An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

TITLE **Guillotine Type Gate Valve**	Phone: +91 431 2574087/2574157 Fax : +91 431 252 0233 / 0525 Email : joe@bheltry.co.in

	Reference Number: MM/FBC&HRSG/Guillatine Gate	**Enquiry Date: 09.12.2009**	**Due date for submission of quotation: 06.01.2010**
You are requested to quote the Enquiry number date and due date in all your correspondences.			

BHEL/Trichy is looking for ..... Supply of **Guillotine Type Gate 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
High Pressure Boiler Plant
Trichy-620014

SPEC NO: FBC&HRSG: 47MFT:00:001

SPECIFICATION FOR MASTER FUEL TRIP VALVE (MFTV) (GUILLOTINE TYPE ISOLATION GATES)

REVISION HISTORY

REV. No	PAGE	REVISION HISTORY	DATE	Prpd	Revd / Appd
00		Original release	26/11/2009	S Behera	

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1.0 APPLICATION

Power operated Gas tight Guillotine type isolation Gates along with their drives are provided at coal feeding tracts before the combustion chamber in coal fired boilers for the circulating fluidized bed (for location refer Annexure-II).

2.0 SPECIFICATION & SALIENT FEATURES :

2.1 The specification covers the design, manufacture, testing, and packing for shipment of isolation gate with actuator for the specified duty conditions. Erection supervision may be included as an optional requirement, separately.

2.2 Guillotine Gates are operated by Electrical Actuators (As indicated in Annexure-1)

2.3 GUILLOTINE GATES :

2.3.0 General

a. The Guillotine Gates are located in dusty atmosphere. Vendor to make necessary provisions in the drive systems arrangement in the selection and arrangement of drive system to ensure trouble free operation under dirty operating conditions.

b. The Gate shall have a guaranteed gas tightness efficiency (on flow) of not less than 99.5 % along the duct (flow direction) as well as from the duct to atmosphere or from atmosphere to the duct, depending on the pressure in both gate open & gate closed condition, without the use of seal air.

c. The Gate blade & seals shall be totally out of coal flow path when the gate is in open / close condition hence coal particle which is abrasive in nature.

d. Gate located in vertical duct and the blade is moving horizontally. Vendor has to provide suitable arrangements to take care of the dead load of the gate blade.

e. Gate blade thickness to be selected suitably to withstand high temperature differentials across the gate blade in closed condition (to avoid warping etc., of the gate blade)

f. The gate is supported on upstream and downstream duct through flanges. The extended portion (i.e. super structure) is either to be suitably supported on upstream duct or design the extended portion suitably without any additional supports. If any additional supports required, the support & its details are to be provided by the vendor.

g. Seal air blowers are to be mounted in the gate itself as shown in Annexure-III. If not possible to locate the blowers in the gate itself, blowers without any interference may be mounted in floor elevation 16800 (Refer Annexure-II for further details). For both the conditions seal air blowers shall not be affected by the temp of the flow medium. Necessary steps shall be taken care by Vendor.

h. Seal air to be supplied both open and closed position of the gate seal air blower, piping and all other accessories are part of vendor scope. Exact floor plan will be furnished after award of contract. Tentatively 15meter of seal air pipe to be considered by vendor for estimation for each gate.

i. Separate blower for each gate to be provided.

j. Close Bonnet with bolt & nut has to be provided for withdrawal chamber also.

k. Stainless steel fasteners & Gaskets (asbestos free) shall be provided.

2.3.1 Gate drive mechanism

a) The electrical actuator shall have provision for local manual operation from floor level, by means of a hand wheel. The force required to operate the gate shall be limited to 35 kgf (maximum) at the rim of the hand wheel.

2.3.2 Seals

a. Guillotine Gates shall be provided with suitable seals viz. leaf / bulb seal etc thus providing sealing chamber for supply of seal air

b. Seal air requirements (for 100% sealing efficiency) shall be provided by seal air blower. Separate blower as a part of gate is advisable (refer Annexure-III). For seal air parameter refer Annexure-I.

c. Entry side i.e port and bonnet seals to be provided to create a seal air chamber

d. All around Continuous seal air chamber to be ensured

e. Outlet of seal air blower to be provided with isolation valve for on line maintenance of seal air blower.

2.4 ELIGIBILITY

Bidders / their collaborator having experience in :

Engineering, Manufacturing and supply of similar Gates/Dampers of same / larger size / operating parameters for coal fired boiler which have completed minimum two years of trouble free operation in any two power plants in India / abroad are only eligible for bidding. Bidder to provide necessary documents to meet the eligibility criteria

3.0 EXTENT OF SUPPLY

The extent of supply stated herein is not necessarily exhaustive and shall not relieve the supplier from his responsibilities to provide goods & services necessary to satisfy the purchaser's performance criteria & required life, to be complete for installation & to be fit for purpose, safe, reliable, easily maintained and efficient in operation.

The extent of supply is as per quantity indicated in Annexure-1

4.0 TERMINAL POINTS

The terminal points for the extent of supply shall be

a) Inlet side flange & Outlet side flange (i.e. companion flanges) of Gate with fasteners.
b) Electrical & Limit switch terminal box of the actuator for the Gate
c) Electrical and limit switch terminal box of actuator for seal air isolation valve
d) Blower with seal air piping.

5.0 GENERAL REQUIREMENTS

(i) Seal Material: - Inconel or other superior materials which is corrosion resistant and have requisite flexural strength to act as seals at the specified operating parameters.

(ii) Actuator shall be selected in such a way that 40 % of starting torque of actuator shall be matched with maximum torque requirement.

(iii) Actuators are directly mounted on the drive shaft (refer Annexure-III enclosed).

(iv) Time for full opening or full closing not exceeding **one** minute.

(v) Seal air chamber shall be designed such that there is no coal accumulation in the seal air chamber even during gate open condition can be provided.

(vi) The operating temperature is 1000 Deg C as given in the annexure –I vendor has to select suitable material to match the operating condition Vendor to submit necessary documents / calculations to prove the suitable of materials for the above operating condition.

(vii) One set of Seals to be supplied as mandatory spares.

(viii) Same material is to be selected for both frame and blade.

(ix) Material used in a existing installation is given for reference. Slide gate materials as per DIN standard is furnished in the table, equivalent material to be used.

SL.No	EQUIPMENT PART LIST	DIN MATERIALS
1	WORKING FRAME	1.4828 X15 Cr Ni Si 20-12 HEAT RESIITING STEEL
2	SLIDE GATE BLADE	1.4828 X15 Cr Ni Si 20-12 HEAT RESIITING STEEL

6.0 TESTING

The Gates/Dampers should be tested in horizontal position at manufacturer's works for operation and leak tightness with & without seal air to prove the guaranteed leak tightness. **This will be witnessed by BHEL representatives.**

For testing the leak tightness, a plenum chamber is to be pressurized to the operating pressure with Gate blade in closed position. Detailed test procedure for leak tightness is to be submitted for approval with drawing showing the test set up and sample calculations. This should be submitted along with the offer.

7.0 MISCELLANEOUS

OVERALL TRANSPORT LIMITATIONS IN INDIAN ROAD (FOR GUIDANCE):

Width = 3500 mm (normal) & 5000mm (under special condition)
Length = 13000 mm
Height = 3000 mm
Weights = 20000 kg

Vendor shall submit shipping bill of material with packages, identified with over all size, quantity and weight. Over all dimensions shall be as per transport limitations furnished above.

The actuator and accessories may be shipped along with Gate in Separate packages. Instructions to mount them at site shall be submitted. Gate and accessories are to be painted and packaged to take care of corrosion due to sea voyage and rough handling at port & site.

8.0 DOCUMENTS :

Vendor shall submit the following document and drawing in English

8.1 DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER

a) General arrangement drawing with major dimensional details and sufficient cross sectional views for clear understanding of gates indicating the space requirement.
b) Bill of material and material specification
c) Typical Quality plan as per BHEL format (format enclosed in Annexure-VII) including material, fabrication, assembly, bought out items.
d) Type of sealing arrangement
e) All necessary documents / calculations as mentioned in the specifications
f) Comments / deviation for the specification
g) Scope of supply clearly indicating terminal points and exclusions
h) Detailed test procedure for leak tightness is to be submitted for approval with drawing showing the test set up and sample calculations
i) Start-up / commissioning spares, recommended spares list for two years trouble free operation and its cost
j) Document submission schedule
k) Experience list (Reference list) of the Vendor for the application indented and capacity of the Gate supplied.
l) Typical O&M manual

8.2 Documents to be submitted after ordering before manufacturing

a) Revised Quality plan (if any)
b) Test Setup & procedure for Leak tightness test
c) Detailed dimensional General drawing of the total system with cross sectional details
d) Specification for bought out items

8.3 Documents to be submitted before dispatch

a) Complete inspection / test records of Gate & Actuator
b) Leak test results with & without seal air
c) Raw material Test Certificates
d) Packing drawing & specification

8.4 Documents to be submitted along with Dispatch

a) Shipping list / supply schedule
b) List of spares dispatched
c) O&M manual
   i. 2 Nos of Hard copies
   ii. The CD (2 Nos) should contain only the PDF format of the O&M manual as in the hard copy in duplicate.
   iii. The manual should be in correct A4 size and the drawings are in A3 size only. If the drawings are large in size then it should be reduced in A3 size and inserted in the manual.
   iv. O&M manual should be submitted to BHEL Trichy within a month after all drawings / documents approval in **English language**.
d) Erection and commissioning procedure indicating the sequence (in English for Damper & Actuator)
e) Do's and Don'ts
f) Check list

9.0 PAINTING :

Painting is to be carried out as per vendor's standard.

10.0 PACKING AND SHIPPING :

Proper care has to be taken to avoid damage during packing and shipping.

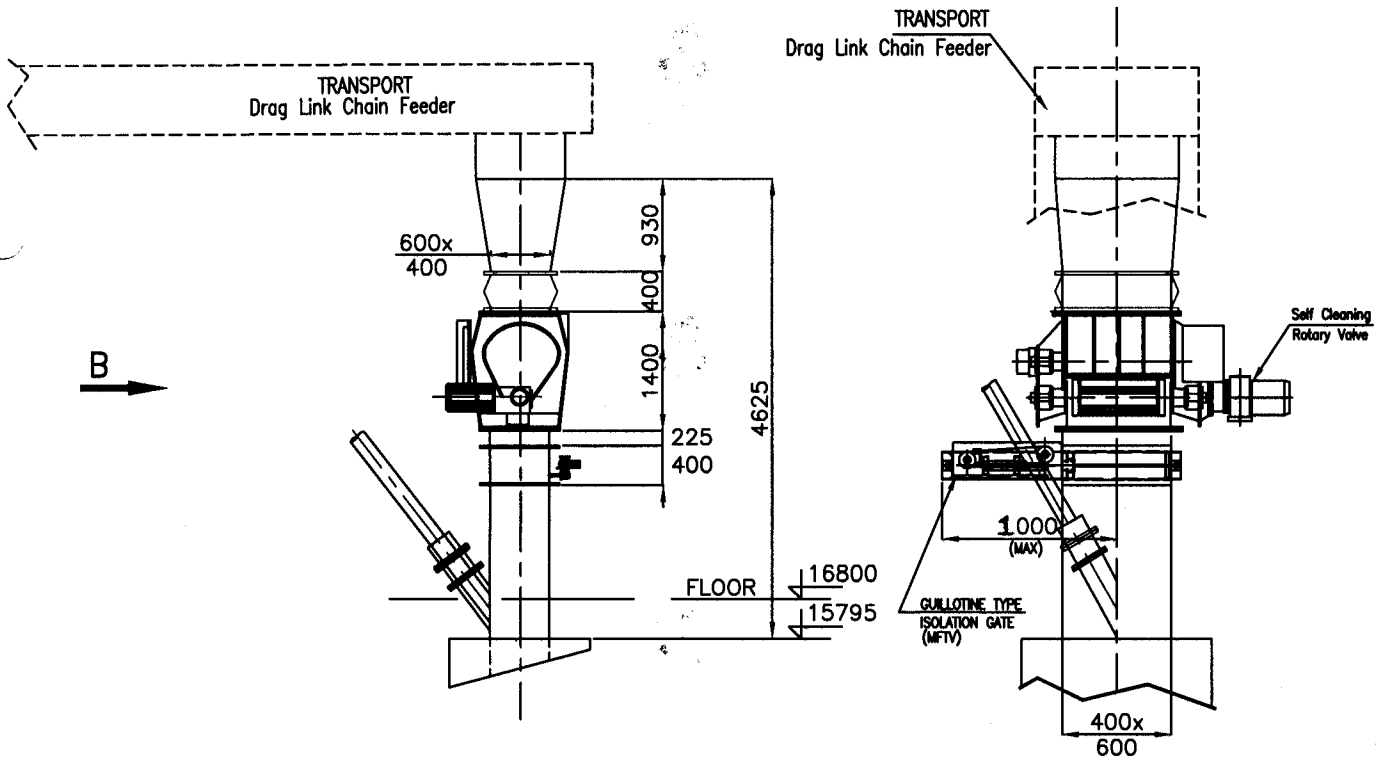
ANNEXURE-I

Parameters:

Sl.NO.	DESCRIPTION	UNIT	PARAMETERS
1	Location (Refer Annxure-2 for location of gate)	--	**Out door** **Located in Coal feeding tracts before the combustion chamber.** **(Rotary Valve out let gate)**
2	Type	-	Guillotine gate
3	Duct cross-sectional area	Length X width in mm	Duct Length – 400 mm (Stroke) Duct Width – 600mm
4	Quantity	No.	**01**
5	Gate width Face to Face	mm	400
6	Function	-	ON/OFF Isolation
7	Drive for Operating the Gate	-	Electrical
8	Coal flow Direction	-	Vertically downward from rotary feeder
9	Movement of Gate Blade Open / close		Horizontal
10	Design Pressure	mm WC	**+2500**
11	Operating Pressure (consider 25% additional margin for actuator selection)	mm WC	**+1000**
12	Site Altitude	m (above MSL)	100
13	Design Temperature	°C	**1000 max.(Not uniform throughout the cross-section)**
14	Maximum ambient temperature	°C	50
15	Minimum ambient temperature	°C	15
16	Seal Air Supply	-	**Separate Blower integral of gate OR floor mounted (Refer Annexure-III)**
17	Seal Air pressure	mm WC	**1000+150**
18	Sealing Efficiency without Seal Air	%	99.5
19	Sealing Efficiency with Seal Air	%	**100**
20	Flowing Medium	-	**Coal Partials (Lignite) upstream of the gate & flue gas from downstream of the gate.**
21	Coal Density	Kg/m^3	**900**

ANNEXURE – II

LOCATION OF GATE



VIEW–B

NOTE:

ONE GUILLOTINE TYPE GATE IS PROVIDED BELOW SCRV (SELF CLEANING ROTARY VALVE)AS SHOWN IN SKETCH ACTUATOR IS TO BE PLACED IN SUCH A WAY THAT NO INTERFERENCE WITH ADJACENT COMPONENT.

ALL DIMENSIONS MARKED ARE CRITICAL AND THAT TO BE MAINTAINED.

SEAL AIR BLOWER TO BE MOUNTED IN THE GATE IT SELF AS SHOWN IN ANNEXURE–III

IF NOT POSSIBLE TO LOCATE THE BLOWERS IN THE GATE ITSELF WITHOUT ANY INTERFERENCE

BLOWERS MAY BE MOUNTED IN FLOOR ELEVATION 16800.

SEAL AIR TO BE SUPPLIED BOTH OPEN AND CLOSED POSITION OF THE GATE

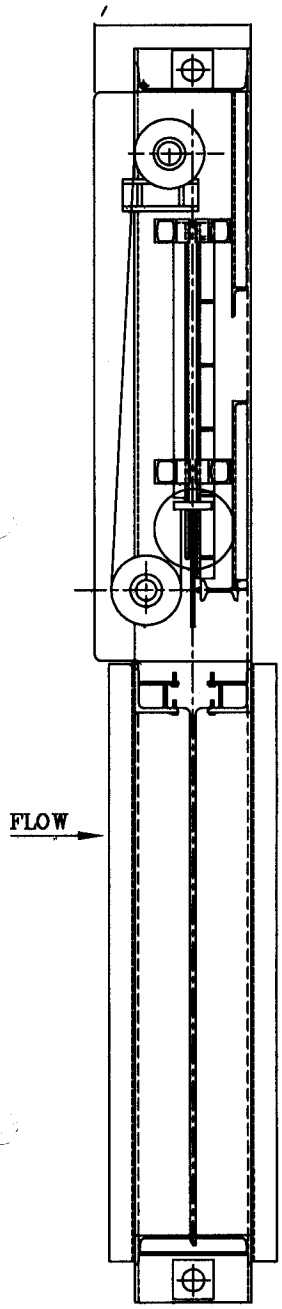
SEAL AIR BLOWER, PIPING AND ALL OTHER ACCESSORIES ARE PART OF VENDOR SCOPE.

EXACT FLOOR PLAN WILL BE FURNISHED AFTER AWARD OF CONTRACT.

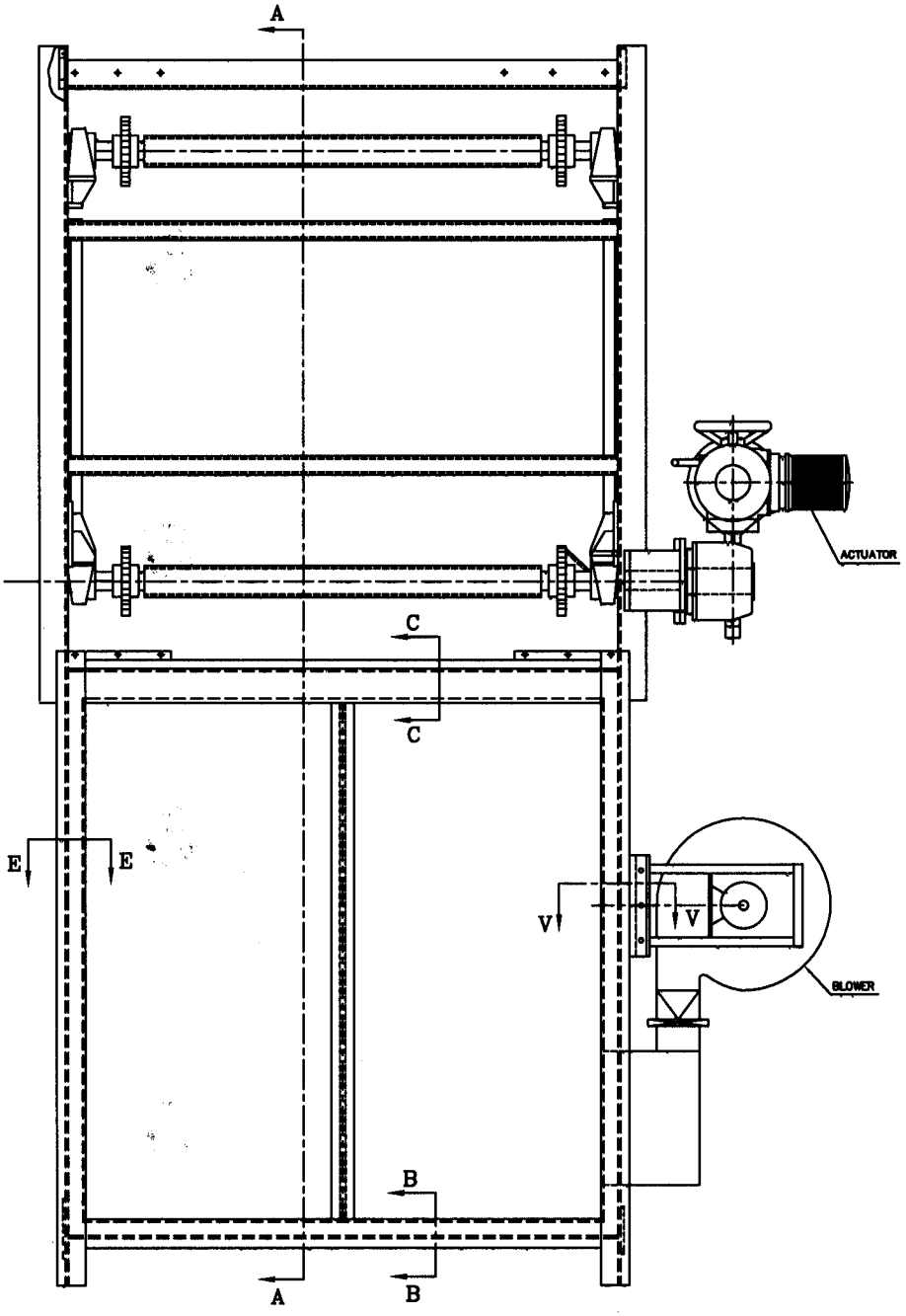
TENTATIVELY 15METER OF SEAL AIR PIPE TO BE CONSIDERED BY VENDOR FOR ESTIMATION FOR EACH GATE.

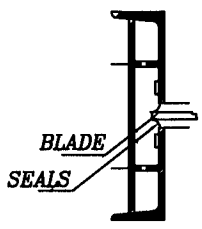
ANNEXURE – III

TYPICAL GATE, ACTUATOR AND BLOWER MOUNTING ARRANGEMENT

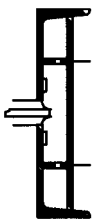


SECTION–AA

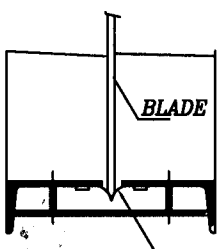




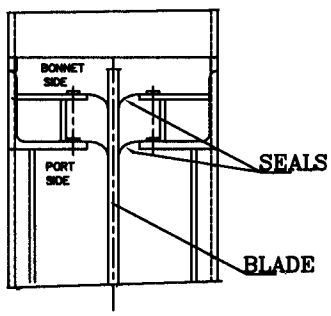
SECTION–EE



SECTION–VV



SECTION–BB



SECTION–CC

ANNEXURE-IV
(ELECTRICAL ACTUATOR SPECIFICATION)

1) SPEC NO.FBC&HRSG:CI:DCACTUR/REV00 – 8 Pages

2) SPEC NO.FBC&HRSG:CI:DCACTUR:DS/REV00 – 2 Pages

PURCHASE SPECIFICATION FOR VALVE-ACTUATORS (D.C)

The tender shall please furnish clearly along with quotation details for each of the items listed out in the specification without ambiguity.

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
G.1	**ENCLOSURE:**	
G.1.1	Actuators shall be of a totally enclosed weather proof and dust proof construction with IP 55 enclosure and shall be suitable for outdoor applications without the necessary for a canopy.	
G.1.2	Actuators shall be suitable for operation in damp, dusty polluted atmospheres of 100% relative humidity and ambient temperatures varying from (-20°C to + 70°C).	
G.2	**VOLTAGE:**	
G.2.1	The unit shall be suitable for operation on 220 V DC supply.	
G.3	**CONSTRUCTION:**	
G.3.1	Actuators shall have provision to accommodate raising spindle of the valve and the hole shall be properly covered with a removable lid. If required in certain cases, the actuator shall be supplied with an extension cylinder to accommodate larger spindle travel.	
G.3.2	The actuator shall be suitable for mounting directly on the valve. The actuator shall be capable of giving the required torque, rpm and thrust without the help of any additional spur gear box arrangement. The actuator shall be suitable for mounting in any position.	
G.3.3	Actuator shall have blank removable bush of Aluminium bronze which can be threaded to accommodate raising spindles of diameters indicated in our enquiry. The threaded bush shall have sufficient length to take the maximum thrust of the actuators. The actual material specification of the blank bush shall be furnished.	
G.3.4	The exact mounting arrangement with dimensions shall be clearly furnished along with the offer.	
G.3.5	The dimensions drawing of the blank adaptor bush shall be furnished along with the offer.	

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
G.3.6	Actuator shall have a hand wheel fitted on it for emergency operation. The hand wheel shall be designed such that it is declutched automatically when the power supply to the motor is restored. The material of the hand wheel shall be either malleable iron or steel. The hand wheel shall have adequate clearance from housing for easy grapping and operation. The hand wheel engaging lever shall give trouble free performance under repeated operations.	
G.3.7	Actuator offered shall be with self-locking worm.	
G.3.8	Actuator assemblies shall have all metal gear trains. Fiber gears are not preferred.	
G.4	TORQUE AND THRUST:	
G.4.1	Actuator shall be capable of giving the required torque at the output shaft. (Required torques is given in the enquiry). The actuator must also be capable of giving higher torque during opening in certain valves, where this will be equal to approximately 1.5 times closing torque correspondingly in these case opening thrust also is 1.5 times the thrust values indicated in the enquiry for closing.	
G.4.2	Indicate the adjustable range of torque and starting torque of actuator in Kgm for actuator offered. The maximum thrust capability of the actuators shall also be furnished. The actuator shall be designed to take the full thrust.	
G.5	REVOLUTIONS:	
G.5.1	Actuator shall be capable of giving total operating turns as indicated in the enclosure. Please furnish actual number of turns available for each actuator offered.	
G.6	SPEED:	
G.6.1	Desired output shaft speeds are enclosed in enquiry for various cases. Actual speeds of actuator offered shall be clearly indicated.	
G.7	WEIGHT:	
G.7.1	Furnish weight of actuator including all accessories.	

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
G.8	LUBRICANT:	
G.8.1	The gear box of the actuator shall preferably be oil filled. Furnish details of lubricant used with Indian Oil Company's equivalent. The actuator shall have proper seals to prevent leakage of oil in the limit switch compartment terminal box and motor.	
G.9	LIMIT SWITCH ACTUATING MECHANISM:	
G.9.1	The actuating mechanism for limit switches of valve with more than five revolutions shall be of Roller Counter Mechanism. The cam disc mechanism is preferred for revolutions below five. The actuating mechanism for auxiliary limit switches shall be with cam disc mechanism.	
G.10	DIMENSIONAL CATALOGUES:	
G.10.1	Three copies of catalogues of the actuator in English language describing the constructional details shall be sent along with the offer. The catalogues shall also provide over all dimensions of the actuator, maximum spindle acceptance diameters and other details called for in the specification. Description of the code numbers representing various actuators shall be submitted.	
G.11	O & M INSTRUCTION MANUALS:	
G.11.1	One copy of operating and maintenance instruction manual shall accompany the actuator ordered. 2 Hard Copies of O&M manual with Actuator data sheets & 1 CD contains the O&M details and Actuator datasheets are to be forwarded to BHEL(T) after placement of order.	
	ACCESSORIES	
A.1	TORQUE SWITCHES:	
A.1.1	Two number adjustable torque switches (one for open and one for close) each with 2 NO & 2 NC potential free contacts.	
A.1.2	The torque switches shall have accuracy ± 3% of set value. Please furnish actual percentage of variation allowed.	
A.1.3	It is required to have calibration for the torque switches so that the switches could be easily set to any valve desired, within the range specified for the actuator.	

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
A.2	LIMIT SWITCHES:	
A.2.1	Two numbers of position limit switches (one for open and one for close) each with 2 NO & 2NC potential free contacts.	
A.2.1.A	Each limit switch shall be capable of being set to trip at any point between fully open and fully closed position.	
A.2.2	Two auxiliary limit switches (one for open and one for close) each with 2NO & 2NC potential free contacts.	
A.2.3	The limit switches shall be independently adjustable type.	
A.3	MICRO SWITCHES:	
A.3.1	Limit switches and torque switches shall be weather proof suitable for damp atmospheres and shall not cause any trouble during commissioning and operation.	
A.3.2	Limit switch compartment shall be weather proof and spacious enough for easy setting.	
A.3.3	The switches shall be suitable for the following ratings, 220 volts DC, 0.5 amps.	
A.4	LOCAL POSITION INDICATORS:	
A.4.1	Actuator shall have a local position indicator to indicate 0 to 100% of valve travel.	
A.4.2	The actuator shall be suitable for operating different valve sizes with varying lift. The actuator shall therefore have adjustable gear for the local position indicator so that accurate indication of valve position can be obtained for all valve lifts by adjusting the gears. The gears selection chart for setting of local position indicator and mechanical transmitter for different valve lifts (output shaft revolutions) shall be furnished along with offer.	
A.5	ELECTROMAGNETIC BRAKES:	
A.5.1	In case electro magnetic brakes are provided in the actuator the same shall also have IP 55 weather proof enclosures. A cross sectional drawing showing brake arrangement shall be submitted.	
A.6	SPACE HEATER:	
A.6.1	Actuator shall have a space heater in the limit switch compartment suitable for 220V DC supply.	

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
A.7	REMOTE POSITION TRANSMITTER:	
A.7.1	Actuator shall have two position transmitter for remote indication suitable for 50 Volts AC single phase supply and 50 volts DC supply. Rating of position transmitter 2 x 100 ohms, 100 mA 50 volts. A suitable fixed dropping resistor must be put in series for limiting the power consumption.	
	MOTORS	
M.1	POWER SUPPLY:	
M.1.1	Motor shall be suitable for operation on a 220V DC supply.	
M.1.2	Motor shall operate without any trouble under the following conditions. a. If the voltage varies within + 10% - 20% of the rated value of 220V.	
M.2	CONSTRUCTION:	
M.2.1	Motor shall be totally enclosed fan cooled construction with IP 65 weather proof enclosure and shall be suitable for out door installation without canopy. Cooling fan shall be suitable for both directions of rotation. Motor with IP 67 enclosure class are acceptable without cooling fan.	
M.2.1.A	Double shielding grease pre lubricated regreasable antifriction bearings having min. life rating of 20,000 hours shall be furnished.	
M.2.2	Motor shall be of conforming to BS 2613-70, IS 325 of any other equivalent international standard for all requirements unless other wise specified herein.	
M.2.3	Motor shall be painted with corrosion proof epoxy resin paint.	
M.3	INSULATION:	
M.3.1	Motor shall have class B/F insulation with tropicalisation suitable for polluted dusty and corrosion atmospheres of relative humidity 100%. Motor shall be designed for ambient temperatures varying between –20°C to ± 70°C. If class ' F ' insulation is offered for the motor the temperature rise of the motor winding shall be limited to the maximum temperature allowed for class ' B' insulation. It shall also be possible to rewind the motor with class ' B' insulation materials in case with windings and insulation get burned out.	

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
M.3.1.A	Insulation seales with two additional dips and bakes of epoxy finish shall be included for windings.	
M.4	RATING:	
M.4.1	Motor shall be short time rated for minimum 15 minutes continuous operation S2-15 min. Minimum interval required between two successive operations shall be furnished. Cooling curves and temperature rise curves of the motor shall be furnished.	
M.5	STARTING:	
M.5.1	Motor shall be suitable for direct on-line starting.	
M.5.2	Starting current shall be limited to 6 times the full load current.	
M.5.3	Motor shall be capable of 1. Starting at 85% of rated voltage. 2. Running at 80% of rated voltage for a period of 5 minutes.	
M.6	EARTHING TERMINALS:	
M.6.1	Two earthing terminals shall be provided in either side of the motor.	
M.7	Motor shall be provided with THERMOSTATE for overload protection embedded on the windings.	
M.8	MOTOR DATA:	
M.8.1	Two reproducibles of motor data sheets for each type of actuators ordered shall be furnished. Two reproducibles of internal wiring and suggested control schematic for each type of actuator ordered shall be furnished.	
M.9	WEIGHT:	
M.9.1	Weight of the motor shall be furnished with the offer.	
M.10	TESTS:	
M.10.1	Routine tests and type tests are to be conducted as indicated below and required copies of the test certificates are to be furnished for the type tests as well as routine tests.	

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
	ROUTINE TEST: 1. Dimensions : Overall and mounting 2. Details of painting : Anti- corrosiveness Epoxy as per spec.& vendor Shade, Finish & Paint Thickness 3. Manual operation through hand wheel. 4. Checking of wiring 5. Testing of position and torque limit switches for accuracy and repeatability. 6. Hand-auto switching function. 7. For motors, all routine tests as called in IS: 325 / BS 4999. 8. Output shaft speed and torque of actuator and corresponding current as per catalogue. 9. Stall current and stall torque for the actuator assembly. 10. a. Position indicator and transmitter: calibration check for accuracy, linearity and repeatability. 11. Leakage test for gear case (visual). 12. HV test at 1.6 KV (80% of 2 KV) for the assembled actuator. 13. Operation of actuator under variation in supply voltage (+10% -20%) for verifying rated torque and speed. **TYPE TESTS:** 1. Type test for motor as per IS: 325 / BS 4999 part 60. 2. Noise and vibration test for total assembly IS: 4729 / BS 4999. 3. Temp. rise test during: a. Operation of actuator at 90% voltage. b. Operation of actuator at 50°C ambient. **CONTROLS**	
C.1	**INTERNAL WIRING:**	
C.1.1	Three copies of internal wiring diagram, Tech. Data sheet suggested controls schematic and limit switch contact development diagram shall be sent along with the offer without which the offer will not be considered.	
C.2	**TERMINAL BOX:**	
C.2.1	All terminals of position limit switches, torque limits switches, space heaters and positions transmitters shall be brought to a common terminal board. The terminals shall be of screw type with sufficient insulation between 2 adjacent terminals. All terminals must be suitable for 2.5 sq.mm wires.	

SL.NO	BHELREQUIREMENT	# Vendor's confirmation (Yes/No/NA)
C.2.2	Minimum 5 numbers of terminals shall be available in the terminal board as spare terminals.	
C.2.3	Terminal box of motor shall be capable of being turned through 300° in steps of 90° to facilitate cable entry from any direction.	
C.2.4	Terminal box of actuator shall be weather proof and have enough space for connecting there numbers of PVC insulated armoured copper conductor cable 19 core / 2.5mm².	
C.2.5	Terminal box of motor shall be weather proof and have enough space for connecting 1number PVC insulated armoured aluminimum conductor cable 3 core / 6 mm². Motor terminals shall be of stud type.	
C.2.6	Both the terminal boxes shall be fitted with a removable front cover plate.	
C.2.7	Internal wiring shall be done with 1.5 sq.mm PVC insulated copper wires. Ferrules should be provided on both ends of the wire for easy identification.	
C.2.8	Actuator is to be provided with cable glands suitable for the cable size indicated above.	
C.3	All screws used in terminal block shall have heads with screw driver slots. Control circuit terminals shall have minimum rating of 10 amps. At 500 volts.	
C.4	Actuator must be fitted with three cable glands for limit switch compartment and one cable glands for motor.	
	SPARES	
S.1	Supplier may specify a list of recommended spares for 2/5 years operation. An exploded view of the actuator shall be furnished with part numbers for identifying the spares.	

NOTE:
VENDOR HAS TO NOTE THAT ONLY DC ACTUATOR IS IN THEIR SCOPE. DC STARTERS ARE NOT IN THEIR SCOPE OF SUPPLY

PREPARED	CHECKED	APPROVED
	D Kavitha	5/4/05

DC ACTUATOR MOTOR DATA SHEET

SL.NO.	BHEL REQUIREMENTS		VENDOR DETAILS
1.0	Application/Designation		
2.0	Manufacturer		
3.0	Applicable Standards		
4.0	Rated a) Output	KW	
	b) Speed	RPM	
5.1	Type of Duty		
5.2	Duty Designation		
6.0	Supply Conditions. a) i) Rated Voltage (Armature) ii) Field Excitation	V V	
	b) Allowable variation in voltage	%	
7.0	Current a) Full load i) Armature ii) Field	 Amps Amps	
	b) Starting i) Max. Starting ii) Min. Starting	 %FL %FL	
8.0	Full load Efficiency	%	
9.0	Method of starting – D.O.L/Reduced Voltage Starting		
10.0	Torque a) Starting	 %FLT	
	b) Maximum	%FLT	
11.1	Resistance		
11.1.1	Armature Winding	Ohms	
11.1.2	Field Winding	Ohms	
11.2	Inductance		
11.2.1	Armature Winding	mH/H	

DC ACTUATOR MOTOR DATA SHEET

SL.NO.	BHEL REQUIREMENTS		VENDOR DETAILS
11.2.2	Field Winding	H	
12.0	Class of Insulation		
12.1	Armature		
12.2	Field		
12.3	Commutator		
13.1	Reference Ambient Temp.	°C	
13.2	Temperature rise above reference ambient of		
13.2.1	Armature: Resistance Method /Thermometer Method	°C	
13.2.2	Field: Resistance Method /Thermometer Method	°C	
13.2.3	Commutator – Thermometer	°C	
13.2.4	Core – Thermometer	°C	
14.0	Type of Enclosure		
15.0	Suitable for outdoor operation	Yes/No	
16.0	Degree of Protection		
17.0	Type & No. Of Terminals brought out		
18.1	Space heaters provided	Yes/No	
18.2	If you, details of space heater		
19.0	Shaft Orientation		
20.0	Dimensional Drg. Enclosed	Yes/No	
21.0	Starter in Vendors' Scope of Supply	Yes/No	
22.0	Treatment against corrosion given	Yes/No	

NOTE:

VENDOR HAS TO POSITIVELY FILL UP THIS DATA SHEET AND FURNISH THE SAME WITHOUT FAIL ALONG WITH THEIR OFFER.

ANNEXURE-V
(Typical BHEL QP Format)

1) Manufacturing Quality Plan - 1 Page (BHEL QP Format)

BHEL QP Format	Bharat Heavy Electricals Ltd. PRODUCT ENGINEERING/FBC & HRSG	MANUFACTURING QUALITY PLAN	For the spec. No.

MANUFACTURER'S NAME AND ADDRESS:	ITEM: SYSTEM:	QP No.: REV No.: DATE: PAGE No.:	PROJECT: CUST NO: PACKAGE: P.O. No.: DATE:

SL No.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	E	AGENCY 11			REMARKS
										VE	M	B	
1	2	3	4	5	6	7	8	9	10				12

MANUFACTURER/SUBCONTRACTOR		LEGEND C OF C: CERTIFICATE OF CONFORMANCE. VE: MANUFACTURER/SUB-CONTRACTOR'S VENDOR. M: MANUFACTURER/SUB-CONTRACTOR. B: BHEL/NOMINATED INSPECTION AGENCY. E: RECORD IDENTIFIED WITH "√" SHALL BE ESSENTIAL INCLUDED BY CONTRACTOR IN QUALITY DOCUMENTATION. PT: PENETRATION TEST.	FOR BHEL USE
PREPARED BY	REVIEWED BY		
NANE & SIGNATURE		INDICATE 'P' PERFORM, 'W' WITNESS, AND 'V' VERIFICATION AS APPROPRIATE.	NAME & SIGN. OF APPROVING AUTHORITY & SEAL

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