



# PRODUCT STANDARD

TUBE MILLS

BA 50063

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REV. NO.: 01

## TECHNICAL SPECIFICATION FOR ELECTRICAL ACTUATOR

THE FOLLOWING SPECIFICATION IS FOR THE PROCUREMENT OF ELECTRICAL ACTUATOR FOR PULVERIZED FUEL SHUT OFF GATE AND BALL FEEDING SHUT OFF GATE APPLICATION.

	BALL FEEDING SHUT OFF GATE VAR:01	PULVERIZED FUEL SHUT OFF GATE VAR:02
CONNECTION OF THE GATE IN SQ M	: 0.049	0.2809
TORQUE IN DA NM	: 3.6	7.8
SERVICE FACTOR	: 1.5	1.5
MINIMUM NECESSARY STENGTH IN DA NM	: 900	1350
SCREW - DIA	: 30	40
PITCH	: 6	16
DIRECTION	: LEFT HAND	2 STARTS LEFT HAND
DIRECTION OF CLOSURE SHAFT OF ACTUATOR	: CLOCK WISE	CLOCK WISE

MAT. CODE: BA 9750063015

BA 9750063023

VENDOR SHALL SELECT A SUITABLE ACTUATOR BASED ON THE ABOVE DATA AND FRUNISH ALL THE DATA AS PER THE ENCLOSURES GIVEN IN SHEET 2 TO SHEET 13.

CONTD....2....

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Revised As MARKED up in  
SHEET 1 OF 13

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HYDERABAD

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PREP:

K. SRINIVAS REDDY

APPROVED: Y.V.

Prepared:

Y.V.

Approved:

Date:

23.02.90



# TUBE MILLS

## TECHNICAL CONFIRMATIONS

(FILL UP. TAKE PHOTOSTAT COPIES- FURNISH ALONG WITH OFFER)

## ELECTRICAL ACTUATOR FOR OPEN-CLOSE APPLICATION

SL. NO.	SPECIFICATION CONDITION	YES/ NO	REMARKS.

MOTOR

- 1.0 MOTOR SUITABLE FOR 415V, 3  $\phi$   
50 Hz, 3 WIRE UNGROUNDED SUPPLY
- 1.1 MOTOR CONFORM TO IS 325 (OR) BS2613-70
- 1.2 MOTOR PAINTED WITH CORROSION  
PROOF EPOXY RESIN PAINT.
- 1.3 MOTOR INSULATION MINIMUM  
CLASS B(NON HYGROSCOPIC INSULATION  
WITH TROPICALISATION SUITABLE FOR  
CL 3.8 B)
- 1.4 MOTOR RATED FOR 15 MINUTES DUTY  
(FOR OPEN-CLOSE S2-15)
- 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.

ACTUATOR + SECONDARY GEAR BOX

- 2.0 ACTUATOR + SY.GB: CAN START AT 80% RATED VOLT AND RUN AT 75% VOLT AT SPECIFIED RUN TORQUE FOR 5 MIN.
- 2.1 ACTUATOR + SY.GB CAN R OPERATE AT SPECIFIED RUN TORQUE FOR THE FOLLOWING CONDITIONS:

CONTD...3...

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SL. SPECIFICATION CONDITION

YES/NO

REMARKS.

2.1A AT  $\pm 10\%$  RATED VOLTAGE (415V)

2.1B AT  $\pm 5\%$  RATED FREQ. (50HZ)

2.1C AT  $\pm 10\%$  RATED VOLTAGE + FREQ.  
ABSOLUTE.

3.0- ACTUATOR (BASIC ACTU + SY. GEAR BOX) AS A WHOLE WILL MEET MINIMUM IP : 55 PROTECTION, AND SUITABLE FOR OUTDOOR APPLICATION.

3.1 NAME PLATE FOR TORQUE SWITCH  
CALIBRATION SHALL BE PROVIDED  
WITH TORQUE VALUE IN KGM.

3.2 ACTU. HAND WHEEL DE-CLUTCH  
AUTOMATICALLY UPON POWER  
SUPPLY RESTORATION.

3.3 COUNTER CLOCKWISE ROTATION  
LOOKING AT ACTU DRIVING  
END SHALL RESULT IN CLOSE.

3.4 ACTU. WILL MEET SPECIFIED  
RUN TORQUE FOR 15 MINUTES.

3.5 FOUR LIMIT SWITCHES, TWO TORQUE SWITCHES OF SELF LATCHING TYPE 02 RATED FOR 250V, AC 5 AMPS: 250V DC-0.5 AMP, AND EACH SWITCH SHALL HAVE 2 NO + 2 NC INDEPENDENT CONTACTS.

3.6 ACTU. PROVIDED WITH MECHANICAL POSITION INDICATOR FOR 0 TO 100% ADJUSTABLE WITH IN 360° ROTATION.

3.7 A. ACTU. PROVIDED WITH HEATER  
SUITABLE FOR 240V AC, 1  $\phi$   
50 HZ. IN LIMIT SWITCH  
COMPARTMENT.

B. AGTU. SUITABLE FOR OPN. IN  
DAMP DUSTY POLLUTED  
ATMOSPHERES OF 100% REL-  
ATIVE HUMIDITY AND  
AMBIENT TEMP. OF 20°C TO 50°C



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SL. SPECIFICATION CONDITION YES/NO REMARKS.

NO.

3.8A ACTU. PROVIDED WITH COMMON  
TERMINALS AND EACH TERMINAL  
SUITABLE FOR 2 x 2.5 SQ.MM WIRE

3.8B INTERNAL WIRING IS DONE  
AS PER BHEL DIAGRAM

WIRING DIAGRAM  
SHALL BE PASTED INSIDE.  
TB COMPARTMENT.

4.0 ACTUATOR SHALL BE PROVIDED  
WITH TWO POSITION TRANSMITTERS  
RATED FOR 50V AC/DC.

5.0 ACTUATOR + SY.GB SHALL MEET  
ALL THE CONDITIONS MENTIONED  
IN ACTUATOR DATA SHEET.  
(STEIN INFORMATION ABOUT  
TORQUE SCREW

*Shew* TORQUE SCREW DIA  
PITCH  
SPEED & RPM  
RIGHT HAND OR  
LEFT HAND THREAD  
THREAD START  
LINEAR MOVEMENT

6.0 EVERY ACTUATOR  
EXPECIALLY SY.GB SHALL  
SELF LOCKING WORM GEARS.

7.0 i) THE 15 MIN RUN TORQUE AND  
FOR GATE SHALL BE MINIMUM  
ii) 5 TIMES THE 15 MIN. RUN  
TORQUE.

8.0 NECESSARY NUMBER OF FASTNERS  
(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)

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**B. NO. OF STARTS PER HR.  
WITH LOAD AT SPECIFIED  
RUN TORQUE**

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SL. SPECIFICATION  
NO. REQUIREMENT

ACTUATOR SL.NO.

2.9 C. FULL LOAD RPM

D. AMBIENT IN °C  
(-20°C TO + 50°C)

E. DUTY TIME IN SECS.  
(32-15 MIN.)

F. FULL LOAD POWER  
FACTOR.

G. FULL LOAD EFFICIENCY

## GEAR BOX:

3.0 A. PRIMARY GEAR BOX RATIO

B. PRIMARY GEAR BOX  
EFFICIENCY

3.1 PY GB-MAX OPERATING  
TORQUE KGM

4.0 (A) SECONDARY GB TYPE & MAKE

B. SECONDARY GB RATIO

4.1 (C) SECONDARY GB EFFICIENCY

4.1 SY.GB.MAY OPERATING  
TORQUE KGM

4.2 SY.GB.MOMENTARY TORQUE  
CAPACITY

5.0 ACTUATOR + SY.GB OUTPUT  
RPM

4.0 (B) SECONDARY GB RATIO

(C) SECONDARY GB EFFICIENCY.

5.1 ACTUATOR + SY.GB RUN TORQUE  
RANGE, KGM.

5.2 ACTUATOR + SY.GB STARTING  
TORQUE, KGM

5.3 OUTPUT BUSH DETAIL

5.4 APPROXIMATE WEIGHT OF  
ACTUATOR + SECONDARY GEAR BOX

5.5 LUBRICANT

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SL. NO.	SPECIFICATION REQUIREMENT	ACTUATOR SL.NO.
---------	---------------------------	-----------------

- A. RECOMMENDED INTERVAL OF CHECKING/FILLING.
- B. TYPE OF LUBRICANT.
- C. INDIAN EQUIVALENT MAKE
- D. QTY. IN LITRES/KG.

5.6 TYPE AND MAKE OF LIMIT SWITCHES AND TORQUE SWITCHES.

5.7 ACTU + SY QB PAINT

- A. COLOUR
- B. PAINT THICKNESS.

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## TEST REQUIREMENTS FOR "ACTUATOR + SECONDARY GEAR BOX" TEST REQUIREMENTS

### T(A) ROUTINE TEST :

1. Dimensions : Overall and mounting.
2. Details of painting as per SPEC. & Vendor : a. ANTI.-Corrosiveness Epoxy
  - i) Shade, ii) Finish
  - iii) Paint thickness
3. Manual operation through hand wheel. :
4. Checking of wiring BHEL Std.TB Diagram. :
5. Testing of position and torque limit switches for accuracy and repeatability. By turn setting (No. turns) for position limit switches & Torque setting for torque switches. :
6. Hand-Auto Switching function :
7. For motors, all routine tests as called in IS: 325/BS4999/VDE/0530/IEC 432.
8. Final output shaft speed and torque of actuator + Sy. Gear box and corresponding current as per catalogue. :
9. Position indicator and transmitter Calibration check for accuracy, linearity and repeatability.
10. Leakage test for gear case (Visual)
11. HV test at 1.6 KV (80% of 2KV) for the assembled actuator)
12. Operation of "Actuator + Sy. Gear Box" under variation in supply voltage ( $\pm 10\%$ ) for verifying Specified run torque.

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13. Checking of actuator Output bush as per data sheet.

T(B) TYPE TESTS:

1. Type test for motor as per IS 325/854999 Part 60/VDE 0530/IEC  $\pm 32$
2. Noise and vibration test for total assembly IS:4729/BS 4999
3. Temp. rise test during
  - a. Operation of actuator at 75% voltage for 5 Min.
  - b. 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 and Electrical endurance test for Limit switches.
7. All tests listed under routine test
8. Damp heat cycle test as per IS 9000/IEC 68-30
9. Every type of actuator shall be tested with the respective gate at vendor's work for performance and proper matching:

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T. Chandra  
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## T(C) DOCUMENTS TO BE PROVIDED

1. Certificate for routine test detailing out the results :
2. Routine and type test reports 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 :

## T(D) NOTES:

1. The tests should also be in conformity to the QP submitted by the supplier and approved by BHEL/Customer.
2. All testing 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.

Prepared	Checked	Approved	Date	
Y. VENKATESHWARLU		D.G.M.	23/2/90	BHEL
CUST		PROJECT:	S	SUPPLIER
			SPEC. NO.	

SUPPLIER'S NAME :  
SUPPLIERS REF. :  
CONTACT PERSON :  
DESIGNATION :

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STANDARDS



# LIMIT SWITCH CONTACT DEVELOPMENT

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		POSITION OF VALVE / DAMPER			
LIMIT SWITCH CONTACT TERMINAL <u>NO</u>		FULL OPEN	INTERMEDIATE	FULL CLOSE	
OLS 1 & OLS 2	17 - 18 & 33 - 34	—	X	X	THESE LIMIT SWITCH CONTACTS ACT ON VALVE REACHING RESPECTIVE POSITION
	19 - 20 & 35 - 36	X	—	—	
	21 - 22 & 37 - 38	—	X	X	
	23 - 24 & 39 - 40	X	—	—	
CLS 1 & CLS 2	25 - 26 & 41 - 42	X	X	—	
	27 - 28 & 43 - 44	—	—	X	
	29 - 30 & 45 - 46	X	X	—	
	31 - 32 & 47 - 48	—	—	X	
OTS	1 - 2 & 5 - 6	OFF AT OVER TORQUE DURING OPENING TRAVEL			
	3 - 4 & 7 - 8	ON AT OVER TORQUE DURING OPENING TRAVEL			
CTS	9 - 10 & 13 - 14	OFF AT OVER TORQUE DURING CLOSING TRAVEL			
	11 - 12 & 15 - 16	ON AT OVER TORQUE DURING CLOSING TRAVEL			

X INDICATES CONTACT CLOSED

— INDICATES CONTACT OPEN

REFER WIRING DIAGRAM

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PREPARED

CH. SUDHAKAR RAO

CHECKED

T. V. Sankaralingam

APPROVED

[Signature]

DRG NO.

REV

00

OTS

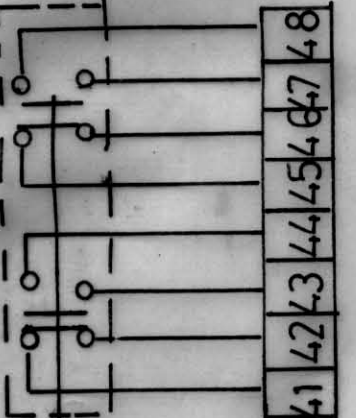
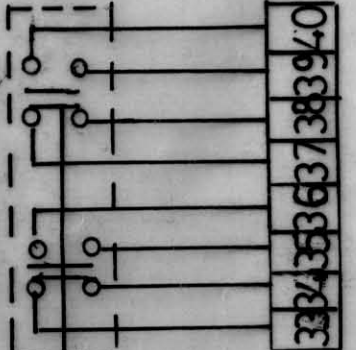
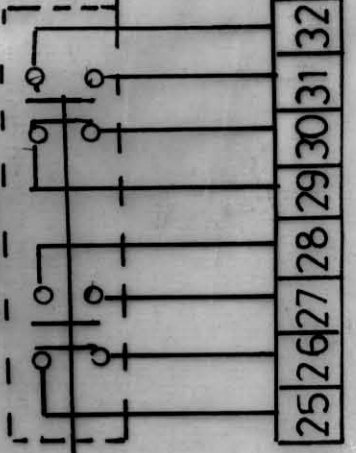
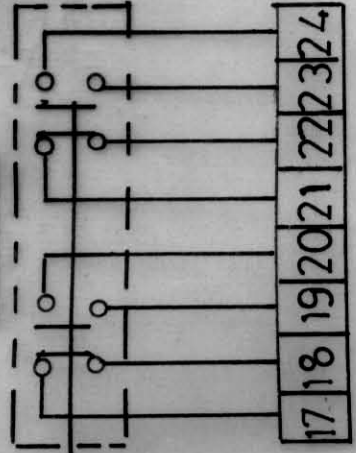
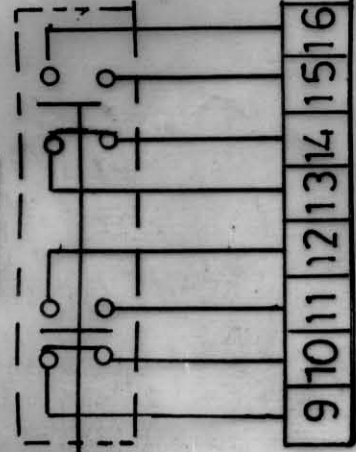
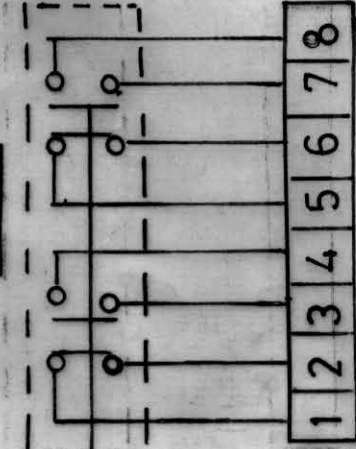
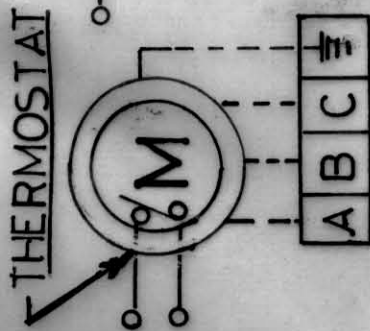
CTS

OLS-1

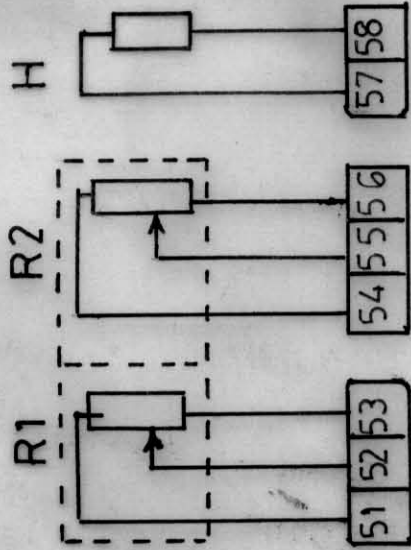
CLS-1

OLS-2

CLS-2



BA50063



NOTE

1 CTS - TORQUE SWITCH FOR C.W. ROTATION 'CLOSE'

OTS - TORQUE SWITCH FOR C.C.W. ROTATION 'OPEN'

OLS-1 } LIMIT SWITCHES FOR POSITION OPEN

OLS-2 } LIMIT SWITCHES FOR POSITION CLOSE

CLS-1 } LIMIT SWITCHES FOR POSITION CLOSE

CLS-2 } LIMIT SWITCHES FOR POSITION OPEN

R1, R2: DOUBLE RESISTANCE TRANSMITTER 2X100 OHMS

H HEATER - 240V AC 1  $\phi$  50 C/S IN LIMIT SWITCH COMPARTMENT.

2. WINDING THERMOSTAT CAN BE CONNECTED TO MOTOR CONTROL CIRCUIT

# STANDARD INTERNAL WIRING DIAGRAM FOR ACTUATORS

(DRAWN FOR INTERMEDIATE POSITION OF DAMPER)

3. ALL THE CONTROL TERMINALS SHALL BE SUITABLE FOR 2 NOS, 2.5. SQ.MM STRANDED COPPER CABLE
4. CABLE GLANDS OF DOUBLE COMPRESSION TYPE BRASS MATERIAL SHALL BE PROVIDED SUITABLE TO,
  - (1) 3 NOS. PG 29 (FOR CONTROL)
  - (1) 1 NO. PG 21 (FOR POWER)