

Technical Pre-Qualification Requirement for

Secondary air damper power cylinder

1. The vendor shall be an established Secondary air damper power cylinder with double acting (henceforth referred as SADC) manufacturer having adequate Design, Engineering, Manufacturing, inspection and testing facilities and shall furnish technical backup documents for the proof of above requirements.
2. The SADC offered shall be from the existing regular manufacturing range of the supplier. Vendor shall provide the manufacturing catalogue or general reference list for the offered SADC along with offer.
3. The supplier shall have experience of having supplied SADC with accessories for temperature service, dusty, corrosive & highly polluted atmospheric conditions or for the application of similar severity as specified in the enquiry. Supplier shall submit documents in proof of the same.
4. Proven track record is required. As a proof for this pre-qualifying requirement point, vendor should submit:
Minimum ONE end user certificate for the satisfactory operational performance of their supplied SADC with accessories meeting or exceeding the specification requirements.

(OR)

Minimum TWO purchase orders meeting or exceeding the requirements as per the enquiry specification

5. In case of ordering, the vendor shall have the responsibility for the following and same to be confirmed point wise.
 - i) Vendor should have the component replacement responsibility in case of defect / failure.
 - ii) Experts from vendor's side shall associate in commissioning activities at site, if required.
 - iii) Vendor should ensure the product performance during erection & commissioning.
6. Backup document checklist to meet PQR to the fullest satisfaction of BHEL:

S. No	Document description	Check list
1	Documents to meet Clause (1)	<input type="checkbox"/>
2	Product Catalogues to meet Clause (2)	<input type="checkbox"/>
3	Supply reference document (PO /Inspection Reports) to meet Clause (3)	<input type="checkbox"/>
4	Documents to establish the track record as per Clause (4)	<input type="checkbox"/>
5	Confirmation to clause (5)	<input type="checkbox"/>

Memorandum of Understanding

**M/s BHEL
Trichy – 620 014**

and

(Vendor Code :)

For supplying

SADC

Page 1 of 10

MOU NO : MOU / TPBHEL / SADC REV.01

Memorandum of Understanding (MOU) for supplying SADC.

1.0 GENERAL:

1.1.1 This MOU is signed for supplying of **SADC** as per the agreed standardized specification so that these details need not be discussed again and again for future supplies.

1.2 The various aspects covered in this MOU are as follows.

1.2.1 The general points are covered in Section – 1.0 – General.

1.2.2 The specification requirements are covered in Section – 2.0 – Specifications.

1.2.3 The documents to be submitted along with the offer / after placement of Order / Along with the equipment are covered in Section 2.0.

1.2.4 The Inspection / Testing and Packing requirements are covered in Section – 2.0 Testing, Inspection and Packing.

1.2.5 The project specific details / data and if any customer specific requirements shall be covered in Section 3.0 – Project related Information. **DEVIATION ON**

PROJECT RELATED INFORMATION WILL LEAD TO REJECTION OF OFFER.

1.2.6 **If any differences are found between the details given in data sheets and other sections, Data sheet shall be considered as final and the vendors shall meet this requirement for that particular project.**

1.3 Sections 1.0, 2.0 are standard and Section 3.0 alone will be furnished along with enquiry to the vendors for their acceptance.

1.4 It is agreed that no deviations will be taken by the vendors while submitting their offers against future enquiries.

1.5 Since the specifications are standardized and an understanding has been reached, the future enquiries will be floated on “SINGLE BID SYSTEM” only. Hence, if any offer is found with deviations, the same will be totally rejected and will not be considered for further evaluation.

1.6 The validity of this MOU is for TWO years from the date of signing. After the expiry of the period, the same can be extended further with or without any modifications. However, in case any changes are required, the MOU may be amended before the expiry of the validity.

1.7 Pre commissioning spares (if applicable) with price break up as per the list shall be supplied along with the equipment.

1.8 Two years recommended Spares list (vide Section 3.0) with price break up shall be enclosed (if applicable).

1.9 If any special or non-standard tools are required for installation, operation or maintenance, the same shall be supplied along with the equipment.

1.10 Trouble-free operation of the equipment shall be guaranteed for a period of 12 months from the date of commissioning OR 18 months from the date of dispatch whichever is earlier.

1.11 Dispatch clearance will be issued along with PGMA with DU Nos. for the ordered items to vendor after the receipt of acceptable Inspection Report . Vendor agreed to mark the PGMA with DU Nos. in the casing of the packing and in the Packing Slip.

1.12 Since the vendors' works alone is approved by BHEL, it is agreed the vendor will manufacture this item in their own works only and will not off-load the jobs to any other suppliers without the written approval by BHEL.

1.13 All components should be packed in such a way that it should not get damaged during transport.

1.14 BHEL and the Vendor shall have an involvement which will commence at bid stage and follow through the completion and acceptance, thus ensuring total conformity to Purchaser's requirements.

2.0 SPECIFICATIONS

2.1 Scope

This specification covers design, manufacture, inspection, testing and supply of Secondary Air Damper control.

2.2 Codes & Standards:

The equipment shall be designed to meet the latest revisions of the relevant standards and other governing standards as applicable and also meet with the local standards where the equipment is installed.

2.3 Design & Constructional Requirements:

2.3.1 Application:

For driving secondary air dampers in corner fired boiler.

2.3.2 Ambient conditions:

- a. Atmospheric conditions: Dusty, corrosive & highly polluted
- b. Ambient temp. 100 deg C max.
- c. Relative humidity 90% max.

2.3.3 Construction Details

Back plate inclined at 15 degrees to the vertical Plane.

2.3.4 General Requirements:

- a. Supply air pressure : Min 4.5 & Max. 7.0 kg /sq.cm. (g)
(for cylinder & positioner)
- b. Control signal air pressure : 0.2 to 1.0 kg /sq.cm. (g) (3 to 15 psig)
or 4-20 mA as applicable
- c. Positioner : Reverse acting. (shall be field reversible)
with 4 gauges (one signal, one supply & two output)
- d. Positioner type : Pneumatic/Electro-pneumatic
- e. Rate of piston movement : 9mm/sec plus/minus 1mm/sec
(shall be field adjustable)
- f. Control characteristics :Linear. Provide Extra cams for square and
square root characteristics to be supplied.
 - i. Accuracy + / - 1.0 % of full scale
 - ii. Dead band + / - 0.1 % of full scale
 - iii. Hysteresis + / -0.5 % of full scale
 - iv. Repeatability + / - 0.3 % of full scale:
 - v. Sensitivity + / - Better than 0.5 % of
full scale
- g. Air connections : 1/4" NPT(F) for supply & signal air
respectively.
- h. Pneumatic piping : Stainless steel tubes

- i. Air consumption : Vendor to specify.
- j. Airsets : Air filter regulator set with max set pressure of 7 Kg/sq.cm shall be offered. Air set shall have one output pressure gauge.
- k. Airlock valves : Provide self reset airlock relays for stay put
When air failure
- l. Materials of construction : Vendor shall specify specific grades of material offered by them.
 - i. Cylinder Barrel-Seamless steel Pipe.
 - ii. Barrel Inside coating-hard chrome plating
 - iii. Piston- carbon steel
 - iv. Piston Rod- Stainless steel/chrome moly steel
 - v. with hard chrome plating
 - vi. Piston rod bearing- leaded tin bronze
 - vii. Piston Seals- viton
 - viii. Wiper Seals- viton
 - ix. Gaiter- vendor to specify
- m. Piston Rod End Size :Male Threaded with Lock Nut
- n. Painting :Anti - corrosive epoxy resin.
- o. All equipment & accessories shall be weatherproof, water / oil tight to NEMA 4 & 13, suitable for outdoor installation & 100 deg C ambient.
- p. Marking on pressure gauges shall be in kgs /sq.cm(g).
- q. The power cylinders and accessories shall be piped up together.
- r. Following details shall be furnished by the suppliers along with offer:
 - i. Spares recommended for commissioning.
 - ii. Spares recommended for two years trouble free operation.
 - iii. Unit weight of cylinder with accessories.
 - iv. Dimensional layout drawing.
 - v. Catalogues for all equipment.
- s. Following documents shall be furnished by the vendor along with the supplies.
 - i. Material test certificates.
 - ii. Operational test certificates.
- t. The air cylinder shall be marked permanently with paint, Project Name and BHEL material code (indent No:)
- u. The air cylinders shall be packed in separate wooden boxes with seaworthy packing for export jobs & land-worthy packing for inland jobs.

- v. O&M Manuals: 5 sets of manuals required with following details are to be supplied:
 - i. Catalogues of main equipment and all accessories with reference no. indicated. Internal parts shall be clearly identified and marked.
 - ii. Recommended spares for commissioning.
 - iii. Recommended spares for two years trouble free service.
 - iv. Dimensional layout drawing. (All accessories shall be shown, including piping diagram. Disposition and dimensions shall be in line with BHEL drg. as applicable for the cylinder size)
 - v. Trouble shooting guide
 - vi. Full description on construction and operation

2.3.5 Variants of SADC

Vendor shall submit for data sheets and dimensional drawings for each of the following variants. Vendor shall confirm against each size of SADC that can be offered meeting the requirements of all above clauses of the specification.

Sl.no	SADC size Bore X Stroke	BHEL Drawing no.	Rev
1	4"X4"	4-45-000-00655	03
2	4"X4"	4-45-000-01405	01
3	2.5"X5"	4-45-000-01806	00
4	2.5"X5"(without ALV)	4-45-000-01881	00

BHEL will specify the SADC size and positioner type in the enquiry. Vendor shall select the corresponding power cylinder and accessories.

All relevant documents will be approved while signing this MOU. The approval will have validity same as that of this MOU.

2.3.6 Material of Construction and Accessories

	MOC	Vendor to furnish considering all sizes
1	Cylinder Barrel-Seamless steel Pipe	
2	Barrel Inside coating-hard chrome plating	
3	Piston- carbon steel	
4	Piston Rod- Stainless steel/chrome moly steel with hard chrome plating	
5	Piston rod bearing- leaded tin bronze	
6	Piston Seals- viton	
7	Wiper Seals- viton	
8	Gaiter	
	ACCESSORIES	Make & Model
9	Air Set make	
10	Air Lock valve	
11	Pneumatic positioner make	
12	Electro-Pneumatic positioner make	

DATA SHEET

Project Name : NTPC UNCHAHAR 1X500 MW
Customer No. : R5/4267
Enquiry No. / P.O.No. :
Material code : L426714520001001 AND L426714520001002

SNo	Description	BHEL Specification	Vendor confirmation
01	Application	Driving Secondary air damper	
02	Construction	Trunnion mounted (But without swivel base and pin) Suitable for outdoor mounting. Back plate inclined at 15 deg to the vertical plane. heavy duty without cushioned ends with gaiter	
03	Operating medium	Compressed air at 3.5 -7 Kg/sq.cm(g)	
04	Duty cycle	Continuous (modulating)	
05	Angle of movement of driven lever	75 degrees	
06	Cylinder bore & stroke	4" X 4"	
07	Ambient	100 deg. C	
08	Relative humidity	90% max	
09	Atmospheric conditions	Dusty, corrosive & polluted	
10	Supply air pressure	4.5 min 7 max kg/sq.cm(g)	
11	Control signal	0.2 to 1 kg/sq.cm(g)	
12	Positioner	Direct acting (Must be possible to change to reverse loading)	
12.1	Positioner Type	Pneumatic or Electro-Pneumatic	
13	Rate of movement	9 mm/sec +/- 1mm/sec Field adjustable	
14	Control characteristics	Linear	
		Extra cam for square	
		Extra cam for square root	
		Accuracy ± 1% of FS	
		Dead band ± 0.1% of FS	
		Hysteresis ±0.5% of FS	
		Repeatability±0.3% of FS	
		Sensitivity ±0.5% of FS	
15	Air connections	Suitable for ¼" OD tubing	
16	Pneumatic piping	Vendor to confirm spec	
17	Air consumption	Vendor to specify	
18	Air set	Set pressure	
		Output gauge	
19	Air lock valves	Self reset airlock relay	

20	Materials of construction	Vendor to specify grade for all materials	
	Cylinder barrel	Seamless c.s. pipe	
	Barrel inside coating	Hard chrome/polished	
	Piston	Carbon steel	
	Piston Rod	SS/Cr-Mo steel w/t HC plating	
	Piston rod bearing	Leaded Tin Bronze	
	Piston seals	Viton	
	Wiper seals	Viton	
	Gaiter	Vendor to specify	
21	Piston rod end size		
21.1	Trunnion & Hole Dim.		
22	Painting	Epoxy	
23	Disposition drawing		
24	Enclosure	NEMA4&13	
25	Pressure Gauge marking	Kg/sqcm(g)	
26	All accessories piped up	Vendor to confirm	
27	Details submitted for	Commissioning spares	
		2 Years Spares	
		Unit weight (kgs)	
		Dimensional drawing	
		Catalogues	
28	Inspection documents with supplies	Material test certificates Operational test cert.	
29	Marking	Vendor to confirm	
30	Packing	Sea worthy / Land worthy	
31	O&M Manuals	To be furnished for power cylinder & accessories	

ENDORSEMENT SHEET FOR DRAWINGS / DOCUMENTS

PROJECT NAME	NTPC DARLIPALLI 2 X 800 MW
CONTRACT NO	CS-9549-102-01
PACKAGE NAME	SG PACKAGE
MAIN SUPPLIER	BHARAT HEAVY ELECTRICALS LTD / TIRUCHY
MANUFACTURER NAME	BHARAT HEAVY ELECTRICALS LTD / TIRUCHY
PROJECT / PACKAGE SPECIFIC DOCUMENT NUMBER	BHEL DRAWING NO : Nil
DRAWING TITLE	NTPC DRAWING NO: 9549-102-QVI-Q-021, Rev 01 ENDORSEMENT SHEET FOR QP FOR PNEUMATIC ACTUATOR - POWER CYLINDER
REFERENCE PROJECT NAME	NTPC GADARWARA 2 X 800 MW
REFERENCE CONTRACT NO	CS-9572-102
REFERENCE PACKAGE NAME	SG PACKAGE
REFERENCE MAIN SUPPLIER	BHARAT HEAVY ELECTRICALS LTD / TIRUCHY
REFERENCE MANUFACTURER NAME	BHARAT HEAVY ELECTRICALS LTD / TIRUCHY
REFERENCE PROJECT / PACKAGE SPECIFIC DOCUMENT NUMBER	BHEL DRAWING NO : Nil
REFERENCE DRAWING TITLE	NTPC DRAWING NO: 9572-102-TRY-Q-VI-Q-041, Rev 00 POWER CYLINDER

- i) CERTIFIED THAT ITEM/COMPONENT IS IDENTICAL TO THAT CONSIDERED FOR REFERENCE DOCUMENT APPROVAL
- ii) THAT THERE ARE MINOR CHANGES IN THE ITEM/COMPONENT WITH RESPECT TO CONSIDERED FOR REFERENCE DOCUMENT APPROVAL AND AFFECT THE REFERENCE DOCUMENT SLIGHTLY AS INDICATED BELOW.



Signature Not Verified
 Digitally signed by U K SAHAI
 Date: 2015.06.02 11:43:29 IST
 Reason: CAT I
 Location: NTPC (APPROVED) (NTPC SEAL)

SIGN (MAIN SUPPLIER)  DATE:13/05/2015 NTPC (APPROVED) (NTPC SEAL)

BHEL-TIRUCHY UNIT
 CUSTODIAN NAME
 RM. VAIRAVAN
 Sr. Manager
 Controls & Instrumentation / FB
 BHEL, Trichy - 620 014.





Note: Quality Plan approved by NTPC for Gadawara Project is attached.

MANUFACTURING QUALITY PLAN


		Manufacturer's Name & Address (As per LOA approved vendor List- Refer Note 7)		ITEM: PNEUMATIC ACTUATORS (OPEN/CLOSE & REGULATING TYPE)		QP No.		CI:QA:1804:CQP:04		NTPC GADARWARA 2 X 800 MW					
						Rev No.		Package No.		SG					
Component & Operations		Characteristics		Class		Type of check		Quantum of check		Date:		Contract No.		Remarks	
										Page No.		Main supplier			
A Raw Materials & Bought out items Inspection															
1	Cylinder, Piston Rod	a. Material	Major	CHEM	OSPL			Spec, BS 970	LGB						
		b. Dimensions	Major	MEAS	100%			Spec, BS 970	LGB						
		c. Finish, plating thickness	Major	MEAS	100%			Spec, BS 970	LGB						
		d. Case hardening	Major	VISU	100%			Spec, BS 970	LGB						
2	Cylinder caps, piston rings	a. Material	Major	CHEM	OSPL			Spec, Mfr Drg.	LGB						
		b. Dimensions	Major	MEAS	OSPL			Spec, Mfr Drg.	LGB						
3	"O" ring	a. Material	Major	CHEM	OSPL			Spec, Mfr Drg.	LGB						
		b. Dimension	Major	MEAS	OSPL			Spec, Mfr Drg.	LGB						
		c. Hardness	Major	MEAS	OSPL			Spec, Mfr Drg.	LGB						
4	Housing & cover	a. Material	Major	CHEM	OSPL			Spec, Mfr Drg.	LGB						
		b. Dimension	Major	MEAS	OSPL			Spec, Mfr Drg.	LGB						
5	Air filter regulator	a. Type and Make	Minor	PHYS	OSPL			Spec, Mfr Drg.	LGB						
		b. Pressure gauge range	Minor	PHYS	OSPL			Spec, Mfr Drg.	LGB						
		c. Dimension of process connection	Major	MEAS	OSPL			Spec, Mfr Drg.	LGB						
6	Limit switches	a. Make & type number	Major	PHYS	100%			Spec, Mfr Drg.	LGB						
		b. Functional check	Major	ELEC	100%			Spec, Mfr Drg.	LGB						
7	Air Lock relay	a. Make & type number	Major	PHYS	100%			Spec, Mfr Drg.	LGB						
8	Solenoid valve (for open / close type only)	a. Make & type number	Major	PHYS	100%			Spec, Mfr Drg.	LGB						
		b. Functional check	Major	ELEC	100%			Spec, Mfr Drg.	LGB						
										Signature: 					
										Location: NTPC GADARWARA Date: 25/04/19					
										For NTPC use					
										Reviewed by:					
										Approved by:					

Format No.: QS-01-QAI-P-09/F1-R1

MANUFACTURING QUALITY PLAN

		Manufacturer's Name & Address (As per LOA approved vendor List- Refer Note 7)		ITEM: PNEUMATIC ACTUATORS (OPEN/CLOSE & REGULATING TYPE)		QP No. Rev No. Date: Page No.		CI:QA:1804:CQP:04 Package No. Contract No. Main supplier		NTPC GADARWARA 2 X 800 MW SG CS-9572-102-01 BHEL Tiruchy		
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Ref Doc	Acceptance Norms	Format of record	Agency			Remarks
									D	M	C	
B	In Process Inspection	c. Class of insulation										
1	Complete Assembly	a. Functional Check	Critical	ELEC	100%	Spec. Drgs.	Spec. Drgs.	LGB	P	-	-	
		b. Leak test (at min. supply air pressure)	Critical	PHYS	100%	JIS B 8377	JIS B8377 spec Data sheet	LGB	P	-	-	
C	Finished Product Inspection											
1	Routine Tests	a. No load operation test	Major	PHYS	100%	JIS B8377 spec BHEL appd Data sheet	JIS B8377 spec BHEL appd Data sheet	Int R/TC		P	W	Manufacturer's Test certificate shall be reviewed. NTPC to witness on 10% sample selected at random.
		b. Physical verification of mounting & surface finish	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	BHEL to witness 20% sample or minimum 2 Nos. per model.
		c. Dimensional check	Major	MEAS	100%	--DO--	--DO--	Int R/TC		P	W	Verification of supplier routine test certificates for 100% quantity.
		d. Verification of type, make & insulation level	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	
		e. Stroking length & time	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	
		f. Pressure resistance test	Critical	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	
		g. Response time test	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	
		h. Provision of accessories like linkage mechanism,	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	
		i. Performance test (linearity, hysteresis,	Critical	MECH	100%	--DO--	--DO--	Int R/TC		P	W	
				LEGEND: * RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION ** M: MANUFACTURER / SUB SUPPLIER; C-MAIN SUPPLIER; N: NTPC; P - PERFORM; W - WITNESS; V-VERIFICATION AS APPROPRIATE; 'CHP' - NTPC SHALL INDICATE IN COLUMN 'N' AS W				NTPC Doc. No.: 9572-102-TRY-QVI-Q-041, Rev 00				
Sub supplier 		Main supplier 								Reviewed by:		Approved by:

MANUFACTURING QUALITY PLAN

	Manufacturer's Name & Address (As per LOA approved vendor List- Refer Note 7)	ITEM: PNEUMATIC ACTUATORS (OPEN/CLOSE & REGULATING TYPE)	QP No.	CI:QA:1804:CQP:04	NTPC GADARWARA 2 X 800 MW	
	Sub system:	Rev No.	Package No.	Date:	Contract No.	SG
j. Stayput & manual operation	Critical MECH 100% 20%	Page No.	JIS B8377 spec Data sheet	Main supplier	CS-9572-102-01 BHEL Tiruchy	
Type test	Type test requirement shall be as per agreement with NTPC Engg - CHP					
D Notes:	Type test requirement shall be as per agreement with NTPC Engg - CHP					
1. LEGENDS:	PHYS : Physical VISU : Visual OSPL : One sample per Lot CHEM : Chemical LGB : Log Book	MEAS : Measurement ELEC : Electrical Int. R : Internal Report MECH : Mechanical TC : Test Certificate				
2. Vendor shall arrange all the testing facilities at their works. Tests for which facilities are not available at vendor works, are to be carried out at National test houses like ETDC, CIL, NPL, ERTL, etc. at vendor costs.						
3. Through Log Book / any other documents / systems available at their vendor works, it shall be possible to co-relate the finished products with the Raw materials and in-process stage checks / inspection carried out.						
4. All measuring and testing instruments shall be periodically calibrated from recognized test houses and certificate made available during inspection for verification.						
5. Packing shall be as per BHEL standard packing procedure.						
6. BHEL specification and BHEL approved Data sheet shall be used for inspection.						
7. As per LOA agreed vendors are 1) Dong Woo Valve controls Co. Ltd, Korea 2) Shin Hwa Engg Co Ltd, Korea 3) Keltron, Cochin 4) IL, Palghat 5) SMC, Noida (Power cylinders for SADC and BTC application. (Bore size - 4" x stroke 4" for SADC and Bore size 12" x stroke 16" for BTC) M/s Rotex, Mumbai.						
E Reference Standards	List of Application					
JIS B 8377	1. Hot air damper (Elev A to J)					
BS 970	2. Cold air damper (elev A to J)					
F Make of Accessories	3. Primary APH flue gas outlet damper (A & B)					
1 Limit switches	4. Secondary APH flue gas outlet damper (A & B)					
2 Solenoid valve						
3 Air Lock relay						
4 Positioner						
Sub supplier	Main supplier	For NTPC use	NTPC Doc. No.: 9572-102-TRY-QVI-Q-041, Rev 00	Reviewed by:	Approved by:	
Format No.: QS-01-QAI-P-09/F1-R1						

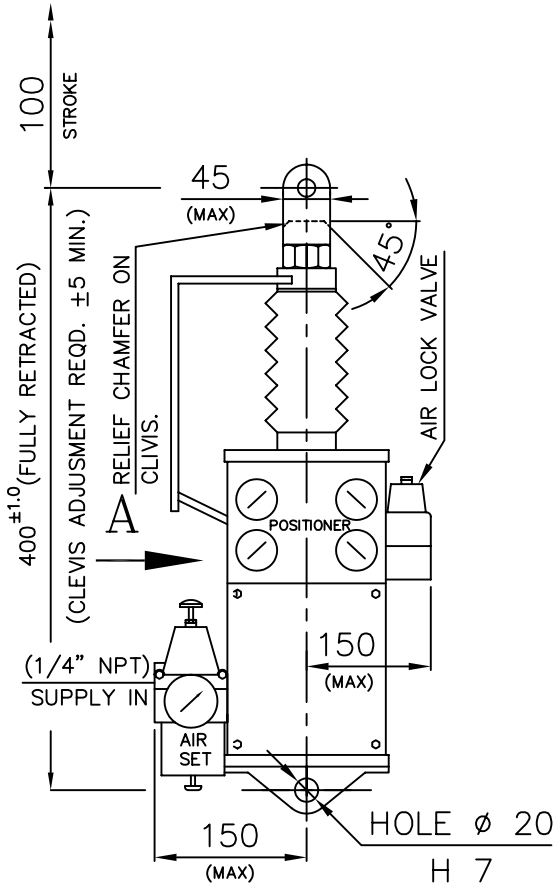
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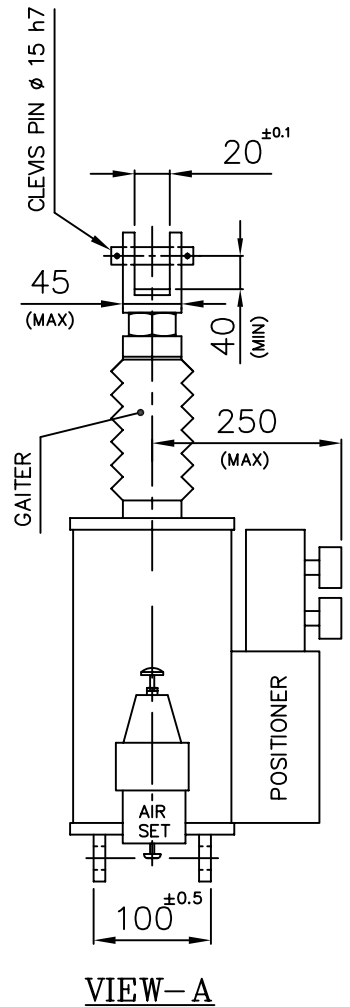
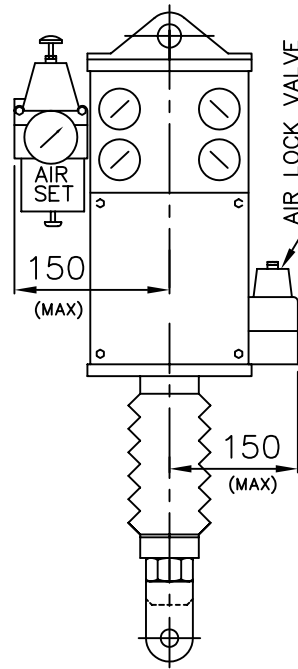
FOR TOLERANCES OF UNTOLERANCED
DIMENSIONS DURING MANUFACTURE
REFER PLANT STD. NO TP 023 0299

MOUNTING DIMENSIONS AND ACCESSORIES

**ARRANGEMENT - A
(UPWARD MOUNTING)**



**ARRANGEMENT - B
(DOWNWARD MOUNTING)**



VIEW - A

NOTES : -

1. ALL ACCESSORIES SUCH AS DOUBLE ACTING POSITIONER, AIR LOCK VALVE ETC. SHALL BE MOUNTED AND PIPED-UP.
2. AIR LOCK VALVE SHALL BE OF SINGLE PIECE DESIGN.
3. TWO NUMBERS OF PNEUMATIC TERMINALS SHALL BE OF 1/4 INCH NPTF. (ONE FOR SIGNAL AIR AND ANOTHER FOR SUPPLY AIR)
4. LIST OF ACCESSORIES TO BE AS PER SPECIFICATION.
5. FOR QTY. OF ARRANGEMENT-A AND ARRANGEMENT-B, REFER CONTRACT PURCHASE ORDER.

REV 01	DATE	ALTD	REV 02	DATE	ALTD	REV 03	DATE	ALTERED :CSS
		CHD & APPD :H.M.F.B.		29.3.04	CHD & APPD :H.M.F.B.		010709	CHD & APPD :MTP
DRAWING UPDATED & REDRAWN.			DIMN 150 ADDED			DRAWING UPDATED AND NOTE-5 ADDED		
NAME	DRN. C.S.S	CHD KMP	APPD. KC	TITLE				REV
SIGN DATE	-Sd-	-Sd-	-Sd-	4"X4" SADC CYLINDER				03
							4-45-000-00655	

