



Bharat Heavy Electricals Ltd
Boiler Auxiliaries Plant
Ranipet-632 406

EDC/GATES & DAMPERS
TECHNICAL SPECIFICATION

SPECIFICATION NO: GDRS:023

REV NO:02

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1	Item	Clevis mounting Air cylinder	Vendor / Acceptance / Comments
2	Scope of supply	Air cylinder with Clevis & pins on both side, turnbuckle, leather bellow and lock nut (any other accessories refer purchase enquiry)	
3	Application	Cylinders are used for open /close of Gate and Dampers.	
4	Type	Heavy duty, Double acting; 100% Fail safe	
5	Operating Medium	Instrument air (Compressed Air) 3 to 7 kg/cm ² filtered & lubricated.	
6	Working Environment	Dusty, corrosive & highly polluted.Temperature may go up to 110° C.	
7	Bore & Stroke	Refer purchase enquiry.	
8	Clevis dimension and material	Optimum size of clevis with pin to be designed by vendor. Dimensional details & clevis thread size to be furnished by the vendor. Clevis material IS 2062, or steel casting of IS 1030: Gr.230-450W (Cast iron not recommended). Dimensional tolerance should be H9f8. Chain connecting the Clevis pin & Cylinder body to be provided.	
9	Clevis pin to pin center distance and material	1)Refer Purchase enquiry (if nothing specified then it is vendor choice) 2)Clevis Pin material – EN8 or better material (vendor to specify)	
10	Turnbuckle with lock nut	Adjustable Turnbuckle with minimum 50 mm lead movement. Lock nuts (4nos) to be provided for freezing the turnbuckle adjustment. While adjusting the turnbuckle, clevis should move forward/backward without rotating. LH & RH threads should be provided (Refer Fig.1) Turnbuckle Material – EN8 or better material (vendor to specify)	
11	Ports	1" NPT with counter boring of 2mm depth with metallic dummy cap(refer figure)	
12	Cylinder Head	Made up of IS 2062 or steel casting as per IS 1030: Gr.230-450W (cast iron not recommended)	
13	Cylinder barrel	1)Seamless steel tube, hard chrome plated (Thickness to be specified in GA drawing) & mirror finished. Material - ASME SA 106 GR B or better material 2)Chrome plating thickness: 20-30 microns minimum	
14	Piston	1)Made up of one piece, fine grain alloy cast iron . Vendor to specify material specification for BHEL approval. 2)Piston Wear Strip made of PTFE is to be provided for Bore dia 300mm and above.	

02	30-01-17	Sl.no.10 Material added	M. Suresh	V. Kesavan
01	22-12-16	Sl.nos. 13,14,26 revised	M. Suresh	V. Kesavan
00	07-08-15	Fresh Release	Sd M suresh	Sd V.KESAVAN
REV	DATE	DESCRPTION	PREPARED	APPROVED

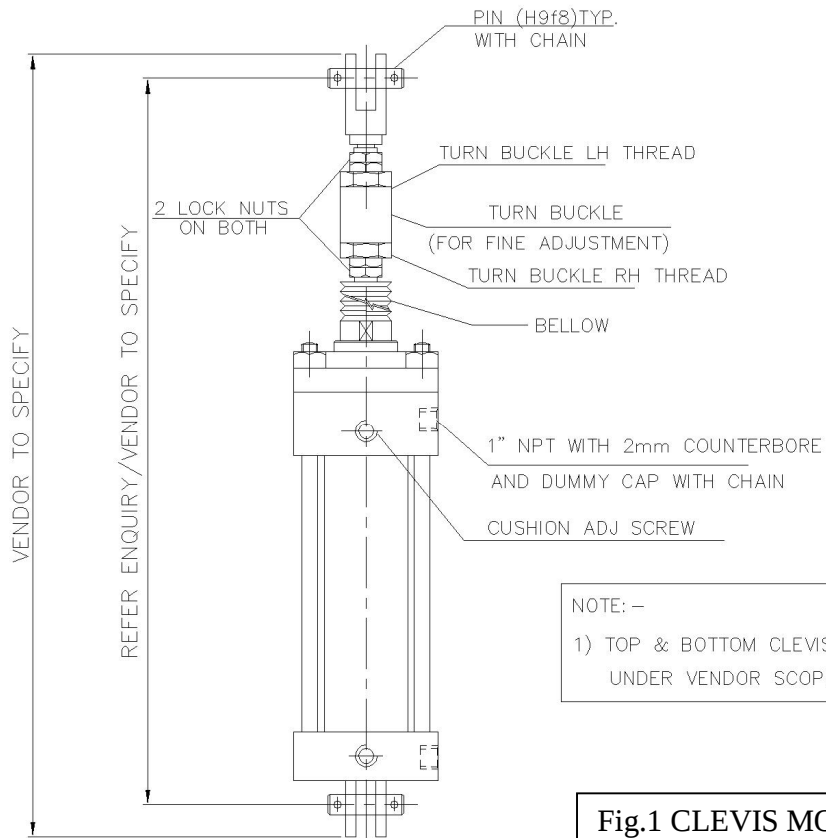
SL. NO	Particulars	Description	Vendor / Acceptance /Comments
15	Piston rod design and material	Material- BS 970 EN8 or better material. Rod diameter to be specified by the vendor depending on their design. High tensile material with case hardened & chrome plated with thread at the end. 4 or 6 wrench flat on piston rod to be provided for assembling and dismantling. The piston and rod shall be fixed by a reliable method.	
17	Rod cartridge	Suitably designed to provide support to endure the lateral load of 1/20 of the maximum cylinder force generated by the nominal pressure and guide the piston rod. (Material – IS2062 or IS210 FG220 with Bronze Bush or better material)	
18	Piston rod protection	Leather bellows and dust wiper to be provided.	
19	Seals	VITON (Piston packing, Rod Packing, wipers & cushioning etc.)	
20	Variable end Cushioning	Both Rod and head side with Adjusting mechanism. Cushion stroke length shall be 25mm for bore dia ≤ 275mm and 30mm for cylinder dia > 300mm	
21	Tie rod	Suitable number of tie rods to be provided.	
22	Cylinder interior parts	In the case where it is liable to rust, the rust preventive surface treatment shall be processed.	
23	Inspection	100 percent inspection by BHEL or BHEL approved agency.	
24(a)	Minimum working pressure test	During testing, the piston shall operate smoothly at the given Minimum working pressure. The test shall be carried out Several (Minimum 5) times of operation as per condition given below. a) cylinder orientation : Vertical (Piston rod extension in the downward direction & retraction in the upward direction) b) Load: No load c) Test pressure: 0.61 kgf/cm ² for bore diameter 125-250 mm and 0.51 kgf/cm ² for bore diameter 300 - 350 mm. d) Cushion opening: Full-open e) Operating method of cylinder to be tested: Change over the pneumatic valve of test equipment, and allow the piston to operate in the direction of the rod side and cylinder head side alternately. f) Jerk Test: During testing, piston/piston rod has to move smoothly without any jerky motion both in the upward & downward direction	

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24(b)	Pressure resistance test	During testing, the respective parts of the cylinder should not undergo any abnormalities such as loosening and permanent deformations. Installing direction of cylinder to be tested: It is not designated particularly, but every possible attention shall be paid to secure safety. a) Test pressure : 0.7 MPa (7.13 kgf / cm²) b) Holding time of pressurizing: 2 Minute or over c) Pressurizing method : After releasing the back pressure side to the open air, pressurize the rod side and the head side respectively.	
24(c)	Variable Cushion Functioning test	Test shall be carried out on both sides of the cylinder, by adjusting the needle valve mechanism. Change of retardation shall be observed and recorded at any convenient test pressure	
24(d)	Piston rod _ Oscillation test	Mount the cylinder vertically downward direction, allow the piston rod to extend fully. Hold the end of piston rod, shake it with hand in the horizontal direction. Note down the oscillation value on either side. It will be 2mm for stroke less than 2000 mm and 3 mm for stroke greater than 2000 mm.	
25	Name plate	Two name plates are to be fastened at the front end cover (ie one near the cushion adjustment face & other near the port face). It has to contain the following details. 1) Manufactures name 2) Maximum working pressure (kg/cm²) 3) Bore diameter (mm) 4) Stroke length (mm) 5) BHEL material code (Indent No / P.O.Ref.) 6) Year and month of manufacture and serial number. 7) Cylinder weight in kgs	
26	Painting	Surface preparation– Blast cleaning of SA 2 1/2 to a surface profile of 35 to 50 micron. Epoxy primer-as per IS 13238 with film thickness of 30 micron. Epoxy finish paint as per is 14209 with film thickness of 30 micron. Shade 692 of IS 5. Total DFT=60 micron. Note: suitable care to be taken to protect the machined surface during blast cleaning.	
27	Packing	a) Port-metallic plug type cap with chain welded to cylinder head to be provided. (Fig. 2) b) Threaded portion of piston rod - Protected from rust and transit damage. c) Cylinder assembly - Wrapped in polythene paper and packed in wooden crate.	

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28	Documents during Enquiry	The following details shall be furnished by the supplier during offer itself; without this the offer will not be considered. a) Point wise acceptance /comment for specification GDRS: 023 / (Refer latest rev) to be submitted along with offer. b) General Arrangement drawing with sectional view & material specification. c) Spares recommended for commissioning d) Spares recommended for two years trouble free operation. e) Seal Kit model no & make. f) Catalogue, if any	
29	Drawing for approval	Approval to be obtained for detailed drawing with BOM & Spare kit BOM before manufacturing.	
30	Documents during Supply	The following documents shall be submitted by the supplier along with supply of Air cylinder a) Material test certificate. b) Operational test certificate. c) Operation and Maintenance manual-indicating assembly, dismantling, operation, maintenance, instruction and spare kit make & model details.	
31	Notes	All sharp corners & edges are to be rounded of (Approximately R2)	

SL. NO	BORE SIZE (mm) #	TH (mm) #	PS (NPT) (INCH) #	RD (mm) #
01	125	M20X1.0	1.00	25
02	150	M27X1.5	1.00	35
03	175	M27X1.5	1.00	35
04	200	M27X1.5	1.00	40
05	250	M39X2.0	1.00	45
06	300	M45X2.0	1.00	50
07	350	M56X3.0	1.00	65



**Fig.1 CLEVIS MOUNTED
AIR CYLINDER**



**Fig.2 1" NPT Dummy cap
with chain**