



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

429-002/A

<b>Vendor Code :</b> 23505	<b>Enquiry No</b>	<b>Enquiry Date</b>	<b>Due Date for Quotation</b>
<b>Vendor Name :</b> Open Tender Dummy Code Australia	1701500590 - 07	24.04.2015	30.05.2015
Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order. <u>Bid should be submitted in Two Parts. 1. Techno-commercial Bid (Part-I) and 2. Price Bid (Part-II) in a separate sealed cover and both the covers must be placed in a Third Cover and Sealed. Our Enquiry No, Enq. date &amp; Enq. Due date must be written on all Three covers.</u>			

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	L068519759901001  Cold Air regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories Reco. Bore x Stroke Size : 6 x 8 inches Run Torque : 23 kgm Lever length : 200 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput Operating Speed : 8 - 10mm/sec Application : Cold Air Damper Control Tag nos. HFE 81 AA101 TO HFE 89 AA101	NO	9.000	9.00	30.10.15
20	L068519759901002  Hot Air regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories Reco. Bore x Stroke Size : 8 x 16 inches Torque : 90 kgm Lever length : 270 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput Operating Speed : 8 - 10mm/sec Application : Hot Air Damper Control Tag nos. HFE 51 AA101 TO HFE 59 AA101.	NO	9.000	9.00	30.10.15
30	L068519759901003  Gas SAH Outlet regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories Reco. Bore x Stroke Size : 12 x 16 inches Torque : 307 kgm Lever length : 390 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput	NO	4.000	4.00	30.10.15

The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening. Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
2/\*

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

40	L068519759901004	NO	2.000	2.00	30.10.15
Operating Speed : 5 - 7mm/sec Application : Secondary Air Heater O/L regulating damper control Tag nos. HNA 12 AA101, HNA 12 AA102, HNA 22 AA101, HNA 22 AA102					
50	L068519759901005	NO	9.000	9.00	30.10.15
Gas PAH Outlet regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories Reco. Bore x Stroke Size : 20 x 14 inches Torque : 460 kgm Lever length : 460 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput Operating Speed : 5 - 7mm/sec Application : Primary Air Heater O/L regulating damper control Tag nos. HNA 11 AA101, HNA 21 AA101.					
60	L068519759901006	NO	13.000	13.00	30.10.15
Linkage rods as per the Drawing No: 3-48-209-48515/02 for Cold Air Regulating Damper Control Actuator					
70	L068519759901007	NO	2.000	2.00	30.10.15
Linkage rods as per the Drawing No: 3-48-209-48516/01 for Hot Air Regulating Damper Control Actuator and SAH Fluegas O/L Damper Control Actuator.					
80	L141619759901001	NO	2.000	2.00	30.10.15
Linkage rods as per the Drawing No: 3-48-209-60188/01 For Gas Gas PAH Outlet Damper Actuator.					
Pneumatic Actuator (Regulating duty) with SMART positioner, 3 nos. of 9 pin plug & socket arrangement & other accessories Run torque : 60kgm Output Lever length : 248mm Recommended Bore x Stroke Size in inches : 08 x 08 Angle of rotation : 0 to 90 degrees Tag nos. :90 QHL 10 AA101, 90 QHL 20 AA101 Operation Speed Range : 6mm/sec to 9mm/sec Action on Loss of Power Air : Stayput Action on Loss of 4 - 20mA signal : Stayput Application : FD Fan Inlet Damper Control					

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of  
tenderers who have submitted their offer and who may like to be present for the tender  
opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

Page  
3/\*

1701500590 / 24.04.2015			23505		
90	L141619759901002	NO	2.000	2.00	30.10.15
	Linkage rods as per the drawing no. 3-48-209-52984/02 for FD Fan inlet damper actuator				
100	L141819759901001	NO	2.000	2.00	30.10.15
	Pneumatic Actuator (Regulating duty) with SMART positioner, 3 nos. of 9 pin plug & socket arrangement & other accessories. Run torque : 50kgm Output Lever length : 248mm Recommended Bore x Stroke Size in inches : 08 x 08 Angle of rotation : 0 to 90 degrees Tag nos. : 90 QHL10 AA101, 90 QHL20 AA101 Operation Speed required : 6mm/sec to 9mm/sec Action on Loss of power Air : Stayput Action on Loss of 4 to 20mA Command Signal : Stayput Application : FD Fan Inlet Damper Control				
110	L141819759901002	NO	2.000	2.00	30.10.15
	Linkage rods as per the drawing no. 3-48-209-52984/02 for FD Fan inlet damper actuator				
120	L141919759901001	NO	2.000	2.00	30.10.15
	Pneumatic Actuator (Regulating duty) with SMART positioner & other accessories Run torque : 50kgm Output Lever length : 248mm Recommended Bore x Stroke Size in inches : 08 x 08 Angle of rotation : 0 to 90 degrees Tag nos. : 90 QHL10 AA101, 90 QHL20 AA101 Operation Speed required : 6mm/sec to 9mm/sec Action on Loss of power Air : Stayput Action on Loss of 4 to 20mA Command Signal : Stayput Application : FD Fan Inlet Damper Control				
130	L141919759901002	NO	2.000	2.00	30.10.15
	Linkage rods as per the drawing no. 3-48-209-52984/02 for FD Fan inlet damper actuator				
140	L142019759901001	NO	2.000	2.00	30.10.15
	Pneumatic Actuator (Regulating duty) with SMART positioner & other				

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of  
tenderers who have submitted their offer and who may like to be present for the tender  
opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
4/\*

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

	accessories Run torque : 60 kgm Output Lever length : 248 mm Recommended Bore x Stroke Size in inches : 08 x 08 Angle of rotation : 0 to 90 Degrees Tag nos. : 90 QHL10 AA101, 90 QHL20 AA101 Operation Speed required : 6 mm/sec to 9 mm/sec Action on Loss of power Air : Stayput Action on Loss of 4 to 20mA Command Signal : Stayput Application : FD Fan Inlet Damper Control				
150	L142019759901002	NO	2.000	2.00	30.10.15
	Linkage rods as per the drawing no. 3-48-209-52984/02 for FD Fan inlet damper actuator.				
160	L171319759901001	NO	14.000	14.00	30.10.15
	Cold air damper actuator with SMART positioner Reco. Bore x Stroke Size : 6 x 8 inches Torque : 38 kgm Lever length : 270 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Tag nos. HFE 51,52,53,54,55,56,57 AA101. Operation Speed Range : 6mm/sec to 9mm/sec Action on Loss of Power Air : Stayput Action on Loss of 4 - 20mA signal : Stayput.				
170	L171319759901002	NO	14.000	14.00	30.10.15
	Hot air damper actuator with SMART positioner. Reco. Bore x Stroke Size : 8 x 16 inches Torque : 103 kgm Lever length : 310 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Tag nos. HFE 71,72,73,74,75,76,77 AA101. Operation Speed Range : 6mm/sec to 9mm/sec Action on Loss of Power Air : Stayput Action on Loss of 4 - 20mA signal : Stayput.				
180	L171319759901003	NO	4.000	4.00	30.10.15
	PA fan blade pitch control actuator with SMART positioner as per the technical specification of the Power cylinder TCI:143/Rev.08, as per the technical specification of the SMART positioner TCI:317/02 and as per the TB Wiring Drawing No.3-97-599-21709. Reco. Bore x Stroke Size : 4 x 8 inches Torque : 10 kgm Lever length : 200 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty				

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of  
tenderers who have submitted their offer and who may like to be present for the tender  
opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
5/\*

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

	Tag nos. HFE 10,15 AA101. Operation Speed Range : 6mm/sec to 9mm/sec Action on Loss of Power Air : Stayput Action on Loss of 4 - 20mA signal : Stayput.				
190	L171319759901004	NO	4.000	4.00	30.10.15
	FD fan A&B blade pitch control actuator with SMART positioner. Reco. Bore x Stroke Size : 4 x 8 inches Torque : 10 kgm Lever length : 200 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Tag nos : HLB 10,15 AA101. Operation Speed Range : 6mm/sec to 9mm/sec Action on Loss of Power Air : Stayput Action on Loss of 4 - 20mA signal : Stayput.				
200	L171319759901005	NO	4.000	4.00	30.10.15
	ID fan Blade pitch control actuator with SMART positioner. Reco. Bore x Stroke Size : 4 x 8 inches Torque : 10 kgm Lever length : 200 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Tag nos : HNC 10,15 AA101 Operation Speed Range : 6mm/sec to 9mm/sec Action on Loss of Power Air : Stayput Action on Loss of 4 - 20mA signal : Stayput.				
210	L171319759901006	NO	14.000	14.00	30.10.15
	The linkage rods as per the Drawing No: 3-48-209-48515/02 for the Cold Air Damper Actuator.				
220	L171319759901007	NO	14.000	14.00	30.10.15
	The linkage rods as per the Drawing No: 3-48-209-48541/01 for the Hot Air Damper Actuator				
230	L171319759901008	NO	12.000	12.00	30.10.15
	The linkage rods as per the Drawing No:3-48-209-52983/02 for the PA,FD ,ID fan actuators				
240	L171519759901001	NO	27.000	27.00	30.10.15
	Pneumatic actuator (Regulating Duty) with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories. Run Torque : 32 kgm Output Lever length : 270 mm Reco. Bore x Stroke Size : 6 x 8 inches Angle Of rotation : 0 to 90 degrees Duty : Regulating duty				

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of  
tenderers who have submitted their offer and who may like to be present for the tender  
opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
6/\*

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

Tag nos. HFE 15 AA101,HFE 25 AA101,HFE 35 AA101,HFE 45 AA101, HFE 55 AA101,HFE 65 AA101, HFE 75 AA101,HFE 85 AA101,HFE 95 AA101.

Operation Speed Range : 5mm/sec to 9mm/sec

Action On loss of power air : Stayput

Action of loff os 4 to 20mA signal : Stayput

Application : Cold Air Damper Control

250 L171519759901002 NO 27.000 27.00 30.10.15

Pneumatic actuator (Regulating Duty) with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories.

Reco. Bore x Stroke Size : 8 x 16 inches

Torque : 94 kgm

Lever length : 270 mm

Angle Of rotation : 0 to 90 degrees

Duty : Regulating duty

Tag nos. : HFE 16 AA101,HFE 26 AA101,HFE 36 AA101,HFE 46 AA101,HFE 56

AA101,HFE 66 AA101,HFE 76 AA101,HFE 86

AA101,HFE 96 AA101.

Operation Speed Range : 5mm/sec to 9mm/sec

Action On loss of power air : Stayput

Action of loff os 4 to 20mA signal : Stayput

Application : Hot Air Damper Control

260 L171519759901003 NO 12.000 12.00 30.10.15

Pneumatic actuator (Regulating Duty) with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories.

Reco. Bore x Stroke Size : 20 x 14 inches

Torque : 461 kgm

Lever length : 460 mm

Angle Of rotation : 90 degrees

Duty : Regulating duty

Tag nos. HNA 32 AA101 & HNA 32 AA102

HNA 42 AA101 & HNA 42 AA102

Operation Speed Range : 5mm/sec to 9mm/sec

Action On loss of power air : Stayput

Action of loff os 4 to 20mA signal : Stayput

Application : Secondary APH Flue Gas Outlet damper Control actuator.

270 L171519759901004 NO 6.000 6.00 30.10.15

Pneumatic actuator (Regulating Duty) with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories.

Reco. Bore x Stroke Size : 20 x 14 inches

Torque : 582 kgm

Lever length : 500 mm

Angle Of rotation : 0 to 90 degrees

Duty : Regulating duty

Tag nos. HNA 12 AA101,HNA 22 AA101.

Operation Speed Range : 5mm/sec to 9mm/sec

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
7/\*

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

	Action On loss of power air : Stayput Action of loff os 4 to 20mA signal : Stayput Application : Primary APH Flue Gas Outlet damper Control actuator			
280	L171519759901005	NO	27.000	27.00 30.10.15
	Linkage rods as per the Drawing No: 3-48-209-48541/01 for Cold Air Regulating Damper Control Actuator			
290	L171519759901006	NO	27.000	27.00 30.10.15
	Linkage rods as per the Drawing No: 3-48-209-48516/01 for Hot Air Regulating Damper Control Actuator.			
300	L171519759901007	NO	18.000	18.00 30.10.15
	Linkage rods as per the Drawing No: 3-48-209-48542/02 For Gas SAH Outlet Damper Control Actuator and Gas PAH Outlet Damper Actuator.			
310	L180419759901001	NO	18.000	18.00 30.10.15
	Cold Air regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories. Reco. Bore x Stroke Size : 6 x 8 inches Run Torque : 40 kgm Lever length : 270 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput Operating Speed : 8 - 10mm/sec Application : Cold Air Damper Control Tag nos. HFE 15 AA101,HFE 25 AA101,HFE 35 AA101,HFE 45 AA101, HFE 55 AA101,HFE 65 AA101, HFE 75 AA101,HFE 85 AA101,HFE 95 AA101.			
320	L180419759901002	NO	18.000	18.00 30.10.15
	Hot Air regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories Reco. Bore x Stroke Size : 8 x 16 inches Torque : 110 kgm Lever length : 310 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput Operating Speed : 8 - 10mm/sec Application : Hot Air Damper Control Tag nos. HFE 16 AA101,HFE 26 AA101,HFE 36 AA101,HFE 46 AA101,HFE 56 AA101,HFE 66 AA101,HFE 76 AA101,HFE 86			

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of  
tenderers who have submitted their offer and who may like to be present for the tender  
opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
8/\*

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015		23505			
330	L180419759901003	NO	8.000	8.00	30.10.15
<p>AA101,HFE 96 AA101.</p> <p>Gas SAH Outlet regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement &amp; other accessories. Reco. Bore x Stroke Size : 20 x 14 inches Torque : 520 kgm Lever length : 460 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput Operating Speed : 5 - 7mm/sec Application : Secondary Air Heater O/L regulating damper control Tag nos. HNA 32 AA101, HNA 32 AA102, HNA 42 AA101, HNA 42 AA102</p>					
340	L180419759901004	NO	8.000	8.00	30.10.15
<p>Gas PAH Outlet regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement &amp; other accessories. Reco. Bore x Stroke Size : 14 x 16 inches Torque : 340 kgm Lever length : 390 mm Angle Of rotation : 0 to 90 degrees Duty : Regulating duty Action on Loss of power air : Stayput Action on Loss of command signal : Stayput Operating Speed : 5 - 7mm/sec Application : Primary Air Heater O/L regulating damper control Tag nos. HNA 12 AA101, HNA 12 AA102, HNA 22 AA101, HNA 22 AA102.</p>					
350	L180419759901005	NO	18.000	18.00	30.10.15
<p>Linkage rods as per the Drawing No: 3-48-209-48541/01 for Cold Air Regulating Damper Control Actuator</p>					
360	L180419759901006	NO	18.000	18.00	30.10.15
<p>Linkage rods as per the Drawing No: 3-48-209-48516/01 for Hot Air Regulating Damper Control Actuator.</p>					
370	L180419759901007	NO	16.000	16.00	30.10.15
<p>Linkage rods as per the Drawing No: 3-48-209-60188/01 For Gas SAH Outlet Damper Control Actuator and Gas PAH Outlet Damper Actuator.</p>					
380	L180619759901001	NO	18.000	18.00	30.10.15
<p>The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.</p>				<p>Yours faithfully, For <b>BHARAT HEAVY ELECTRICALS LIMITED</b></p> <p>MANAGER / PURCHASE (FOSSIL BOILERS) Yours faithfully,</p>	



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
9/\*

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

Cold Air regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories  
Reco. Bore x Stroke Size : 6 x 8 inches  
Run Torque : 40 kgm  
Lever length : 270 mm  
Angle Of rotation : 0 to 90 degrees  
Duty : Regulating duty  
Action on Loss of power air : Stayput  
Action on Loss of command signal : Stayput  
Operating Speed : 8 - 10mm/sec  
Application : Cold Air Damper Control  
Tag nos. HFE 15 AA101,HFE 25 AA101,HFE 35 AA101,HFE 45 AA101, HFE 55 AA101,HFE 65 AA101, HFE 75 AA101,HFE 85 AA101,HFE 95 AA101.

390 L180619759901002 NO 18.000 18.00 30.10.15

Hot Air regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories  
Reco. Bore x Stroke Size : 10 x 16 inches  
Torque : 200 kgm  
Lever length : 310 mm  
Angle Of rotation : 0 to 90 degrees  
Duty : Regulating duty  
Action on Loss of power air : Stayput  
Action on Loss of command signal : Stayput  
Operating Speed : 8 - 10mm/sec  
Application : Hot Air Damper Control  
Tag nos. HFE 16 AA101,HFE 26 AA101,HFE 36 AA101,HFE 46 AA101,HFE 56 AA101,HFE 66 AA101,HFE 76 AA101,HFE 86 AA101,HFE 96 AA101.

400 L180619759901003 NO 8.000 8.00 30.10.15

Gas SAH Outlet regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories  
Reco. Bore x Stroke Size : 20 x 14 inches  
Torque : 520 kgm  
Lever length : 460 mm  
Angle Of rotation : 0 to 90 degrees  
Duty : Regulating duty  
Action on Loss of power air : Stayput  
Action on Loss of command signal : Stayput  
Operating Speed : 5 - 7mm/sec  
Application : Secondary Air Heater O/L regulating damper control  
Tag nos. HNA 32 AA101, HNA 32 AA102, HNA 42 AA101, HNA 42 AA102

410 L180619759901004 NO 8.000 8.00 30.10.15

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
10/12

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

Gas PAH Outlet regulating damper control actuator along with SMART positioner, 3 nos. of 9 pin plug and socket arrangement & other accessories  
Reco. Bore x Stroke Size : 14 x 16 inches  
Torque : 340 kgm  
Lever length : 420 mm  
Angle Of rotation : 0 to 90 degrees  
Duty : Regulating duty  
Action on Loss of power air : Stayput  
Action on Loss of command signal : Stayput  
Operating Speed : 5 - 7mm/sec  
Application : Primary Air Heater O/L regulating damper control  
Tag nos. HNA 12 AA101, HNA 12 AA102, HNA 22 AA101, HNA 22 AA102.

420	L180619759901005	NO	18.000	18.00	30.10.15
-----	------------------	----	--------	-------	----------

Linkage rods as per the Drawing No: 3-48-209-48541/01 for Cold Air Regulating Damper Control Actuator

430	L180619759901006	NO	18.000	18.00	30.10.15
-----	------------------	----	--------	-------	----------

Linkage rods as per the Drawing No: 3-48-209-48516/01 for Hot Air Regulating Damper Control Actuator.

440	L180619759901007	NO	8.000	8.00	30.10.15
-----	------------------	----	-------	------	----------

Linkage rods as per the Drawing No: 3-48-209-48542/01 For Gas SAH Outlet Damper Control Actuator.

450	L180619759901008	NO	8.000	8.00	30.10.15
-----	------------------	----	-------	------	----------

Linkage rods as per the Drawing No: 3-48-209-60188/01 For Gas PAH Outlet Damper Actuator.

## General Note:

- Offers shall be submitted in two part i.e. Tecno-commercial bid and Price-bid separately in sealed covers.
- You are requested to Quote FOR / site price indicating the P & F freight and Insurance separately. Foreign vendors are requested to quote on FOB basis (Nearest port).
- Loading details shall be applicable as detailed in the annexure
- L1 finalization shall be on Total Cost to BHEL /trichy up to BHEL /Site .
- Tender shall be finalized as package basis for ordering and evaluation for each project.i.e. 9 Packages ( package details are mentioned below).
- Submit filled-in "No deviation" format along with offer.
- Submit filled in Annexure-A along with offer.

The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,

# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
11/12

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

- 8.Applicable Specification for power cylinder: TCI :143/Rev.08  
9.Applicable Specification for SMART positioner: TCI :317/Rev.02  
10.Applicable Packing procedure : QA:CI:STD:PR:04/02  
11. Applicable Quality plan :
- a) Enq. Sl. No. 10 - 70 - Unchahar project -CI:QA:0685:CQP:04.
  - b) Enq. Sl. No. 80 - 90 - Nabi Ngar Aux - QA:CI:STD:QP:42
  - c) Enq. Sl. No.100 -110 - Gadarwara Aux - QA:CI:STD:QP:42.
  - d) Enq. Sl. No.120 -130 - OPGCL Aux - QA:CI:STD:QP:42
  - e) Enq. Sl. No.140 -150 - Neyveli Aux - QA:CI:STD:QP:42
  - f) Enq. Sl. No.160 -230 - OPGCL 3&4 project - QA:CI:STD:QP:42
  - g) Enq. Sl. No.240 -300 - Nabi Ngr (1-3 ) -CI:QA:1715:CQP:04
  - h) Enq. Sl. No.310 -370 - Gadarwara 1 & 2 -CI:QA:1804:CQP:04
  - i) Enq. Sl. No.380 -450 - Darlipali 1 & 2 -CI:QA:1806:CQP:04
- 12.Applicable Wiring Diagram :
- a) Enq. Sl. No. 10 - 70 - Unchahar project -3-97-599-22202/00.
  - b) Enq. Sl. No. 80 - 90 - Nabi Ngar Aux -3-97-599-21717/00.
  - c) Enq. Sl. No.100 -110 - Gadarwara Aux -3-97-599-21822/00.
  - d) Enq. Sl. No.120 -130 - OPGCL Aux -3-97-599-22455/00.
  - e) Enq. Sl. No.140 -150 - Neyveli Aux -3-97-599-22205/00.
  - f) Enq. Sl. No.160 -230 - OPGCL 3&4 project -3-97-599-21709/00.
  - g) Enq. Sl. No.240 -300 - Nabi Ngr (1-3 ) -3-97-599-21717/00.
  - h) Enq. Sl. No.310 -370 - Gadarwara 1 & 2 -3-97-599-21709/00.
  - i) Enq. Sl. No.380 -450 - Darlipali 1 & 2 -3-97-599-21709/00.
13. Price bids of the vendors who are not approved by BHEL shall be considered only after evaluation , registration by BHEL and Customer .  
14. Price bis of the customer approved vendors shall be considered only after evaluation & registration .

## Enclosures:

- 1.No deviation Format sheet
  - 2.Commercial conditions -Annexure -A
  3. Specification for power cylinder: TCI :143/Rev.08
  4. Specification for SMART positioner: TCI :317/Rev.02
  5. Packing procedure : QA:CI:STD:PR:04/02
  6. Quality plan :
- a) Enq. Sl. No. 10 - 70 - Unchahar project -CI:QA:0685:CQP:04.
  - b) Enq. Sl. No. 80 - 90 - Nabi Ngar Aux - QA:CI:STD:QP:42
  - c) Enq. Sl. No.100 -110 - Gadarwara Aux - QA:CI:STD:QP:42.
  - d) Enq. Sl. No.120 -130 - OPGCL Aux - QA:CI:STD:QP:42
  - e) Enq. Sl. No.140 -150 - Neyveli Aux - QA:CI:STD:QP:42
  - f) Enq. Sl. No.160 -230 - OPGCL 3&4 project - QA:CI:STD:QP:42
  - g) Enq. Sl. No.240 -300 - Nabi Ngr (1-3 ) -CI:QA:1715:CQP:04

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,

# BHARAT HEAVY ELECTRICALS LIMITED



( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

Page  
12/12

PHONE :2577359  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

1701500590 / 24.04.2015

23505

- h) Enq. Sl. No.310 -370 - Gadarwara 1 & 2 -CI:QA:1804:CQP:04  
i) Enq. Sl. No.380 -450 - Darlipali 1 & 2 -CI:QA:1806:CQP:04

8. Wiring Diagram :

- a) Enq. Sl. No. 10 - 70 - Unchahar project -3-97-599-22202/00.  
b) Enq. Sl. No. 80 - 90 - Nabi Ngar Aux -3-97-599-21717/00.  
c) Enq. Sl. No.100 -110 - Gadarwara Aux -3-97-599-21822/00.  
d) Enq. Sl. No.120 -130 - OPGCL Aux -3-97-599-22455/00.  
e) Enq. Sl. No.140 -150 - Neyveli Aux -3-97-599-22205/00.  
f) Enq. Sl. No.160 -230 - OPGCL 3&4 project -3-97-599-21709/00.  
g) Enq. Sl. No.240 -300 - Nabi Ngr (1-3 ) -3-97-599-21717/00.  
h) Enq. Sl. No.310 -370 - Gadarwara 1 & 2 -3-97-599-21822/00.  
i) Enq. Sl. No.380 -450 - Darlipali 1 & 2 -3-97-599-22366/00.




"LD clause has to be confirmed without fail."

The offers should reach us 30 minutes before the time of opening of tenders.  
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.




Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



**MANUFACTURING QUALITY PLAN**

	Manufacturer's Name & Address <b>(As per LOA approved vendor List- Refer Note 7)</b>	ITEM: <b>PNEUMATIC ACTUATORS (OPEN/CLOSE &amp; REGULATING TYPE)</b>	QP No.	CI:QA:1715:CQP-04	NABINAGAR 3 X 660
	Sub system: j. Stayput & manual operation	Critical MECH 100% 20%	Rev No.	Package No.	MW
2	Type test	Type test requirement shall be as per agreement with NTPC Engg - CHP	Date: 27/12/2013	Contract No.	SG
D	Notes:	MEAS : Measurement ELEC : Electrical Int. R : Internal Report MECH : Mechanical TC : Test Certificate	Page No. 3 of 3	Main supplier	CS-0370-102-01
	1. LEGENDS:	PHYS : Physical VISU : Visual OSPL : One sample per Lot CHEM : Chemical LGB : Log Book	JIS B8377 spec Data sheet	Int R/TC	BHEL Tiruchy
	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)				
E	Reference Standards				
	JIS B 8377	Specification for Pneumatic cylinder			
	BS 970	Specification for wrought steel for mechanical end			
F	Make of Accessories				
1	Limit switches	ALFA/KELTRON/ILP			
2	Solenoid valve	ASCO / JEFFERSON, ARGENTINA / HERION (GERMANY/ITALY)			
3	Air Lock relay	KELTRON / ILP/SMC			
4	Positioner	KELTRON / ILP/SMC			
		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			
	Sub suppliers & Instrumentation / FB	 R.M. VAIRAVAN Manager			
	For NTPC use				
	Reviewed by:				Approved by:
	Format No.: QS-01-QAI-B-06/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.	CI:QA:1715:CQP:04			NABINAGAR 3 X 660 MW SG					
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Ref Doc	Acceptance Norms	Format of record	Agency		Remarks				
Sub system:									D	M	C	N			
<b>B</b>	<b>In Process Inspection</b>														
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	-	-				
<b>C</b>	<b>Finished Product Inspection</b>														
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	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	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	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	W				
		e. Stroking length & time	Major	PHYS	100%	--DO--	--DO--	Int R/TC	P	W	W				
		f. Pressure resistance test	Critical	PHYS	100%	--DO--	--DO--	Int R/TC	P	W	W				
		g. Response time test	Major	PHYS	100%	--DO--	--DO--	Int R/TC	P	W	W				
		h. Provision of accessories like linkage mechanism,	Major	PHYS	100%	--DO--	--DO--	Int R/TC	P	W	W				
		i. Performance test (linearity, hysteresis,	Critical	MECH	100%	--DO--	--DO--	Int R/TC	P	W	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 'W' AS W												NTPC Doc. No.: 0370-102-01-TR-QVI-Q-2524C, Rev 00			
Sub supplier Controls & Instrumentation / LFB Manager F.M. VAIRAVANANDHAR 						For NTPC use						Reviewed by:		Approved by:	
Format No.: QS-01-QAI-P-09/ELR1 Tiruchy-620015															





**MANUFACTURING QUALITY PLAN**

Sl. No	Component & Operations	Manufacturer's Name & Address (As per LOA approved vendor List- Refer Note 7)	ITEM: PNEUMATIC ACTUATORS (OPEN/CLOSE & REGULATING TYPE)	Qp No.	CI:QA:1715:CQP:04	NABINAGAR 3 X 660 MW			
							Sub system:	Rev No.	Package No.
Characteristics		Quantum of check	Type of check	Ref Doc	Acceptance Norms	Format of record	Agency		
Raw Materials & Bought out items Inspection							M	C/N	D
1	Cylinder, Piston Rod	a. Material	OSPL	Spec, BS 970	Spec, BS 970	LGB	V	-	-
		b. Dimensions	MEAS	Spec, BS 970	Spec, BS 970	LGB	P	-	-
		c. Finish, plating thickness	MEAS	Spec, BS 970	Spec, BS 970	LGB	P	-	-
		d. Case hardening	VISU	Spec, BS 970	Spec, BS 970	LGB	P	-	-
2	Cylinder caps, piston rings	a. Material	CHEM	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	V	-	-
		b. Dimensions	MEAS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	-	-
3	"O" ring	a. Material	CHEM	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	V	-	-
		b. Dimension	MEAS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	-	-
		c. Hardness	MEAS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	V	-	-
4	Housing & cover	a. Material	CHEM	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	V	-	-
		b. Dimension	MEAS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	-	-
5	Air filter regulator	a. Type and Make	PHYS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	V	-
		b. Pressure gauge range	PHYS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	-	-
		c. Dimension of process connection	MEAS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	-	-
6	Limit switches	a. Make & type number	PHYS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	V	-
		b. Functional check	ELEC	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	P	-	-
7	Air Lock relay	a. Make & type number	PHYS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	V	V	-
8	Solenoid valve (for open / close type only)	a. Make & type number	PHYS	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	V	V	-
		b. Functional check	ELEC	Spec, Mfr Drg.	Spec, Mfr Drg.	LGB	V	V	-
Sub supplier controls & Instrumentation / ER				Certification signature by  signed s-pranodgoyal@ntpc.co.in Date: 20/11/2013 Time: 16:28:16 IST Reason: CAT I Location: NTPCEOC		Approved by:			
Format No.: QS-01-QAI-P-00/EL-rt		Main supplier		Reviewed by:		Approved by:			


**MANUFACTURING QUALITY PLAN**

	Manufacturer's Name & Address <b>(As per LOA approved vendor List- Refer Note 7)</b>	ITEM: <b>PNEUMATIC ACTUATORS (OPEN/CLOSE &amp; REGULATING TYPE)</b>	QP No.	CI:QA:1804:CQP:04	NTPC GADARWARA 2 X 800 MW
	Sub system:	Rev No.	Package No.	Contract No.	Main supplier
j. Stayput & manual operation	Critical MECH 100% 20%	JIS B8377 spec Data sheet	JIS B8377 spec Data sheet	Int R/TC	P W W
2 Type test	<b>Type test requirement shall be as per agreement with NTPC Engg - CHP</b>				
<b>D Notes:</b>	MEAS : Measurement ELEC : Electrical Int. R : Internal Report MECH : Mechanical TC : Test Certificate				
<b>1. LEGENDS:</b> PHYS : Physical VISU : Visual OSPL : One sample per Lot CHEM : Chemical LGB : Log Book	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.	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.	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) <b>M/s Rotex, Mumbai.</b>	<b>Reference Standards</b>				
JIS B 8377	Specification for Pneumatic cylinder				
BS 970	Specification for wrought steel for mechanical end				
<b>F Make of Accessories</b>	ALFA/KELTRON/ILP				
1 Limit switches	ASCO / JEFFERSON, ARGENTINA / HERION (GERMANY/ITALY)				
2 Solenoid valve	KELTRON / ILP/SMC				
3 Air Lock relay	KELTRON / ILP/SMC/SIEMENS/ABB				
4 Positioner	NTPC Doc. No.: 9572-102-TRY-QVI-Q-041, Rev 00				
Sub supplier	Main supplier	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	D	M	C	N	Agency	Remarks	
<b>B</b>	<b>In Process Inspection</b>	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	-	-				
<b>C</b>	<b>Finished Product Inspection</b>														
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	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	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	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	W			
		e. Stroking length & time	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	W			
		f. Pressure resistance test	Critical	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	W			
		g. Response time test	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	W			
		h. Provision of accessories like linkage mechanism,	Major	PHYS	100%	--DO--	--DO--	Int R/TC		P	W	W			
		i. Performance test (linearity, hysteresis,	Critical	MECH	100%	--DO--	--DO--	Int R/TC		P	W	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: <b>PNEUMATIC ACTUATORS</b> (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		Ref Doc		Acceptance Norms		Format of record		Agency		Remarks	
										Sub system:		Date:		Contract No.		Main supplier		D	
<b>A Raw Materials &amp; Bought out items Inspection</b>		a. Material		Major		CHEM		OSPL		Spec, BS 970		LGB		V		-		-	
1		b. Dimensions		Major		MEAS		100%		Spec, BS 970		LGB		P		-		-	
		c. Finish, plating thickness		Major		MEAS		100%		Spec, BS 970		LGB		P		-		-	
		d. Case hardening		Major		VISU		100%		Spec, BS 970		LGB		P		-		-	
2		a. Material		Major		CHEM		OSPL		Spec, Mfr Drg.		LGB		V		-		-	
		b. Dimensions		Major		MEAS		OSPL		Spec, Mfr Drg.		LGB		P		-		-	
3		a. Material		Major		CHEM		OSPL		Spec, Mfr Drg.		LGB		V		-		-	
		b. Dimension		Major		MEAS		OSPL		Spec, Mfr Drg.		LGB		P		-		-	
		c. Hardness		Major		MEAS		OSPL		Spec, Mfr Drg.		LGB		V		-		-	
4		a. Material		Major		CHEM		OSPL		Spec, Mfr Drg.		LGB		V		-		-	
		b. Dimension		Major		MEAS		OSPL		Spec, Mfr Drg.		LGB		P		-		-	
5		a. Type and Make		Minor		PHYS		OSPL		Spec, Mfr Drg.		LGB		P		V		-	
		b. Pressure gauge range		Minor		PHYS		OSPL		Spec, Mfr Drg.		LGB		P		-		-	
		c. Dimension of process connection		Major		MEAS		OSPL		Spec, Mfr Drg.		LGB		P		-		-	
6		a. Make & type number		Major		PHYS		100%		Spec, Mfr Drg.		LGB		P		V		-	
		b. Functional check		Major		ELEC		100%		Spec, Mfr Drg.		LGB		P		-		-	
7		a. Make & type number		Major		PHYS		100%		Spec, Mfr Drg.		LGB		V		V		-	
8		a. Make & type number		Major		PHYS		100%		Spec, Mfr Drg.		LGB		V		V		-	
		b. Functional check		Major		ELEC		100%		Spec, Mfr Drg.		LGB		V		V		-	
		Signature: <i>[Signature]</i>		Date: 25/04/19		Location: CATI		Reason: CATI		Signature: <i>[Signature]</i>		Date: 2014.05.05		Location: NTPCEOC		Reason: NTPCEOC		Approved by:	
		Signature: <i>[Signature]</i>		Date: 25/04/19		Location: CATI		Reason: CATI		Signature: <i>[Signature]</i>		Date: 2014.05.05		Location: NTPCEOC		Reason: NTPCEOC		Approved by:	

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

For NTPC use

Sub supplier: *[Signature]*  
 Main supplier: *[Signature]*

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

Ref : MM/BOI/C&I/07

**SPECIAL CONDITIONS**

1. This tender is for the supply of Pneumatic actuators as per enquiry.
2. The vendor shall have adequate experience in supplying pneumatic actuators to thermal power plants
3. The tender shall be in two parts. One part consisting of commercial and technical conditions and other with price details. Techno-commercial bid and price bid are to be submitted in separate sealed covers. In addition to technical and commercial conditions, vendors who are not registered vendor of BHEL Trichy, have to submit the filled in “supplier registration Forms” along with the technical bid. ***The new vendors may download vendor registration forms from BHEL web site in [www.bhel.com](http://www.bhel.com) and submit all relevant data for formal registration.*** Based on this and other conditions, as well as capacity and capability, vendors will be short-listed. Both these covers are to be put in a single cover duly super scribing the Enquiry Number. The technical and commercial bid will be opened on the due date and based on the acceptance of techno-commercial bid and vendor evaluation, the price bid/RA of the qualified vendors will be opened on a suitable date with due intimation

Following will be the criteria for vendors to qualify:

- a) Vendor should have been approved by BHEL / Trichy for this item.  
(OR)
- b) Vendor should submit the following documents for considering them as an approved vendor:
  - i. Duly filled-in supplier registration forms
  - ii. Availability of minimum manufacturing, handling, testing and measuring facilities as detailed in the Supplier Registration Form
  - iii. BHEL will have the right for spot assessment of the facilities for assessment.
  - iv. Qualifying to our techno commercial requirements of the enquiry.

4. Tendering will be finalized on the basis of project-wise “Total cost upto FOR-Site basis”. ( L1 Tenderer on FOR-Destination Basis)
5. BHEL reserves the right to negotiate the L1 rate.
6. BHEL reserves the right to re-float the tender opened, if L1 price is not the lowest acceptable price to BHEL inter-alia other reasons
7. Vendors have to submit their confirmation to the commercial Terms and Special Terms & Conditions attached.
8. BHEL’s standard LD condition as per pt. (5) of Annexure-A, commercial terms and conditions for the undelivered portion of materials is applicable. Pls. confirm.
9. Payment Terms: Refer pt.( 8)- Annexure-A, commercial terms and conditions.



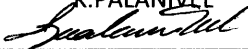
Sr. Engineer/MM/BOI



## 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

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>A RAW MATERIALS &amp; BOUGHT OUT ITEMS INSPECTION</b>												
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

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>B INPROCESS INSPECTION</b>												
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	-	-	
<b>C FINISHED PRODUCT INSPECTION</b>												
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, Hysterisis, 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	-	

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



**D.NOTES:**

**1.LEGENDS:**

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

2. 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.
3. 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.
4. All Measuring and Testing Instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification.

5. Test reports for routine tests are to be furnished by the vendor.
6. Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry.
7. Vendor to give tentative inspection program in advance and confirm exact date two weeks in advance for arranging BHEL's inspection.
8. 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

# Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT , TIRUCHIRAPPALLI 620 014.

## TECHNICAL DELIVERY CONDITIONS

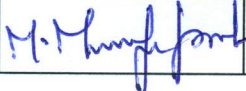



FOR SUB - DELIVERY COMPONENTS OF  
CONTROLS AND INSTRUMENTATION/FB

TCI :143, Rev. 08

PAGE 01 OF 08

### POWER CYLINDERS - REGULATING TYPE

#### Revision History

REV. NO.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED	
					Engg.	QAC
			M.Muruga Prabu	V.M.Selvaraaj	D.Mahendrababu	N.Sridhar
01 - 07	----	General Revisions	- Sd -	- Sd -	- Sd -	- Sd -
08	25-09-13	Revised after revisit				

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS	
1.0	<b>Site conditions :</b>		
1.1	Ambient temperature	50° C	
1.2	Relative humidity	100 %	
1.3	Atmosphere	Dusty, Salty, Highly Polluted & Corrosive	
1.4	Altitude above MSL	1000 metre	
2.0	<b>General :</b>		
2.1	Application	Regulating Dampers	
2.2	Actuator type	Double acting piston type	
2.3	Air Supply	Power	Minimum : 3 kg/sq cm (g)
		Air	Maximum : 7 kg/sq cm(g)
		Signal Air	Minimum : 0.2 to 1kg/sq cm(g)
2.4	Duty Cycle	Continuous	
2.5	Location	Outdoor	
2.6	Mounting	Foot mounted, with output lever having an angular movement	
2.7	Angle of Travel	Refer Purchase Enquiry	
2.8	Operation Speed required.	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	Required	
2.13	Type of stay put device	Self Reset	

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
3.0	<b>Material :</b>	
3.1	Piston rod	Hard chrome plated high strength steel
3.2	Piston	High Strength Steel
3.3	Cylinder barrel	Honed & hard chrome plated seamless Carbon steel
3.4	Piston& Cylinder seals	Viton
4.0	<b>Accessories</b>	
4.1	<b>Limit Switch :</b>	
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	<b>Positioner :</b>	
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)

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
4.2.3	Enclosure	Shall be as per manufacturer's standard
4.2.4	Applicability of SMART Positioner	Refer Purchase enquiry. Separate technical specification for SMART positioner will be attached, if applicable.
4.3	<b>Air Lock Device :</b>	
4.3.1	Type	Set point adjustable with Self Reset
4.4	<b>Air filter cum regulator :</b>	
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	<b>Material : (If there any project specific requirement the same will be indicated in the purchase enquiry )</b>	
	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	<b>Pressure gauge :</b>	
	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	<b>Position Transmitter :</b>	
	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	<b>Hand wheel / Lever</b>	To be provided along with power cylinder for manual operation.
4.7	<b>I/P convertor</b>	Refer purchase enquiry for applicability.
4.8	<b>Junction Box</b>	
4.8.1	Junction Box	All the electrical connections from the accessories input and output signals, 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. Vendor to follow as per the project	3 nos. of double compression type brass with nickel plated weather proof cable glands suitable for cable OD of 18 mm

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
	specific BHEL Terminal block wiring drawing.	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	<b>Linkage rods</b>	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	<b>Characteristics Power cylinder with Positioner</b>	
6.1	Sensitivity	$\pm 0.5$ % of input span under no load.
6.2	Repeatability	$\pm 1$ % of output span under no load.
6.3	Accuracy	$\pm 3$ % of output span under no load
6.4	Hysteresis	$\pm 1$ % of output span under no load.
7.0	<b>Standards</b>	Applicable standard IS 11245-2004
8.0	<b>Inspection &amp; testing</b>	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.
	<b>Painting/Finish for both Power Cylinder &amp; Linkage rods</b>	
9.0	a. Paint Shade	Shall be as per manufacturer's standard
	b. Finish	Corrosion resistant, Epoxy based resin.
10.0	<b>Documents</b>	
10.1	Documents to be submitted in soft copy with complete details, along with the offer & during approval stage.	<ol style="list-style-type: none"> <li>Vendor to submit a duly filled in power cylinder datasheet furnished by BHEL for evaluation.</li> <li>General Arrangement drawing of Power Cylinder assembled with accessories indicating the dimensional details, mounting</li> </ol>

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
		<p>arrangement&amp; foundation details. Vendor has to submit a neat &amp; legible, soft copy of the Auto Cad drawing in pdf version.</p> <ol style="list-style-type: none"><li>3. Tubing drawing indicating all the accessories.</li><li>4. Wiring drawing with terminal blocks numbers.</li><li>5. Taking care of all the requirements indicated in the technical specification of the power cylinder, technical specification of the SMART Positioner (for applicable projects) &amp; technical specification of the I to P Converter (for applicable projects)&amp; terminal block wiring drawing, vendor has to submit the No-deviation format. In the "No Deviation format", vendor to specify the BHEL's enquiry details, project details &amp;reference details of the documents/drawings referred above and should indicate as "No – Deviation". If vendor takes any deviation, the offer is considered as incomplete and the same is liable for rejection.</li><li>6. Point wise Confirmation to the applicable quality plan &amp; packing procedure.</li><li>7. Offer for :<ol style="list-style-type: none"><li>a) Commissioning spares</li><li>b) Maintenance spares for two years operation</li></ol></li></ol>

SL. NO.	DETAILS	TECHNICAL REQUIREMENTS
10.2	Operation & Maintenance Manuals	<p>1. 1 set of soft copy (loaded on a DVD) &amp; 1 set of Hard Copy of the O&amp;M manual comprising of the following documents shall be submitted to BHEL Trichy.</p> <ul style="list-style-type: none"> <li>• Operation &amp; Maintenance instruction set.</li> <li>• Power Cylinder datasheets.</li> <li>• Dimensional drawing of the assembled power cylinder.</li> <li>• Tubing drawing.</li> <li>• Wiring Drawing.</li> <li>• Erection/Calibration procedure.</li> <li>• Catalogues of the power cylinder &amp; its accessories.</li> </ul> <p>2. 1 No. of O&amp;M manual and erection/calibration procedure shall be placed in each power cylinder package for usage during erection &amp; commissioning activity.</p>
10.0	<b>Packing</b>	As per packing procedure No. QA:CI:STD:PR:03 (latest revision).
11.0	<p><b>Pre Qualification Requirements</b> (For open tender case only)</p>	<p>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.</p> <p>The bidder 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.</p>

## NOTE :-

1. Refer current valid list for revision status of Quality Plan, Drawing No. & Packing Procedure.
2. Foundation bolts, Fasteners & Positioner cams shall be identified separately in shipping list/ Delivery challan.

# Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT , TIRUCHIRAPPALLI 620 014.

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

**TDC : TCI : 317 / REV 02**

**PAGE 01 OF 03**

**TECHNICAL SPECIFICATION**  
**OF**  
**SMART POSITIONER**

Rev. No.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED	
					ENGG	QAC
			M.Muruga Prabu	V.M.Selvaraaj	D.Mahendrababu	N.Sridhar
00	11-12-2009	Initial Release	-sd-	-sd-	-sd-	-sd-
01	----	General Revisions	-sd-	-sd-	-sd-	-sd-
02	26-09-2013	Revised to edit the various clauses as per the site feedback	<i>M. Muruga Prabu</i>	<i>V.M. Selvaraaj</i>	<i>D. Mahendrababu</i>	<i>N. Sridhar</i>

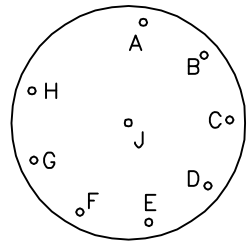
**General instructions to the vendor :-**

- Vendor to quote the SMART positioner along with the position feedback module and alarm module.

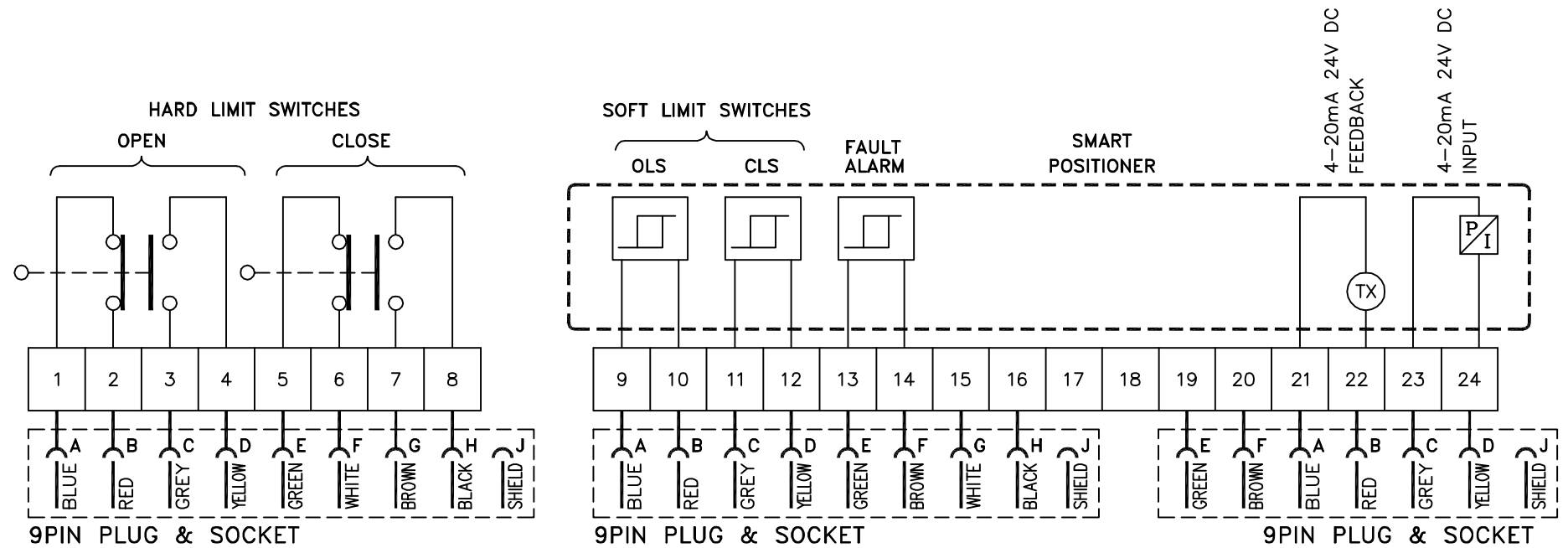
Sl. No	Technical Description/Requirement	
1	SITE CONDITIONS :- Altitude above Sea Level Atmosphere Relative humidity Design Ambient temperature	500 Meters Tropical, Dusty, Windy & Heavily polluted atmosphere 0 – 95 % 50 °C
2	Make	SIEMENS / ABB
3	Type of Input	4-20 mA, 24VDC , 2 wire system (Loop powered from the external supply)
4	Operational signal range	3.6 mA - 21 mA (4-20 mA). Split range operation shall also be possible.
5	Voltage	Vendor to specify.
6	Input impedance	Vendor to specify.
7	Supply Air pressure	5 – 7 kg/cm <sup>2</sup>
8	Air Capacity	Vendor to match with the requirement of the actuator.
9	Sensitivity, Characteristic Deviation, Hysteresis	Vendor to match with the requirement of the actuator.
10	Type of Acting (Direct/Reverse)	Vendor to match with the requirement of the actuator.
11	Stroke time	Vendor to match with the requirement of the actuator.
12	No. of pneumatic outputs (Single/Double)	Vendor to match with the requirement of the actuator.
13	Pneumatic Process Connection	¼" NPT (F)

SI. No	Technical Description/Requirement	
14	Communication by Hart Protocol	SMART positioner shall be compatible for Remote calibration & Diagnostics using Hart Management System.
15	Calibration	SMART positioner shall be compatible for Auto Start with self calibration, Remote calibration & manual calibration using push buttons available on the positioner.
16	Position feed back	4-20mA position feedback signal shall be provided.
17	Indication for travel	Electronic Indication shall be provided.
18	Electrical Cable entry	Side or bottom entry to avoid water ingress.
19	Protection Class	IP 65 minimum
20	Action of actuator during 4 to 20 mA control signal failure.	SMART positioner shall be compatible for achieving Fail Open, Fail Close & Stay put (Fail freeze) functions.
21	Accessories	For Supply & output pressure, gauges shall be provided.
22	EMC Compliance	SMART positioner shall conform to IEC 61000-6-2, 3, IEC 61326; or equivalent standards.
23	Influence of Temperature rise & Vibration effect on SMART Positioner	Vendor to specify.

**TB DIAGRAM OF REGULATING DUTY POWER CYLINDER**



**9 PIN  
PLUG & SOCKET  
ARRANGEMENT**



**NOTE**

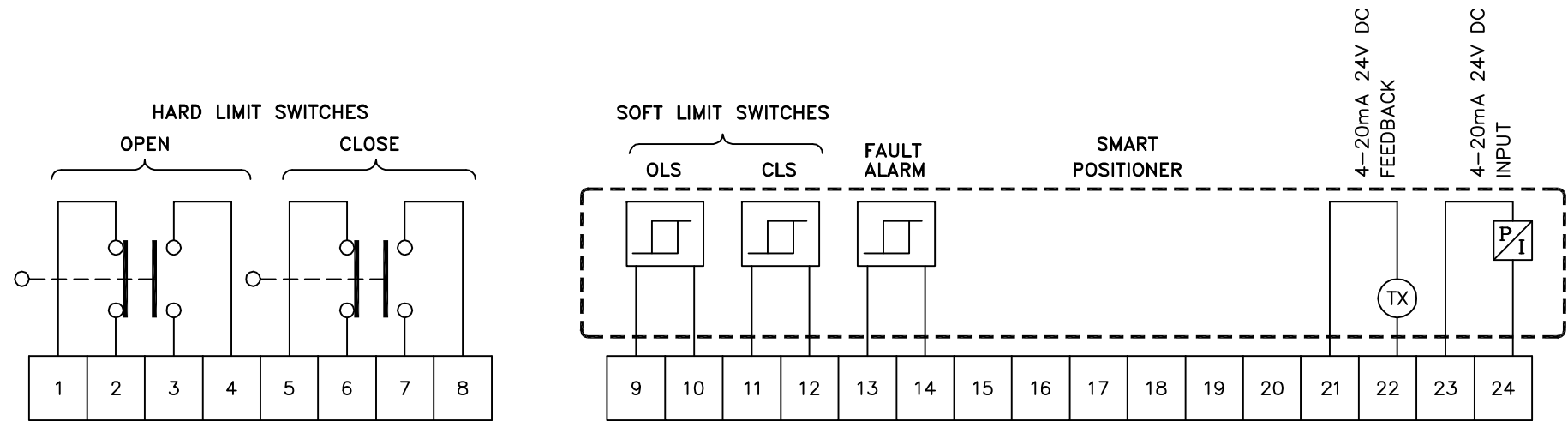
3 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTD ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT 4PAIR x 0.5SQ.MM, INSTRUMENTATION CABLE OF OD 17MM

JOB NO.		401	
STATUS			
DISTRIBUTION CONTRACT			
TO			
No. OF			
REV	DATE	ALTERED :	
		CHD. / APPD. :	
ZONE			

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.

NTPC Drg. No. : .		NBPPL Drg. No. : .	
PROJECT : <b>FEROZE GANDHI UNCHAHAR THERMAL POWER PROJECT</b> STAGE-IV, 1 x 500MW, Customer No. 0685			
OWNER :		<b>NTPC LIMITED</b> (A GOVERNMENT OF INDIA ENTERPRISE)	
EPC VENDOR :		<b>NTPC BHEL POWER PROJECTS PRIVATE LIMITED</b> (A JOINT VENTURE COMPANY OF NTPC & BHEL) Y.S.R. PURAM, VILLAGE MANNAVARAM, SRI KALAHASTI MANDAL, DIST. CHITTOOR - 517620 (A.P.)	
<b>Bharat Heavy Electricals Ltd</b> UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014	DRN	NAME	A.ThambuRaj
	CHD	SIGNATURE	<i>[Signature]</i> 260714
	APPD	DATE	26-07-14
DEPT. - C&I	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
CODE - 392	NTS		ITEM NO
TITLE		CARD CODE	REV
TERMINAL BLOCK DIAGRAM FOR POWER CYLINDER (DRAWN FOR INTERMEDIATE POSITION OF PC) Sheet 01 of 01		U 01	<b>00</b>
DRAWING NO :		<b>3-97-599-22202</b>	

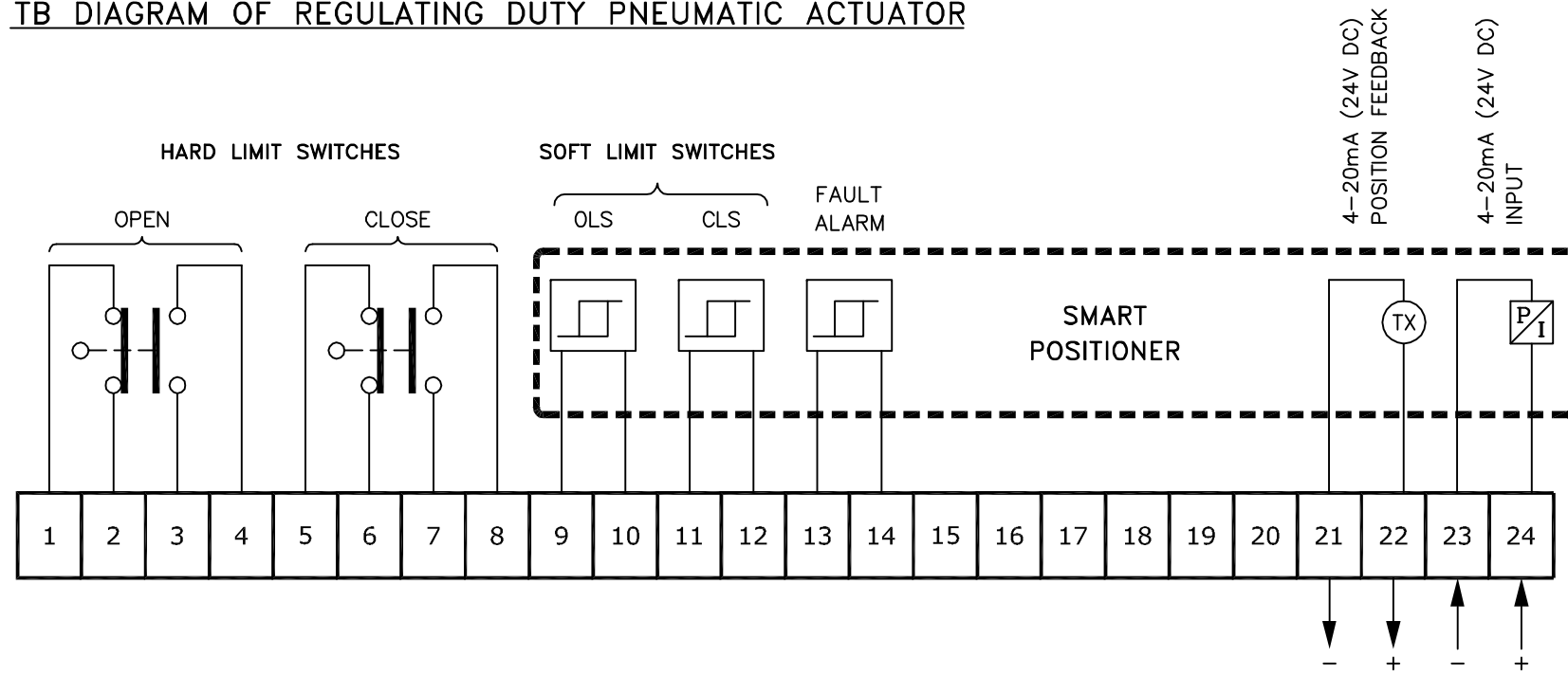
TB DIAGRAM OF REGULATING DUTY POWER CYLINDER



REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

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		ORISSA POWER GENERATION CORPORATION LIMITED IB THERMAL POWER STATION - AUX. BOILER 60 TPH, 19 KG/SQ.CM, 250°C, Cust. No. 1419.					
		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014		DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	M.Muruga Prabu		30-12-14	—		
		APPD	V.M.Selvarraaj		30-12-14			
	DEPT. : C & I		ALL DIMENSIONS ARE IN MM	SCALE NTS	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE : 392								
TITLE TERMINAL BLOCK DIAGRAM FOR PNEUMATIC ACTUATOR (DRAWN FOR INTERMEDIATE POSITION OF ACTUATOR) Sheet 01 of 01				CARD CODE	DRAWING NO : 3-97-599-22455		REV	
				U 01			00	

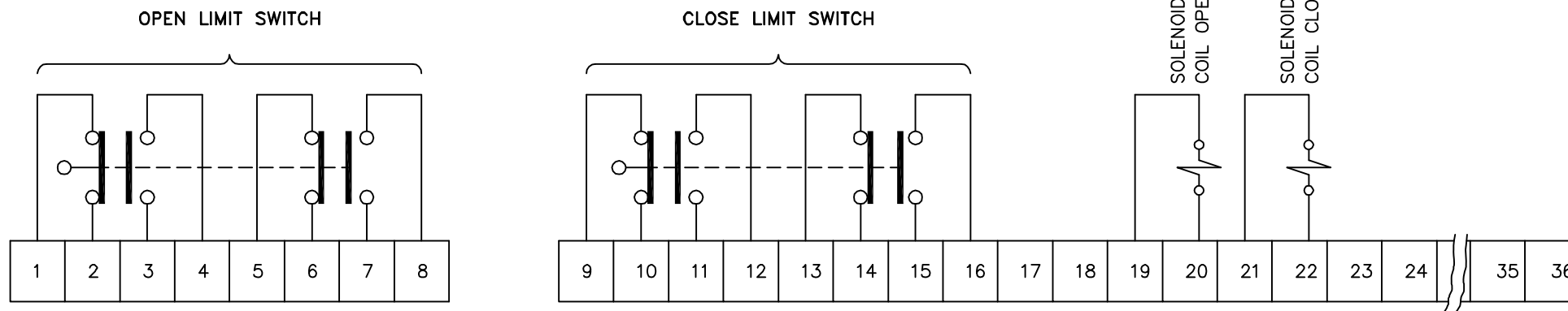
TB DIAGRAM OF REGULATING DUTY PNEUMATIC ACTUATOR



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.	CUSTOMER :  नेवेली लग्निनाइट कांरपोरेशन लिमिटेड (एनएलसी लिमिटेड) NEYVELI LIGNITE CORPORATION LIMITED (NLC LTD.)																
	CONSULTANT :  लहमेयर इंटरनेशनल इंडिया प्राइवेट लिमिटेड M/S LAHMEYER INTERNATIONAL (INDIA) PRIVATE LIMITED.																
	PROJECT : NEYVELI NEW THERMAL POWER PROJECT ( N N T P P ) - Aux Boiler 2 x 500 MW LIGNITE FIRED UNITS, Customer No. 1420 PACKAGE : STEAM GENERATOR AND AUXILIARIES ( NTA1 )																
	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI – 620014	<table border="1"> <tr> <th>DRN</th> <th>NAME</th> <th>SIGNATURE</th> <th>DATE</th> <th>NO. OF VAR</th> </tr> <tr> <td>CHD</td> <td>M.Muruga Prabu</td> <td></td> <td>01-08-14</td> <td>—</td> </tr> <tr> <td>APPD</td> <td>V.M.Selvaraj</td> <td></td> <td>01-08-14</td> <td>—</td> </tr> </table>	DRN	NAME	SIGNATURE	DATE	NO. OF VAR	CHD	M.Muruga Prabu		01-08-14	—	APPD	V.M.Selvaraj		01-08-14	—
	DRN	NAME	SIGNATURE	DATE	NO. OF VAR												
CHD	M.Muruga Prabu		01-08-14	—													
APPD	V.M.Selvaraj		01-08-14	—													
DEPT. : C & I CODE : 392	ALL DIMENSIONS ARE IN MM SCALE : NTS WEIGHT (Kg) : —	REF TO ASSY / OLD DWG : — ITEM NO : — No OF ITEMS : —															
TITLE : <b>TERMINAL BLOCK DIAGRAM FOR PNEUMATIC ACTUATOR (DRAWN FOR INTERMEDIATE POSITION OF ACTUATOR)</b> Sheet 01 of 01	CARD CODE : U 01	DRAWING NO : <b>3-97-599-22205</b> REV : <b>00</b>															

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

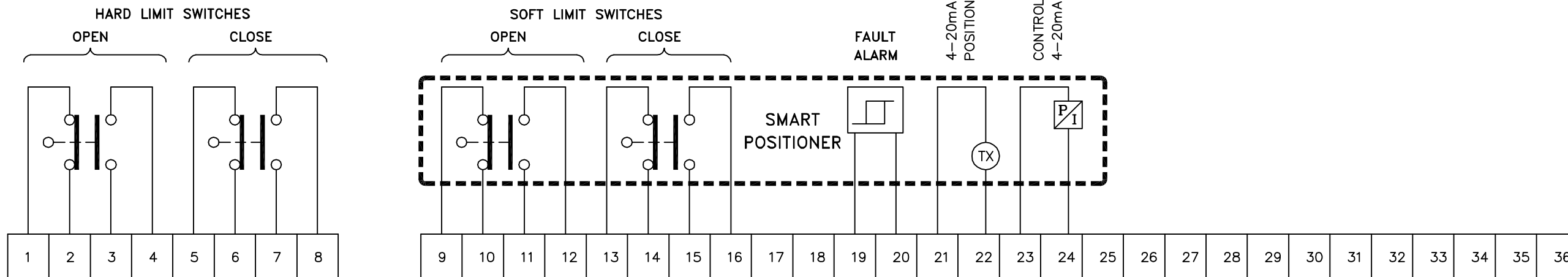
**TB DIAGRAM OF OPEN/CLOSE DUTY PNEUMATIC ACTUATOR**



**NOTE**





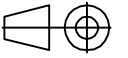
1. # - SINGLE COIL OR DUAL COIL FOR THE RESPECTIVE APPLICATION SHALL BE DECIDED BASED ON THE CONTRACT REQUIREMENT.

**TB DIAGRAM OF REGULATING DUTY PNEUMATIC ACTUATOR**



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.

REV	DATE	ALTERED :
		CHD. / APPD. :
ZONE		

OWNER / : PROJECT :	 <b>OPGC</b> Power for Progress	<b>ORISSA POWER GENERATION CORPORATION LIMITED</b> IB THERMAL POWER STATION, BANHARPALI 2 x 660 MW, UNIT - 3 & 4, Customer No. 1713 & 1714			
CONSULTANT :		DEVELOPMENT CONSULTANTS PRIVATE LIMITED (DCPL)			
 Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN	NAME A.ThambuRaj	SIGNATURE 	DATE 12-09-13	NO. OF VAR
	CHD	M.Muruga Prabu		12-09-13	—
	APPD	V.M.Selvaraj		12-09-13	—
DEPT.-C & I CODE - 392		SCALE NTS	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO
TITLE TERMINAL BLOCK DIAGRAM FOR PNEUMATIC ACTUATOR (DRAWN FOR INTERMEDIATE POSITION OF ACTUATOR) Sheet 01 of 01			CARD CODE U 01	DRAWING NO : <b>3-97-599-21709</b>	REV <b>00</b>

**NOTE**

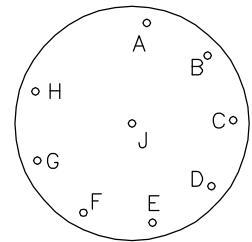
THE FOLLOWING CABLE GLANDS / PLUG AND SOCKETS SHALL BE PROVIDED.

(a). FOR OPEN/CLOSE DUTY POWER CYLINDER

- (i). 2 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTD ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT 4PAIR x 0.5SQ.MM, INSTRUMENTATION CABLE OF OD 17MM.
- (ii). 1 No. CABLE GLAND TO SUIT 5C x 2.5 SQ.MM (Cu.) CONTROL CABLE OD 17MM OD

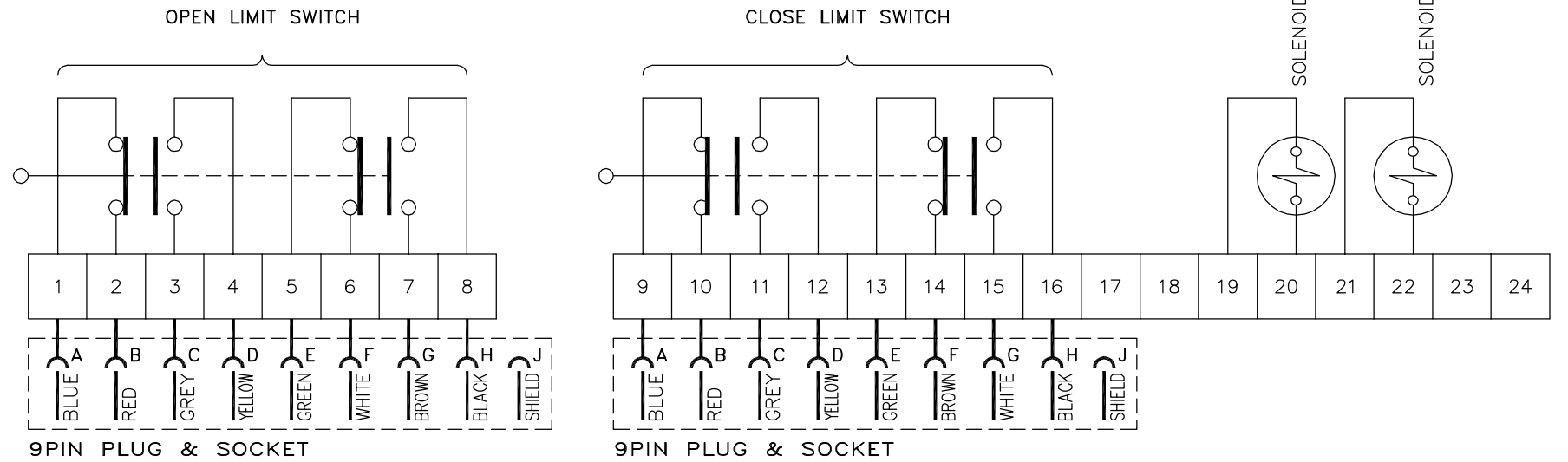
(b). FOR REGULATING DUTY POWER CYLINDERS

- (i). 3 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTD ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT 4PAIR x 0.5SQ.MM, INSTRUMENTATION CABLE OF OD 17MM

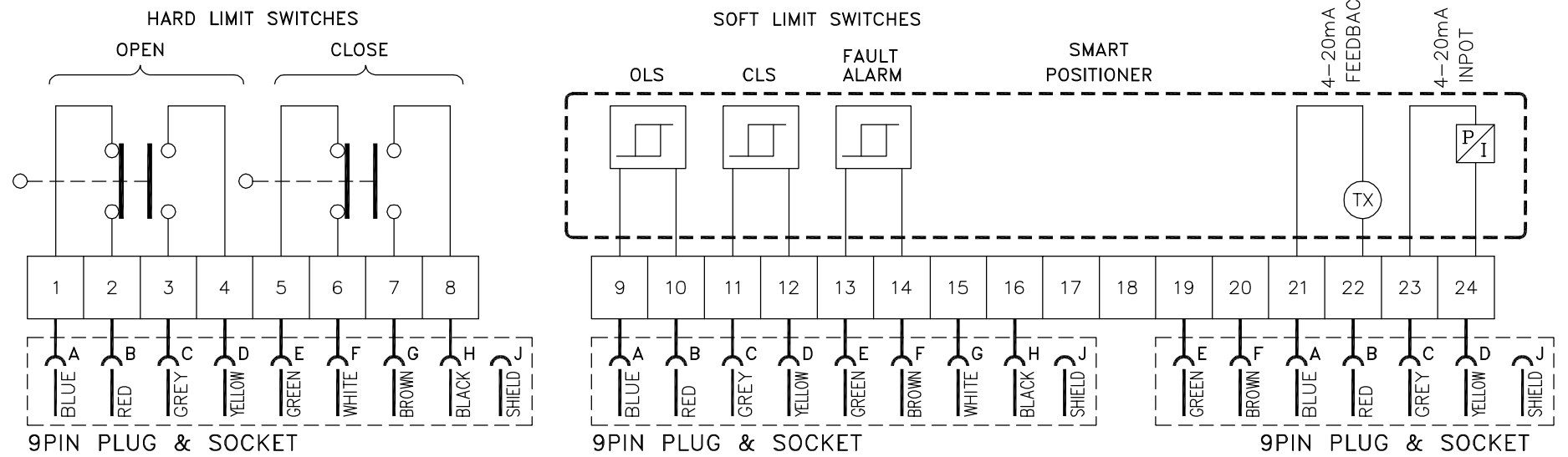


9 PIN PLUG & SOCKET ARRANGEMENT

**TB DIAGRAM OF OPEN/CLOSE DUTY POWER CYLINDER**



**TB DIAGRAM OF REGULATING DUTY POWER CYLINDER**



NTPC DRG. No. : 0370-102-01-TR-PVI-L-0962  
Sheet 01 of 01

REV	DATE	ALTERED :
		CHD. / APPD. :
ZONE		

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.

OWNER :		<b>NABINAGAR POWER GENERATING CO. PVT LIMITED (NPGCL)</b>			
PROJECT :		NABINAGAR SUPER THERMAL POWER PROJECT STEAM GENERATOR PACKAGE, 3 x 660 MW, UNIT-1,2&3, Cust. No. 1715, 1716 & 1717			
CONSULTANT :		<b>NTPC LIMITED</b> (A GOVERNMENT OF INDIA ENTERPRISE) CONSULTANCY WING			
BHARAT HEAVY ELECTRICALS LTD UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR
	CHD	M.Muruga Prabu	<i>[Signature]</i>	05-10-13	—
	APPD	V.M.Selvaraj		05-10-13	—
DEPT.-C & I	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE - 392	NTS				
TITLE		CARD CODE	BHEL DRG. No. :		REV
TERMINAL BLOCK DIAGRAM FOR POWER CYLINDER (DRAWN FOR INTERMEDIATE POSITION OF PC)		U 01	3-97-599-21717		00

**NOTE**

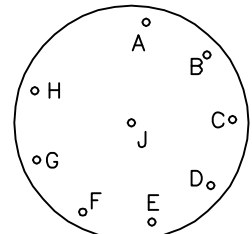
THE FOLLOWING CABLE GLANDS / PLUG AND SOCKETS SHALL BE PROVIDED.

(a). FOR OPEN/CLOSE DUTY POWER CYLINDER

- (i). 2 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTD ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT 4PAIR x 0.5SQ.MM, INSTRUMENTATION CABLE OF OD 17MM.
- (ii). 1 No. CABLE GLAND TO SUIT 5C x 2.5 SQ.MM (Cu.) CONTROL CABLE OD 17MM OD

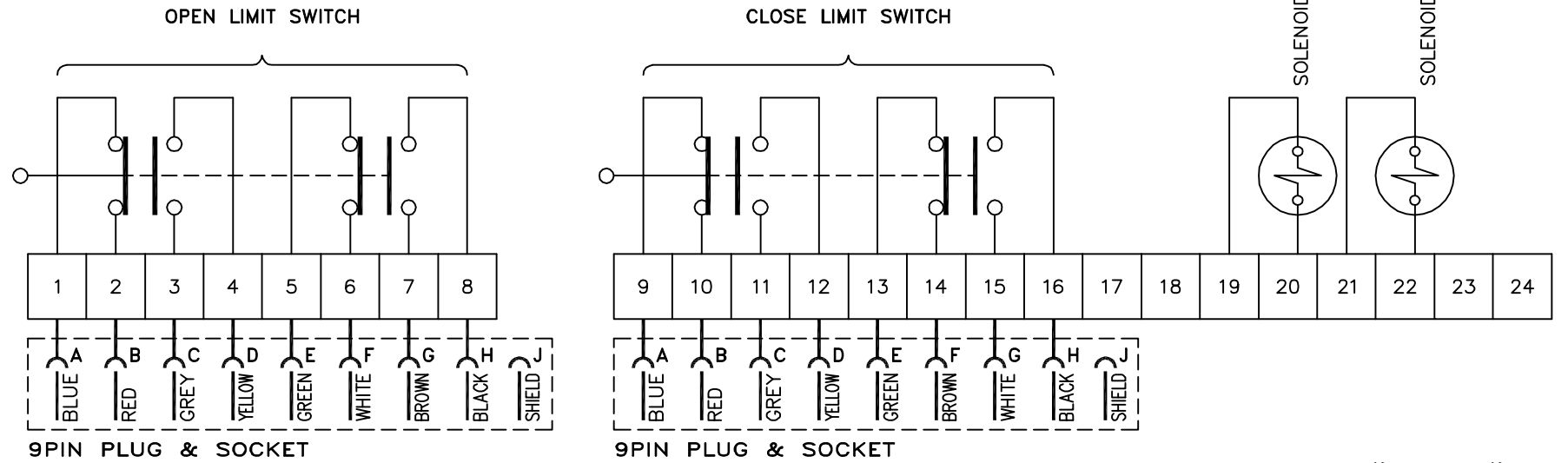
(b). FOR REGULATING DUTY POWER CYLINDERS

- (i). 3 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTD ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT 4PAIR x 0.5SQ.MM, INSTRUMENTATION CABLE OF OD 17MM

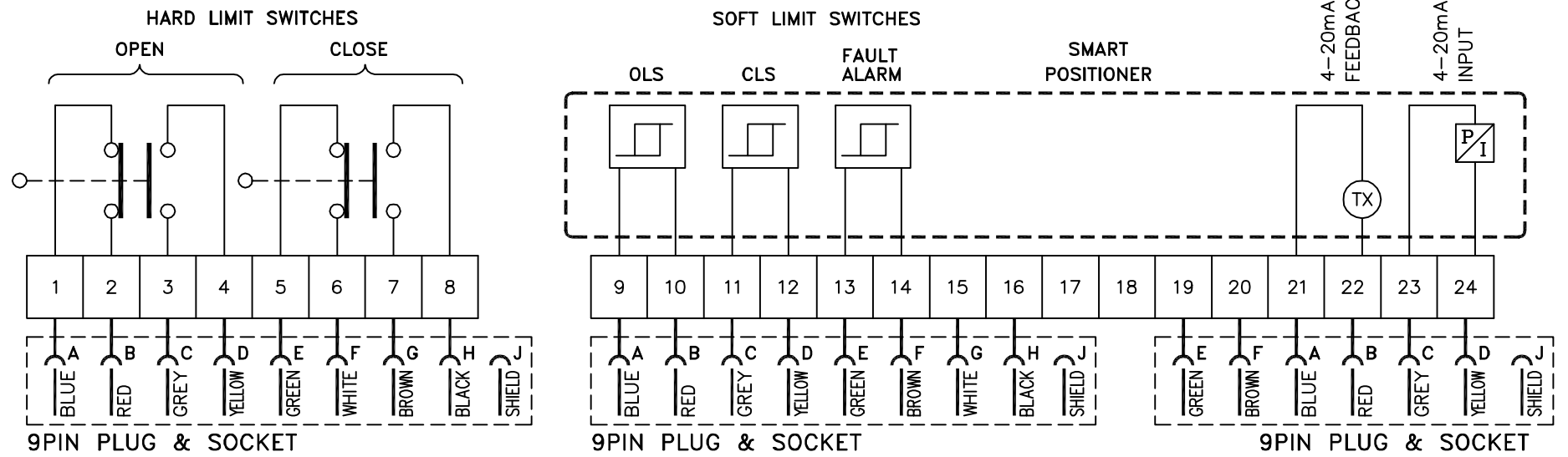


**9 PIN PLUG & SOCKET ARRANGEMENT**

**TB DIAGRAM OF OPEN/CLOSE DUTY POWER CYLINDER**



**TB DIAGRAM OF REGULATING DUTY POWER CYLINDER**



NTPC DRG. No. : 9572-102-PVM-L-XXX  
Sheet 01 of 01

REV	DATE	ALTERED :
		CHD. / APPD. :
ZONE		

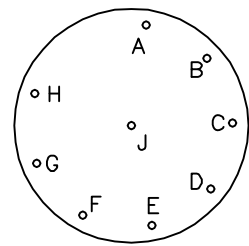
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

PROJECT :		<b>GADARWARA SUPER THERMAL POWER PROJECT</b>				
		STAGE-1, 2 x 800 MW, Customer No. 1804 & 1805				
		STEAM GENERATOR PACKAGE				
CUSTOMER :		<b>NTPC LIMITED</b> (A GOVERNMENT OF INDIA ENTERPRISE)				
BHARAT HEAVY ELECTRICALS LTD UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR	
	CHD	A.ThambuRaj	<i>[Signature]</i>	27-11-13		—
	APPD	V.M.Selvaraj		27-11-13		
DEPT.-C & I	SCALE NTS	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS	
CODE - 392						
TITLE		CARD CODE	BHEL DRG. No. :		REV	
TERMINAL BLOCK DIAGRAM FOR POWER CYLINDER (DRAWN FOR INTERMEDIATE POSITION OF PC)		U 01	3-97-599-21822		00	

**NOTE**

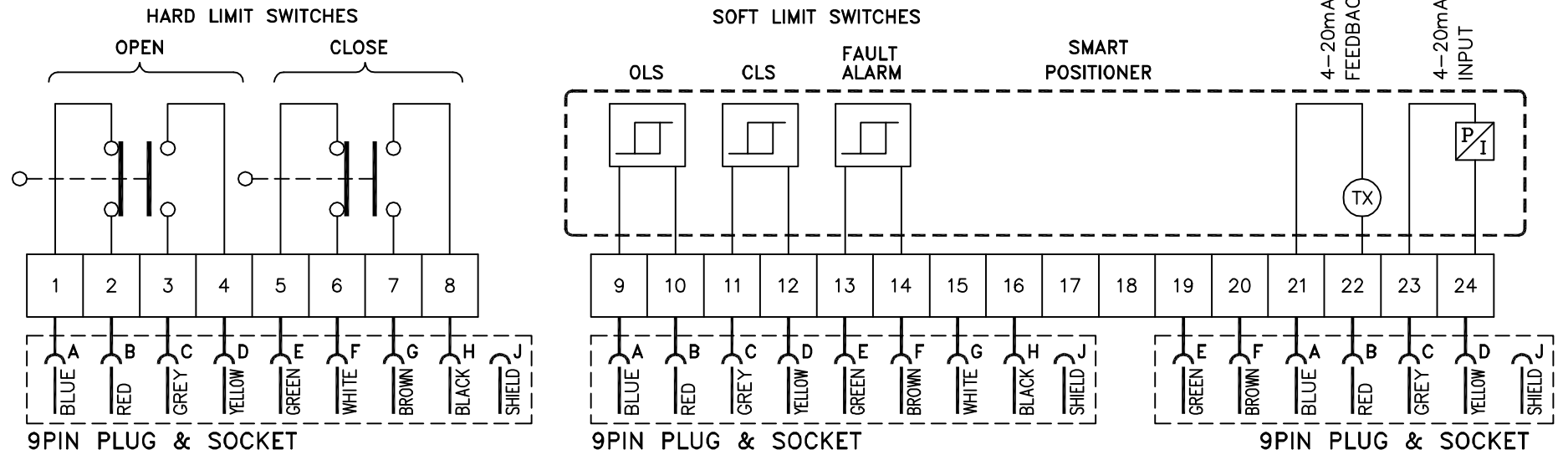
FOR REGULATING DUTY POWER CYLINDERS

(i). 3 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTD ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT  
4PAIR x 0.5SQ.MM, INSTRUMENTATION CABLE OF OD 17MM



**9 PIN  
PLUG & SOCKET  
ARRANGEMENT**

**TB DIAGRAM OF REGULATING DUTY POWER CYLINDER**

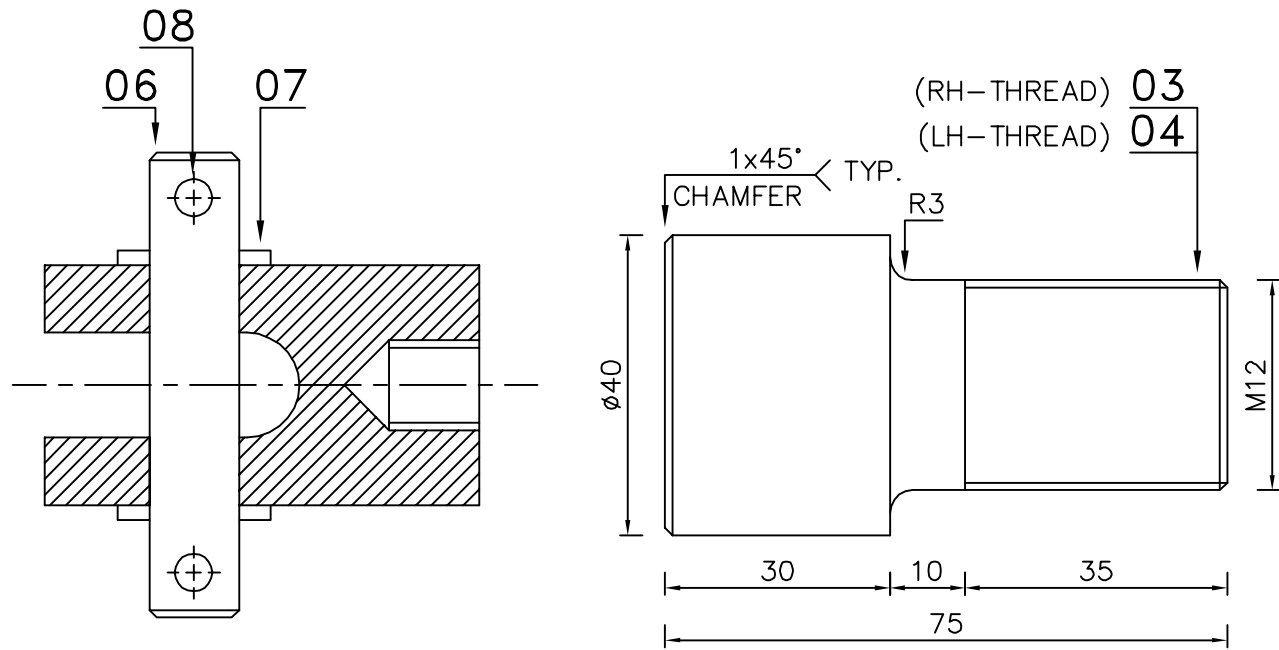
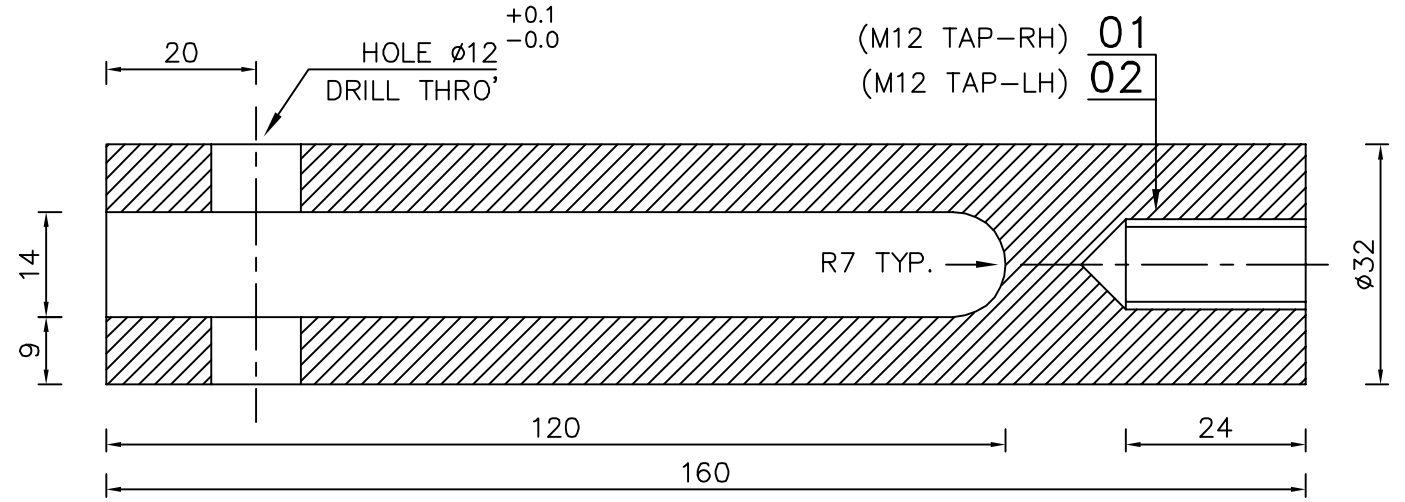
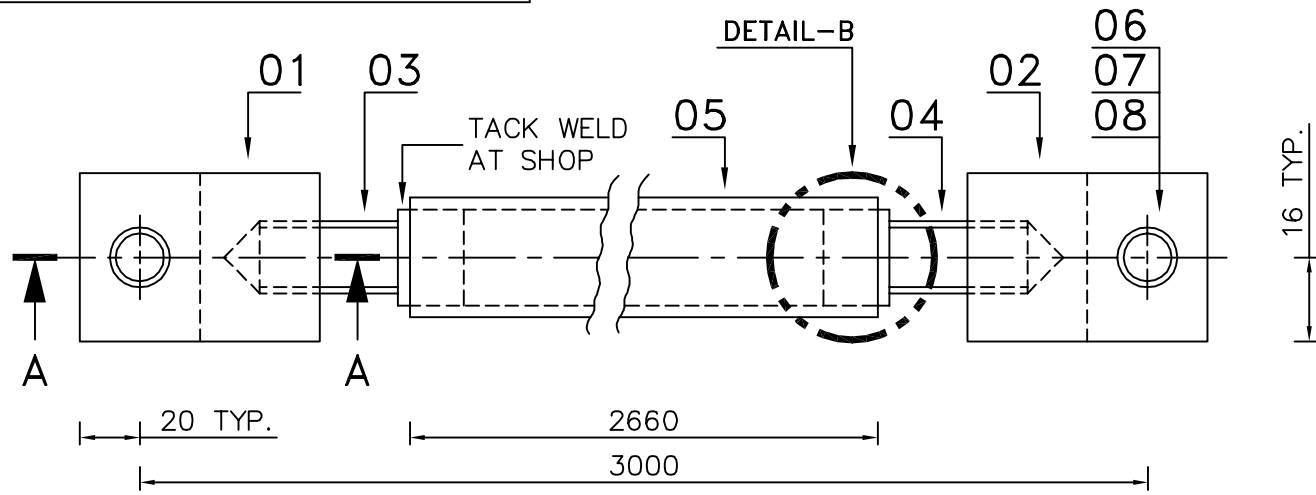


NTPC DRG. No. : 9549-102-PVM-L-XXX  
Sheet 01 of 01

REV	DATE	ALTERED :
		CHD. / APPD. :
ZONE		

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.

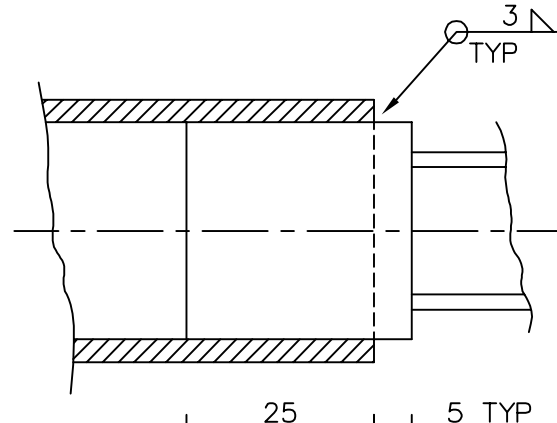
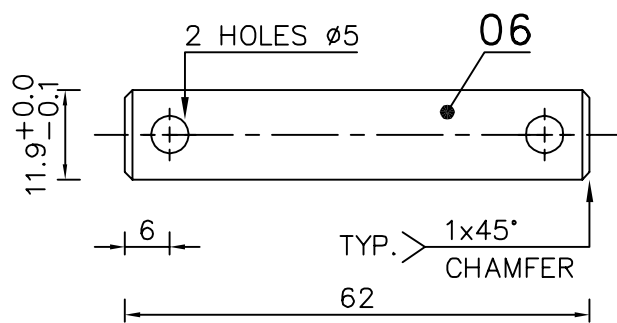
PROJECT : <b>DARLIPALI SUPER THERMAL POWER PROJECT</b> STAGE-1, 2x800 MW, Customer No. 1806 & 1807 STEAM GENERATOR PACKAGE							
CUSTOMER : <b>NTPC LIMITED</b> (A GOVERNMENT OF INDIA ENTERPRISE)							
	Bharat Heavy Electricals Ltd		DRN	NAME	DATE	NO. OF VAR	
	UNIT: HIGH PRESSURE BOILER PLANT		CHD	A.ThambuRaj			09-10-14
	TIRUCHIRAPALLI - 620014		APPD	M.Muruga Prabu			11-10-14
DEPT. : C & I		SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG		ITEM NO	
CODE : 392		NTS					
TITLE			CARD CODE	BHEL DRG. No. :		REV	
TERMINAL BLOCK DIAGRAM FOR POWER CYLINDER (DRAWN FOR INTERMEDIATE POSITION OF PC)			U 01	3-97-599-22366		00	



SECTION-AA

DETAIL-B

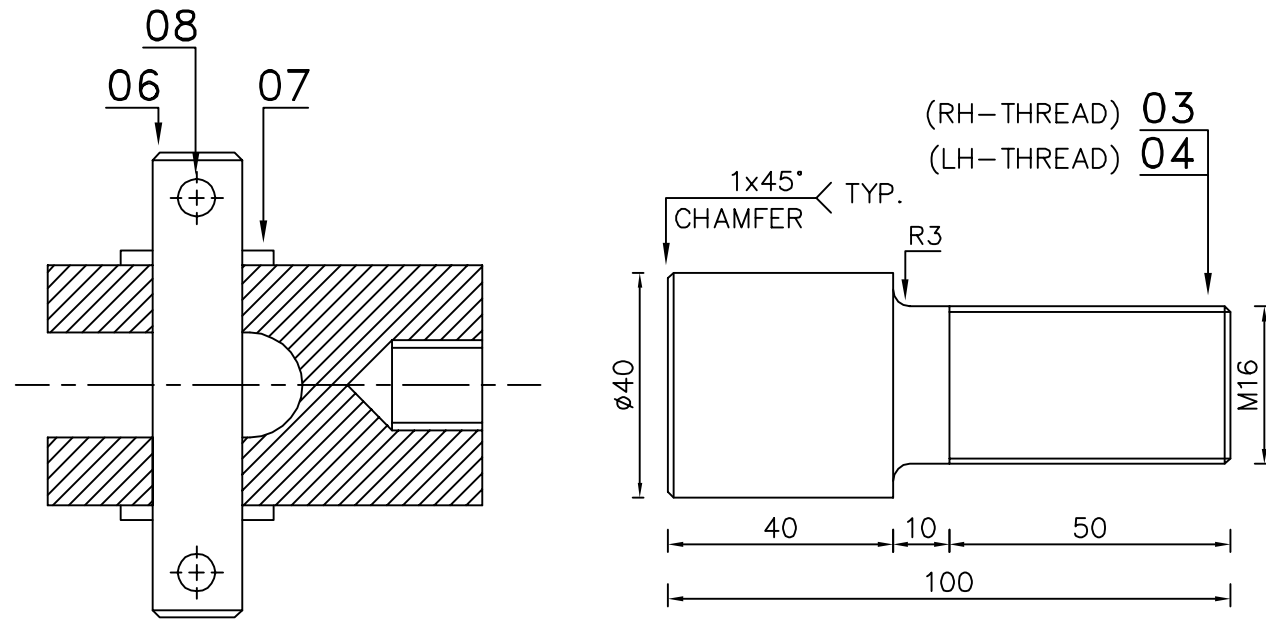
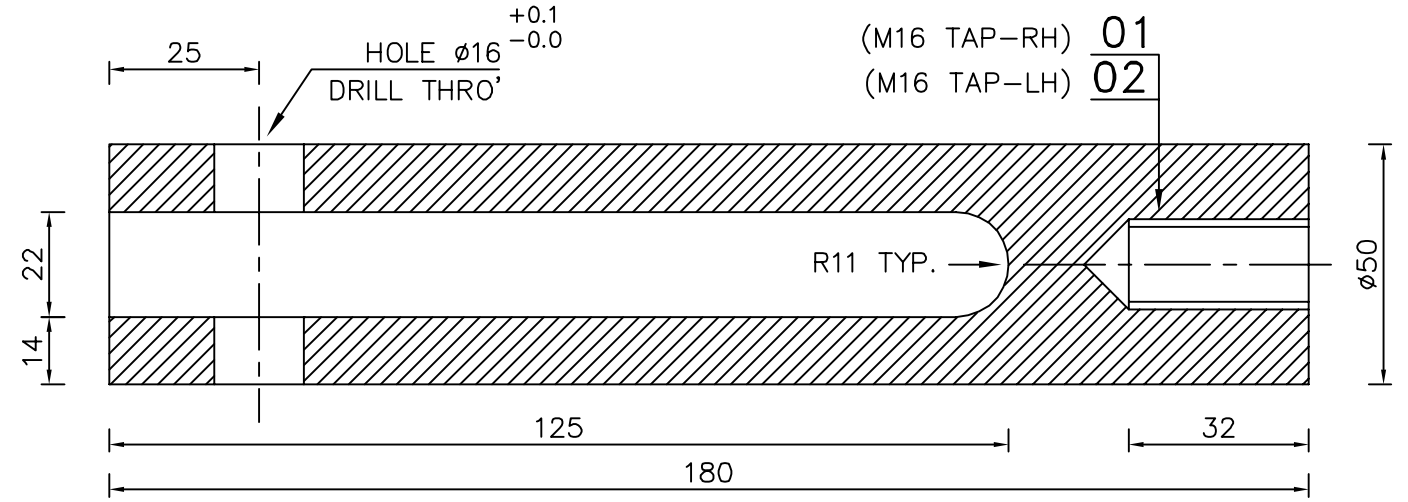
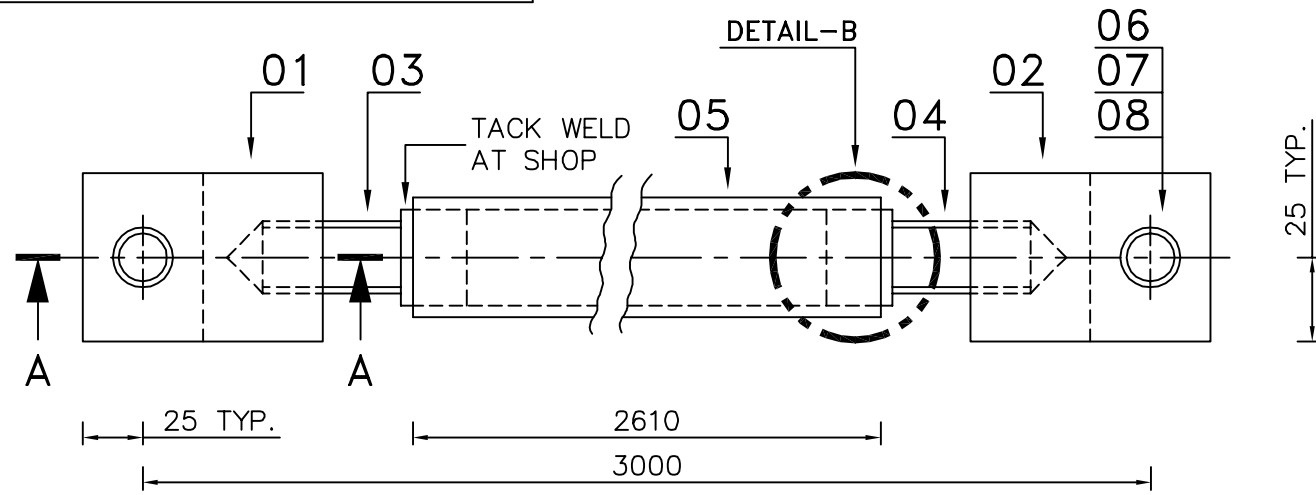
DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	QTY
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
08	SPLIT PIN 4 x 25					41704-40025			0.003	4
07	WASHER PNCHD A 12					41408-00012			0.006	4
06	PIN DIA 12 : 62					15-024-192			0.060	2
						SA 479 TYP 304				1
05	TUBE D 48.3x3.68 2660					15-082-020			10.900	1
						SA 106 Gr.B				1
04	ROD DIA 40 : 75					15-039-116			0.400	1
						SA 193 B7				1
03	ROD DIA 40 : 75					15-039-116			0.400	1
						SA 193 B7				1
02	ROD DIA 32 : 160					15-339-140			1.000	1
						SA 105				1
01	ROD DIA 32 : 160					15-339-140			1.000	1
						SA 105				1



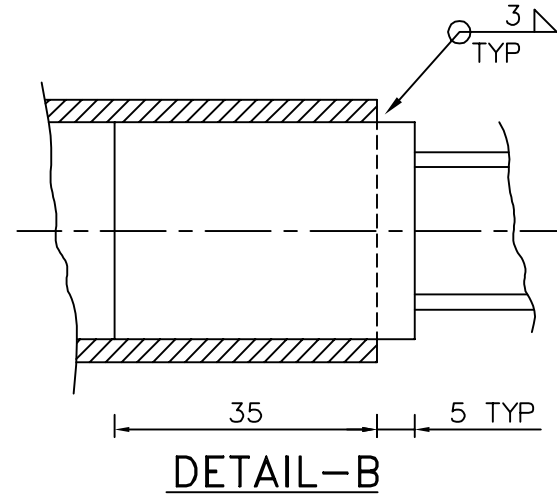
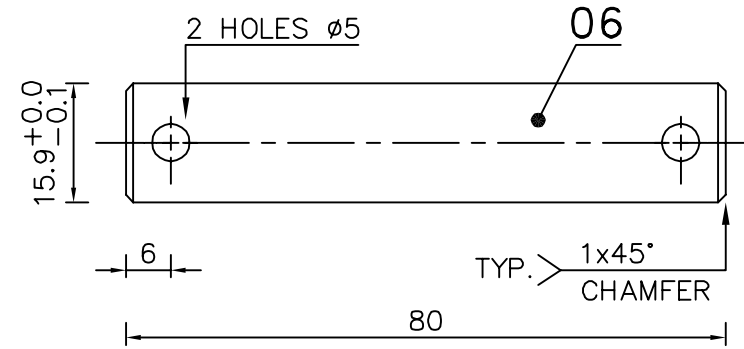
REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD				
Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014		DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	M.Muruga Prabu		18-08-11	—
		APPD	V.M.Selvarraaj		25-11-11	—
DEPT. : C & I	ALL DIMENSIONS ARE IN MM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE : 392		NTS	13.856	THIS DRG SUPERSEDES EARLIER DRAWING	—	—
TITLE		CARD CODE	DRAWING NO :	REV		
LINKAGE ROD ASSEMBLY FOR 06" X 08" POWER CYLINDER Sheet 01 Of 01		U 01	3-97-599-20390	00		

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.



SECTION-AA

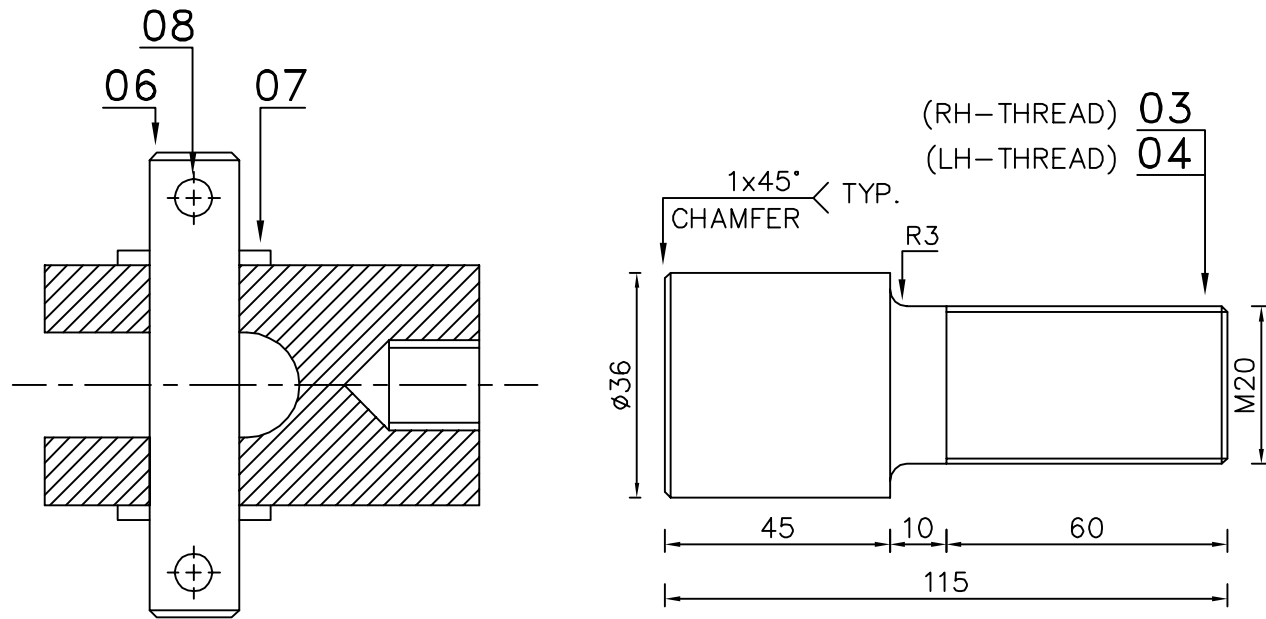
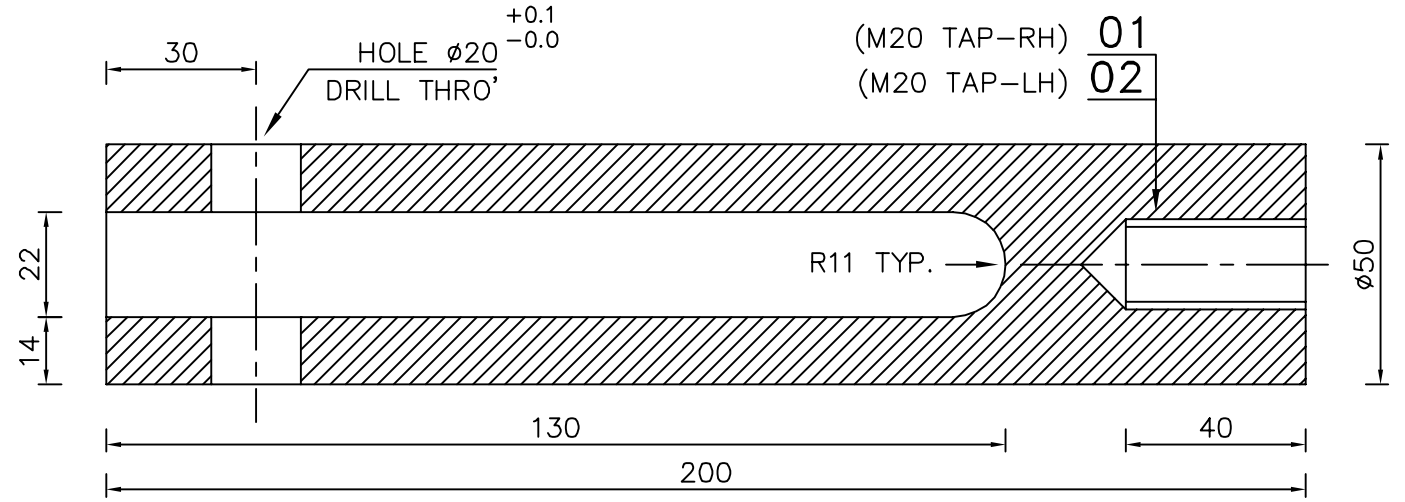
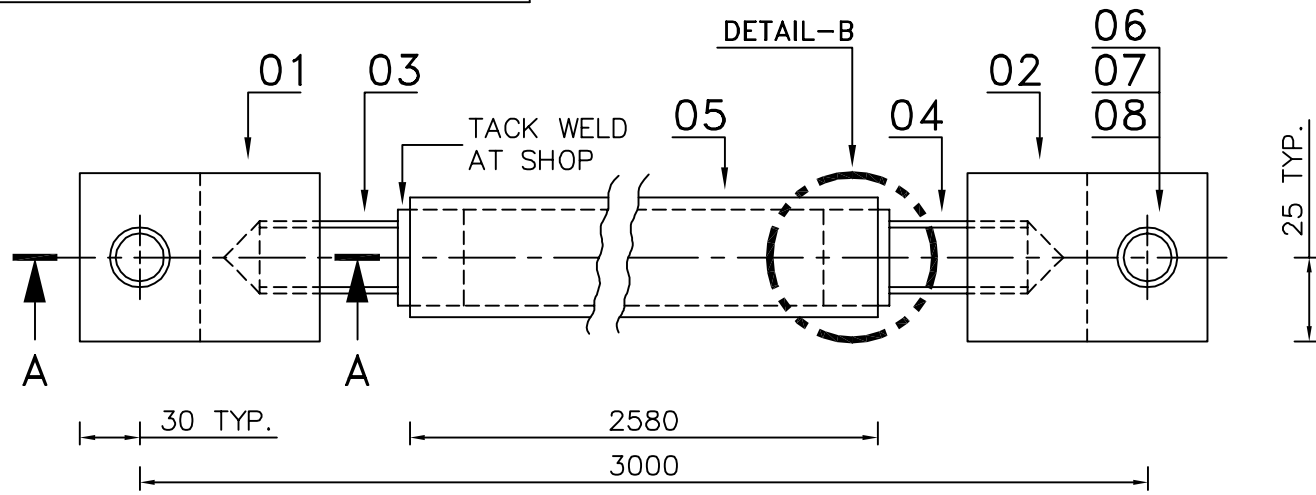


DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
08	SPLIT PIN 4 x 36					41704-40036			0.004	
									4	
07	WASHER PNCHD A 16					41408-00016			0.016	
									4	
06	PIN DIA 16 : 80					15-024-192			0.130	
						SA 479 TYP 304			2	
05	TUBE D 48.3 x 3.68 2610					15-082-020			10.700	
						SA 106 Gr.B			1	
04	ROD DIA 40 :100					15-039-116			0.520	
						SA 193 B7			1	
03	ROD DIA 40 :100					15-039-116			0.520	
						SA 193 B7			1	
02	ROD DIA 50 : 180					15-339-142			2.700	
						SA 105			1	
01	ROD DIA 20 : 180					15-339-142			2.700	
						SA 105			1	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD						
DEPT. : C & I CODE : 392		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014		DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-52984/02		CHD	M.Muruga Prabu		25-11-11	—
				APPD	V.M.Selvarraaj		25-11-11	—
TITLE LINKAGE ROD ASSEMBLY FOR 08" X 08" POWER CYLINDER Sheet 01 Of 01		ALL DIMENSIONS ARE IN MM SCALE NTS	WEIGHT (Kg) 17.480	CARD CODE U 01	REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-52984/02	ITEM NO —	No OF ITEMS —	REV 00

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

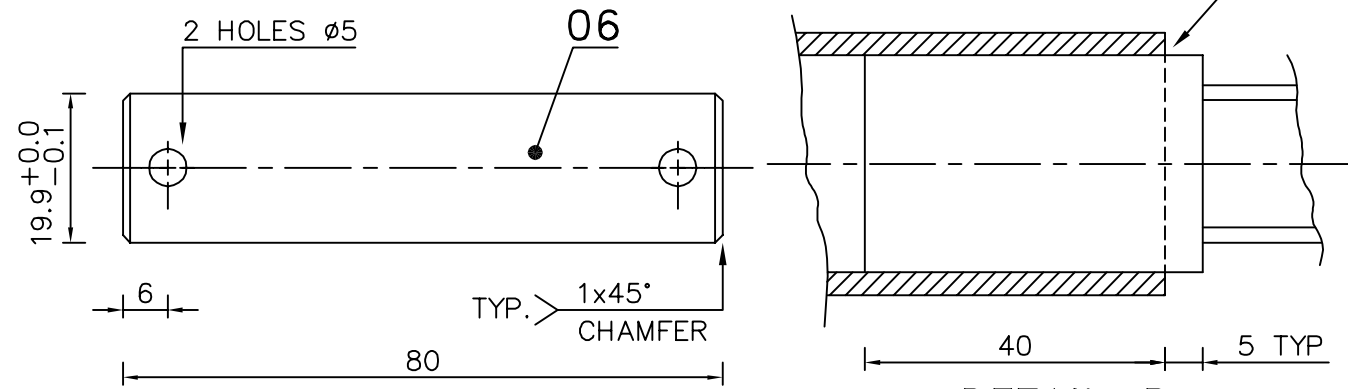
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.



SECTION-AA

DETAIL-B

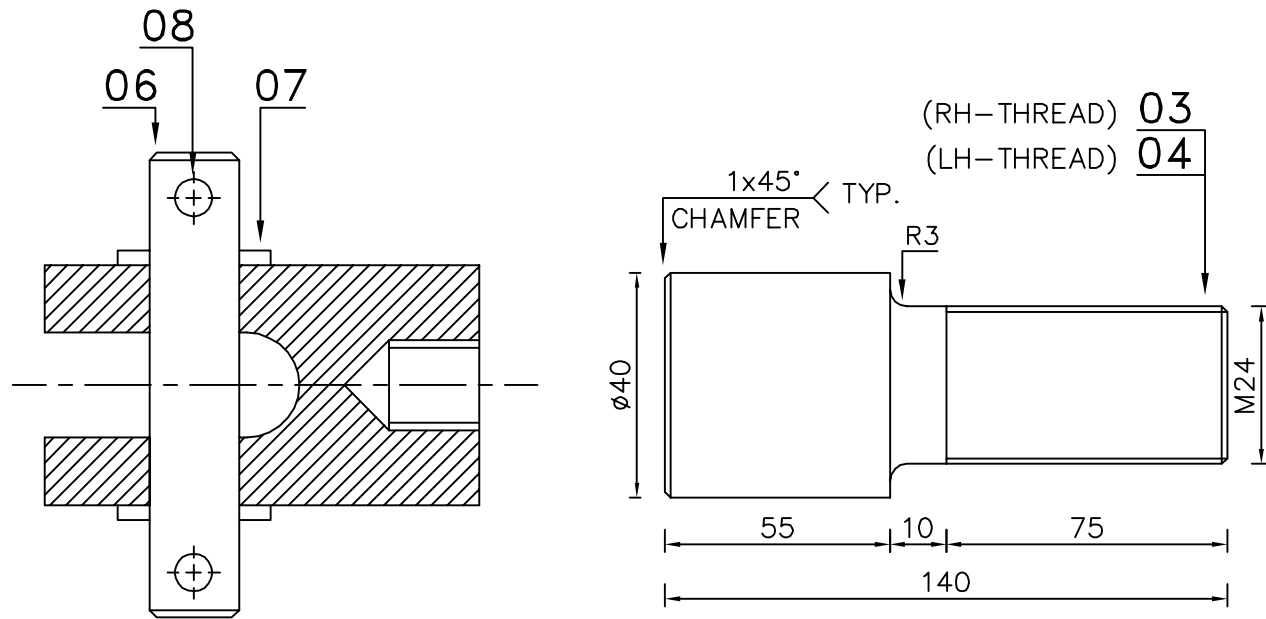
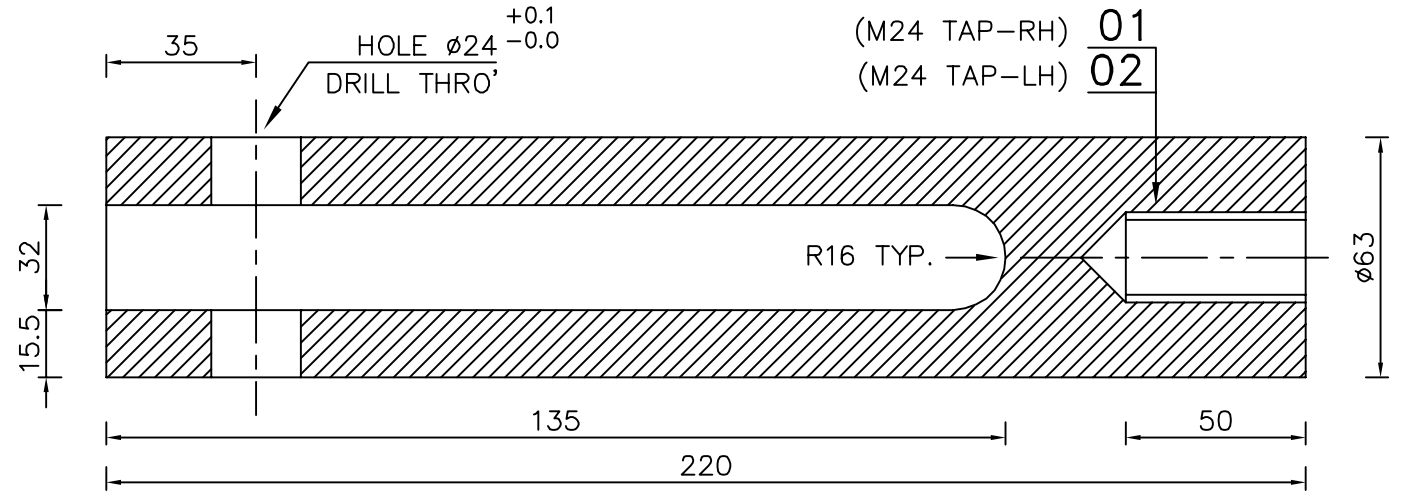
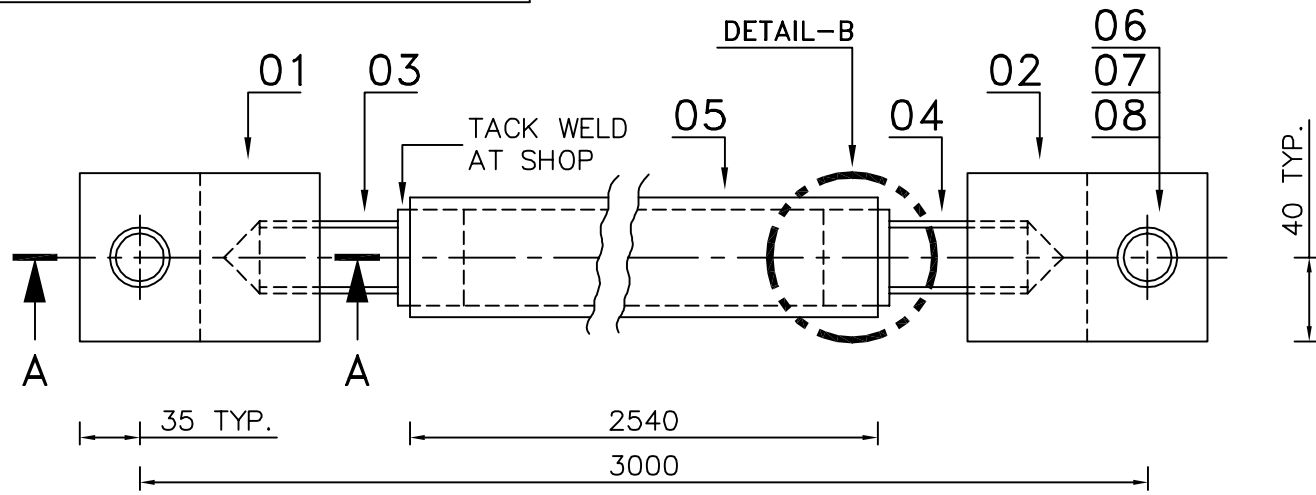
DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
08	SPLIT PIN 4 x 36					41704-40036			0.004	
									4	
07	WASHER PNCHD A 20					41408-00020			0.017	
									4	
06	PIN DIA 20; 80					15-024-193			0.200	
						SA 479 TYP 304			2	
05	TUBE D 48.3x5.08 2580					15-082-021			14.200	
						SA 106 Gr.B			1	
04	ROD DIA 36; 115					15-039-088			0.900	
						SA 193 B7			1	
03	ROD DIA 36; 115					15-039-088			0.900	
						SA 193 B7			1	
02	ROD DIA 50; 200					15-339-142			3.000	
						SA 105			1	
01	ROD DIA 50; 200					15-339-142			3.000	
						SA 105			1	



TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD				
DEPT. : C & I CODE : 392	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	M.Muruga Prabu		18-08-11	—
		APPD	V.M.Selvarraaj		25-11-11	—
REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-52985/02		WEIGHT (Kg)	SCALE	ITEM NO	No OF ITEMS	
TITLE LINKAGE ROD ASSEMBLY FOR 08" X 16" POWER CYLINDER Sheet 01 Of 01		22.484	NTS	—	—	
CARD CODE U 01		DRAWING NO : 3-97-599-20392		REV 00		

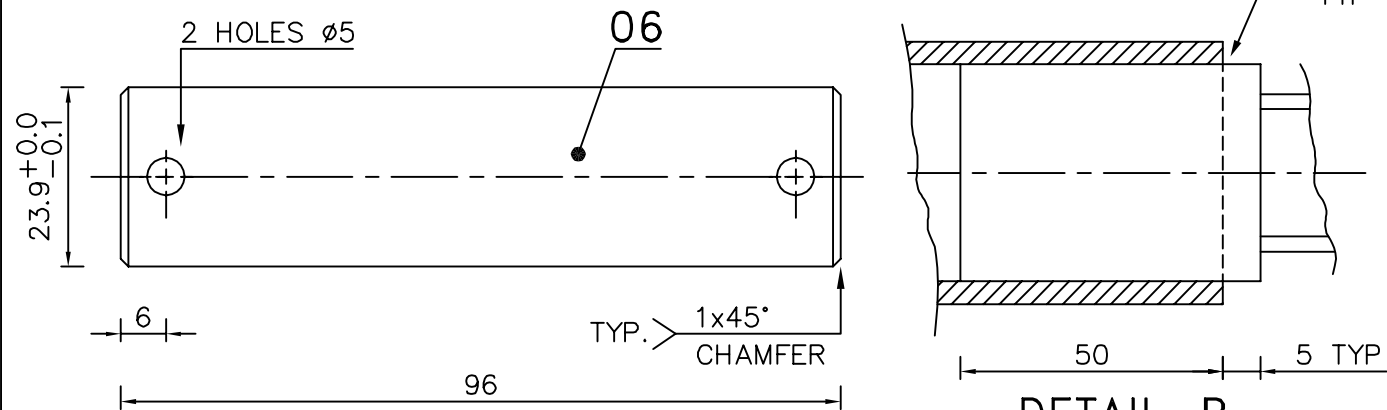
REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

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.



SECTION-AA

DETAIL-B

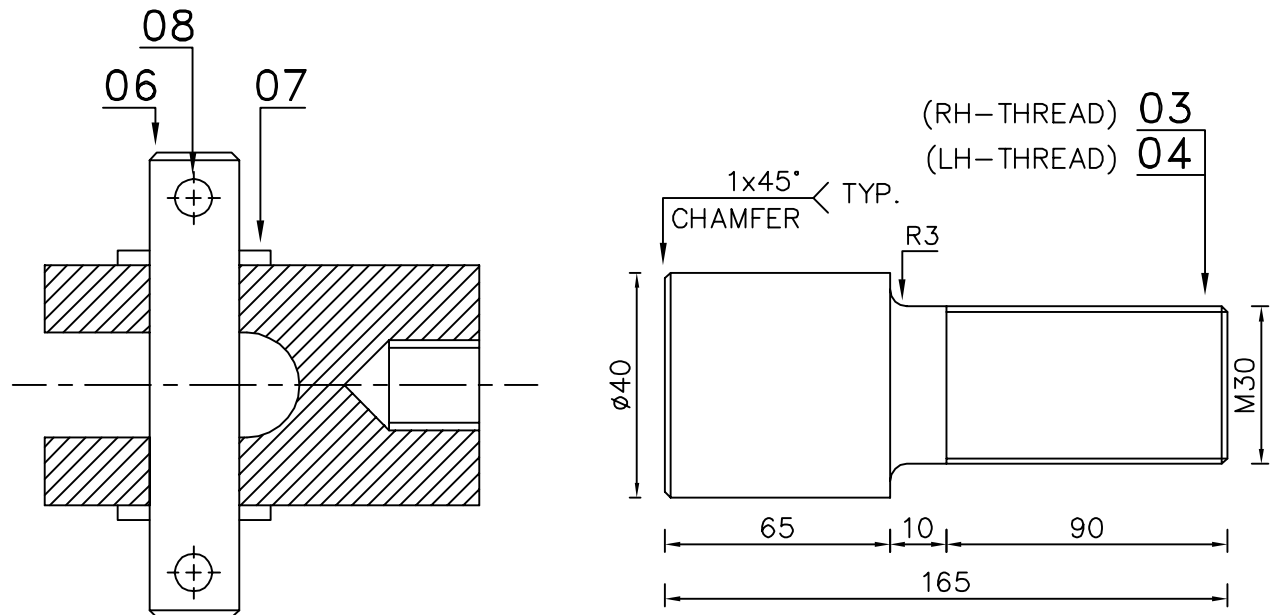
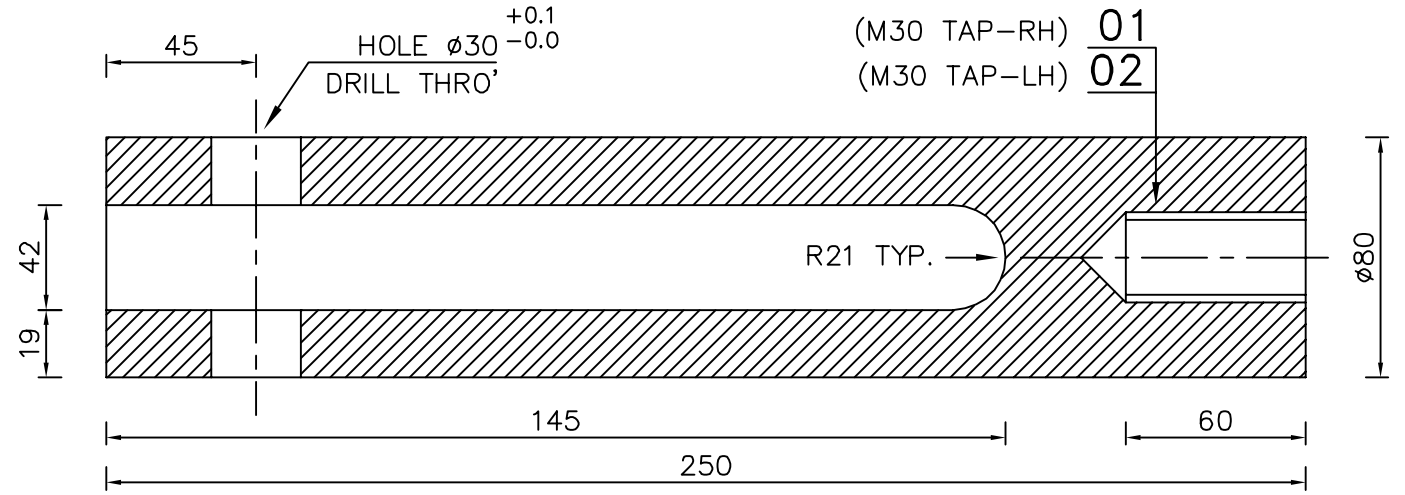
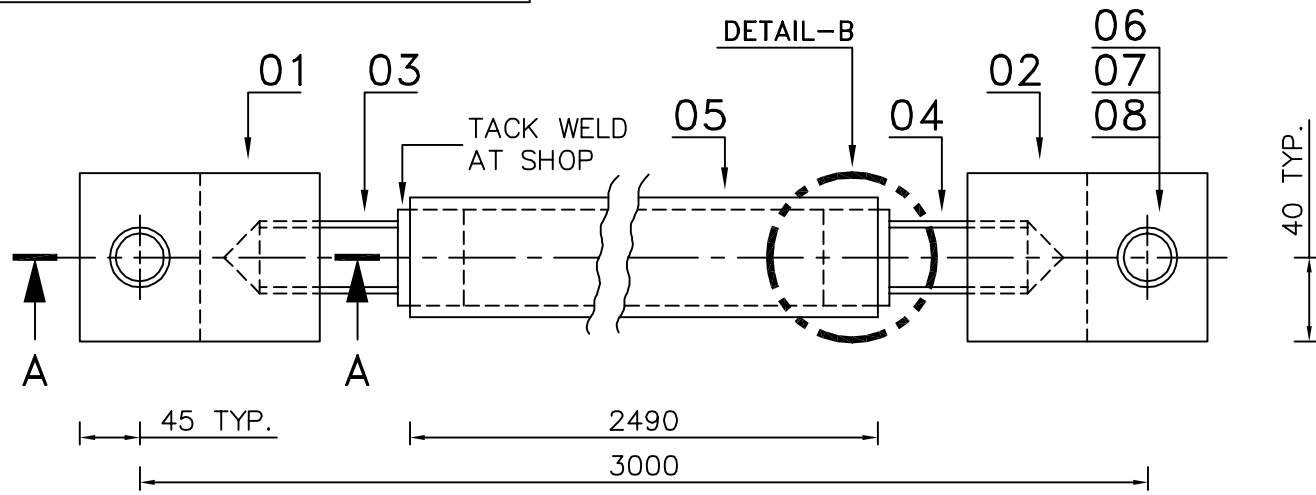


DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	QTY
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
08	SPLIT PIN 4 x 36					41704-40036			0.004	4
07	WASHER PNCHD A 24					41408-00024			0.031	4
06	PIN DIA 24; 96					15-024-194			0.400	2
						SA 479 TYP 304				
05	TUBE D 60.3x8.74 2540					15-082-031			28.600	1
						SA 106 Gr.B				
04	ROD DIA 40; 140					15-039-116			1.300	1
						SA 193 B7				
03	ROD DIA 40; 140					15-039-116			1.300	1
						SA 193 B7				
02	ROD DIA 63; 220					15-339-143			5.200	1
						SA 105				
01	ROD DIA 63; 220					15-339-143			5.200	1
						SA 105				

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD				
DEPT. : C & I CODE : 392	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	M.Muruga Prabu		18-08-11	
		APPD	V.M.Selvarraaj		25-11-11	
TITLE		WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS	REV
LINKAGE ROD ASSEMBLY FOR 12" X 16" POWER CYLINDER		42.540	THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-52986/02			
Sheet 01 Of 01		CARD CODE	DRAWING NO :			
		U 01	3-97-599-20393		00	

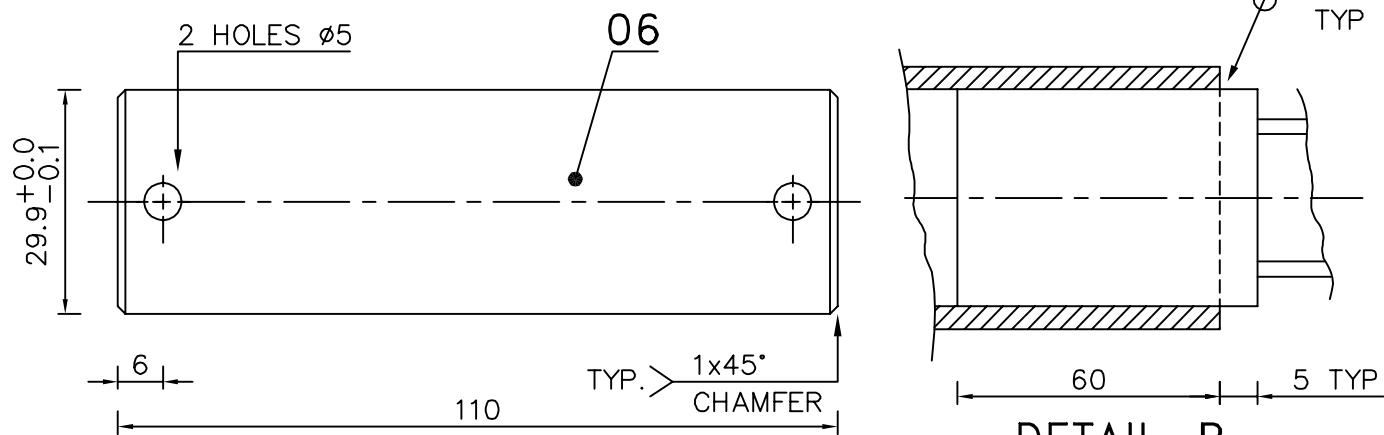
REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

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.



SECTION-AA

DETAIL-B

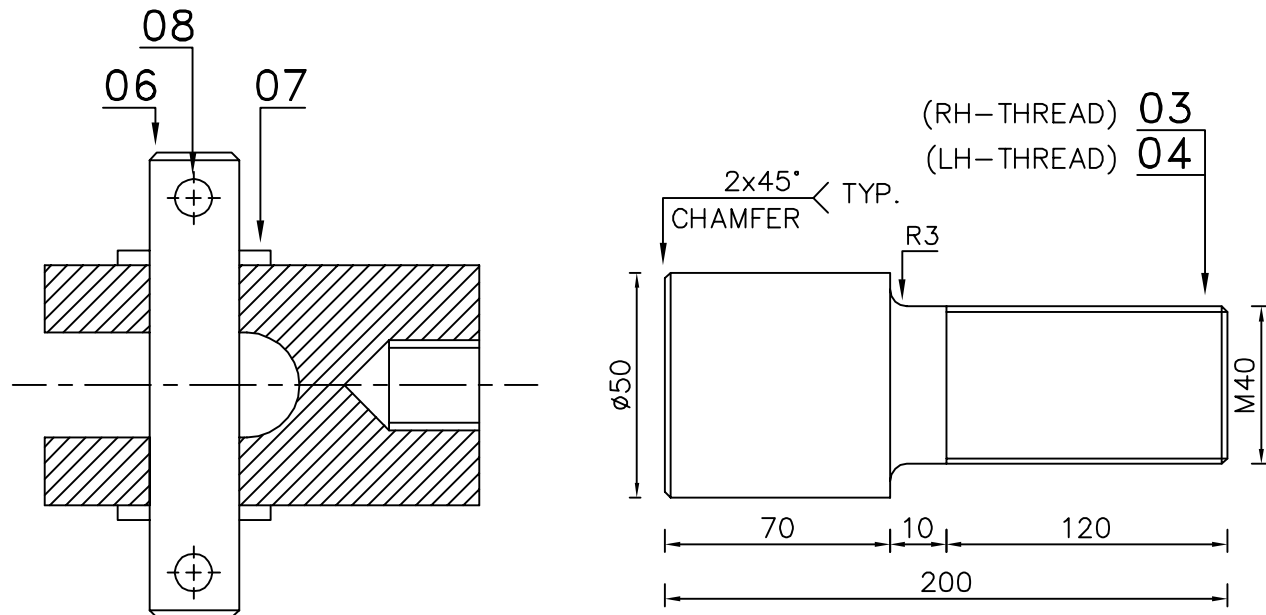
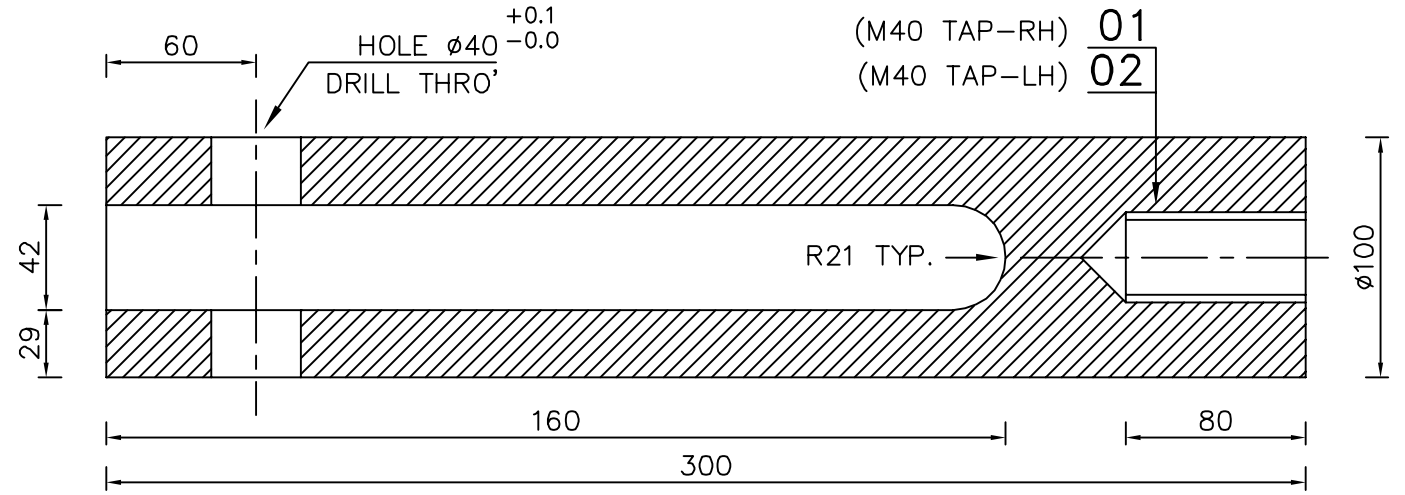
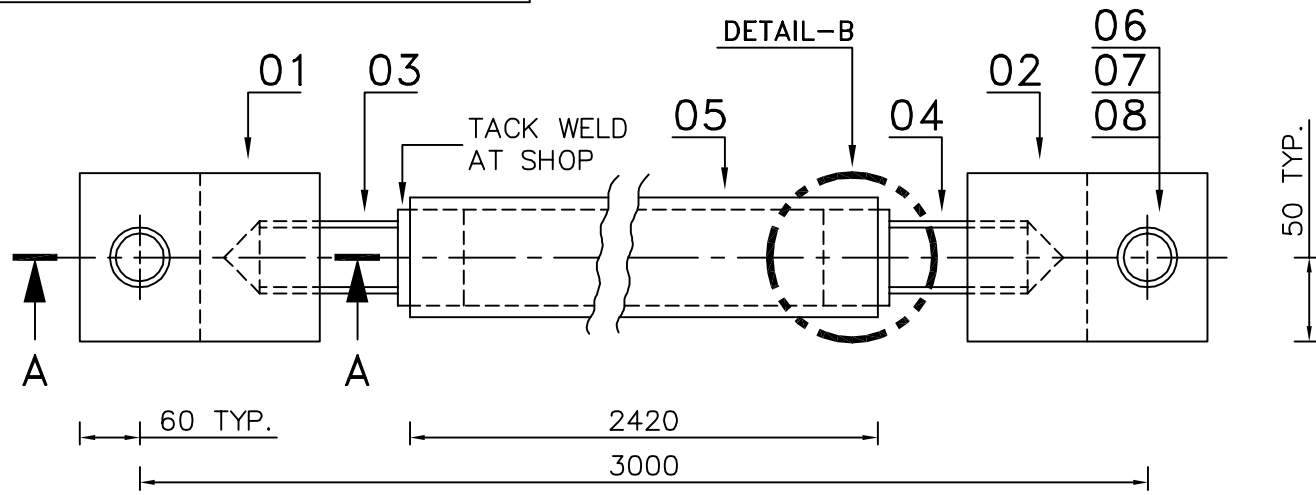


DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
08	SPLIT PIN 4 x 45					41704-40045			0.005	
									4	
07	WASHER PNCHD A 30					41408-00030			0.050	
									4	
06	PIN DIA 30; 110					15-024-194			0.700	
						SA 479 TYP 304			2	
05	TUBE D 60.3x8.74 2490					15-082-031			28.000	
						SA 106 Gr.B			1	
04	ROD DIA 40; 165					15-039-116			1.600	
						SA 193 B7			1	
03	ROD DIA 40; 165					15-039-116			1.600	
						SA 193 B7			1	
02	ROD DIA 80; 250					15-339-144			9.800	
						SA 105			1	
01	ROD DIA 80; 250					15-339-144			9.800	
						SA 105			1	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD				
DEPT. : C & I CODE : 392	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	M.Muruga Prabu		18-08-11	—
		APPD	V.M.Selvarraaj		25-11-11	—
REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-52987/02		WEIGHT (Kg)	SCALE	ITEM NO	No OF ITEMS	
TITLE LINKAGE ROD ASSEMBLY FOR 14" X 16" POWER CYLINDER Sheet 01 Of 01		52.420	NTS	—	—	
CARD CODE U 01		DRAWING NO : 3-97-599-20394		REV 00		

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

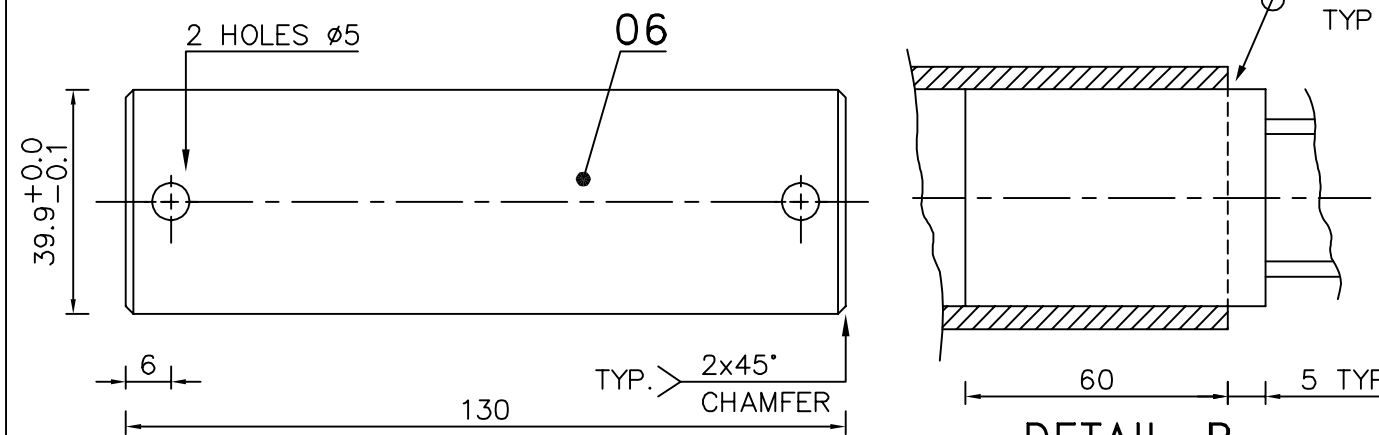
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.



SECTION-AA

DETAIL-B

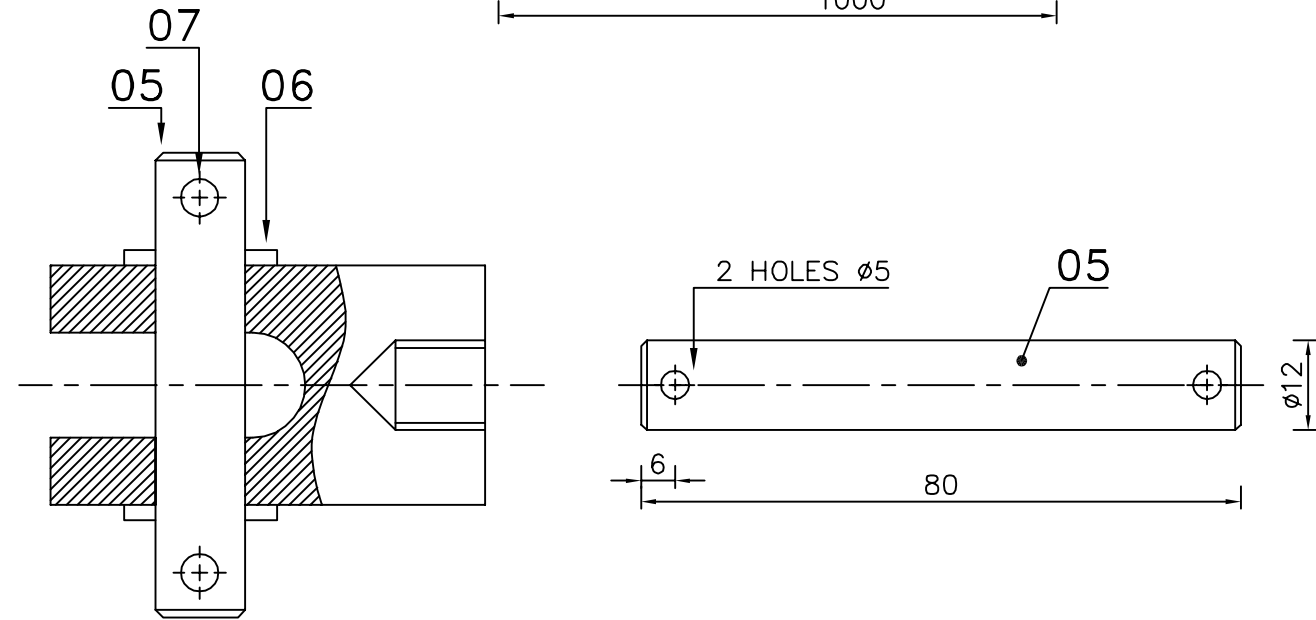
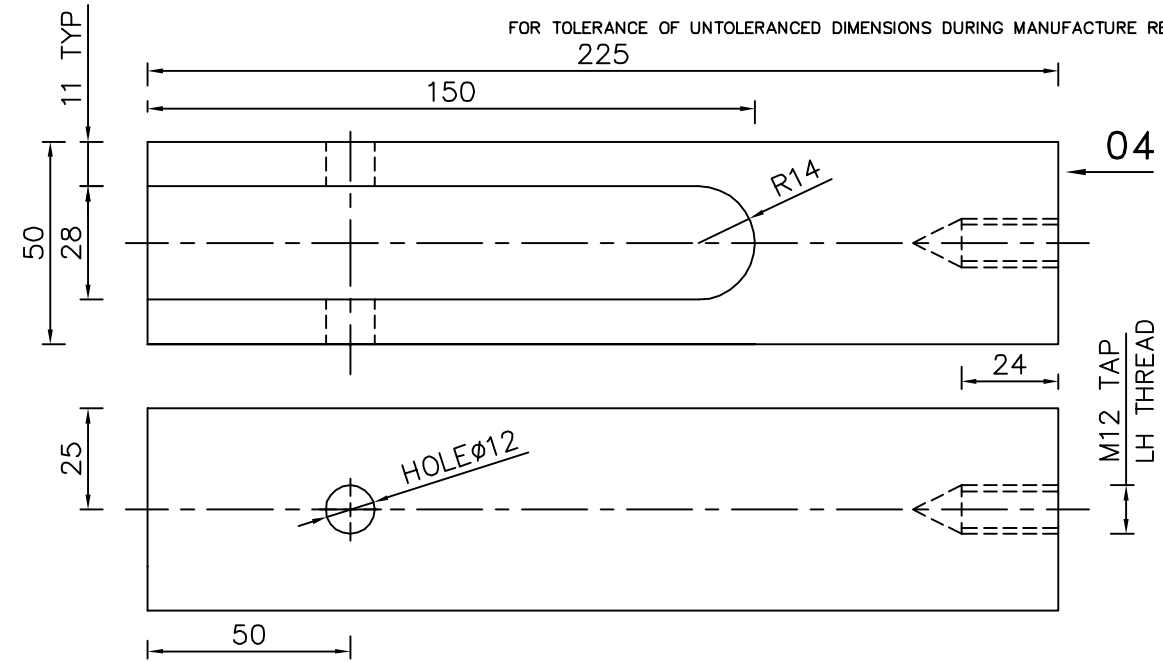
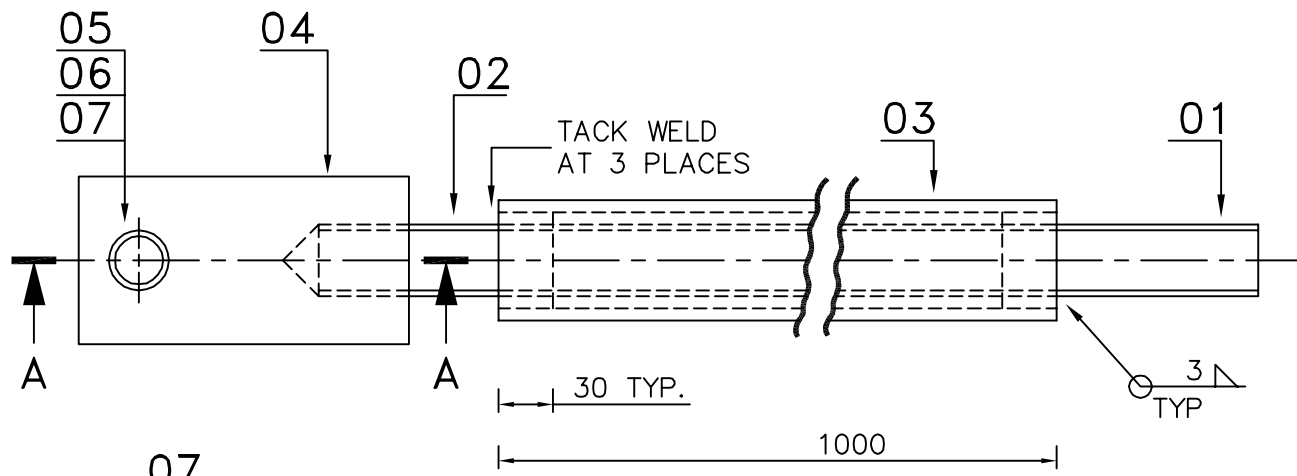
DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
08	SPLIT PIN 4 x 45					41704-40045			0.005	
									4	
07	WASHER PNCHD A 39					41408-00039			0.126	
									4	
06	PIN DIA 40; 130					15-024-159			1.280	
						SA 479 TYP 304			2	
05	TUBE D 73x9.53 2420					15-082-041			36.000	
						SA 106 Gr.B			1	
04	ROD DIA 50; 200					15-039-142			2.400	
						SA 193 B7			1	
03	ROD DIA 50; 200					15-039-142			2.400	
						SA 193 B7			1	
02	ROD DIA 100; 300					15-339-134			12.500	
						SA 105			1	
01	ROD DIA 100; 300					15-339-134			12.500	
						SA 105			1	



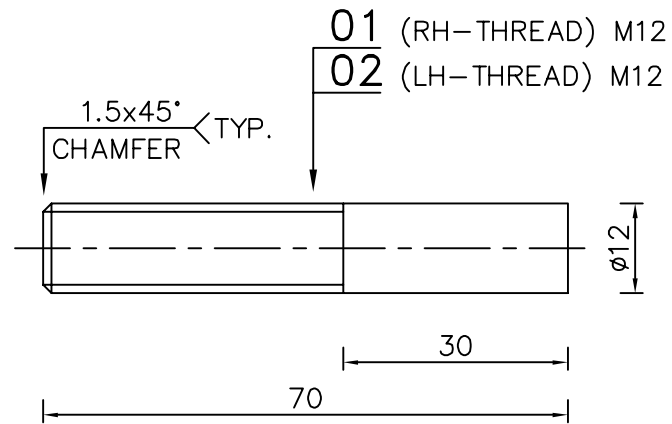
REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD				
DEPT. : C & I CODE : 392	ALL DIMENSIONS ARE IN MM SCALE NTS WEIGHT (Kg) 68.884	DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	M.Muruga Prabu		18-08-11	
		APPD	V.M.Selvarraaj		25-11-11	
TITLE		CARD CODE	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS	
LINKAGE ROD ASSEMBLY FOR 20" X 14" POWER CYLINDER		U 01	THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-59700/00			
Sheet 01 Of 01			DRAWING NO :		REV	
			3-97-599-20395		00	

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.



SECTION-AA

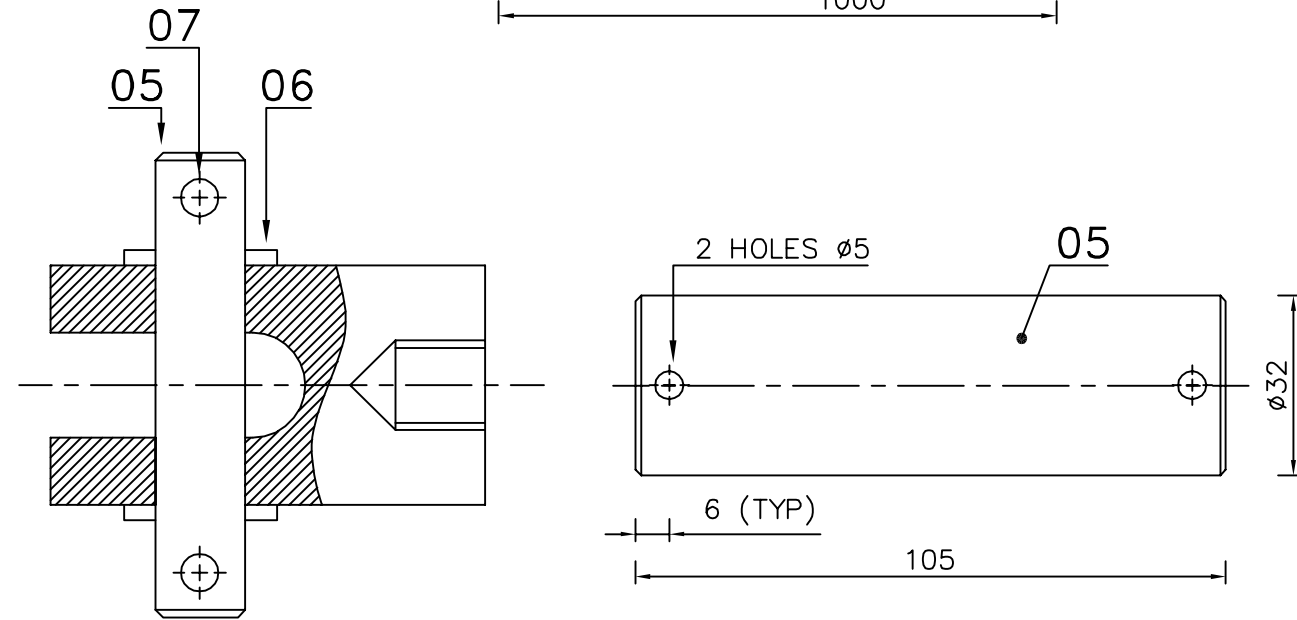


DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	07	SPLIT PIN 4 x 25				41704-40025			0.002	
									2	
	06	WASHER PNCHD A 12				41408-00012			0.006	
									2	
	05	PIN DIA 12; 80				15-024-192			0.070	
						SA 479 TYP 304			1	
	04	ROD DIA 50; 225				15 339 142			3.40	
						SA 105			1	
	03	ERW TUBE 21.3x3.73; 1000				15-082-002			1.62	
						SA 106 GR. B			1	
	02	ROD DIA 12; 70				15-039-115			0.06	
						SA 193 B7			1	
	01	ROD DIA 12; 70				15-039-115			0.06	
						SA 193 B7			1	

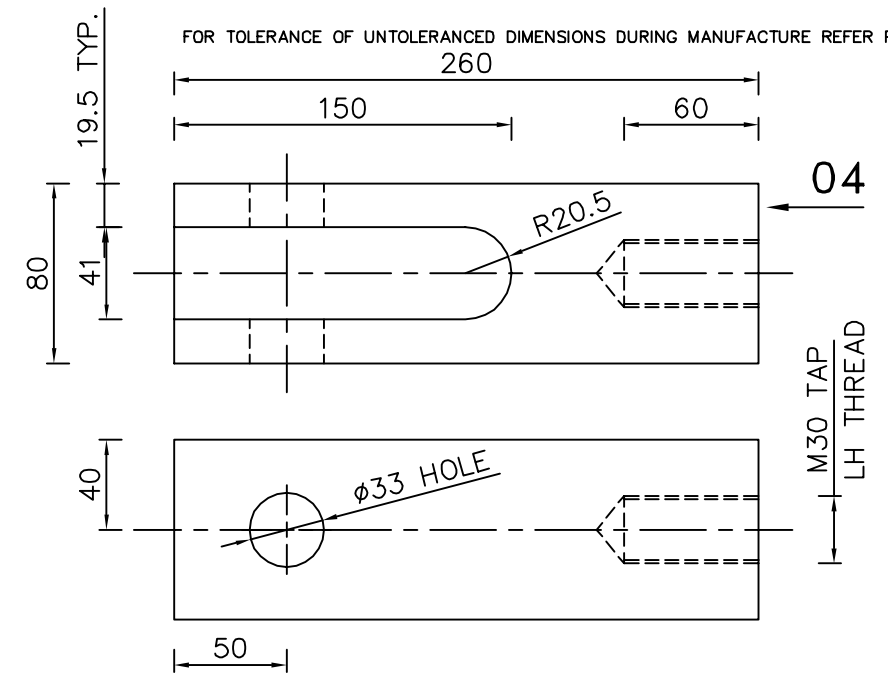
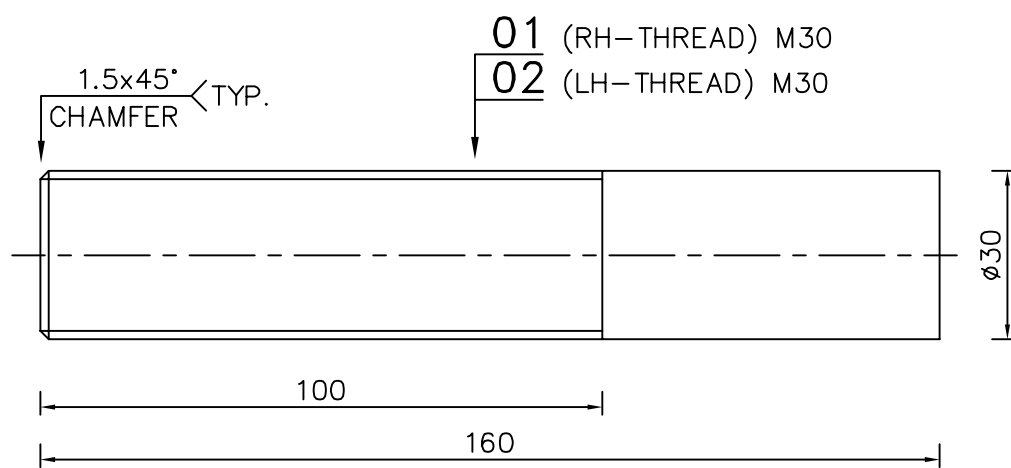
REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD					
DEPT. : C & I CODE : 392	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR	
		CHD	M.Muruga Prabu		18-08-11	—	
		APPD	V.M.Selvarraaj		25-11-11	—	
REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-48515/02		WEIGHT (Kg)	5.226	SCALE	NTS	ITEM NO	No OF ITEMS
TITLE LINKAGE ROD ASSEMBLY PIN DIAMETER 12		CARD CODE	U 01	DRAWING NO :		REV	00
		Sheet 01 Of 01		3-97-599-20396			

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.



SECTION-AA

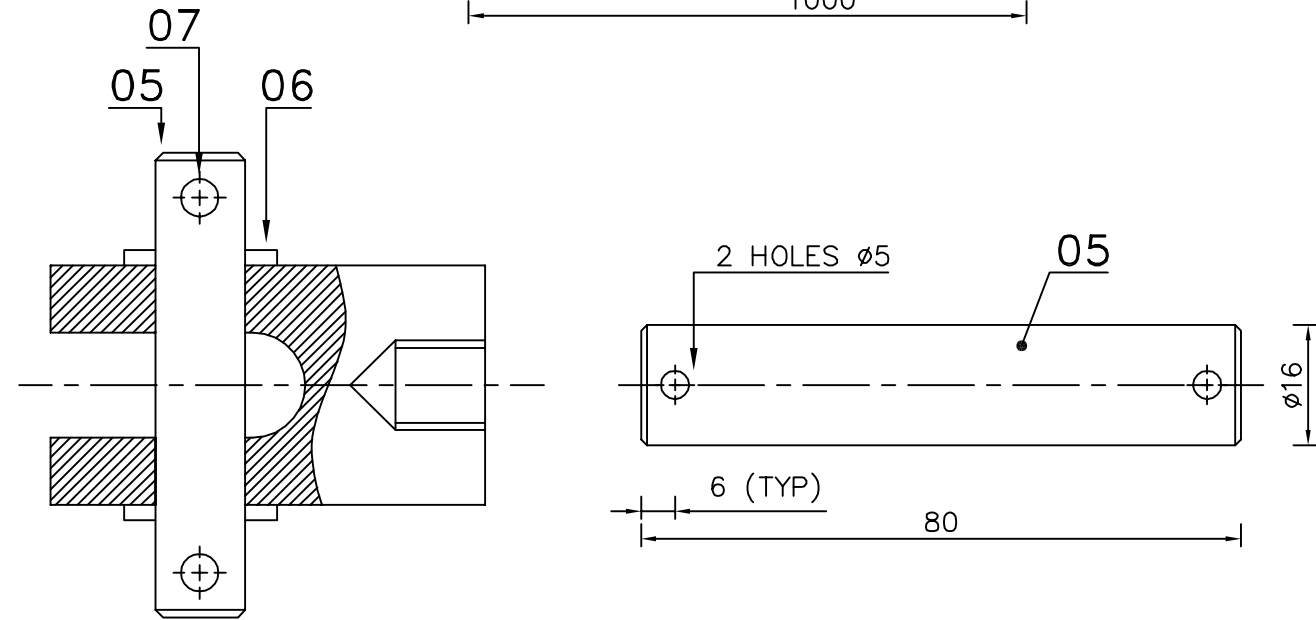
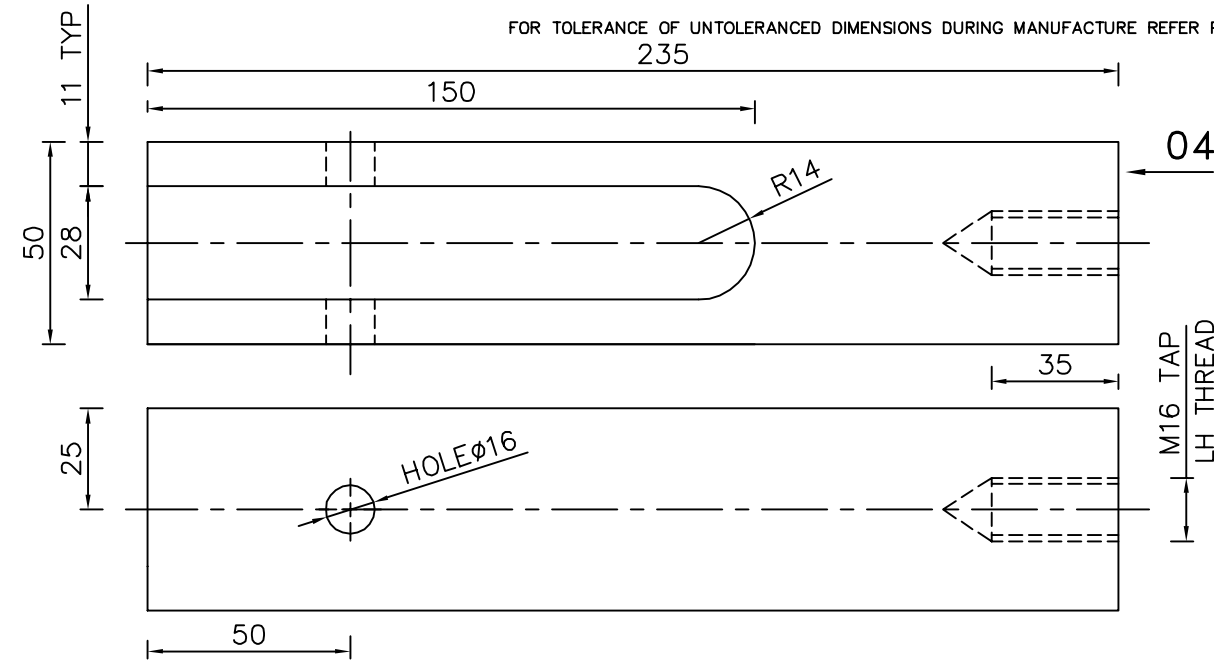
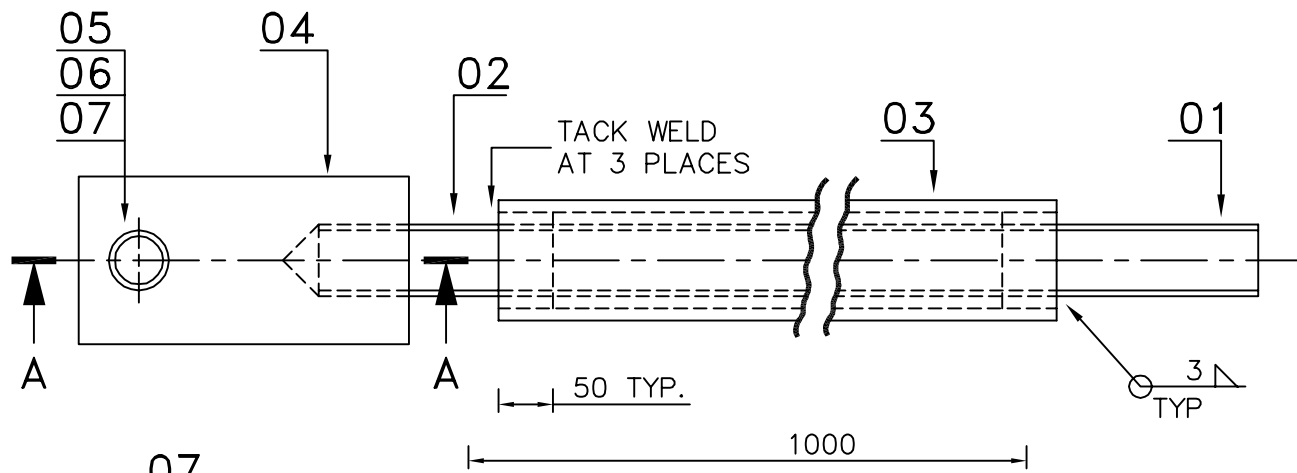


DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	GS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	07	SPLIT PIN 4 x 45				41704-40045			0.004	
									2	
	06	WASHER PNCHD A 33				41408-00033			0.070	
									2	
	05	PIN DIA 32; 105				15-024-194			0.630	
						SA 479 TYP 304			1	
	04	ROD DIA 80; 260				15-339-144			10.500	
						SA 105			1	
	03	ERW TUBE 42.9x4.05; 1000				15-038-081			3.840	
						IS 1239			1	
	02	ROD DIA 30; 160				15-039-087			0.950	
						SA 193 B7			1	
	01	ROD DIA 30; 160				15-039-087			0.950	
						SA 193 B7			1	

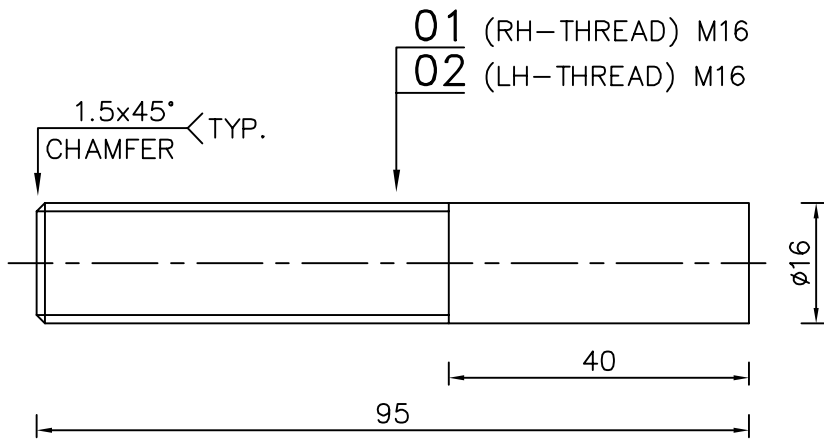
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD					
DEPT. : C & I CODE : 392		NAME A.Thambu raj		SIGNATURE 		DATE 18-08-11	NO. OF VAR
		CHD M.Muruga Prabu		DATE 25-11-11		—	
		APPD V.M.Selvaraaj		DATE 25-11-11		—	
REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-60188/01		WEIGHT (Kg) 17.018	SCALE NTS	ITEM NO —	No OF ITEMS —		
TITLE LINKAGE ROD ASSEMBLY PIN DIAMETER 32			CARD CODE U 01	DRAWING NO : 3-97-599-20397		REV 00	

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

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.



SECTION-AA

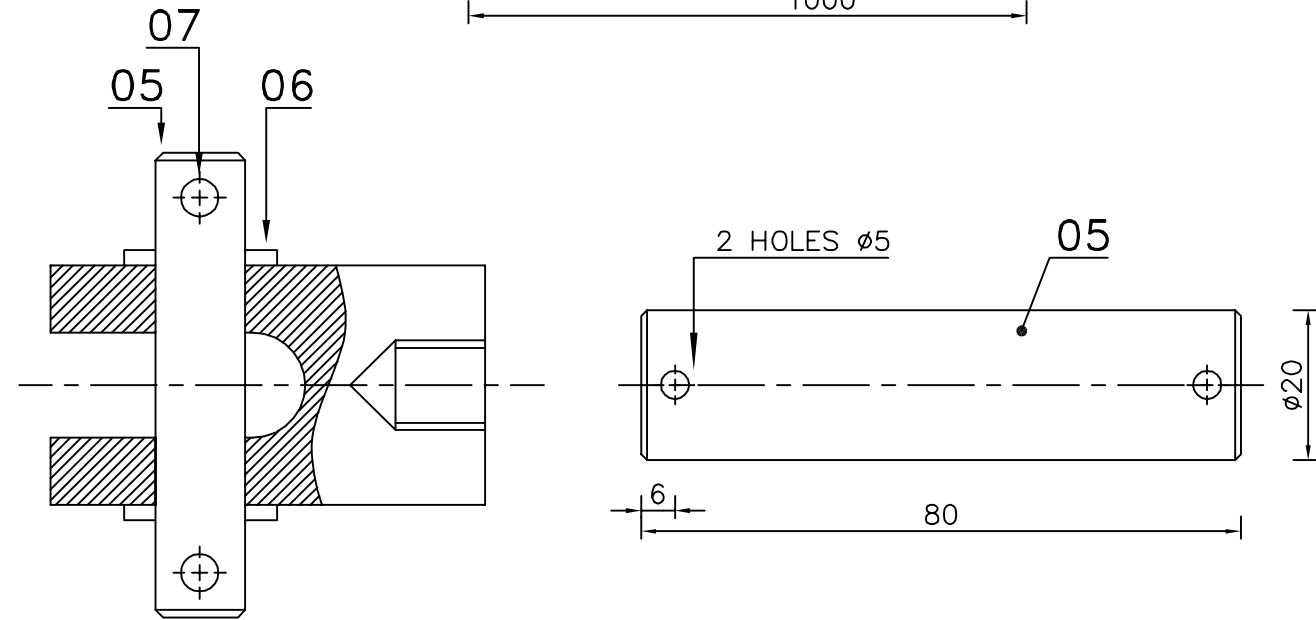
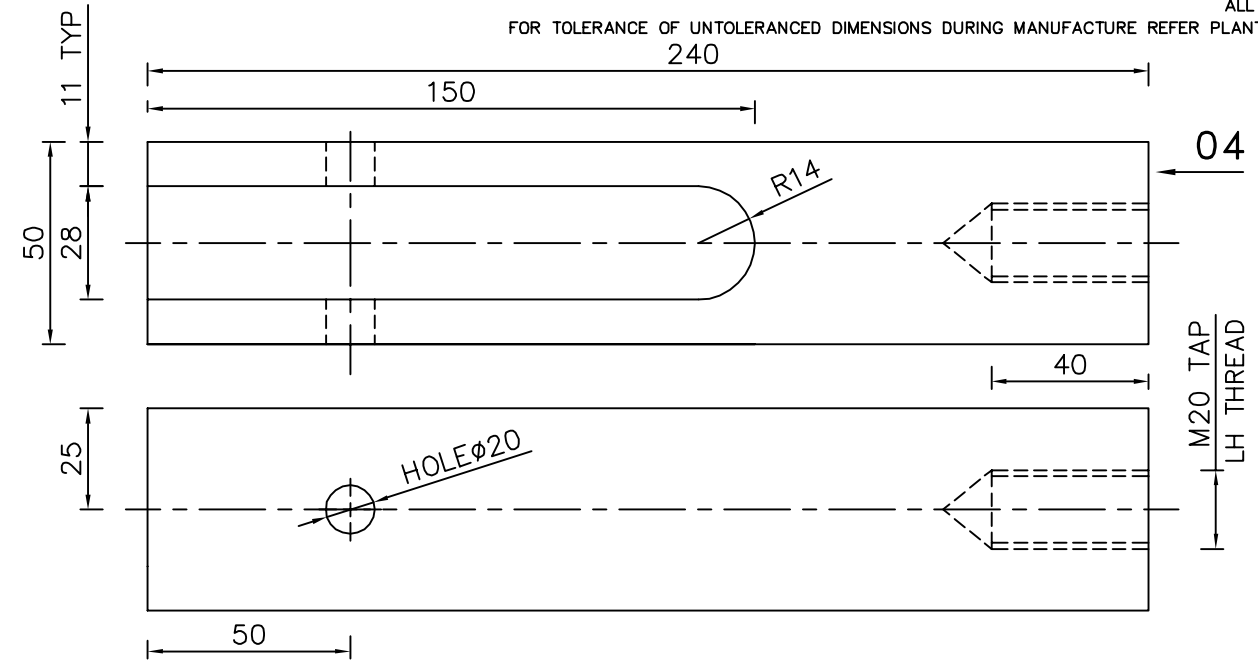
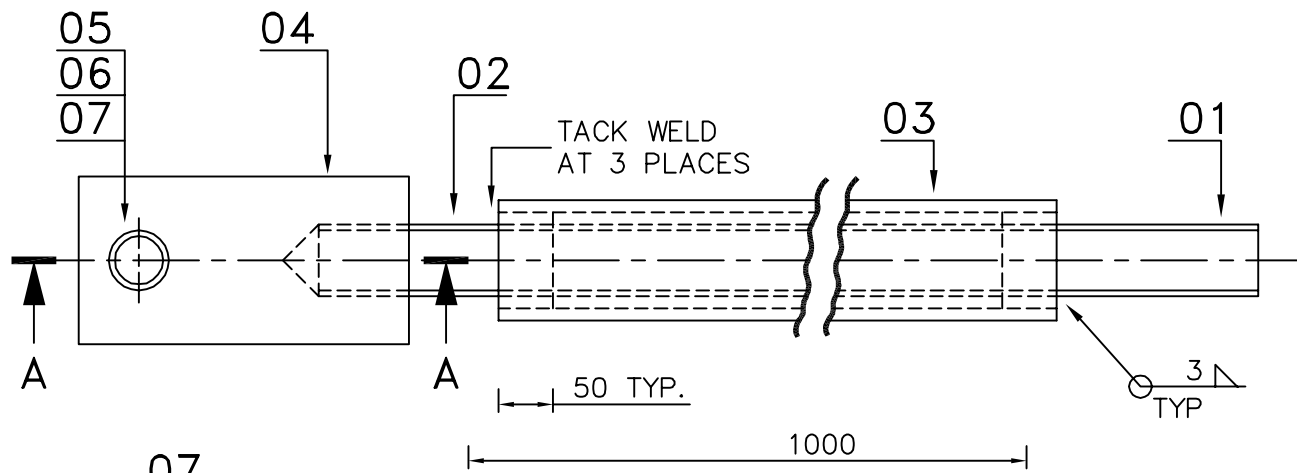


DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	07	SPLIT PIN 4 x 25				41704-40025			0.003	
									2	
	06	WASHER PNCHD A 16				41408-00016			0.01	
									2	
	05	PIN DIA 16 ; 80				15-024-193			0.150	
						SA 479 TYP 304			1	
	04	ROD DIA 50 ; 235				15-339-142			3.70	
						SA 105			1	
	03	ERW TUBE DIA 27.3 X 2.65 ; 1000				15-038-034			1.58	
						IS 1239			1	
	02	ROD DIA 20 ; 95				15-039-086			0.20	
						SA 193 B7			1	
	01	ROD DIA 20 ; 95				15-039-086			0.20	
						SA 193 B7			1	

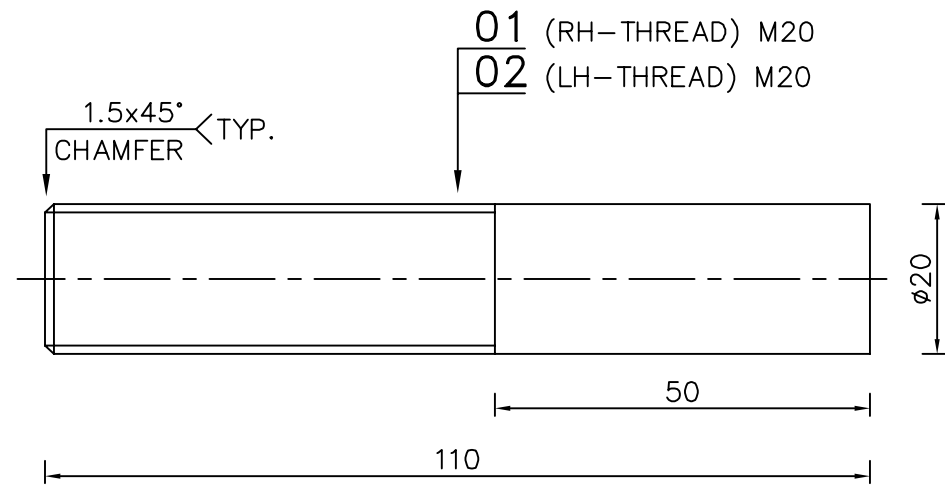
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD						
DEPT. : C & I CODE : 392		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014		DRN	NAME	SIGNATURE	DATE	NO. OF VAR
				CHD	M.Muruga Prabu		18-08-11	—
				APPD	V.M.Selvaraj		25-11-11	—
TITLE LINKAGE ROD ASSEMBLY PIN DIAMETER 16		ALL DIMENSIONS ARE IN MM	SCALE NTS	WEIGHT (Kg) 5.856	REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-52257/00		ITEM NO —	No OF ITEMS —
		CARD CODE U 01		DRAWING NO : 3-97-599-20398			REV 00	

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

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.



SECTION-AA

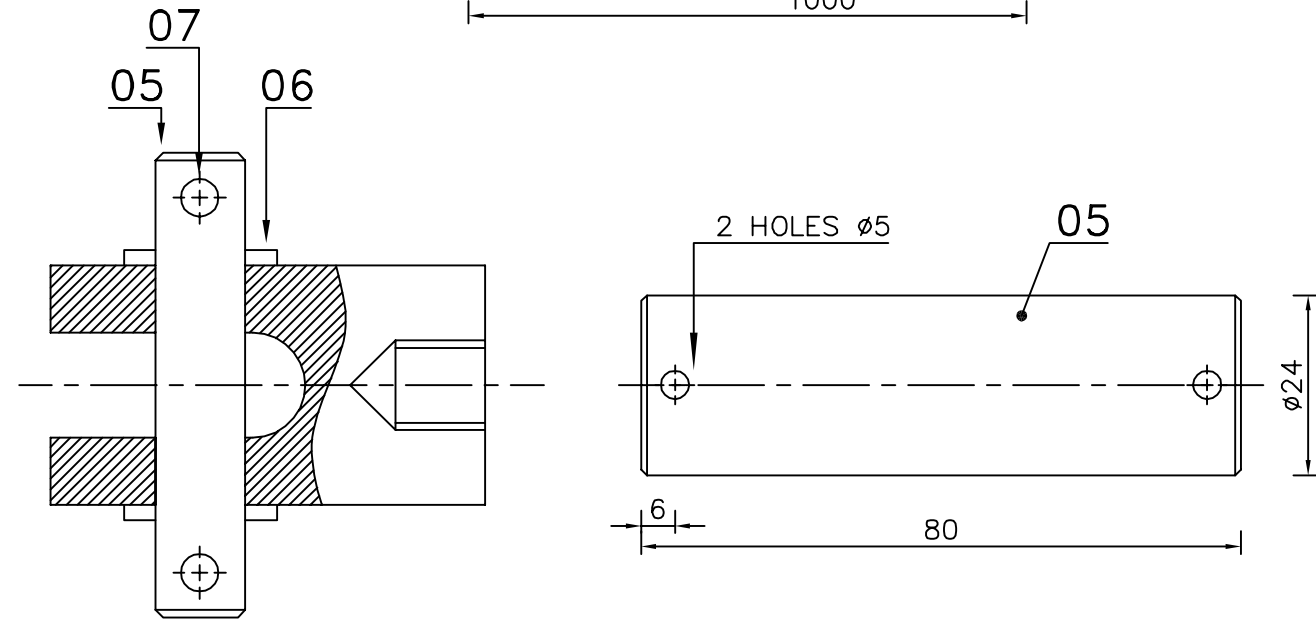
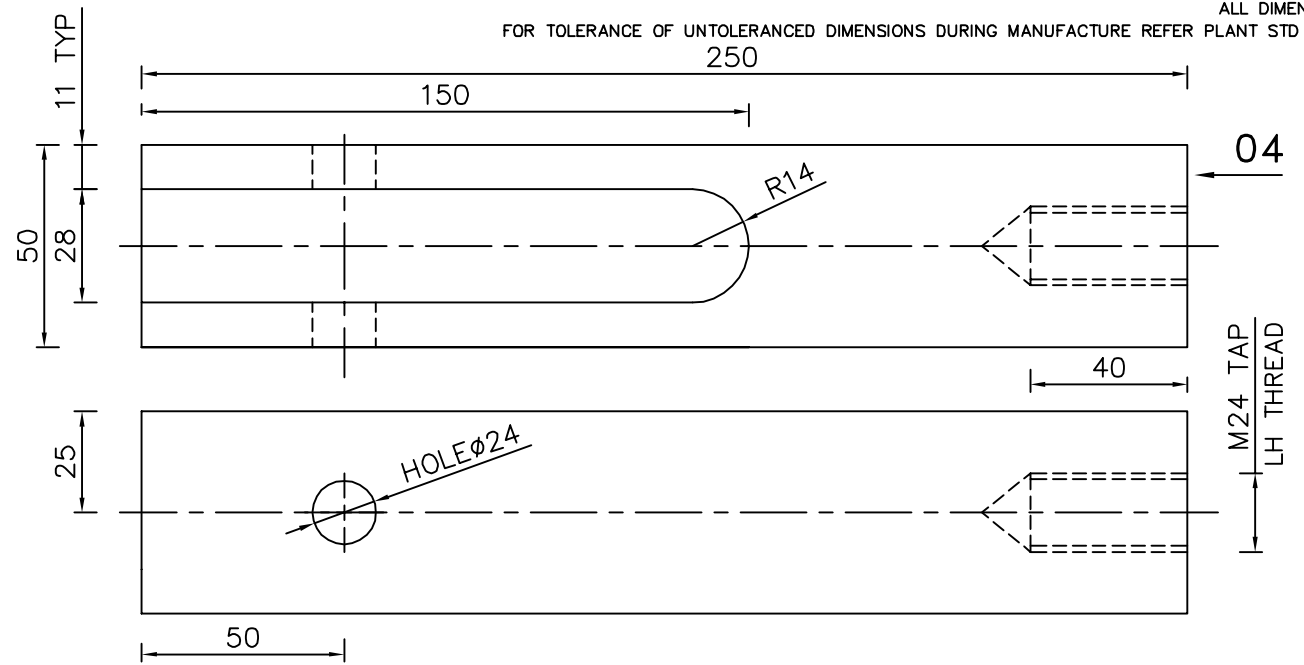
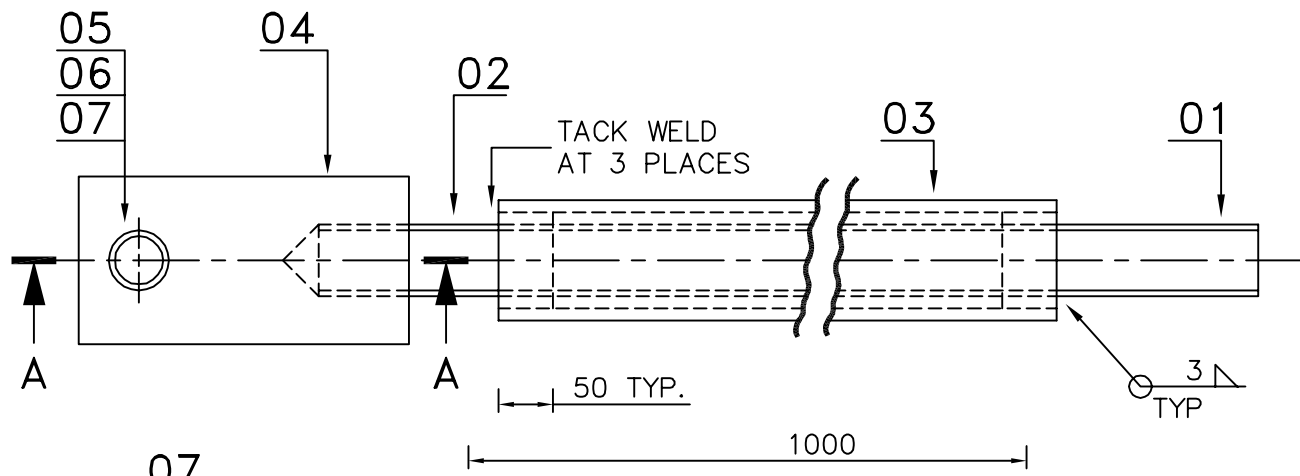


DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	07	SPLIT PIN 4 x 36				41704-40036			0.003	
									2	
	06	WASHER PNCHD A 20				41408-00020			0.017	
									2	
	05	PIN DIA 20; 80				15-024-193			0.20	
						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	

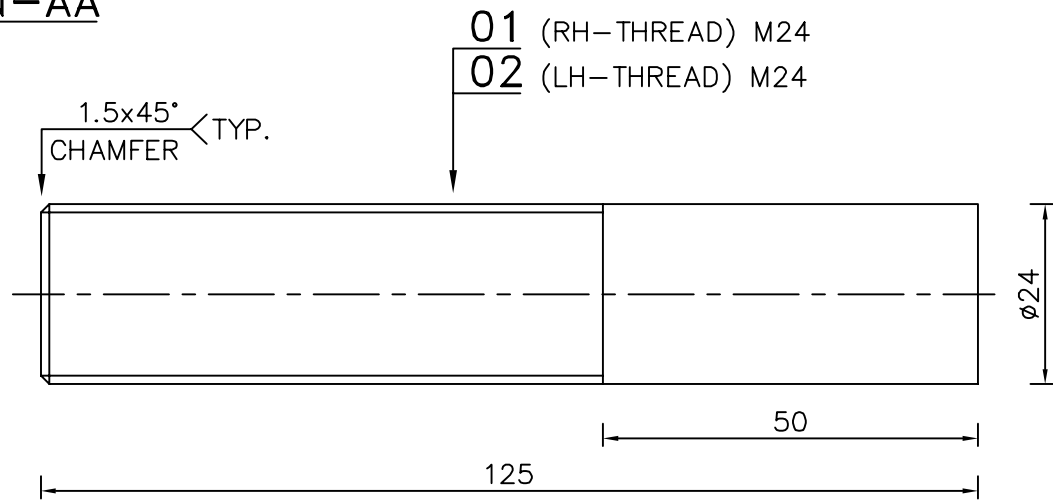
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD					
DEPT. : C & I CODE : 392	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR	
		CHD	M.Muruga Prabu	<i>[Signature]</i>	18-08-11	—	
		APPD	V.M.Selvarraaj		25-11-11	—	
REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-48541/01		WEIGHT (Kg)	5.980	SCALE	NTS	ITEM NO	No OF ITEMS
TITLE LINKAGE ROD ASSEMBLY PIN DIAMETER 20		CARD CODE	U 01	DRAWING NO :		REV	
				3-97-599-20399		00	

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

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.



SECTION-AA

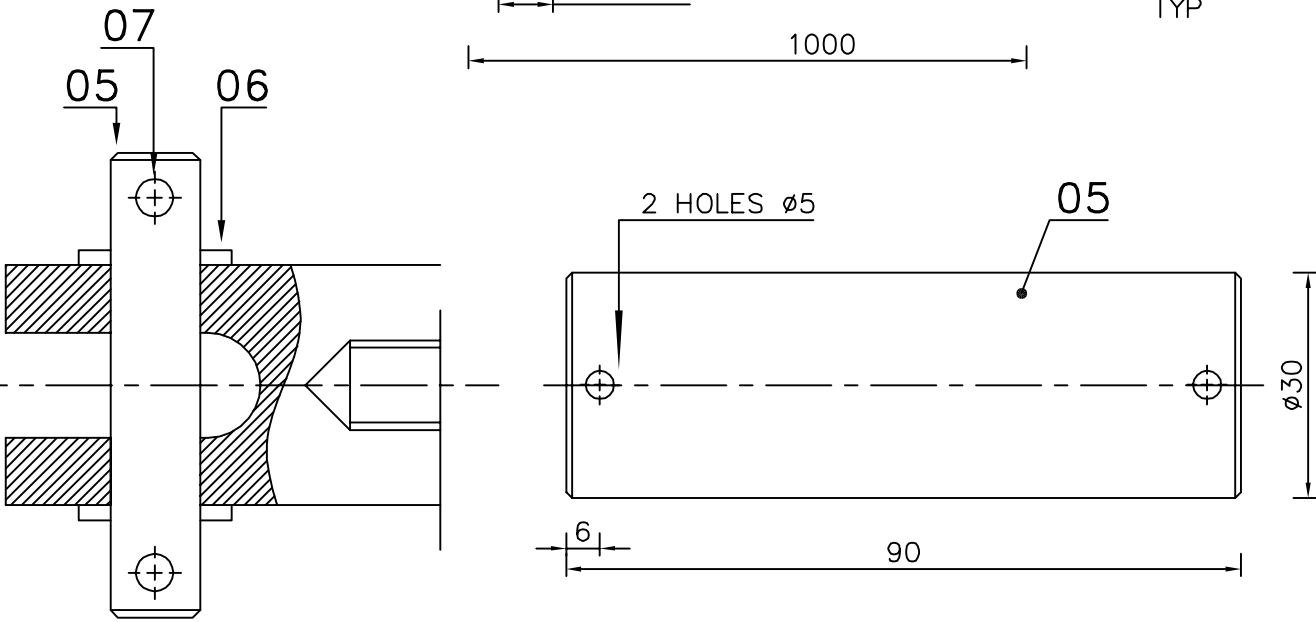
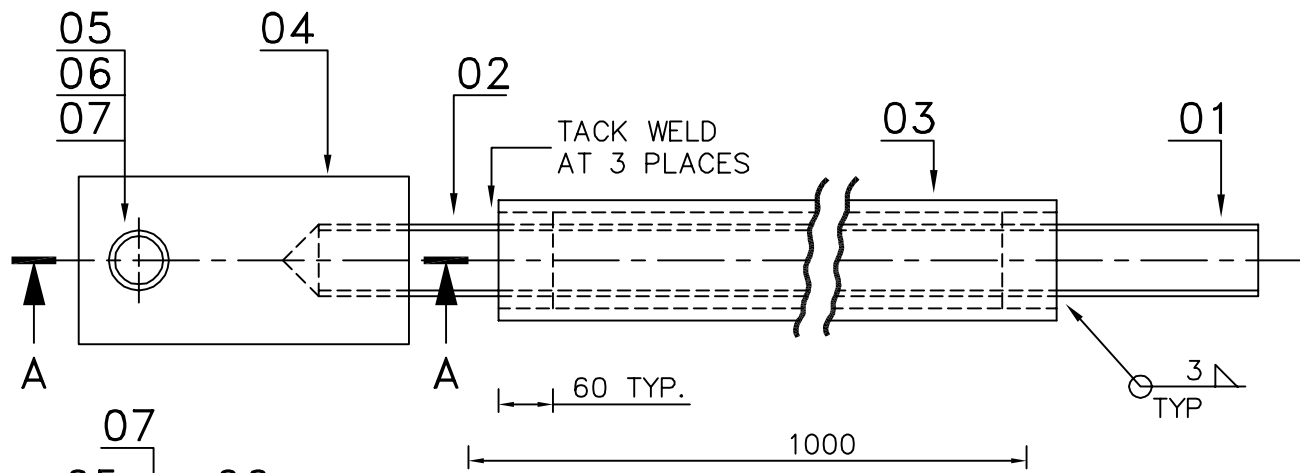


01 (RH-THREAD) M24  
02 (LH-THREAD) M24

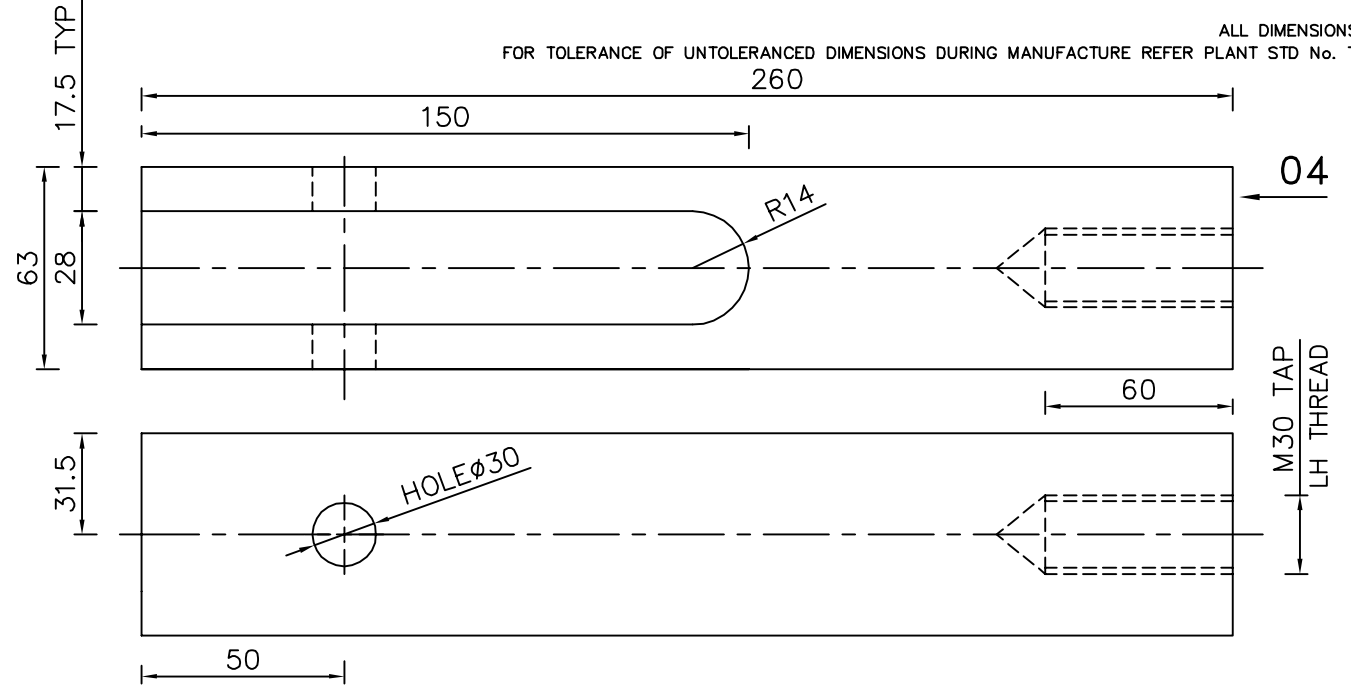
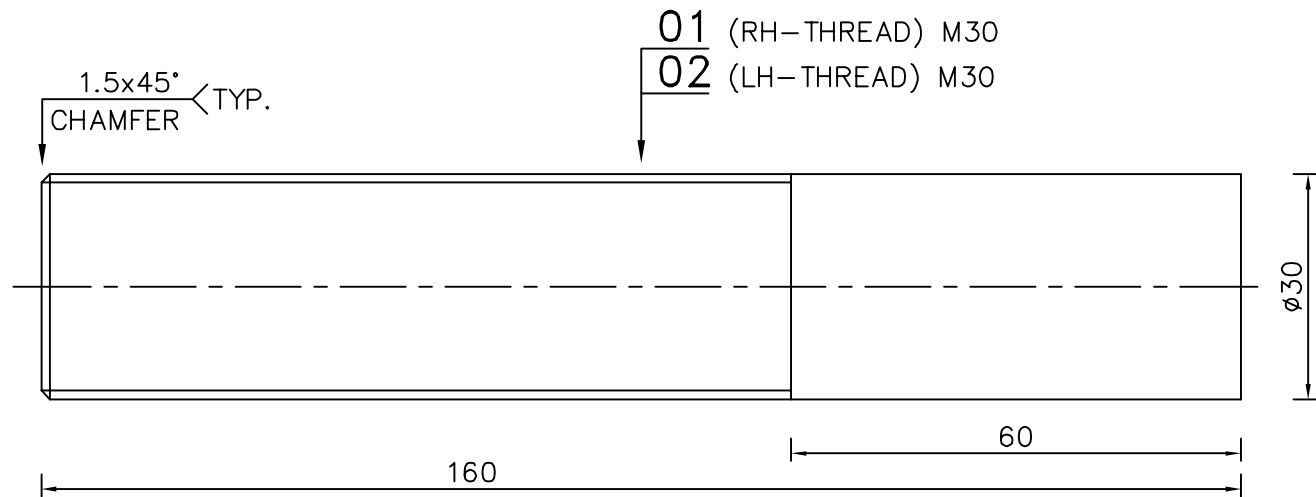
DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	07	SPLIT PIN 4 X 36				41704-40036			0.003	
									2	
	06	WASHER PNCHD A 24				41408-00024			0.031	
									2	
	05	PIN DIA 24 ; 80				15-024-194			0.09	
						SA 479 TYP 304			1	
	04	ROD DIA 50 : 250				15-339-142			3.80	
						SA 105			1	
	03	ERW TUBE 33.4 X 3.38 ; 1000				15-082-010			2.50	
						SA 106 GRB			1	
	02	ROD DIA 24 : 125				15-039-086			0.50	
						SA 193 B7			1	
	01	ROD DIA 24 : 125				15-039-086			0.50	
						SA 193 B7			1	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD							
DEPT. : C & I CODE : 392		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014		DRN	NAME	SIGNATURE	DATE	NO. OF VAR	
			M.Muruga Prabu		18-08-11	—			
			V.M.Selvarraaj		25-11-11	—			
REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-48516/01		SCALE	WEIGHT (Kg)	ITEM NO	No OF ITEMS				
TITLE LINKAGE ROD ASSEMBLY PIN DIAMETER 24		ALL DIMENSIONS ARE IN MM	NTS 7.458	U 01	DRAWING NO : 3-97-599-20400	REV 00			

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		



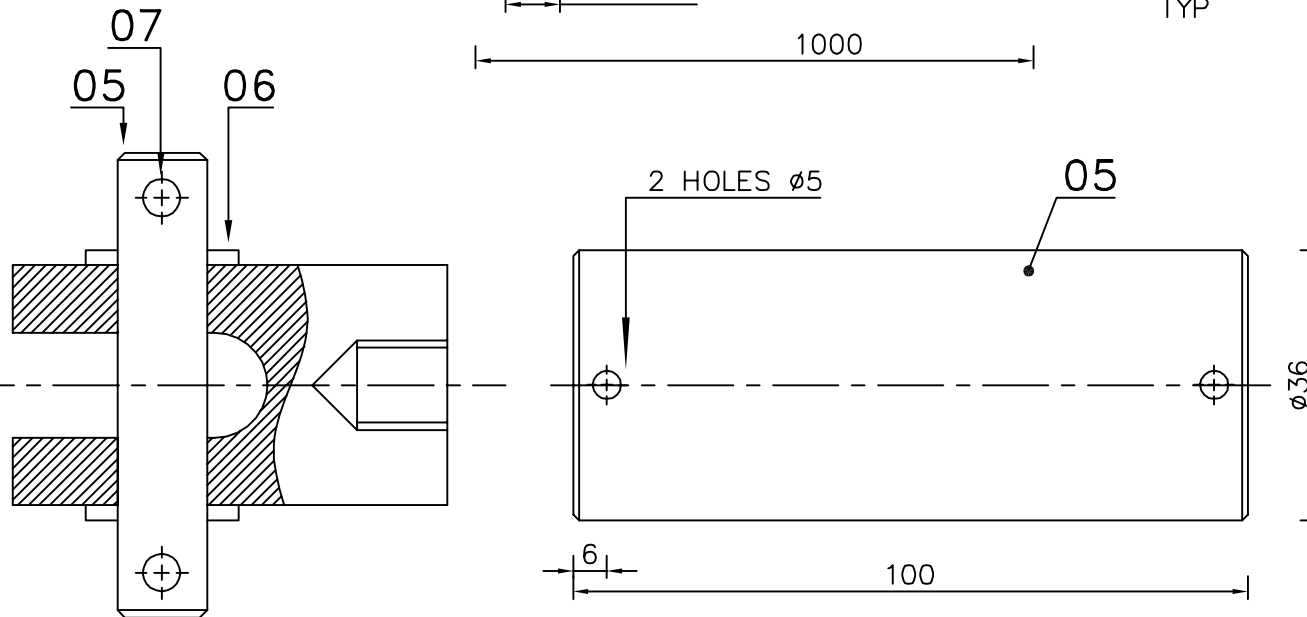
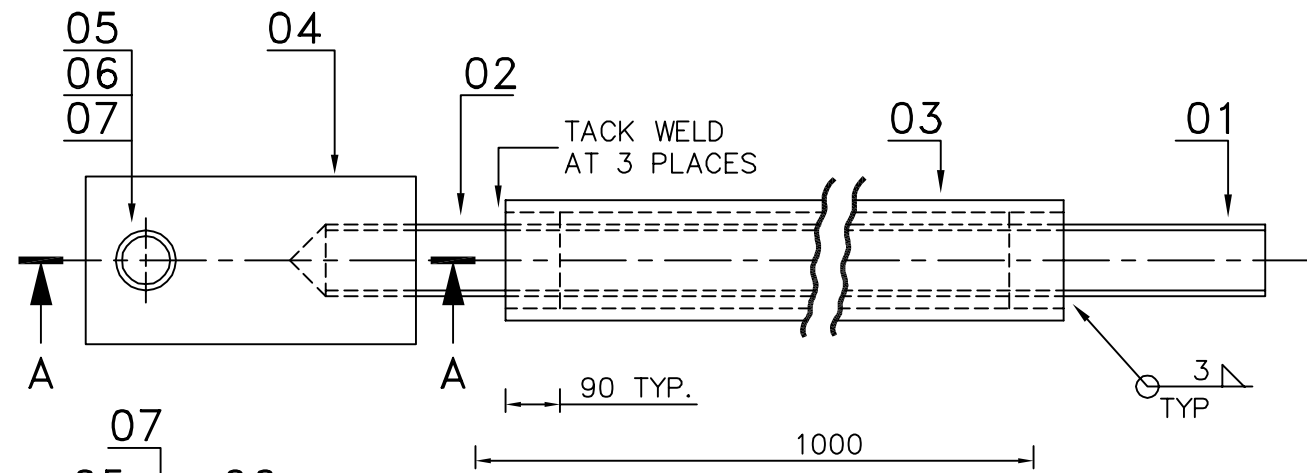
SECTION-AA



DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	QTY
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	07	SPLIT PIN 4 x 45				41704-40045			0.004	2
	06	WASHER PNCHD A 30				41408-00030			0.05	2
	05	PIN DIA 30; 90				15 024 194			0.58	1
						SA 479 TYP 304			1	
	04	ROD DIA 63; 260				15 339 143			6.36	1
						SA 105			1	
	03	ERW TUBE 42.9x4.05; 1000				15 038 081			3.84	1
						IS 1239			1	
	02	ROD DIA 30; 160				15 039 087			0.95	1
						SA 193 B7			1	
	01	ROD DIA 30; 160				15 039 087			0.95	1
						SA 193 B7			1	

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						
	DEPT. : C & I CODE : 392	ALL DIMENSIONS ARE IN MM	SCALE NTS	WEIGHT (Kg) 12.788	DRN	NAME	SIGNATURE	DATE	NO. OF VAR
					CHD	M.Muruga Prabu		18-08-11	—
					APPD	V.M.Selvaraj		25-11-11	—
TITLE				CARD CODE	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS	REV	
LINKAGE ROD ASSEMBLY PIN DIAMETER 30				U 01	THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-48517/01	—	—	00	

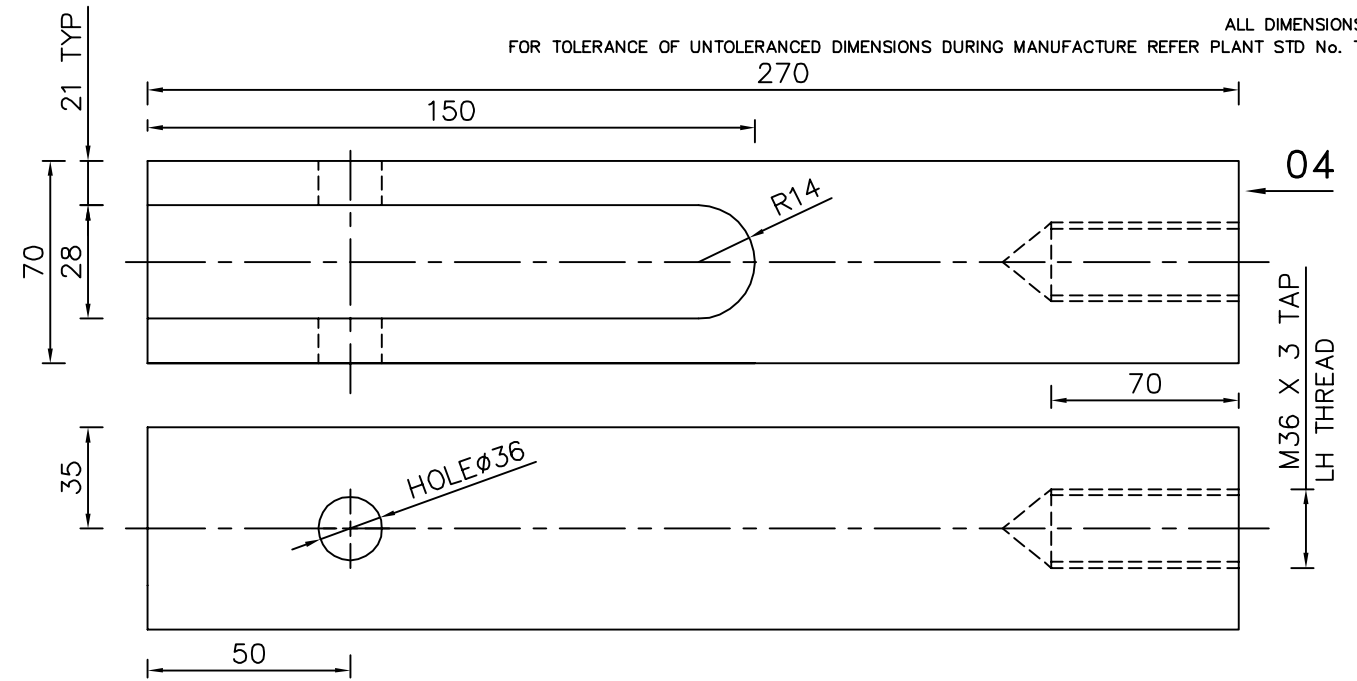
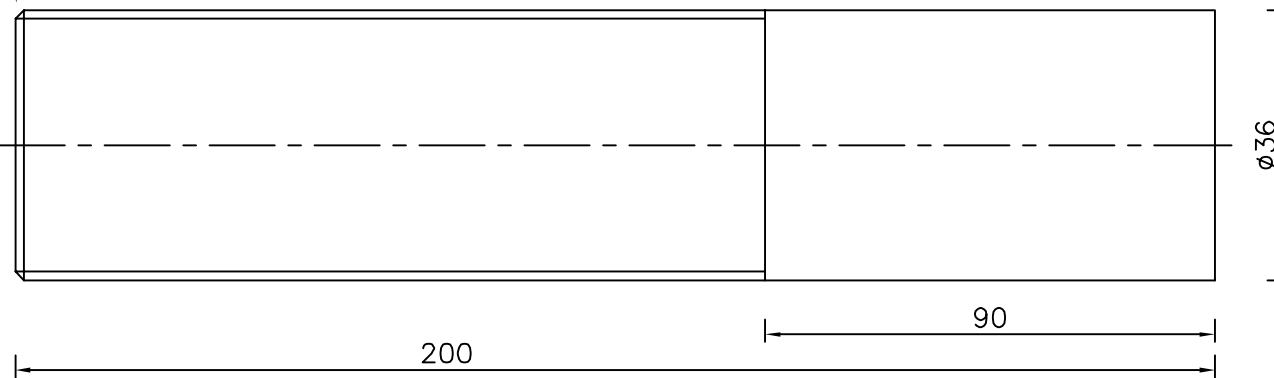
REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		



SECTION-AA

1.5x45° CHAMFER TYP.

01 (RH-THREAD) M36 X 3  
02 (LH-THREAD) M36 X 3



DU. NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	CS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	07	SPLIT PIN 4 x 56				41704-40025			0.005	
									2	
	06	WASHER PNCHD A 36				41408-00036			0.87	
									2	
	05	PIN DIA 36 : 100				15-024-326			0.90	
						SA 479 TYP 304			1	
	04	ROD DIA 70 : 270				15-339-061			9.30	
						SA 105			1	
	03	TUBE DIA 42.9 X 3.25 ; 1000				15-038-061			3.14	
						IS 1239			1	
	02	ROD DIA 36 : 200				15-039-088			1.60	
						SA 193 B7			1	
	01	ROD DIA 36 : 200				15-039-088			1.60	
						SA 193 B7			1	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STANDARD				
DEPT. : C & I CODE : 392	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN	NAME	SIGNATURE	DATE	NO. OF VAR
		CHD	M.Muruga Prabu	<i>[Signature]</i>	18-08-11	—
		APPD	V.M.Selvarraaj		25-11-11	—
REF TO ASSY / OLD DWG THIS DRG SUPERSEDES EARLIER DRAWING 3-48-209-48542/02		WEIGHT (Kg)	SCALE	ITEM NO	No OF ITEMS	
TITLE LINKAGE ROD ASSEMBLY PIN DIAMETER 36		18.290	NTS	—	—	
CARD CODE U 01		DRAWING NO : 3-97-599-20402		REV 00		

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

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.