

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT , TIRUCHIRAPPALLI 620 014.

**TECHNICAL DELIVERY CONDITIONS
FOR SUB - DELIVERY COMPONENTS OF
CONTROLS AND INSTRUMENTATION/FB**

TCI :143, Rev. 09

PAGE 01 OF 12

POWER CYLINDERS - REGULATING TYPE

Revision History

REV. NO.	DATE	DESCRIPTION	PREPARED	REVIEWED		APPROVED
				Engineering	Quality	
01 - 08	----	General Revisions	-sd-	-sd-	-sd-	-sd-
09	21 -12-15	Revised to include typical GA drawing				

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
1.0	Site conditions :	
1.1	Ambient temperature	50° C
1.2	Relative humidity	100 %
1.3	Atmosphere	Dusty, Salty, Highly Polluted & Corrosive in nature.
1.4	Altitude above MSL	1000 metres
2.0	General :	
2.1	Application	Regulating Duty.
2.2	Actuator type	Pneumatic operated power cylinder, double acting, piston rod type.
2.3	Actuator assembly	Stand arrangement The power cylinder shall be mounted on the stand. Stand arrangement shall be made of steel structural material. It should have the base for mounting the cylinder and provision for fixing the foundation bolts. The entire arrangement should be able to withstand the load and torque requirements. All the components fixed on to the stand-structural material by using SS Bolt, Plain Washer, Spring washer and Nut arrangement. Vendor to choose the exact mechanical arrangements and dimensions accordingly. Output Shaft and Output Lever The piston rod shall be connected to the output shaft through a lever. The fixing arrangement of lever and output shaft shall be such that the lever should not slip on the shaft. The output lever for driving the load shall be connected to

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS	
		the output Shaft. This arrangement should be such that the output lever shall be capable of fixing at any position/orientation around the shaft (360°). A typical arrangement has been indicated in page 09.	
2.4	Air Supply	Power Air	Minimum : 3 kg/sq cm (g)
			Maximum : 7 kg/sq cm(g)
		Signal Air	Minimum : 0.2 to 1kg/sq cm(g)
2.5	Duty Cycle	Continuous	
2.6	Installation	Outdoor	
2.7	Angle of Travel	Refer Purchase Enquiry	
2.8	Piston operating speed	Refer Purchase Enquiry	
2.9	Action on Loss of Power Air Supply.	Stay put (Fail freeze)	
2.10	Action on Loss of Command Signal.	Stay put (Fail freeze)	
2.11	Position indicator	1 No. local mechanical position indicator is required.	
2.12	Provision for reversal of action	Actuator assembly to be configured in Direct acting. Provision to change to reverse action shall be provided	
3.0	Material :		
3.1	Piston rod	Hard chrome plated high strength steel. Leather bellows / Gaiters shall be provided to prevent piston rod from rusting.	
3.2	Piston	High Strength Steel.	
3.3	Cylinder barrel	Honed & hard chrome plated seamless Carbon steel.	

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
3.4	Piston & Cylinder seals	Viton.
3.5	General	Necessary surface treatment shall be provided for all the components (as applicable) to prevent rust and corrosion.
4.0	Accessories	
4.1	Limit Switch :	
4.1.1	Quantity	One for open and one for close
4.1.2	Number of contacts	In case of Conventional positioner, 2 NO + 2 NC
		In case of SMART positioner, 1 NO + 1 NC
4.1.3	Type	Snap action
4.1.4	Limit Switch Enclosure	Dust & Weather Proof, IP 65
4.1.5	Contact Rating	5A at 240 V AC / 0.2A at 220 V DC
4.1.6	Make	Shall be as per the manufacturer's standard
4.2	Positioner :	
4.2.1	Features	Input Signal Air: 0.2 to 1kg/sq cm (g). Positioner shall be suitable for working at an air pressure of 3 to 7 kg/sq.cm.(g) Shall be integrally mounted on the power cylinder and shall be suitable for both direct and reverse acting. Each Positioner shall be provided with three pressure gauges. One for Signal Air and one each on either side of the power air to the cylinder.
4.2.2	Cam characteristics	1 No. linear cam to be fixed on the positioner. 1 No. equal percentage, 1 No. square root and 1 No. blank cam to be supplied extra along with the Positioner in a separate pack. (Refer to Note-2)
4.2.3	Enclosure	Dust & Weather proof, IP 65

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
4.2.4	Applicability of SMART Positioner	Refer Purchase enquiry. Separate technical specification for SMART positioner will be attached, if applicable.
4.3	Air Lock Device :	
4.3.1	Type	Set point has to be adjustable. Self Reset.
4.4	Air filter cum regulator :	
4.4.1	Supply air pressure	7 Kg / sq.cm
4.4.2	Type	Diaphragm
4.4.3	Pressure rating	15 Kg / sq.cm
4.4.4	Material : (If there are project specific requirements then the same will be indicated in the purchase enquiry)	
	a. Body	Die-cast aluminium
	b. Inner valve and seating	Stainless steel
	c. Spring	Stainless steel
4.4.5	Output pressure	0 – 7 Kg / sq.cm
4.4.6	Filter size	Pneumatic positioner - 25 microns.
		SMART positioner – 5 microns
4.4.7	Make	Placka/Shavo Norgren
4.4.8	Pressure gauge :	
	a. Dial	50 mm Diameter
	b. Type	Bourdon

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
	c. Material	Phosphor bronze (Bourdon)
	d. Range	0 – 10 Kg / sq cm
	e. Accuracy	± 5%
	f. Make	Shall be as per manufacturer's standard
4.4.9	Air connection inlet	Air connection inlet shall be suitable for accepting ¼" OD PVC sheathed copper tubing
4.5	Position Transmitter :	
	a. Type	Electronic, Inductive – Non-Contact type, 2 wire
	b. Output	4-20 mA, linear DC output@ 600 ohms max.
	c. Power supply	24VDC, Loop Powered from the control system
	d. Enclosure	Die-cast aluminium, Dust & Weatherproof IP 65
	e. Accuracy	± 1% of span
	f. Make	Shall be as per manufacturer's standard
4.6	Hand wheel / Lever	To be provided along with power cylinder for manual operation.
4.7	I/P convertor	Refer purchase enquiry for applicability.

4.8	Junction Box	
4.8.1	Junction Box	All the electrical connections from the accessories, shall be wired suitably as per the wiring drawing to the junction box. Protection Class: IP-65. Terminal blocks shall be of Cage-Clamp type, suitable for 2.5 sq.mm. Cable.
4.8.2	Termination of external cable to the Junction box.	As per wiring drawing and Purchase Enquiry, 3 nos. of double compression type brass with nickel plated weather proof cable glands suitable for cable OD of 18 mm. or 3 nos. of 9 pin plug & socket connector with socket mounted on terminal box and plug may be supplied as loose to suit cable of OD 18 mm.
5.0	Linkage rods	The Linkage rods shall be supplied as per the drawings referred in the purchase enquiry. The application names & tag nos. have to be painted on the linkage rods for easy identification.
6.0	Characteristics Power cylinder with Positioner	
6.1	Sensitivity	± 0.5 % of input span under no load.
6.2	Repeatability	± 1 % of output span under no load.
6.3	Accuracy	± 3 % of output span under no load
6.4	Hysteresis	± 1 % of output span under no load.
7.0	Inspection & testing	As per quality plan CI:QAC:STD:QP:42 (latest revision) or project specific quality plan. The applicable quality plan will be indicated in the purchase enquiry.

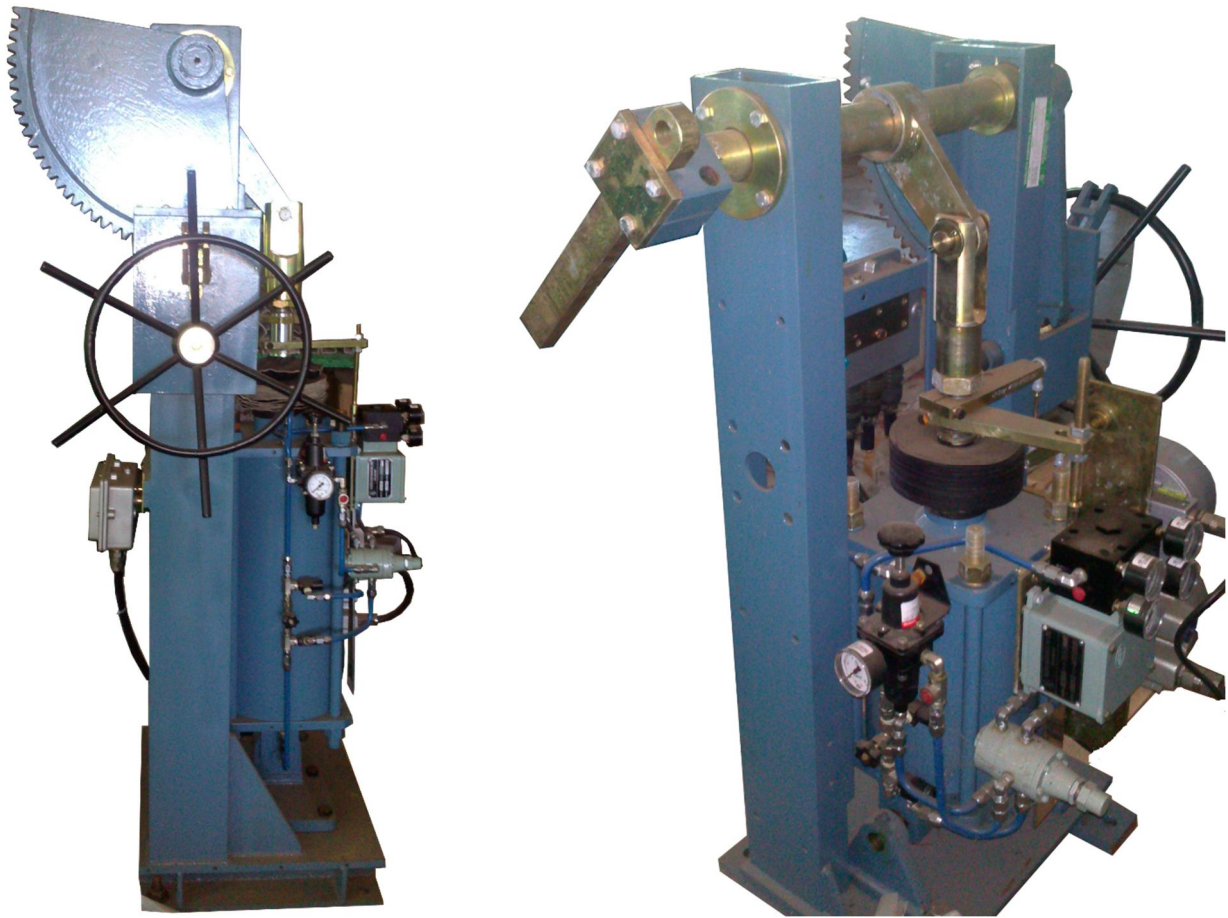
8.0	Painting/Finish for both Power Cylinder & Linkage rods	
	a. Paint Shade	Shall be as per manufacturer's standard
	b. Finish	Corrosion resistant, Epoxy based resin.
9.0	Documents	
9.1	Documents to be submitted along with the offer.	1. The Sub-Delivery Enquiry Deviation format shall be filled in with the details of BHEL's enquiry, project, technical specification of the power cylinder, technical specification of the SMART Positioner (as applicable), Project Specific Annexure (as applicable) & technical specification of the I to P Converter (as applicable), terminal block wiring drawing, Quality plan & Packing procedure. Vendor to conform to the requirements of all the above documents/drawings and indicate "No Deviation". 2. Any deviation taken by the vendor shall only be indicated in the Sub-Delivery Enquiry Deviation form. Deviations indicated elsewhere in the offer shall not be considered. 3. Offer for : a) Commissioning spares b) Maintenance spares for two years operation

9.2	Documents to be submitted by the vendor after placement of Purchase order.	1. Duly filled in power cylinder datasheet furnished by BHEL for evaluation. 2. General Arrangement drawing of Power Cylinder assembled with accessories indicating the dimensional details, mounting arrangement & foundation details. Vendor has to submit a neat & legible, soft copy of the Auto Cad drawing in pdf version. 3. Tubing drawing indicating all the accessories. 4. Wiring drawing with terminal blocks numbers.
9.3	Operation & Maintenance Manuals	1. 1 set of soft copy (loaded on a DVD) & 1 set of Hard Copy of the O&M manual comprising of the following documents shall be submitted to BHEL Trichy. • Operation & Maintenance instruction set. • Power Cylinder datasheets. • Dimensional/GA drawing of the assembled power cylinder. • Tubing drawing. • Wiring Drawing. • Erection/Calibration procedure. • Catalogues of the power cylinder & its accessories. 2. 1 No. of O&M manual and erection/calibration procedure shall be placed in each power cylinder package for usage at Site during erection & commissioning activity.

10.0	Packing	Shall be as per manufacturer's standard practice. The packing shall be suitable for safe transport, safe delivery at site and shall be suitable to avoid damages due to water entry and shall withstand the environmental conditions during storage at site.
11.0	Pre Qualification Requirements (For open tender case only)	Vendor should have supplied and commissioned Stand-mount type, regulating power cylinder 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. Vendor can offer and supply such equipment with collaboration or valid license agreement for design, engineering, manufacture, supply of such equipment in India provided the collaborator meets the above provenness criteria.
12.0	Bill of material/Scope of supply (brief) for a stand-mount power cylinder assembly.	• <i>Pneumatic operated power cylinder, double acting, piston rod type.</i> • <i>Stand arrangement</i> The power cylinder shall be mounted on the stand. Stand arrangement shall be made of steel structural material. It should have the base for mounting the cylinder and provision for fixing the foundation bolts. The entire arrangement should be able to withstand the load and torque requirements. All the components shall be fixed on to the stand-structural material by using SS Bolt, Plain Washer, Spring washer and Nut arrangement. Vendor to choose the exact mechanical arrangements and dimensions of the stand/base accordingly. • <i>Output Shaft and Output Lever</i>

		The piston rod shall be connected to the output shaft through a lever. The fixing arrangement of lever and output shaft shall be such that the lever should not slip on the shaft. The output lever for driving the load shall be connected to the output Shaft. This arrangement should be such that the output lever shall be capable of fixing at any position/orientation around the shaft (360°). • <i>Pneumatic or SMART positioner (as per the enquiry).</i> • <i>Position Feedback transmitter.</i> • <i>Air Lock Relay.</i> • <i>Air Filter regulator.</i> • <i>Manual Isolation Valve for Power air.</i> • <i>Piston movement speed restrictor.</i> • <i>Equilising Valve</i> • <i>Limit Switch assembly.</i> • <i>Hand wheel/lever arrangement.</i> • <i>Integral Junction box.</i> • <i>Cable glands or Plug & Socket connectors (as per the enquiry)</i> • <i>Linkage rod.</i> • <i>I to P Converters (applicability-as per the enquiry).</i> Vendor to supply all the above indicated items/accessories. Over and above, if any other items/accessories are required for complete functioning of the power cylinder, vendor to take care of the same.
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1. Foundation bolts, Fasteners, Spare Positioner cams and Linkage Rods shall be m identified separately in shipping list/Delivery challan.



Typical arrangement of Pneumatic actuator assembly

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT , TIRUCHIRAPPALLI 620 014.

TECHNICAL DELIVERY CONDITIONS

FOR SUB - DELIVERY COMPONENTS OF

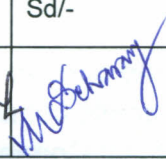
CONTROLS AND INSTRUMENTATION

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Technical Specification for I/P Converter

Specification No. TCI:257

Revision History

Rev. No.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED	
					ENGG	QAC
00	20.02.99	INITIAL RELEASE	Sd/-	Sd/-	Sd/-	Sd/-
01	10.03.04	Revised after Revisit	Sd/-	Sd/-	Sd/-	Sd/-
02	06-12-12	Certain clauses revised after revisit	M. Mungu	M. Mungu		

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
1.0	<u>SITE CONDITIONS</u>		
1.1	Altitude above mean sea level	Actual values are based on site conditions Mentioned in the contract documents	
1.2	Ambient temperature condition	-20 to +70° C	
1.3	Relative humidity	95 %	
1.4	Atmosphere	Dusty and Heavily polluted	
2.0	<u>INPUT</u>		
2.1	Input Current	4–20 mA, DC – Two wire system.	
2.2	Input Resistance	Less than 250 ohm.	
3.0	<u>OUTPUT</u>		
3.1	Output Pressure	0.2 – 1.0 Kg / sqcm.	
3.2	Air Consumption	0.2 Scfm (max.) at 1.4 Kg / sqcm (g) supply Pressure.	
4.0	<u>CHARACTERISTICS</u>		
4.1	Zero adjustability	150 % of output span.	
4.2	Repeatability	Less than +/-0.3 % of span.	
4.3	Response time	5 Seconds.	
4.4	Hysteresis	Less than +/- 0.3 of Span.	
4.5	Ambient temperature effect	1 % span from -20° C to 60° C.	
4.6	Calibration accuracy	+/- 0.5 % of Span.	
4.7	Operating temperature	4° C to 82° C.	
4.8	Air supply Pressure	1.2 to 1.5 Kg / sqcm (g) [1.4 Kg / sqcm (g) typical].	
4.9	Volume booster	As per applicability.	
4.10	Pneumatic connections	¼" NPT (F).	
4.11	Electrical Connections	¾" NPT (F) with brass gland.	
4.12	Method of operation	Internal feedback correction.	
4.13	Filter size	25 Microns	
4.14	Fail Freeze/Fail Safe	As per applicability	
5.0	<u>AIR FILTER REGULATOR</u>		
5.1	Supply Air Pressure	0 – 3.5 Kg/sqcm.	
5.2	Output Pressure	1.4 Kg/sqcm.	
5.3	Filter quality	To suit I / P Converter.	
5.4	Type	Diaphragm	
5.5	Pressure rating	5 Kg/sq.cm.	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
5.6	Material i. Body ii. Inner valve & seating iii. Spring	Die – cast Aluminum. Stainless steel. Stainless steel.	
5.5	Output gauge	Required.	
6.0	<u>MOUNTING</u>	Outdoor – Pipe or Wall.	
7.0	<u>HOUSING</u>		
7.1	Body Material	Die-Cast Aluminium	
7.2	Protection Class	IP-65	
8.0	<u>ACCESSORIES</u>	Mounting Brackets, Bolts & Nuts, Clamps, Gaskets, Name Plate in SS.	
9.0	<u>INSPECTION & TESTING</u>	As per Quality Plan QA:CI:STD:QP:43 (Latest Revision).	
10.0	<u>DOCUMENTS</u> 3 Sets of the following	1.T.R. for routine test for each converter 2.T.C.for type test. 3.Guarantee certificate. 4.Calibration certificate. 5.Catalogues. 6.O & M manuals.	
11.0	<u>PACKING</u>	As Per Packing Procedure QA:CI:STD:PR:04 (latest revision).	

NOTE

- 1.Refer current Valid List revision status of Quality Plan, & Packing Procedure.
- 2.In Vendor Compliance column-vendor to indicate 'Confirmed' or 'Not Applicable'.



CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR **PNEUMATIC ACTUATOR (POWER CYLINDER)** **(OPEN / CLOSE AND REGULATING TYPE)**

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
00	14/05/1993	Sd/-	Sd/-	Sd/-	Initial release.
01	16/06/1997	Sd/-	Sd/-	Sd/-	Format Revised.
02	21/06/2002	Sd/-	Sd/-	Sd/-	Department name changed, CTQ requirements added & General revision.
03	08/01/2004	Sd/-	Sd/-	Sd/-	Revised to include the Comments/ Feedback of internal discussion.
04	14/09/2010	RM.VAIRAVAN 	N.SRINIHAR 	K.PALANIVEL 	Format Changed. Revised as per Feedbacks from QC and Engineering during discussion.

	BHARAT HEAVY ELECTRICALS LIMITED TIRUCHIRAPPALLI - 620014	QUALITY PLAN FOR PNEUMATIC ACTUATOR (POWER CYLINDER) (OPEN / CLOSE AND REGULATING TYPE)	QA:CI:STD:QP:42 Rev: 04 Page: 2 of 4
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Sl. No	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc. & Acceptance STD	Format of record	AGENCY			Remarks
					M	B/C			M	B	C	
A	RAW MATERIALS & BOUGHT OUT ITEMS INSPECTION											
01	Cylinder Piston rod	a. Material	Critical	CHEM	One of sample	-	Specification, BS 970	TC	V	V	-	
		b. Dimension	Critical	MEAS	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
02	“ O “ ring	a. Material	Critical	CHEM	-do-	-	Specification	TC	V	V	-	
		b. Dimension	Critical	MEAS	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
		c. Hardness	Critical	MEAS	-do-	-	-do-	TC	V	V	-	
03	Cylinder Barrel & End Cover	a. Material	Critical	CHEM	-do-	-	Specification	TC	V	V	-	
		b. Dimension	Critical	MEAS	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
04	Piston Cylinder	a. Pressure Resistance Test	Major	PHYS	-do-	-	JIS B 8377	IIR/LGB	P	V	-	
05	Air filter Regulator	a. Make & Type	Major	PHYS	100%	-	Specification, Data Sheet	IIR/LGB	P	-	-	
		b. Output Gauge range	Major	PHYS	-do-	-	Specification	IIR/LGB	P	-	-	
		c. Process connection Size	Major	MEAS	-do-	-	-do-	IIR/LGB	P	-	-	
		d. Filter size in Microns	Major	PHYS	-do-	-	-do-	TC	V	V	-	
06	Limit Switches	a. Make & Type	Major	PHYS	-do-	-	Specification, Data Sheet	IIR/LGB	P	-	-	
		b. Functional check	Major	ELEC	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
07	Air Lock Relay	a. Make & Type	Major	PHYS	-do-	-	Specification	IIR/LGB	P	V	-	
		b. Functional check	Major	ELEC	-do-	-	Mfr. Std.	IIR/LGB	P	-	-	
08	Solenoid valve (Applicable Only for open / close)	a. Make & Type	Major	PHYS	-do-	-	Specification, Data Sheet	TC	P	-	-	
		b. Coil Voltage	Major	MEAS	-do-	-	-do-	TC	P	-	-	
		c. Class of Insulation	Major	PHYS	-do-	-	-do-	TC	P	-	-	
		d. Duty	Major	VISU	-do-	-	Mfr. Std.	TC	P	-		
		e. Functional check	Major	ELEC & MECH	-do-	-	-do-	IIR/LGB	P	-	-	
09	Positioner (Applicable only for regulating power Cylinder)	a. Make & Type	Major	VISU	-do-	-	Data Sheet	IIR/LGB	P	-	-	Performance to be checked during complete assembly testing

M- MANUFACTURER/ SUB-VENDOR; B - BHEL / TPI ; C - CUSTOMER / TPI
P - PERFORM; W - WITNESS V - VERIFICATION;

	BHARAT HEAVY ELECTRICALS LIMITED TIRUCHIRAPPALLI - 620014	QUALITY PLAN FOR PNEUMATIC ACTUATOR (POWER CYLINDER) (OPEN / CLOSE AND REGULATING TYPE)	QA:CI:STD:QP:42 Rev: 04 Page: 3 of 4
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Sl. No	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc. & Acceptance STD	Format of record	AGENCY			Remarks
					M	B/C			M	B	C	
B	INPROCESS INSPECTION											
01	Complete Assembly	a. Functional check	Major	PHYS & ELEC	100%	-	Mfr. Std.	IIR/LGB	P	-	-	
		b. Leak test	Major	PHYS	-do-	-	JIS B 8377	IIR/LGB	P	-	-	
C	FINISHED PRODUCT INSPECTION											
01	Routine Test	a. No Load test	Major	PHYS	100%	20%	Mfr. Std.	IIR/LGB	P	W	-	
		b. Verification of Mounting of Accessories	Major	VISU	-do-	-do-	BHEL App. Drg.	IIR/LGB	P	W	-	
		c. Dimensional check including Process connections	Major	MEAS	-do-	-do-	BHEL App. Drg.	LGB	P	W	-	
		d. Verification of name plate for Type & Model Number	Major	VISU	-do-	-do-	BHEL App. Drg.	IIR/LGB	P	W	-	
		e. Stroke length & Time	Major	MEAS	-do-	-do-	Spec. & BHEL App. Data Sheet	IIR/LGB	P	W	-	
		f. Verification of accessories (Make and Model number)	Major	VISU	-do-	-do-	Spec. & BHEL App. Data Sheet	IIR/LGB	P	W	-	
		g. Performance test (Sensitivity, Hysteresis, Accuracy, Repeatability) Applicable for Regulating duty	Major	MEAS	-do-	-do-	Specification	IIR/LGB	P	W	-	
		h. Stay put device Operation	Major	PHYS	-do-	-do-	Mfr. Std.	IIR/LGB	P	W	-	
		i. Solenoid valve – Coil voltage rating, Insulation & duty (Applicable only for open/ close duty)	Major	VISU & ELEC	-do-	-do-	BHEL App. Data Sheet	IIR/LGB	P	W	-	
		j. Air Filter- Filter Element size in microns	Major	VISU	-do-	-do-	Specification	IIR/LGB	P	W	-	
02	Type Tests	a. Load operation test	Major	PHYS	One of sample	One of sample	Mfr. Std.	TC	P	V	-	
		b. Durability test	Major	PHYS	-do-	-do-	JIS B 8377	TC	P	V	-	

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BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620014

QUALITY PLAN FOR
PNEUMATIC ACTUATOR (POWER CYLINDER)
(OPEN / CLOSE AND REGULATING TYPE)

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D.NOTES:

1.LEGENDS:

MECH	:	Mechanical	MEAS	:	Measurement
ELEC	:	Electrical	TC	:	Test certificate
TR	:	Test Report	CHEM	:	Chemical
VISU	:	Visual	IIR	:	Internal Inspection Report

- The vendor shall arrange all testing facilities at their works. Tests for which facilities are not available are to be carried out at recognized National Test Houses like ETDC/CIL/NPL/ERTL etc., at vendor cost.
- Through Log Book / any other documents available at the vendor's works, it shall be possible to correlate the finished products with raw material and in process stage checks / inspection carried out.
- All Measuring and Testing Instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification.

- Test reports for routine tests are to be furnished by the vendor.
- Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry.
- Vendor to give tentative inspection program in advance and confirm exact date two weeks in advance for arranging BHEL's inspection.
- Packing shall be as per the "PACKING PROCEDURE" indicated in the specification.

E. REFERENCE STANDARDS:

(For Indicated Standards Refer the Latest Version)

JIS B 8377	:	Specification for Pneumatic Cylinder
BS 970	:	Specification for Wrought Steel for Mechanical end

SQP42R4.DOC

M- MANUFACTURER/ SUB-VENDOR; **B** - BHEL / TPI ; **C** - CUSTOMER / TPI
P - PERFORM; **W** - WITNESS **V** - VERIFICATION;

**BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI**

**CONTROLS AND INSTRUMENTATION / FB
QUALITY ASSURANCE**

**STANDARD PACKING PROCEDURE
FOR
ELECTRICAL ACTUATORS, POWER CYLINDERS AND
ELECTRICAL EQUIPMENTS**

Rev	Date	Prepared	Checked	Approved	Revision History
00	01.01.96	Sd/-	Sd/-	Sd/-	Initial History
01	28.03.02	A.J.OMPRAKASH Sd/-	R.VARADARAJAN Sd/-	G.MATHIYALAGAN Sd/-	Department name changed
02	26.02.07	RM.VAIRAVAN 	N. SRIDHAR 	S.SOMASUNDARAM 	Revised after discussion with Shipping Dept.

1.0 SCOPE

- 1.1 This procedure gives minimum guidelines to be complied with for packing of Electrical actuators, Power cylinders and other Electrical equipments. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage for periods more than one year.

2.0 WOOD SPECIFICATION FOR PACKING

- 2.1 Rubber wood as per manufacturer standard.
2.2 Silver Oak as per procedure PR:CHEM:017 or as per relevant International Standards.

3.0 PACKING

- 3.1 For Inland packing, rubber wood and export packing Silver Oak wood shall be used. The wood used shall be seasoned and treated.
3.2 The required wood case for the equipment to be packed shall be made out of individual planks of single length. The case should not have joints. Sufficient number of horizontal, vertical and diagonal planks (dimensions depending up on case size) shall be used for binding and strengthening runners have to be provided with metallic sling plates for handling.
3.3 Support planks are to be provided such that, no force is acting on the parts of equipment or its parts.
3.4 Power cylinders have to be packed with the piston in the closed condition.
3.5 Preservative chemicals are to be applied, wherever required.
3.6 Blank holes if any, shall be plugged.
3.7 Spring actuated equipments have to be de-energised before packing.
3.8 The equipments covered with a polythene sheet shall be kept inside the box, followed by coir, wooden bottoms, thermo coal, etc to prevent vibration effect during loading, transportation, etc.
3.9 The gap between job and the box shall be filled with suitable material like jute, coir, thermo coal, etc.
3.10 On all sides of the inner case, black polythene sheet shall be nailed.
3.11 Loose items of the equipment, if any, shall be packed separately.
3.12 Each case must have sufficient quantity of silica gel, packed in cotton cloth bags, shall be kept at different places as required.

The bags used shall have the following information marked on it.

Silica Gel activator type:

Blue: Active

Rose: Reduced active

White: No activity. To be replaced with fresh Silica gel.

4.0 MARKING

- 4.1 After completing the packing, Stencil marking, as per dispatch instructions and symbol marking as per Annexure – I shall be made. Please ensure the box is stenciled with “FRAGILE ITEM”, “HANDLE WITH CARE”

5.0 PACKING SLIP

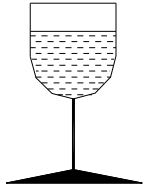
- 5.1 A copy of the packing slip, kept in a polythene cover shall be kept inside the box. Another copy of the packing slip, kept in a polythene cover shall be kept out side the box and covered with a metallic plate to the case.

6.0 CAUTION

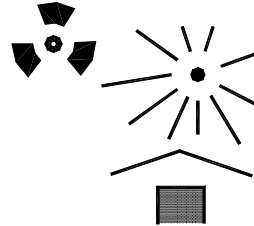
Do not pack any other Mechanical items with this case.

7.0 GENERAL

- 7.1 These packing procedures are the minimum requirements in addition to the standard instructions mentioned in the Purchase Order and Specification.
- 7.2 Deviation to meet the packing procedure requirements / non-clarity in packing approach in any quotation will be liable for rejection of offer.

ANNEXURE – 1TOPROCEDURE NO:CI:QAC:PR:02/00 ; PR:03/00 ; PR:04/00

FRAGILE, HANDLE WITH CARE



PROTECT FROM HEAT AND RADIOACTIVE SOURCES



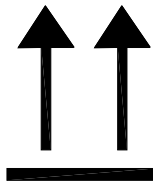
USE NO HOOKS

NOTE: The design of heavy goods packages cannot always resist top lifting by grabhooks.



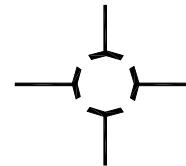
KEEP DRY

NOTE: Not all cases have waterproof internal liners: plywood used in the construction may not have a waterproof glue-line.



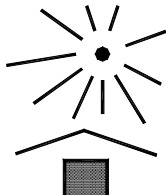
THIS WAY UP

NOTE: Certain designs of small cases make it difficult to distinguish top from bottom.



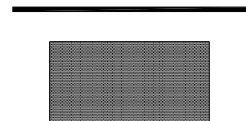
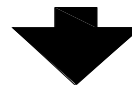
CENTRE OF GRAVITY

NOTE: This should be stencilled as a minimum on the two longest case sides (this information will normally be supplied by the manufacturer of the item(s) packed).

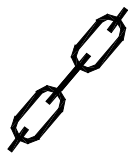


KEEP AWAY FROM HEAT

... kg max

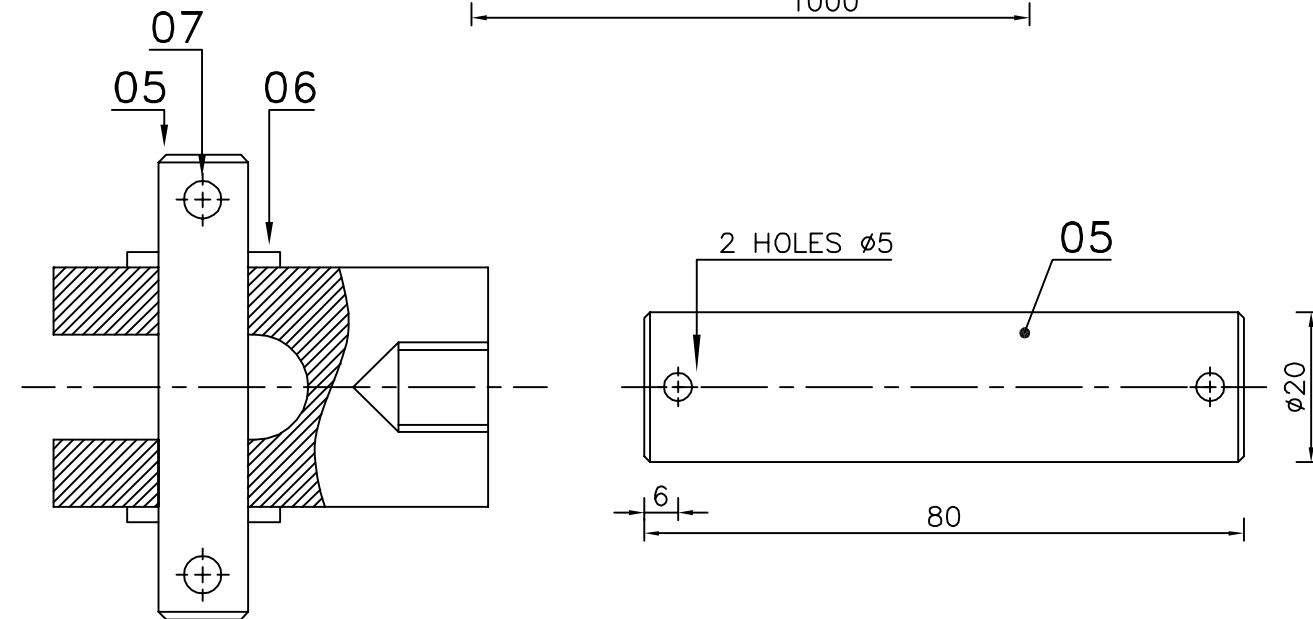
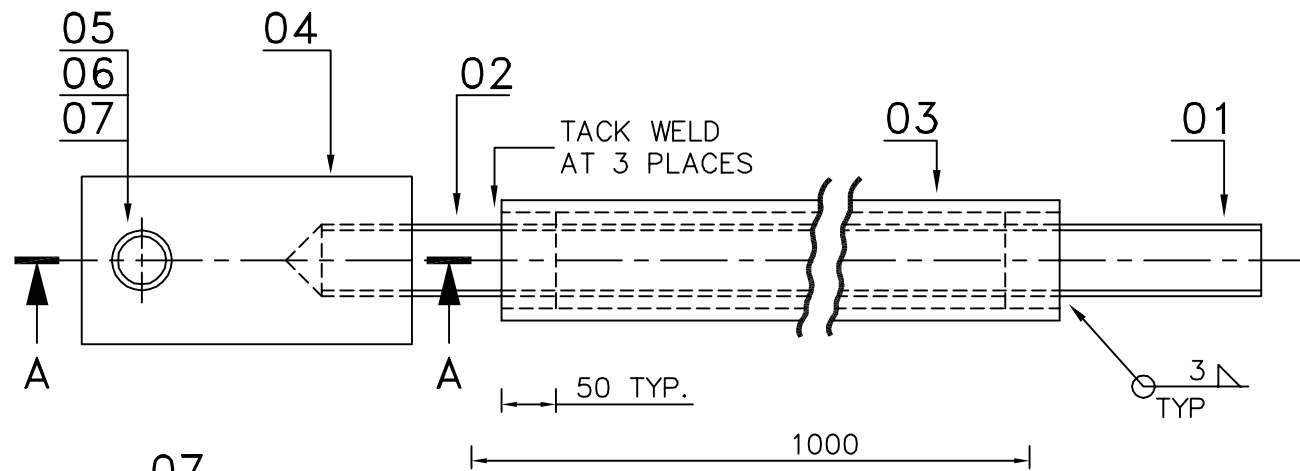


STACKING LIMITATION

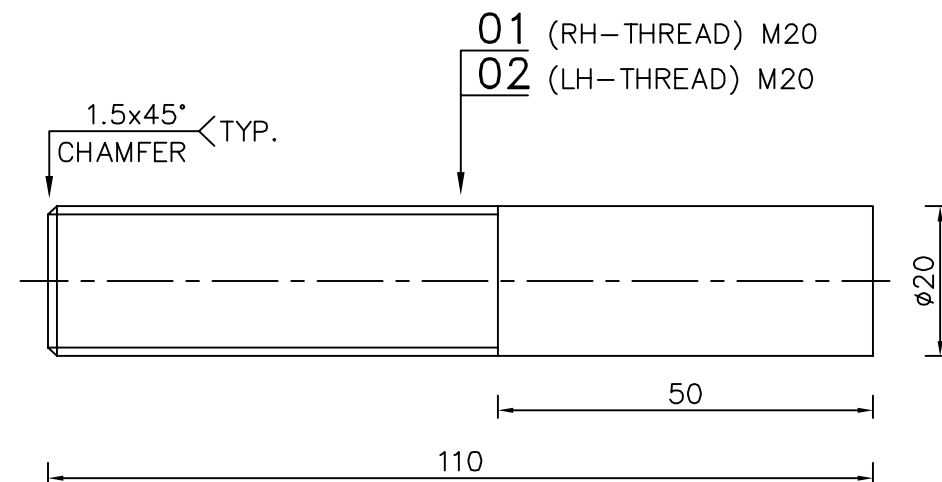


INTERNATIONAL "SLING HERE" SYMBOL

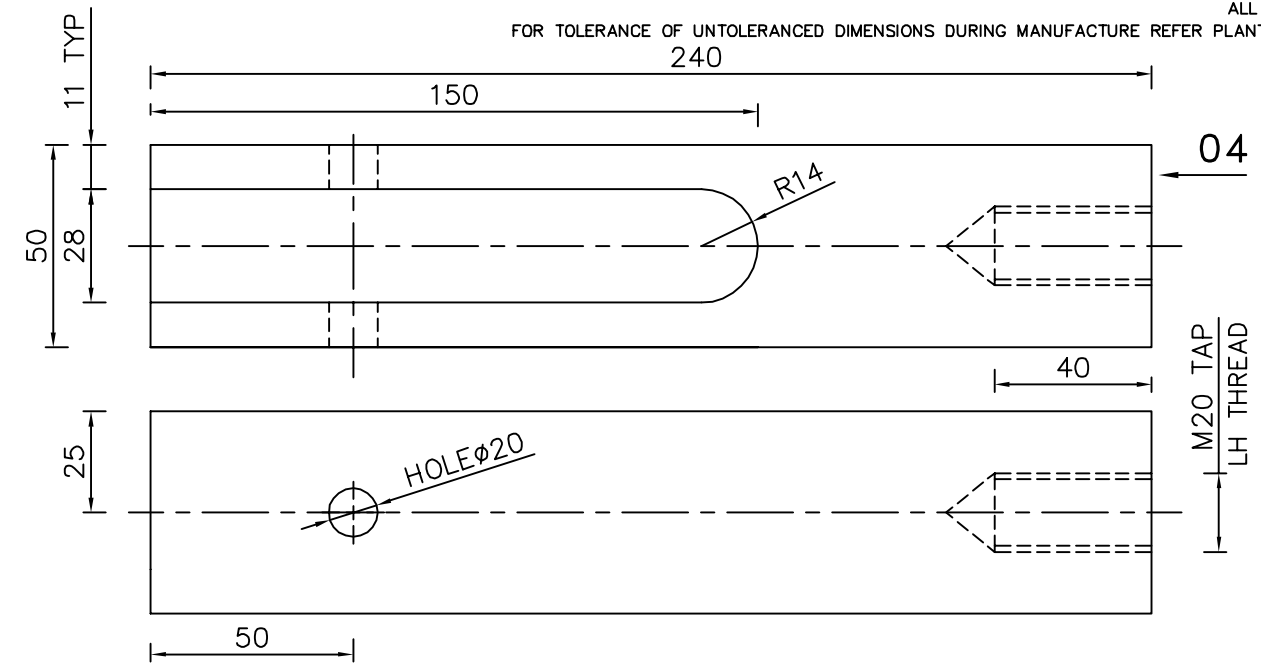
NOTE: The maximum load in kilograms should be marked above the arrow.



SECTION-AA



REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

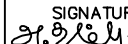
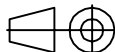


	07	SPLIT PIN 4 x 36				41704-40036			0.003	
									2	
	06	WASHER PNCHD A 20				41408-00020			0.017	
									2	
	05	PIN DIA 20; 80				15-024-193			0.20	
						SA 479 TYP 304			1	
	04	ROD DIA 50; 240				15-339-142			3.70	
						SA 105			1	
	03	ERF TUBE DIA 27.3x2.65; 1000				15-038-034			1.58	
						IS1239			1	
	02	ROD DIA 20; 110				15-039-086			0.230	
						SA 193 B7			1	
	01	ROD DIA 20; 110				15-039-086			0.230	
						SA 193 B7			1	
DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	GS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

STANDARD

बी एच ई एल BHEL		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI – 620014		DRN	NAME A.Thambu raj	SIGNATURE 	DATE 18-08-11	NO. OF VAR —	
				CHD	M.Muruga Prabu		25-11-11		
				APPD	V.M.Selvaraaaj		25-11-11		
DEPT. : C & I		ALL DIMENSIONS ARE IN MM	SCALE NTS	WEIGHT (kg) 5.980	REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-48541/01			ITEM NO —	No. OF ITEMS —
CODE : 392									
TITLE LINKAGE ROD ASSEMBLY PIN DIAMETER 20 Sheet 01 Of 01				CARD CODE U 01	DRAWING NO : 3-97-599-20399				REV 00