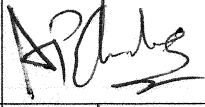
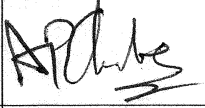
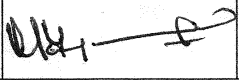


TITLE: TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS FOR ECI
ITEM : ACTUATOR FOR BLADE PITCH CONTROL (CONTINUOUS MODULATING DUTY)
PROJECT : NTPC – DADRI (FGD BOOSTER FANS)

NAME		DESIGNATION	SIGNATURE	DATE
PREPARED	A.P.CHANDRASEKAR	Sr. Engineer		02-05-2018
CHECKED	A.P.CHANDRASEKAR	Sr. Engineer		02-05-2018
APPROVED	M.JEYAMURUGANAND	SDGM		02-05-2018
ISSUED BY				
EDC-ECI				
RECORDS OF REVISION:				
REVISION NUMBER 00		INITIAL RELEASE	02-05-2018	

Sl. No.	Details	Requirements
1.0	General	
1.1	Site Conditions	Ambient Temperature : 0° C to 50° C. Refer to point no. 2.4 for actuator design temperature. Relative Humidity : 95% Atmosphere : Tropical, dusty, salty, corrosive and highly polluted.
2.0	Actuator	
2.1	Actuator type	Continuous Modulating duty, electrical actuator, operated by 4-20 mA demand signal from the control system. Shall be electrical motor driven, consisting of suitable gear train mechanism with other accessories such as power supply, starter circuit, position controller, position feedback transmitter etc. Shall be Foot mounted, Lever operated type.
2.2	Application	Used in the critical application of FD/ID/PA/Booster fan blade pitch control, ID fan inlet vane control as applicable for the project. Hence, failure of any one or more electrical actuator will result in reduction in power generation to half or total loss of power generation. For Blade pitch control, this electrical actuator provides the pilot action to the hydraulic control unit of the fans based on the demand signal, resulting in the change of blade angle.
2.3	Standards	Shall conform to EN-15714-2:2010 CLASS D or equivalent international standard for all requirements.
2.4	Construction	Shall be suitable for operation in hot, humid and tropical atmosphere, highly polluted at places with coal dust and/or fly ash. Actuator enclosure shall be totally enclosed, dust tight, weather-

		proof construction meeting the requirements of IP-68. Shall be suitable for working in a temperature range, (-)20 °C to (+)60 °C.
		Shall be designed for mounting in any orientation without any lubricant leakage or operational difficulties.
2.5	Manual operation	Provision for manual operation such as Hand wheel/Knob/Lever shall be provided for operating the actuator during emergency conditions, during loss of power supply.
3.0	Power Supply	
3.1	Power Supply	1 no. of power supply feeder of 415 V AC, 3 phase, 3 wire, 50Hz (SFU) will be provided to each actuator present in the field. (Vendor to take care of separate hardware units in each actuator, to derive any other voltages that are required for the operation of the actuator).
3.2	Power supply variation	Voltage variation $\pm 10\%$, Frequency variation $\pm 5\%$, Combined voltage and frequency variation 10 %. Actuator should perform without any problem, even under the above situations.
4.0	Design requirements	
4.1	Torque requirement	Shall develop the torque at the output shaft, as specified in the purchase enquiry.
4.2	Operating time of the actuator	The time taken for the actuator lever to move from full close to full open position and vice-versa at rated voltage and frequency, shall be within the time specified in the purchase enquiry.
4.3	Angle of travel	The output lever shall have 0 to 90 degree movement for the demand signal, 4 – 20 mA signal.

4.4	Position accuracy	<1%
4.5	Resolution/Precision	0.15% or better of total travel.
5.0	Motor	
5.1	Motor	The type of motor shall be Squirrel Cage Induction type with Variable Frequency drive or Permanent Magnet Synchronous motor or Brushless DC motor, as per the actuator design.
5.2	Duty Cycle	The duty cycle of the actuator motor shall be 3600 starts/hour or higher.
5.3	Motor winding Insulation	Shall have class-H insulation with tropicalisation suitable for the site conditions.
6.0	Gear Mechanism	
6.1	Gear mechanism	Shall be provided with required gear train mechanism for the purpose of speed reduction. Shall be made out of suitable metal. The gear mechanism shall be suitable for continuous modulating duty and shall be designed suitably to achieve the actuator performance characteristics as indicated in clause no. 7.2. Self-locking feature has to be provided to prevent the drift due to the load acting on the actuator.
6.2	Lubricant	The gear train mechanism shall be either Oil or Grease lubricated.
7.0	Actuator Controls	
		Shall have the following minimum features : - Integral Starter module with Electronic reversing circuits. - Electronic positioner circuit. - Lockable Local/Remote selector switch. - Push buttons for local operation. - Adequate protection feature such as single phasing protection, over load protection etc. as applicable, shall be

7.1	Features of the Actuator	provided. f. Indicating lamps/LED/LCD readout for status/fault, position and indication. g. Potential free, common annunciation contact for various fault conditions. h. Provision to diagnose the type of fault locally in the actuator. i. Shall have SMART, non-intrusive facilities for calibration. j. Vendor to supply necessary tools & kit, parameterization/diagnosis software for actuator calibration and diagnosis at site.
7.2	Actuator performance characteristics	a. Minimum input signal (Deadband) for which the actuator can respond : 0.5 % of full span. b. The actuator shall have STAYPUT characteristics on loss of the demand and feedback signal.
7.3	Position feedback transmitter	Non-contact type position sensor, shall be provided with isolated 4-20 mA DC current output to DCS.
7.4	Position sensing limit	Position limit sensing shall be made available and potential-free, contact shall be provided for Open, Close and 2 predefined intermediary positions respectively and all the contacts shall be terminated in the terminal box. Vendor to indicate the contact rating.
8.0	Local position indicator	Shall be provided.
9.0	Internal Wiring and Termination	
9.1	Internal wiring	Shall be done by using cables of suitable size with proper ferruling. Signal interface details shall be neatly affixed on to the cover/body.

9.2	Termination of Power & Control Cable	1 no. Double compression type, Weather proof, Brass with Nickel plated, cable gland shall be provided for the power cable of OD – 16 mm. Plug & socket/ gland type connectors as per vendor standard shall be provided for the termination of command and feedback signals. The socket/ connectors shall be fixed on the terminal board and wired to the terminal blocks. The Plug shall be suitable for a cable of OD 16 mm (approx.).
9.3	Earth terminal	Shall be provided.
10.0	Output Levers and Linkage rod	
10.1	Linkage rod	Vendor to provide linkage rod of length around 1.5 metre, with suitable connecting mechanism at both sides (actuator and load side) for connecting the levers with the linkage rod. Vendor to provide 2 nos. of output lever of length as per the purchase enquiry (1 for connecting at the output shaft of the actuator and 1 no. for connecting at the output shaft of the load. The diameter of the output shaft of the load will be intimated during drawing approval stage). The connecting mechanisms shall be designed to reduce the effects of backlash. The above link assembly, Crank (R150 adjustable), Output levers along with necessary fasteners and other mounting accessories to be supplied by vendor.
10.2	Output Shaft and Output Lever	The orientation and rotation of the output shaft and lever has to be matched with the load, as per the drawing enclosed with Purchase Enquiry.
11.0	Finish	
11.1	Painting	All external Parts shall be finished and painted to produce a neat and durable surface using Epoxy based paint, which would

		prevent Corrosion & Rusting.
11.2	Asbestos free	The materials used in the actuator and its accessories, shall be free from asbestos.
12.0	Inspection & Testing	
12.1	Quality Plan	Vendor to submit the Vendor Quality Plan for review and approval by BHEL and Customer.
12.2	Inspection & Testing	As per the technical specification, approved Data sheet and approved Quality Plan.
13.0	Documents to be submitted (ALL DRAWINGS WILL BE SUBJECT TO APPROVAL BY M/s NTPC AFTER P.O.)	
13.1	Documents to be submitted along with offer	a. Vendor has to submit “Sub-delivery Enquiry deviation form”, indicating No-Deviation, in case of no deviation, with respect to the requirements indicated in the purchase enquiry. The references of the technical specification and the quality plan have to be indicated in the format. Deviations shall only be indicated in the above form. Deviations indicated elsewhere in the offer will not be considered. b. Technical data sheet, as per BHEL’s format. c. Actuator catalogues, model decoding sheet, wiring drawing, GA drawings and Sizing Calculations. d. Vendor Quality Plan incorporating (Inspection at Raw material stage/In-process stage/Finished product stage, Routine tests and type tests.)
13.2	Documents to be submitted for approval after	a. Technical data sheet, as per BHEL’s format. b. GA Drawings with dimensional details. c. Wiring drawings.

	placement of Purchase order (ALL DRAWINGS WILL BE APPROVED BY M/s NTPC)	d. Vendor Quality Plan.
13.3	O & M manuals	O & M manuals including all details required for operation, erection and commissioning–Soft copies in CDs shall be submitted to BHEL. 2 Sets of hard copies shall be sent to site along with actuator packing.
14.0	Packing	The packing shall be sea-worthy and shall meet Transport, environment, Storage and handling hazards, meeting the requirements as per relevant international standards.
15.0	Pre - Qualification requirement	Vendor should have supplied and commissioned similar products of suitable ratings to thermal power plant applications and the same shall be working satisfactorily for a period of minimum 2 years as on the date of techno-commercial bid opening. The bidder can offer and supply such equipment with collaboration or valid license agreement for design, engineering, manufacture and supply of such equipment in India provided the collaborator meets the above criteria.
16.0	Commissioning	Commissioning of the actuator shall be in vendor's scope. Vendor to take-care of the commissioning spares and special tools required for successful commissioning of the product. A commissioning protocol shall be signed by the customer, site & vendor on successful commissioning of the system and shall be submitted to BHEL-Ranipet.
17.0	Spares	Supplier to indicate a list of recommended spares for 5 years of trouble free operation.
18.0	Service support	After commissioning, vendor to provide necessary service support to installations at various power plant sites like trouble

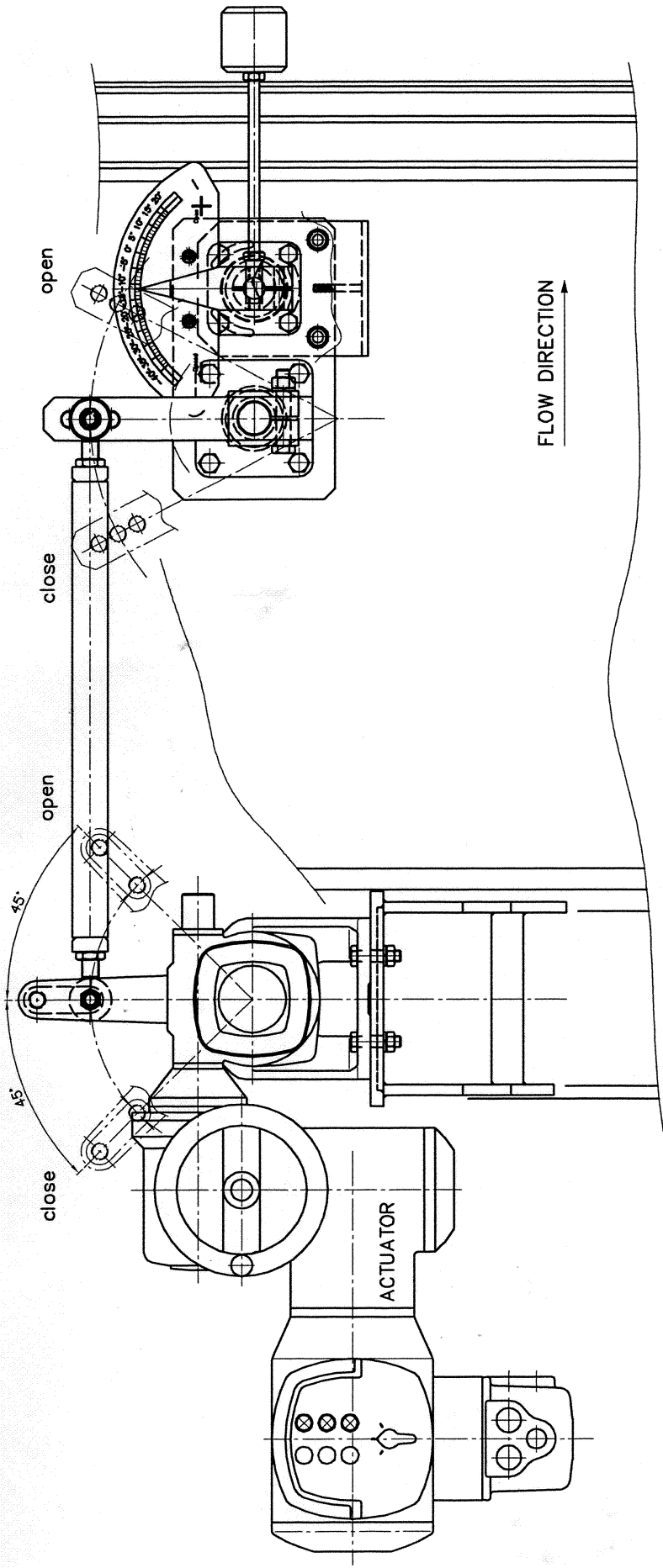
		shooting/rectification works, re-calibration of actuator etc. and shall support supply of spares for a minimum period of 5 years,
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19.0	Specific Requirements	Control unit: Blade Pitch (Booster Fan blade pitch control) Actuating Torque (kg-m): 10 Crank Arm Radius(mm): Approx. 150 Angle of travel (deg.): 0-90 Actuator style: Style -01 (Refer attached drawing) Recommended operating time: 30-35 sec.
20.0	Training	Training should be provided for BHEL/NTPC personnel (min. 2 days) for troubleshooting and maintenance of non-intrusive actuators and proper interfacing with DDCMIS. (Price shall be quoted separately by vendor.)

This technical specification covers only the basic requirements. However, vendor shall take care of all the requirements of the actuator to meet with the performance requirements and to ensure the completeness of the system.

Vendor to indicate whether the following accessories/features are applicable or not. If it is not applicable, vendor to furnish reasons and elaborate how the requirement is taken care of.

1.	Thermostat	Thermostats shall be provided in the motor winding for monitoring the temperature rise and the same shall be interlocked with the control circuit.
2.	Space heater	Actuator shall be provided with Space heater for the purpose of anti-condensation inside the actuator housing. The space heater shall be suitably rated and the power supply shall be derived internally from the main power supply.
3.	Torque switch	Torque switch shall be provided for Open and Close positions. The control circuit shall bypass the torque switches at both end positions.



NOTE:

- 01. ACTUATOR LEVER IS IN THE OPPOSITE SIDE
- 02. ACTUATOR OPEN IS IN THE CLOCKWISE DIRECTION AS PER THE ABOVE VIEW.
- 03. REFER E, C & I INPUT FOR PARTICULAR PROJECT FOR LEVER RADIUS.
- 04. ACTUATOR OPEN/CLOSE DIRECTION SHALL MATCH WITH BLADE OPEN/CLOSE DIRECTION AS SHOWN IN THE DRAWING.

DRN.	P.SARAVANAN	21.06.17	TITLE
CHD.	PRASANNA	21.06.17	ACTUATOR ORIENTATION (STYLE-01)
APPD.	P.M.JAVID	21.06.17	