An ISO 9001 Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY **NOTICE INVITING TENDER**		Phone: +91 431 257 7653 Email : skaruna@bheltry.co.in, ajay@bheltry.co.in Web : www.bhel.com	
TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2631700104**	**Enquiry Date:** **29.11.2017**	**Due date for submission of quotation:** **22.12.2017**

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity
10	**Portable Pneumatic Tube Insert Scarfing Machine** as per the technical specification & commercial conditions applicable (to be downloaded from web site **www.bhel.com** or **https://eprocure.gov.in/epublish/app**)	**03 Nos.**

Important points to be taken care during submission of offer.

1. **Compliance Form No: TRY/ IMP/ 02 or TRY/IND/02A to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**
2. **Delivery period required is 4 months from the date of P.O.**
3. **Commissioning and performance prove out shall be done at BHEL Trichy by the supplier.**
4. **Time period required for commissioning and performance prove out shall be 1 month from the date of intimation by BHEL.**
5. **EMD for this tender is INR 1,00,000/-**
6. **All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.**

BHEL's General guidelines / instructions (refer MM/CE/GENL/001- EMD), compliance form and technical specification can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website https://eprocure.gov.in/epublish/app (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference.

(This is not an E-tender, please submit your offer in hard copies)

Tenders should reach us before 14:00 hours on the due date.
Tenders will be opened at 14:30 hours on the due date.
Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.

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

AJAY V.ASALKAR
Sr. MANAGER
MM / Capital Equipment
BHEL. Tiruchirappalli - 620 014.

Sr. Manager / Capital Equipment / MM

TECHNICAL SPECIFICATION FOR PORTABLE PNEUMATIC TUBE INSERT SCARFING MACHINE

PART - A

S.No	BHEL Specification	Vendor's Offer
1.0	**QUALIFYING CRITERIA**	
1.1	The BIDDER / VENDOR (OEM) shall have atleast **FIVE** Years of Experience in the Design, Manufacture & Supply of "Special Purpose / Custom Built Pneumatically operated portable machines for metalworking".	
1.2	Only those vendors (OEMs), who have Manufactured, supplied and commissioned **at least ONE Pneumatically operated Heavy duty portable tube chamfering machine** similar to the machine specified under Part B, in the last Ten years [as on date of this tender opening(first date)] should quote.	
1.3	Vendor has to submit at least ONE Performance Certificate from their customer, for satisfactory performance of **Pneumatically operated Heavy duty portable tube chamfering machine specified in clause 1.2** supplied to them and such equipment is working satisfactorily for a minimum period of one year [as on date of this tender opening(first date)]. For obtaining the Performance certificate, a suggestive format is provided at the end of part-A.	
1.4	BHEL reserves the right to verify the information provided by the Vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

2.0	INFORMATION TO BE PROVIDED BY VENDOR	
2.1	Vendor shall provide contact details (phone no & email id) including the address of his Agents / Service Centres in India.	
2.2	Details of Special Purpose / Custom Built Pneumatically operated portable machines for metalworking supplied to BHEL units, if any. (Year of commissioning, Application, Type)	
2.3	Number of "Special Purpose / Custom Built Pneumatically operated portable machines for metalworking" supplied and commissioned till date (to quote the equipment supplied during the last three years only)	
2.4	The BIDDER/VENDOR to furnish Reference List of Customers (max 10 customers) including Contact details (phone no & email id).	

Suggestive Format of Performance Certificate:

The performance certificate should be produced **on Customer's Letter Head.**

PERFORMANCE CERTIFICATE

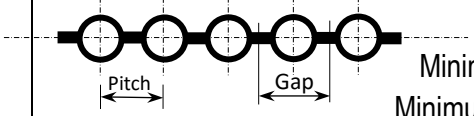
1	Supplier of the machine	
2	Make & Model of the M/C	
3	Month & Year of Commissioning	
4	Pneumatically Operated	
5	Application for which M/C is used	
6	a. Application b. Machining capability	
7	Performance of the Machine (Strike off whichever is not applicable)	Satisfactory / Not Satisfactory
8	After sales service (Strike off whichever is not applicable)	Satisfactory / Not Satisfactory
9	Any Other remarks	

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

Contact details of issuing authority
Name & Designation:
Office No/ Mobile no:
Email ID:

TECHNICAL SPECIFICATION FOR
PORTABLE PNEUMATIC TUBE INSERT SCARFING MACHINE
PART - B

S.No	Description	BHEL Specification	Vendors Offer
1.0	**PURPOSE/ FUNCTION**	The equipment is to be heavy duty portable machine used for the edge preparation of rough flame-cut TUBE Ends in between tubular panels/coils of High Pressure Boilers. The flame-cut ends will be of hardened and irregular in nature in the plane of cut.	
2.0	**Tube end preparation - requirements**		
2.1	Tube ODChamfering	Outside Bevelling on the tubes to get a 37.5° and 45.0° angle for welding. All the above styles shall have a land of 1.0 mm to 2.0 mm in the edge preparation.	
2.2	Facing	End Facing of Tubes, i.e. to get a square cut face with smooth finish.	
2.3	I.D. Boring	Internal straight boring in the I.D. of tubes to a depth of 25mm from the tube end face with a merging taper of 30 deg	
2.4	Accuracy	Face out : +/- 0.1 mm Bevelling Angle : +/- 0.5 degree	
3.0	**Job Specification**		
3.1	Jobs	Tube ends of cut-outs made in Tubular Panels	
3.2	Tube ODx Th Range of Tubes	Tube OD: **38.1** x Th. 3.6 to 12.5 Tube OD: 41.3 x Th. 4.0 to 8.2 Tube OD: 42.4 x Th. 4.0 to 8.6 Tube OD: 44.5 x Th. 4.0 to 8.7 Tube OD :47.63 x Th 4.0 to 10.0 Tube OD: 51.0 x Th. 4.0 to 11.0 Tube OD: 54.0 x Th. 3.6 to 12.5 Tube OD: 57.0 x Th. 7.0 to 11.0 Tube OD: 63.5 x Th. 4.0 to 7.1 Tube OD: 69.85x Th 4.0.to **15.0** Tube OD: **76.1** x Th 4.0 to 8.0	
3.3	Wall Thickness	**To be designed for 3.6 mm to 15 mm**	
3.4	Tubular Panels	Tube OD 38.1mm,thk-3.6 to 12.5 and Pitch 50.8mm, Tube OD 41.3mm,thk-4 to 8.2,Pitch 54mm in tubular panels.(Pitch: between centre of tubes)  Minimum gap : 58 mm Minimum pitch : 50.8 mm	

S.No	Description	BHEL Specification	Vendor's Offer
3.5	Material	i) CARBON STEEL : SA 192, SA 209 Gr. T1, SA 210 Gr.A1/ Gr.C (ASTM) ii) ALLOY STEEL: SA 213 Gr.T2, T11, T12, T22, T23, T91,T92 (ASTM) iii) STAINLESS STEEL: SA 213 304H, 316L, 347H (ASTM) Super 304 H	
3.6	Tube End Condition	**The tube ends of tubular panels are flame cut ends that will be of irregular and hardened in nature.**	
3.7	Width at clamping area	Equipment shall have uniform width from bottom of the clamping jaw to spindle top. The width shall not exceed 57 mm. The width to be suitable enough to insert within the minimum gap for performing tube end scarfing. Vendor to specify the width in the offered machine.	
4.0	**Cutting Tools, Tool Holders& Job Clamp Sizes**		
4.1	O D Clamping Sizes (11 sizes)	The machine shall be capable of clamping tubes with OD 38.1mm/41.3mm /42.4mm / 44.5mm / 47.63mm/51.0mm/54.0mm/57 mm /63.5mm/69.85/76.1mm (Total : 11 sizes) Vendor to provide 1 Set for each equipment.	
4.2	Cutting Tool	HSS Tool Bits (HSS3,HSS with COBALT inclusion)Tools should be as indicated under SL No-3.5 suitable for machining gas cut ends of steel tubes with maximum wall thickness 15 mm. **Cutting speed 18 to 30 m/min**	
4.3	Tool Bits configuration	a) 37.5° for O.D bevelling b) I.D straight boring for a depth of min. 25 mm from tube end face with merging taper of 30^0	
4.4	Cutting Tool Bits Sample drgs.	The cutting tool bits to be offered as per the drawings given below: a) 30-T-36-30020-2-0 – 37½ deg chamfer –Qty:6 Nos b) 20-T-31-28650-rev 07- Four lipped tool (D=25.3)–Qty:6 Nos	
4.5	Tube Holding clamps	a) 40-T-50-25962-0 – Top Clamp-3 No b) 20-T-50-22846-4 – V Block- 3 set	
4.6	Tool Holders	a) 20-T-48-28787-3-0 for chamfering 37 ½ deg- Qty:3 No b) 20-T-48-27249 for four lipped tool-Qty:3 No	

S.No	Description	BHEL Specification	Vendor's Offer
4.7	Cutting Tools	Tool Holders, Tool Bits for Cutting Operations mentioned under 4.1, 4.4, 4.5, and 4.6 to be offered Item wise	
5.0	**Machine Output Ratings:**		
5.1	Spindle cutting Speed	Spindle RPM preferably around 75 to 170 rpm for maximum power at an air inlet pressure of 60-70 psi. Vendor to specify	
5.2	Spindle Stroke	Minimum 25 mm. Spindle should be wobble free at maximum stroke position during working.	
5.3	Spindle Torque	Torque shall be sufficient to cut the above materials in gas cutting edges at an air inlet pressure of 60-70 psi. Vendor to specify	
5.4	Noise Level	Suitable silencers and mufflers to be provided to minimize the noise level.	
5.5	Productivity	Equipment to be capable of giving the productivity as per clause 14.3.vendor to confirm	
6.0	**Machine Configuration:**		
6.1	Machine construction	The equipment shall be of compact and robust construction with high output air-motor, to deliver a high cutting torque for a continuous duty, to meet the specific job application.	
6.2	Machine Operation	Pneumatically Operated	
6.3	Compressed Air Pressure	60 to 70 psi	
6.4	Machine Body	Steel Fabricated body	
6.5	All pneumatic piping& fittings	Metallic Pipes & fittings with minimum joints. Vendor to specify	
6.6	Lifting Hook	A suitably designed Lifting Hook shall be provided at the top of the machine, for handling by EOT Crane and ensure equilibrium of machine geometry. This should be located in such a way that it should not interfere with pneumatic on/off valves	
6.7	Tool Feed	Manual smooth tool feeding through a Hand Wheel without reverse load/Back force. The operator should be able to give feed effortlessly. Preferred tool advancement is 0.4mm or less per revolution of the feed wheel.	

S.No	Description	BHEL Specification	Vendor's Offer
6.8	Job/Tube Clamping	Clamping of tubes shall be on O.D by pneumatic clamping and has to be actuated with a separate locking Lever. The clamping to be rigid enough to hold the tube without slipping while machining. The air pressure shall be at 60 to 70 psi. Vendor to specify the clamping force	
6.9	Tube clamps	Suitable base 'V' clamps for OD clamping for varying tube sizes given under Sl.No. 4.1 as per Drg. No. 40-T-50-25962-0 – Top Clamp Drg. No. 20-T-50-22846-4 – V Block	
6.10	Tube Centring	To be ensured by pneumatic clamping system by means of suitably hardened clamp blocks. Hardness level to be mentioned in the offer.	
6.11	Machine Spindle	Hardened and Ground. Must be able to withstand fatigue due to varying and reversal of loads. Vendor to confirm and Specify	
6.12	Location of Parts	Location of Air Motor, Silencer, FRL Unit, etc. shall be such that they do not interfere with the job surface, when the equipment is engaged. The arrangement shall be convenient for the operator. The following parts/features to be positioned as described for better operator convenience: • Clamping on/off valve to be over the pneumatic clamping cylinder at the front portion. On/off lever should be in line with the spindle axis projecting away from the equipment. • Motor on/off valve can be over the motor but to be located at the centre of the equipment. On/off lever should be in line with the spindle axis projecting away from the equipment. • Feed wheel must be light weight. Vendor to use a suitable material/design. Also there should not be any slippage for forward/reverse motion • Exhaust for valves if any must be inline with the spindle axis. • There must not be any oil leakage in the equipment	
6.13	Silencers& Mufflers	The location of mufflers & silencers should be properly routed and positioned so that it does not hinder the operation. Also apart from the metallic perforated sheet one more detachable additional sheet to avoid the outgoing air/oil mix to interfere with the Operator. Vendor should submit the Line diagram for the same.	

6.14	Internal Construction of the equipment	All gears, Worm wheels, worm, bolts etc shall be made of high tensile strength to withstand the forces during operation. The assembly shall give a smooth performance. Vendor to provide details of the internal parts of the equipment.	
6.15	Weight of single unit	Around 200-250 kg.	
7.0	**Air Motor:**		
7.1	Air Motor	Geared Multi Vane Air Motor	
7.2	Air Motor Power at Output shaft	Air motor power not less than 4.0 kW at an air inlet pressure of 60-70 psi through a 3/4" air hose at the output shaft. Vendor to confirm.	
7.3	RPM	RPM at max. power of output shaft to be specified by Vendor.	
7.4	Stall Torque	Vendor to specify	
7.5	Power / Torque Characteristics	Air Motor Power / Torque characteristics w.r.t rpm / air pressure to be provided with the offer.	
7.6	Gear Ratio	Reduction Gear Ratio – Vendor to specify	
7.7	Lubrication oil consumption rate for Air motor	Lubrication oil consumption rate of the air motor should be minimum. Vendor to specify drops per minute. Vendor to also specify the lubrication oil specification.	
7.8	Speed Regulation	Air motor shall be provided with an Air regulator to select suitable spindle speed.	
8.0	**Pneumatic Circuit:**		
8.1	Air Connection	Air connection through 3/4 inch hoses at a pressure of 60-70 psi shall be provided by BHEL. The equipment to be suitably designed.	
8.2	Air control valves	Control valve for air motor shall be separate from Control valve for clamping cylinder. Pneumatic circuit line diagram to be provided.	
8.3	Air Consumption	Air consumption pattern shall be specified.	
8.4	Filter, Regulator &Lubricator(FRL Unit)	A suitable capacity Air Filter, Regulator & Lubricator unit with metallic protective casing shall be mounted on the equipment.	
8.5	Air Couplings	Quick dis-connect couplings (size 3/4 inch) will be provided by BHEL with the equipment, for air hose connection.	
9.0	**Makes of components:**		
9.1	Geared Multi Vane Air Motor	Ingersoll Rand / San-ei Seiki Seisakushu Co. Ltd / Atlas Copco. Vendor to provide details.	
9.2	Bearings	SKF/INA FAG/IKO/TIMKEN/NTN	

9.3	All pneumatic components	FESTO/SMC	
9.4	F R L Unit	FESTO/SMC	
9.5	Silencer & Mufflers	FESTO/SMC	
9.6	Pneumatic Valves	FESTO/SMC	
9.7	SEALS	SKF/PARKER/MERKEL/HALLITE/SMC/FESTO	
9.8	Pneumatic Hoses	Poly Urethane - FESTO/SMC	
9.9	General	Makes of any other unspecified bought out items shall be specified by Vendor and such makes shall be acceptable to BHEL	
10.0	**Painting:**		
10.1	Paint	Poly Urethane	
10.2	Colour	Apple Green Colour, RAL 6011	
11.0	**Spares:**		
11.1	Main Equipment	Complete List of Spares including Air Motor Bearings, vanes , Seals, Bushes, Set of gears, Spindle, Air Cylinder, Air Valve for Clamping& Spindle rotation, Tool holders, adapter plate etc. for two years of trouble free maintenance may be listed item wise with quantity.	
12.0	**Operation and Maintenance Manuals:**		
12.1	O & M Manual Details	Manuals shall contain the following details: a) Blow-up details of assembly / dismantling, part numbers with part description (detailed sub drawings of machine parts) for Maintenance, Safety Instructions while using, b) Operating Sequence for using the equipment. Trouble Shooting Chart. c) List of all bought out items with make and model number d) Catalogue of all bought out items. e) Lubrication schedule. f) Preventive Maintenance check list. g) Tool holder drawings. h) Tool insert details i) Clamp bases drawings	
12.2	No of Copies of Manuals	One Hard copy and One soft copy in CD/DVD for each machine	
12.3	Language	English	

13.0	**Pre-dispatch Inspection:**		
13.1	Inspection at Vendor's works	Equipment shall be offered for inspection before dispatch at Supplier's works. The inspection will be carried out by BHEL. The performance of the machine, makes, spares etc will be checked by BHEL during PDI. Tubes will be provided by BHEL for PDI. Supplier needs to arrange the transit for PDI material(tubes & Scrap panels)	
14.0	**Commissioning:**		
14.1	Commissioning at BHEL works	Supplier's representative shall be deputed for commissioning and performance prove-out of the equipment at BHEL works.	
14.2	Prove out Trials	**Capability:** Tube OD: 51mm x Th. 11mm – Alloy steel (T22) with gas cut edges – OD chamfer.	
14.3	**Prove out Trials**	**Productivity Prove out:** Tube Size: **OD 38.1mm x 8 mm thickness** Tube Material:**T11 or T22** Tube edges :**Smooth Gas cut edges** OD chamfering/ bevelling style:**37.5 deg** Stock to be removed: **8 mm** **No.of tubes to be proved in 60 minutes:25 tubes**	
15.0	**Training:**		
15.1	Training	Training on Operation and Maintenance of the equipment shall be provided	
16.0	**Guarantee:**		
16.1	Guarantee	The equipment shall be guaranteed for a minimum period of 12 months from the date of commissioning or 18 months from the date of dispatch whichever is earlier	
17.0	**General:**		
17.1	Technical Details	All technical details of the bought out items, circuit diagrams, general arrangement drawings to be provided with the offer.	
17.2	Drawing approval	GA Drawings to be submitted by supplier for approval prior to manufacturing with in 30 days from the date of ordering and BHEL will provide approval with in 15 days from the date of submission, in case of on order.	

Enclosures:

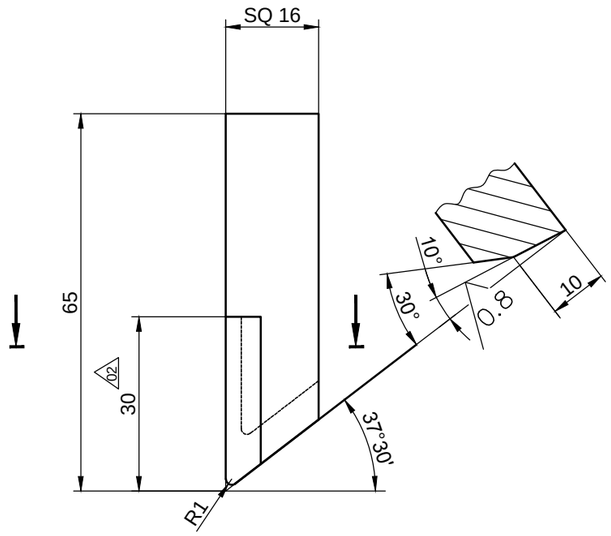
1. 30-T-36-30020-2-0 – 37½ deg chamfer tool
2. 20-T-31-28650-rev 07- Four lipped tool
3. 40-T-50-25962-0 – Top Clamp
4. 20-T-50-22846-4 – V Block
5. 20-T-48-28787-3-0 Tool holder for chamfering 37 ½ deg
6. 20-T-48-27249 Tool holder for four lipped tool

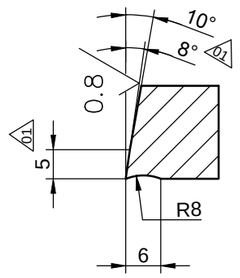
USE AVAILABLE MATERIAL SIZE OF 20X20X200 mm LONG. OR NON.MOVING 16X16 SHANK HARDENED TOOL OF SUITABLE LENGTH	HARDEN & TEMPER TO 62 $^{\pm 1}$ HRc	CUTTING EDGE SHALL BE PROVIDED ON REAR END ALSO AFTER ESTABLISHING THIS TOOL IN REGULAR PRODUCTION

1.6 / 0.8

TOLERANCE FOR UNTOLERANCED DIMENSIONS

UPTO 6 MM	= ±0.1 MM
> 6 UPTO 120 MM	= ±0.2 MM
MORE THAN 120 MM	= ±0.5 MM
ANGULAR TOLERANCE	= ±0.5 Deg
CHAMFER	= ±0.5 Deg





NO. OF PIECES	DESCRIPTION	SEM. PRO/SEQ. NO.	INT. MAT/SEQ. NO.	FINAL MATERIAL	SCRAP SORT	NET WT.(KG)	GROSS WT.(KG)	DRAWING NO	ITEM NO.
	16X16X65		IS 1570	T75 W18 Co6 Cr4		0.15			

COMP.DRG.NO	ø44.5–ø63.5
COMP. DES.	TUBES PANELS
GROUP	11 W.C– 4395

TOOL NO: –36–65812–00
ANGLE : 37.5°
USE WITH : 48.14156.00 & 48.14157.00

BHARAT HEAVY ELECTRICALS LTD.,

BOILER PLANT UNIT, TIRUCHIRAPALLI–14

FIRST ANGLE.	SCALE 1:1	DRAWN	K.V	TOTAL NET WT.KG	
		CHECKED	N.E	TYPE	
		APPROVED	G.S	M/C: INSERT	SCARFING
ALL DIMENSIONS IN MILLIMETRES.		DATE	06/02/2013	NEW/OLD DRG NO.	

CAUTION

TITLE.

EDGE PREPARATION TOOL 37°30'(INSERT SCARFING)

DRAWING NO. 30–T–36–30020

REVISION 02

	DATE	ALTERED / CHECKED	ZONE	
02	06.02.13	ALTERED K.V / CHECKED N.E	02	DIM. 30 WAS 20
01	11.04.83	ALTERED B K R / CHECKED B K R	01	PRIMARY CLEARANCE 5 & 8° ADDED

DRAWING NO. 20-T-31-28650/07

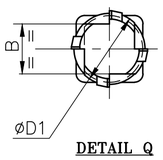
HARDEN AND TEMPER TO 62 $^{\pm1}$ HRc

CHAMFER SHARP EDGES TO 1 x 45°

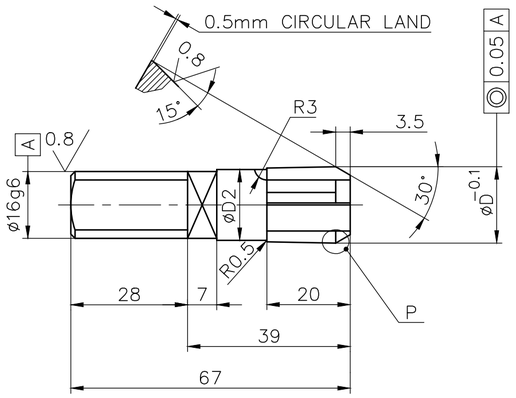
1.6 0.8

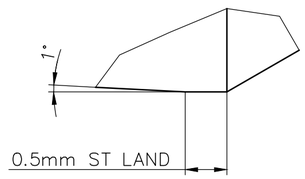
TOLERANCE FOR UNTOLERANCED DIMENSIONS	
UPTO 6 MM	= ±0.1 MM
> 6 UPTO 120 MM	= ±0.2 MM
MORE THAN 120 MM	= ±0.5 MM
ANGULAR TOLERANCE	= ±0.5 Deg
CHAMFER	= ±0.5 Deg

16g6	$^{-0.006}_{-0.017}$



DETAIL Q





DETAIL–P

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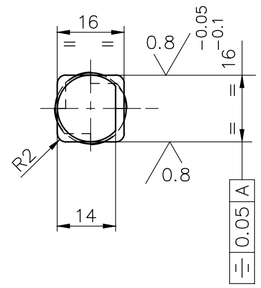
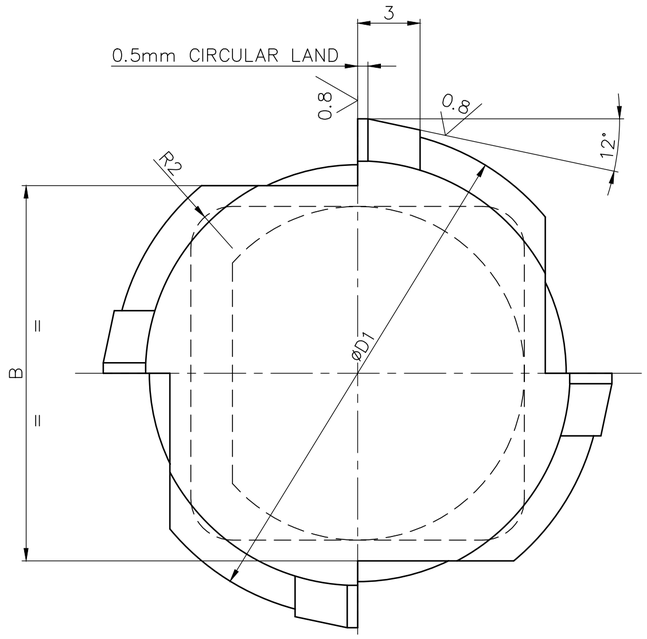
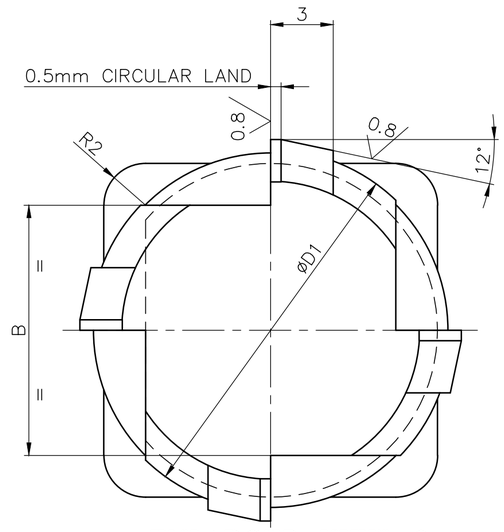




ENLARGED VIEW–Q

FOR DIMNS 'B' > 16



ENLARGED VIEW–Q

FOR DIMNS 'B' < 16

SL. NO.	TOOL NUMBER	øD $^{-0.1}$	B	øD1	øD2	Wt in KG			DRAWN	CHECKED	APPROVED	DATED	COMPONENT DRG NO / DESCRIPTION
12	31–66735–00	25.6	18	24.3	20	0.20			N.E	N.E	G.S	31.01.15	
11	31–66734–00	20.7	15	19.6	18	0.12			N.E	N.E	G.S	19.01.15	
10	31–66730–00	15.60	09	14	14.4	0.10			S.R.S	N.E	G.S	30.03.14	
09	31–66710–00	16.26 $^{-0.1}$	10	15	15 (03)	0.10			R.R.K	N.E	G.S	14.10.13	
08	31–66709–00	19.32 $^{-0.1}$	12	18.3	17	0.12			R.R.K	N.E	G.S	14.10.13	
07	31–66708–00	25.3 $^{-0.1}$	18	24.3	20	0.19			R.R.K	N.E	G.S	14.10.13	
06	31–66703–00	21.72 $^{-0.1}$	15	20.6	18	0.12			K.V	N.E	G.S	30.08.13	
05	31–66684–00	18.3 $^{-0.1}$	12	17.3	17	0.10			H.G	N.E	G.S	04.11.11	
04	31–66683–00	18.6 $^{-0.1}$	12	17.6	17	0.10			H.G	N.E	G.S	04.11.11	U6/1701–HT–190–1–06–751 FURN VERT WALL PANEL L&R
03	31–66682–00	21.3 $^{-0.1}$	15	20.3	18	0.12			H.G	N.E	G.S	04.11.11	U8/1801–HT–175–1–06–731 FRT UPPER WALL PANEL
02	31–66681–00	21.6 $^{-0.1}$	15	20.6	18	0.12			H.G	N.E	G.S	04.11.11	U6/1701–HT–169–1–06–731 FURN UPPER VERT WALL PANEL
01	31–66680–00	24.4 $^{-0.1}$	18	23.4	20	0.16			H.G	N.E	G.S	04.11.11	U6/1701–HT–360–1–06–737 FURN LOWER SPIRAL FRT PANEL

ZONE	DESCRIPTION
07	DATE 31.01.15 ALTERED N.E CHECKED N.E — SL No 12 ADDED
06	DATE 19.01.15 ALTERED N.E CHECKED N.E — SL No 11 ADDED
05 (05)	DATE 18.04.14 ALTERED N.E CHECKED N.E — RAW MATL DESCRIPTION MODIFED
04	DATE 30.03.14 ALTERED S.R.S CHECKED N.E — SL. NO:10 ADDED
03 (03)	DATE 11.02.14 ALTERED N.E CHECKED N.E — DIMN 15 WAS 12
02	DATE 14.10.13 ALTERED R.R.K CHECKED N.E — SL. NO:7,8&9 ADDED
01	DATE 30.08.13 ALTERED K.V CHECKED N.E — SL. NO:6 ADDED

(05)

NO. OF PIECES	DESCRIPTION	SEM. PRO/SEQ. NO.	INT. MAT/SEQ. NO.	FINAL MATERIAL	SCRAP SORT	NET WT.(KG)	GROSS WT.(KG)	DRAWING NO	ITEM NO.
	øDx67 IF øD>22 ø22x67 IF øD<22			IS 1570 T7D W18 Cr4V1					

COMP.DRG.NO		TOOL NO–	
COMP. DES.		FOR END SCARFING & INSERT SCARFING M/C	
GROUP	11	W.C– 5991	

BHARAT HEAVY ELECTRICALS LTD.,

BOILER PLANT UNIT, TIRUCHIRAPALLI–14

FIRST ANGLE.	SCALE				
	NTS (10:1)	DRAWN	H.GOPI GANESH	TOTAL NET WT.KG	
		CHECKED	N.ELANGOVAN	TYPE	
		APPROVED	G.SUBRAMANIAN		
ALL DIMENSIONS IN MILLIMETRES.		DATE		NEW/OLD DRG NO.	

293–090

TITLE.

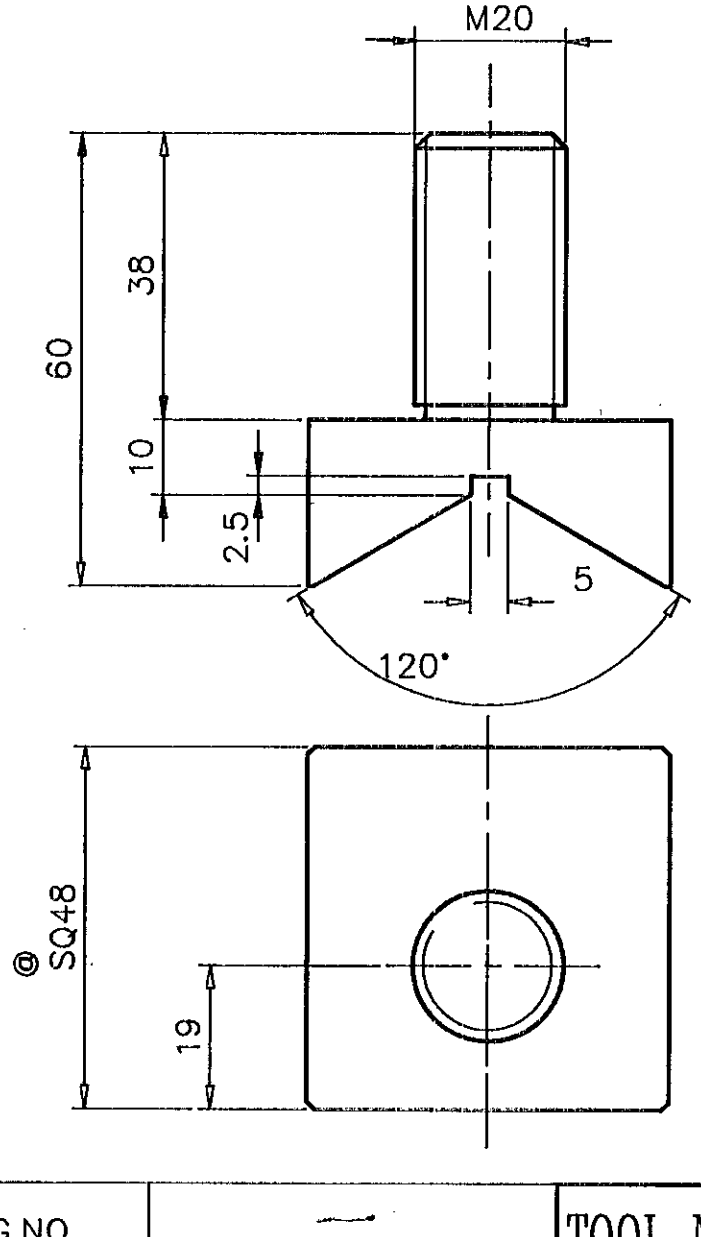
4 LIPPED TOOL FOR END & INSERT SCARFING

DRAWING NO. 20–T–31–28650

REVISION 07

HARDEN & TEMPER TO 28HRc
CHAMFER SHARP EDGES.

3.2



TOLERANCE FOR UNTOLERANCED DIMENSIONS	
UPTO 6 MM	= ±0.1 MM
> 6 UPTO 120 MM	= ±0.2 MM
MORE THAN 120 MM	= ±0.5 MM
ANGULAR TOLERANCE	= ±0.5 deg
CHAMFER	= 1.0 (45°)

COMP.DRG.NO	—	TOOL NO- 50-10330-00
COMP. DES.	PIPES	
TYPE&GROUP	80	W.C- 4393

NO. OF PIECES	NAME-DIMENSIONS	SEMI-PRODUCT	FINAL MATERIAL	INITIAL MATERIAL	SCRAP SORT	NET WT (KG)	GROSS WT (KG)	DRAWING NO.	ITEM NO.
	48x48x60			IS 1875 CL 4		0.5			

REMARKS

TOTAL NET WT(kg)

SCALE		
1:1	DRAWN	GSM
	CHECKED	KSB
	APPROVED	VC
	STDS. OFFICER	
	DATE	100393

TRANS. COPY NO.

ALTERATIONS	DATE	SIGNATURE	ALTERATION INDEX
DIMN 48 WAS 50	290879	A.KUMAR	●

BHEL 33-116

TYPE | GROUP | OLD DRG. | NEW DRG.

TITLE: CLAMP

DRAWING No. 40-T-50-25962

DRAWING NO. 20-T-50-22846/04

FOR IS 1875 CL4: HARDEN&TEMPER TO 28 HRc.
FOR IS 1570 13Ni3 Cr80
CASE CARBURISE TO A DEPTH OF 0.8mm & HARDEN AND TEMPER TO 56–58 HRc.

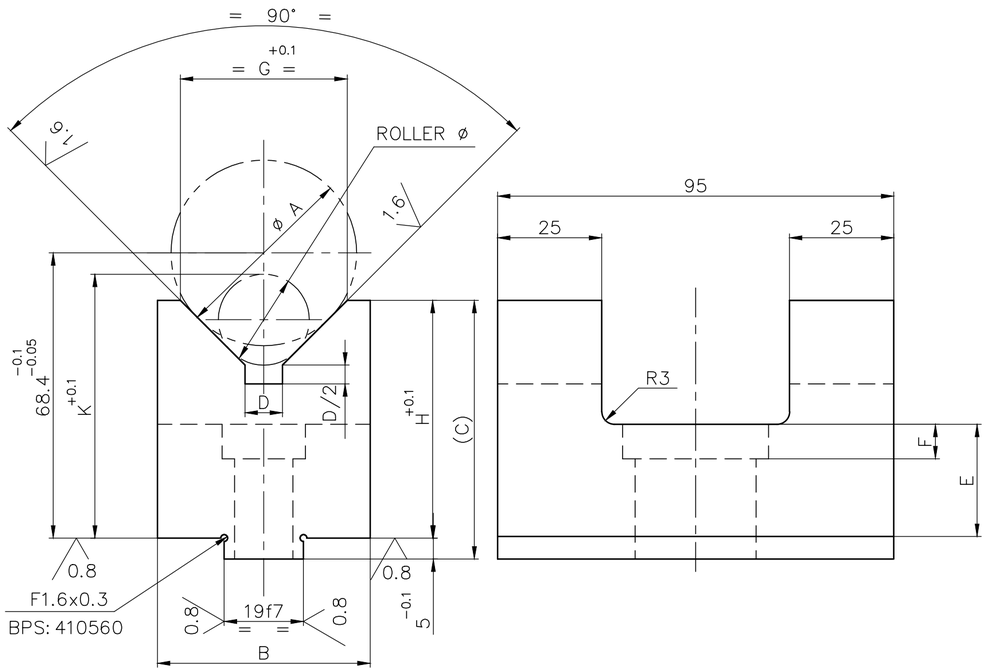
REMOVE SHARP CORNERS. PROFILE END CUT SCARFING M/C .
REF. DRAWING No. SC.8000.013.

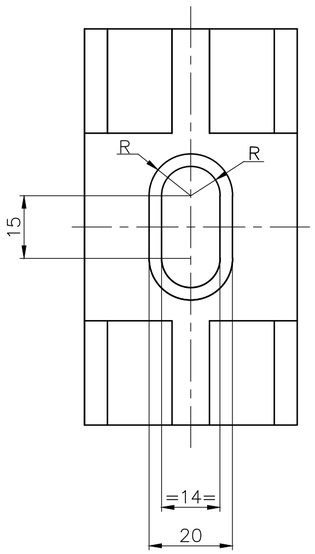
3.2 / 1.6 / 0.8

19f7 $^{-0.020}_{-0.041}$

TOLERANCE FOR UNTOLERANCED DIMENSIONS

UPTO 6 MM	= ±0.1 MM
> 6 UPTO 120 MM	= ±0.2 MM
MORE THAN 120 MM	= ±0.5 MM
ANGULAR TOLERANCE	= ±0.5 Deg
CHAMFER	= ±0.5 Deg





SL.NO	TOOL NO	TUBE ø A	B	(C)	D	E	F	$G^{+0.1}$	$H^{+0.1}$	ROLLER ø	$K^{+0.1}$	Wt	W.C	PARAMETER	DRN	CHD	APPD	DATE
21	50–16465–00	52	52	58	9	30	14	42.74	53	50	92	1.68	5991	05200 xxxx xxx	H.G	N.E	G.S	16.6.12
20	50–16367–00	69.85	70	54 04	25	30	–	60	49	50	79.36	2	5991	06985 xxxx xxx	R.D	N.E	G.S	21.11.11
19	50–16143–00	41.3	45	59.05	10	35	14	29.70	54.05	40	87.48	1.32	5991	0413 xxxx xxx	R.T.S	N.E	G.S	30.01.09
18	50–15779–00	73	73	55	20	14	8	66.44	50	50	77.14	1.6	5991	0730 xxxx xxx	GUNA	GS	GS	
17	50–14983–00	33.7	51	67	8	45	14	34.86	62	36	88.03	1.89	5991	03370 xxxx xxx	SMR	GS	GS	
16	50–14948–00	24	50	70	8	51	14	27.14	65	30	87.64	1.82	5991	02400 xxxx xxx	GSM	GSM	RN	
15	50–14765–00	42	45	63	10	35	14	38.60	58	40	86.98	1.49	5991		SMR	GS	RN	
14	50–14621–00	21.8	48	70	8	53	14	24.03	65	30	89.21	1.75	5991		SMR	GS	GS	
13	50–14620–00	34.2	46	67	9	44	14	35.56	62	50	104.57	1.66	5991		SMR	GS	GS	
12	50–14619–00	48	58	63	10	34	14	47.08	58	50	94.81	1.49	5991		SMR	GS	GS	
11	50–14561–00	35	50	67	8	43	14	36.7	62	50	104.01	1.9	5991		TTV	KAB	V.C	
10	50–14511–00	31.8	51	70	8	45	14	38.17	65	50	106.27	1.78	5991		TTV	KAB	V.C	
9	50–14482–00	60.3	64	60	10	25	8	58.46	55	50	86.12	1.8	5991		TTV	KAB	V.C	
8	50–14130–00	57	64	63	10	28	8	59.8	58	50	88.46	1.69	5991		TTV	KAB	V.C	
7	50–14190–00	38	51	67	9	41	14	40.9	62	50	101.88	1.8	5991		TTV	KAB	V.C	
6	50–10341–00	47.63	51	61	9	34	14	42.6	56	50	95.08	1.62	5991		TTV	KAB	V.C	
5	50–10329–00	76.1	76	54	25	14	8	68.8	49	50	74.94	2.25	5991		TTV	KAB	V.C	
4	50–10328–00	63.5	64	57.15	10	23	6.5	57.3	52.15	50	83.85	1.47	5991		TTV	KAB	V.C	
3	50–10327–00	54	60	59.22	10	30	8	48	54.22	50	90.58	1.75	5991		TTV	KAB	V.C	
2	50–10326–00	51	51	58.3	9	30	14	41.9	53.3	50	92.69	1.71	5991		TTV	KAB	V.C	
1	50–10325–00	44.5	51	62	9	36	14	40	57	50	97.29	1.68	5991		TTV	KAB	V.C	

NO. OF PIECES	DESCRIPTION	SEM. PRO/SEQ. NO.	INT. MAT/SEQ. NO.	FINAL MATERIAL	SCRAP SORT	NET WT.(KG)	GROSS WT.(KG)	DRAWING NO	ITEM NO.
	BxCx95			IS 1570 13Ni3Cr80 IS 1875 CL4					

COMP.DRG.NO	–
COMP. DES.	TUBES
TYPE&GROUP	W.C–5991

TOOL NO–50– –00

TUBE øA

BHARAT HEAVY ELECTRICALS LTD.,

BOILER PLANT UNIT, TIRUCHIRAPALLI–14

FIRST ANGLE.	SCALE NTS	DRAWN S.SENTHIL	TOTAL NET WT.KG
		CHECKED N.ELANGOVAN	TYPE
		APPROVED G.SUBRAMANIAN	RETRACED
ALL DIMENSIONS IN MILLIMETRES.		DATE 02.04.2009	NEW/OLD DRG NO. 20–T–50–15760

CAUTION

293–090

TITLE.

V BLOCK FOR END SCARFING M/C

DRAWING NO. 20–T–50–22846

REVISION 04

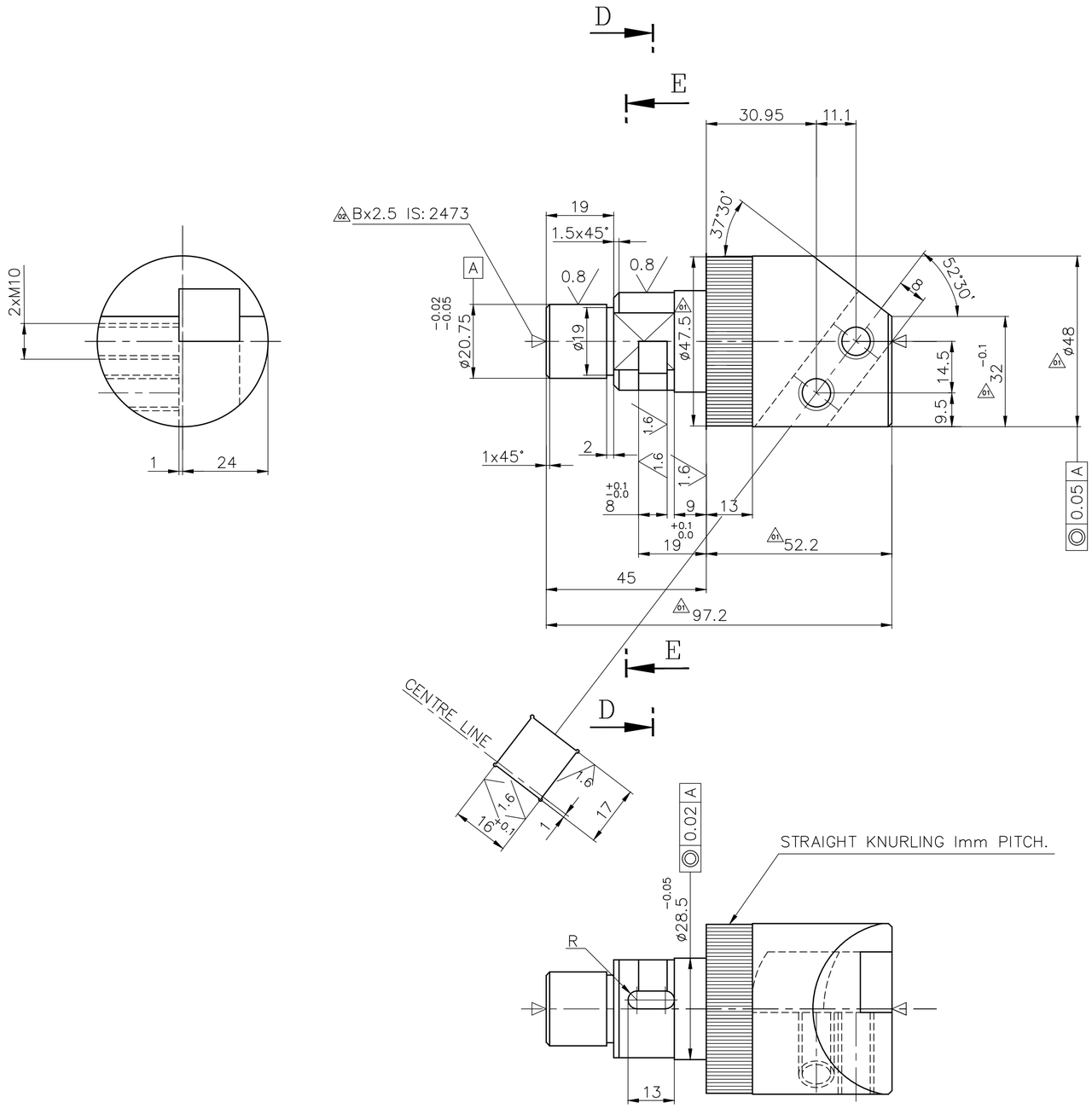
	DATE	ALTERED / CHECKED	ZONE
04	16.6.12	ALTERED H.G CHECKED N.E	SL No: 21 ADDED 04 DIMENSION 54 MM WAS 49 MM
03	21.11.11	ALTERED R.DHANVAR CHECKED N.ELANGOVAN	SL No: 20 ADDED
02	02.04.09	ALTERED S.SENTHIL CHECKED N.ELANGOVAN	SOFT COPY CREATED
01	30.01.09	ALTERED R.T.SELVARAJ CHECKED N.ELANGOVAN	SL NO:19 ADDED

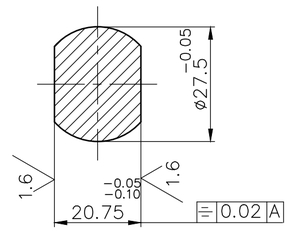
DRAWING NO. 20-T-48-28787/03

03 HARDEN AND TEMPER TO 45–48 HRc.

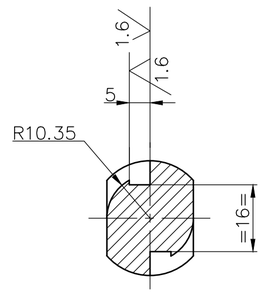
3.2 1.6 0.8

TOLERANCE FOR UNTOLERANCED DIMENSIONS	
UPTO 6 MM	= ±0.1 MM
> 6 UPTO 120 MM	= ±0.2 MM
MORE THAN 120 MM	= ±0.5 MM
ANGULAR TOLERANCE	= ±0.5 Deg
CHAMFER	= ±0.5 Deg





SECTION–EE



SECTION–DD

03	DATE 29.1.14	ALTERED H.G / CHECKED N.E	ZONE 03	MATERIAL EN48 A WAS IS:1570 13Ni3Cr 80. RESPECTIVE CHANGES MADE IN HEAT TREATMENT NOTE.
02	DATE 14.12.12	ALTERED H.G / CHECKED N.E	ZONE 02	MATERIAL IS:1570 13Ni 3Cr 80 WAS IS:1875 CL4.RESPECTIVE CHANGES MADE IN HEAT TREATMENT NOTE. CENTER HOLE SPECIFICATION CHANGED TO IS STANDARD.
01	DATE 12.12.12	ALTERED H.G / CHECKED N.E	ZONE 01	DIMENSIONS 97.2, 52.2, 32, 48&47.5 WERE 101, 56, 30, 50&49.5 RESPECTIVELY.

NO. OF PIECES	DESCRIPTION	SEM. PRO/SEQ. NO.	INT. MAT/SEQ. NO.	FINAL MATERIAL	SCRAP SORT	NET WT.(KG)	GROSS WT.(KG)	DRAWING NO	ITEM NO.
	ø48x98			03 EN 48 A		0.80			

COMP.DRG.NO	–
COMP. DES.	TUBES
TYPE&GROUP	– W.C– 5991

TOOL NO–48–14568–00

BHARAT HEAVY ELECTRICALS LTD.,

BOILER PLANT UNIT, TIRUCHIRAPALLI–14

FIRST ANGLE. SCALE 1:1

DRAWN	R.R.KUMAR	TOTAL NET WT.KG	
CHECKED	N.ELANGOVAN	TYPE	
APPROVED	G.SUBRAMANIAN		
DATE	16.10.2012	NEW/OLD DRG NO.	

ALL DIMENSIONS IN MILLIMETRES.

TITLE.

TOOL HOLDER FOR INSERT SCARFING M/C

DRAWING NO. 20–T–48–28787 REVISION 03

DRAWING NO. 20-T-48-27249

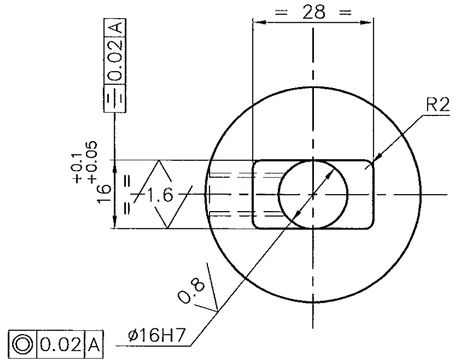
HARDEN AND TEMPER TO 28 ±1 HRc.

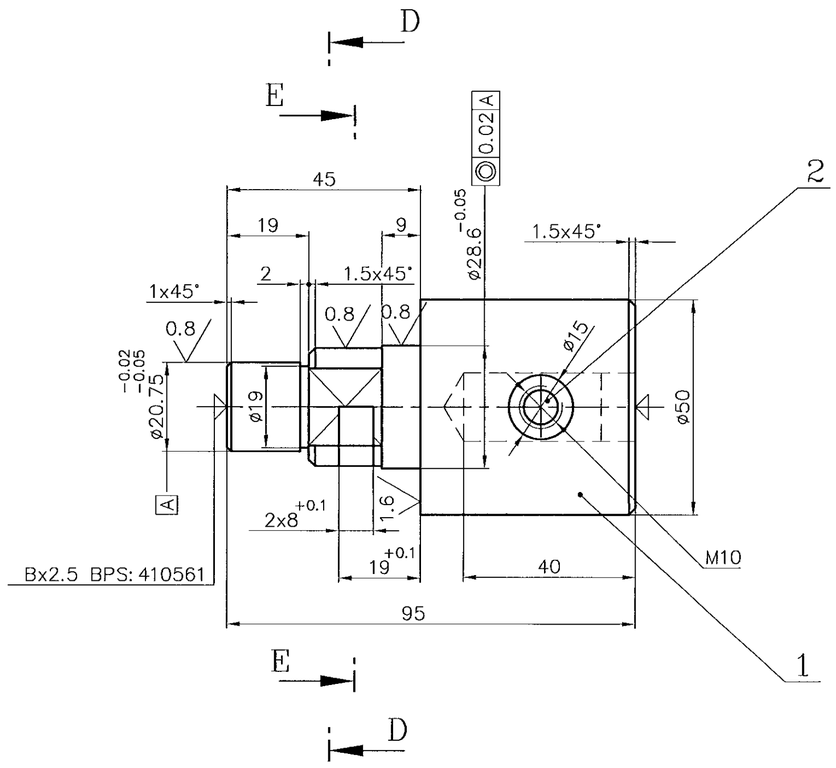
CHAMFER SHARP EDGES TO 1x45°

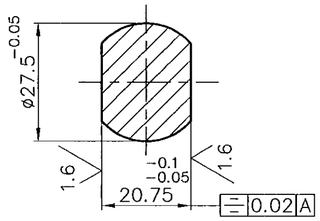
3.2 1.6 0.8

TOLERANCE FOR UNTOLERANCED DIMENSIONS	
UPTO 6 MM	= ±0.1 MM
> 6 UPTO 120 MM	= ±0.2 MM
MORE THAN 120 MM	= ±0.5 MM
ANGULAR TOLERANCE	= ±0.5 Deg
CHAMFER	= ±0.5 Deg

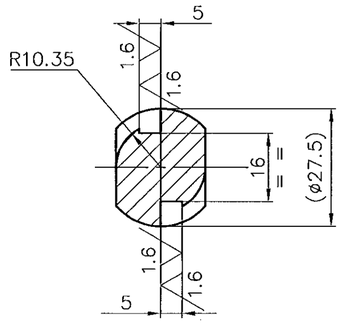
16H7	+0.018 0.0



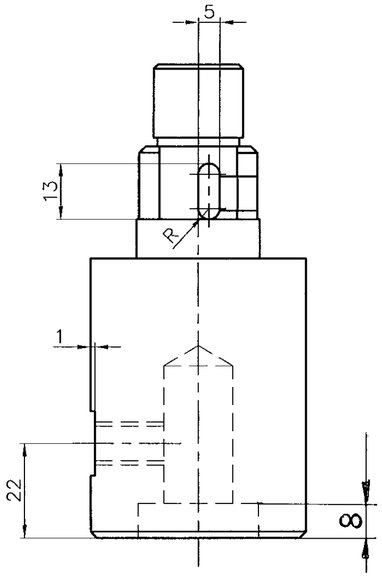




SECTION–DD



SECTION–EE



1	HEX SOC SET SCR M10x20		IS6094–A–45H					2
1	ø50X95			IS 1875 CI4		1.0		1
NO. OF PIECES	DESCRIPTION	SEM. PRO/SEQ. NO.	INT. MAT/SEQ. NO.	FINAL MATERIAL	SCRAP SORT	NET WT.(KG)	GROSS WT.(KG)	DRAWING NO	ITEM NO.

COMP. DRG. NO.	2–06–644–08658
COMP. DESC.	LOWER INTER REAR CORNER WNN PANEL
GROUP: 06	WC: 5991

TOOL NO :- 48-14472-00

BHARAT HEAVY ELECTRICALS LTD.,

BOILER PLANT UNIT, TIRUCHIRAPALLI–14

FIRST ANGLE.	SCALE 1:1	DRAWN	N.Elangovan	TOTAL NET WT.KG	1.0
		CHEKED		TYPE	
		APPROVED			
ALL DIMENSIONS IN MILLIMETRES.		DATE	31.12.2002.	NEW/OLD DRG NO.	

CAUTION

293–090

TITLE.

TOOL HOLD

TOOL HOLDER

DRAWING NO. 20–T–48–27249

REVISION

A	DATE	ALTERED
ZONE		CHECKED