOR SL. NO
22.0	REQUIRED DOCUMENTS (ON PLACEMENT OF ORDER): A. 4 COPIES OF O&M MANUALS B. CATALOGUES C. 2 NO. CD CONTAINING THE ABOVE. D. INSTALLATION DRAWING / MANUAL. E. 6 SETS OF TEST CERTIFICATES.	
23.0	TEST REQUIREMENTS FOR ACTUATOR ALONG WITH SECONDARY GEAR BOX SHALL BE COMPLIED WITH.	

"TECHNICAL INFORMATION"

(FILL UP FOR EACH ACTUATOR- TAKE PLAIN PAPER COPIES - FURNISH ALONG WITH OFFER) SUPPLIER SHALL FURNISH THE FOLLOWING IN THIS SAME FORMAT ONLY. ABSENCE OF ANY DETAIL WILL RESULT AS INCOMPLETE OFFER AND WILL NOT BE CONSIDERED.

SPECIFY TOLERANCE WHEREVER APPLICABLE - (REQUIRED TO BE CHECKED DURING TESTING/INSPECTION).

1.0	ACTUATOR TYPE CHOSEN.	
2.0	MOTOR: TYPE & FRAME SIZE	
2.1	K.W (415V, 50HZ, 3 ϕ , AC)	
2.2	STARTING CURRENT (A)	
2.3	CURRENT AT RUN TORQUE (A)	
2.4	FULL LOAD CURRENT (AT 100% TORQUE SETTING) (A)	
2.5	CURRENT AT DYNAMIC STALL (LOCKED ROTOR) (A)	
2.6	TIME ALLOWED AT LOCKED ROTOR (IN SECONDS)	

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SL.NO.	SPECIFICATION CONDITION	ACTUATOR SL. NO
2.7	A. STARTING TORQUE (KGM) B. RUN TORQUE (KGM) C. CLASS OF INSULATION D. STATOR WINDING - STAR OR DELTA.	
2.8	FULL LOAD TORQUE (100% TORQUE SETTING) (KGM)	
2.9	A. NO. OF STARTS PER HR. WITH NO LOAD. B. NO OF STARTS PER HR WITH LOAD AT SPECIFIED RUN TORQUE. C. FULL LOAD RPM. D. AMBIENT TEMPERATURE IN °C (-20°C TO +50°C). E. DUTY TIME. F. FULL LOAD POWER FACTOR. G. FULL LOAD EFFICIENCY. H. RECOMMENDED BACK UP FUSE & OLR VALUES FOR DESIGNING THE MCC.	
3.0	GEAR BOX: A. PRIMARY GEAR BOX RATIO. B. PRIMARY GEAR BOX EFFICIENCY.	
3.1	PRIMARY GEAR BOX MAX OPERATING TORQUE KGM.	
4.0	A. SECONDARY GEAR BOX TYPE & MAKE. B. SECONDARY GB RATIO C. SECONDARY GB EFFICIENCY	
4.1	SY.GB.MAX. OPERATING TORQUE KGM.	
4.2	SY.GB.MOMENTARY TORQUE CAPACITY.	
5.0	ACTUATOR + SY.GEAR BOX OUTPUT RPM.	
5.1	ACTUATOR + SY. GB RUN TORQUE RANGE, KGM	
5.2	SECONDARY GB LEAD ANGLE LESS THAN OR EQUAL TO 6°	
5.3	WORM & WORM WHEEL MATERIAL.	
5.4	ACTUATOR + SY.GB STARTING TORQUE, KGM	

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SL.NO.	SPECIFICATION CONDITION	ACTUATOR SL.NO
5.5	ACTUATOR + SY. GEAR BOX DYNAMIC STALL TORQUE KGM.	
5.6	BORE DIA X LENGTH OF SY. GB IN MM.	
5.7	APPROXIMATE WEIGHT OF ACTUATOR + SY. GEAR BOX. (KG)	
5.8	LUBRICANT: A. RECOMMENDED INTERVAL OF CHECKING/FILLING. B. TYPE OF LUBRICANT. C. INDIAN EQUIVALENT MAKE. D. QTY. IN LITRES/KG. E. INITIAL FILL BY VENDOR	
5.9	TYPE AND MAKE OF LIMIT SWITCHES AND TORQUE SWITCHES.	
5.10	ACTUATOR + SY. GB PAINT A. COLOUR B. PAINT THICKNESS. (MICRONS)	
5.11	OPERATING TIME IN SECONDS FOR EACH ACTUATOR TO BE FURNISHED	
5.12	INDICATE VERY CLEARLY THE RELATIONSHIP BETWEEN NOMINAL TORQUE & RATED TORQUE AND NOMINAL CURRENT & RATED CURRENT	

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SL.NO. TEST TYPE RESULT

ROUTINE TEST:

1	DIMENSIONS	OVERALL & MOUNTING
2	DETAILS OF PAINTING AS PER SPECIFICATION & VENDOR	1. ANTI CORROSIVE EPOXY PAINT 2. SHADE 3. FINISH 4. PAINT THICKNESS (MIN 80 MICRONS) 5. PEEL OFF TEST
3	MANUAL OPERATION THROUGH HAND WHEEL	
4	CHECKING OF BHEL STD. TB WIRING DIAGRAM	
5	TESTING OF POSITION & TORQUE LIMIT SWITCHES FOR ACCURACY AND REPEATABILITY. BY TURN SETTING (NO OF TURNS) FOR POSITION LIMIT SWITCHES & TORQUE FOR TORQUE SWITCHES.	
6	MANUAL - AUTO SWITCHING FUNCTION	
7	FOR MOTORS, ALL ROUTINE TESTS AS CALLED FOR IN IS 325 / BS 4999/ VDE 0530 / IEC 432.	

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SL.NO.	TEST TYPE	RESULT
8	FINAL OUTPUT SHAFT SPEED & TORQUE OF ACTUATOR + SY. GB AND CORRESPONDING CURRENT AS PER CATALOGUES	
9	POSITION INDICATOR & TRANSMITTER CALIBRATION CHECK FOR ACCURACY, LINEARITY & REPEATABILITY.	
10	LEAKAGE TEST FOR GEAR CASE (VISUAL)	
11	HV TEST AT 1.6 KV (80% OF 2 KV) FOR THE ASSEMBLED ACTUATOR	
12	OPERATION OF ACTUATOR + SY. GB UNDER VARIATION IN SUPPLY VOLTAGE ($\pm 10\%$) AND VARIATION IN FREQUENCY ($\pm 5\%$) FOR VERIFYING SPECIFIED RUN TORQUE & SPEED.	
13	CHECKING OF ACTUATOR BORE DIA X LENGTH AND KEYWAY WIDTH X DEPTH DIMENSIONS	

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SL.NO.	TEST TYPE	RESULT
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TYPE TESTS:

1	TYPE TEST FOR MOTOR AS PER IS 325 / BS 4999 PART 60 / VED 0530 / IEC 432	
2	NOISE AND VIBRATION TEST FOR TOTAL ASSEMBLY IS 4729 / BS 4999	
3	TEMPERATURE RISE TEST DURING: • OPERATION OF ACTUATOR AT 75% VOLTAGE FOR 5 MINUTES • OPERATION OF ACTUATOR AT 50° C AMBIENT	
4	ENCLOSURE PROTECTION FOR THE TOTAL ASSEMBLY FOR IP 55 AS PER IS 2147 OR NEMA – IV OUTDOOR	
5	ENDURANCE TEST FOR ACTUATOR	
6	MECHANICAL & ELECTRICAL ENDURANCE TEST FOR LIMIT SWITCHES	
7	ALL TEST LISTED UNDER ROUTINE TEST	
8	DAMP HEAT CYCLE TEST AS PER IS 9000 / IEC 68- 30	

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SL.NO.	TEST TYPE	RESULT
9	<p><u>PERFORMANCE TEST OF ACTUATORS</u></p> <p><u>A) SIZING TORQUE TEST</u></p> <p>Place the beam connected to the actuator in the horizontal position and add weights to it until the actuator stalls (With torque switch active) Ref.Fig.1</p> <p><u>B) DYNAMIC STALL TORQUE TEST</u></p> <p>1. Remove all the weights from the Damper simulator 1 beam. 2. Run the actuator without load until it hits a U-bolt arrangement which has weights attached to the bottom of it (Ref.Fig.2) 3. Add weights until the actuator cannot lift the U-bolt arrangement from the horizontal position.</p> <p><u>C) GEAR BOX STURDINESS TEST</u></p> <p>Repeat the sizing torque test and ensure that there is no damage of gear box of actuator.</p>	
	<u>DOCUMENTS TO BE PROVIDED</u>	
1.	Certificate for routine test detailing out the results	
2.	Routine and type test for motors	
3.	Type test report for tests listed under 'B'	
4.	Material Test Certificate for casting, gear, shaft etc.	
5.	Endurance Test for limit switches	

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SL.NO.	TEST TYPE	RESULT
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NOTES:

1. The tests should also be in conformity to the QP submitted by the supplier and approved by BHEL/Customer.
2. All test facilities shall be arranged by the vendor at his works before calling BHEL Representative for inspection.
3. Approved drawings, P.O., specifications and relevant standards shall be made available during testing/inspection.
4. All measuring and testing instruments shall be periodically calibrated from national test house and certificates made available during inspection.

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Annexure to FBC&HRSG: CI: 111 REV 01 (Page 15)

This Annexure Specification got priority over Main specification FBC & HRSG: CI: 111 REV 01 (Page 15)

1. Actuators shall carry the CE marking (European conformity), as per the 'council of the European communities' directive. The supplier is responsible for CE marking conformity.

2. Motor shall be suitable for 3 Phase, 400V, 50Hz.

3. Documents:

Routine /type test certificate, O&M manual shall be supplied both in English & French language.

4. Electrical actuator are with integral starter

5. Vendor to indicate KW rating.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME	A. PRABHU	NITIN MENON	A. SWAMINATHAN
SIGNATURE			
DATE	26/07/08	26/07/08	26/07/08

Limit switches : Physical / Mechanical limit switches for open / close position indication shall be suitable for 230V, AC, 50Hz.

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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