



An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

ENQUIRY	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com
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	Enquiry Number: 2620700025	Enquiry Date: 27.06.2007	Due date for submission of quotation: 30.08.2007
Your are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

Item	Description	Quantity	Delivery Schedule
10	CNC Header Pipe / Fitting Boring & Edge Preparation Machine 800mm capacity as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com)	2 Nos.	20.03.2008

Note:

Confirmation of acceptance for BHEL commercial terms & conditions and Price Bid formats have been posted in BHEL Corporate web site www.bhel.com under Enquiry reference “2620700025”. Your offer should be based on all the above documents.

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

Manager / Capital Purchase / MM / Manufacturing

PART A
CNC HORIZONTAL BORING MACHINE (800 mm Capacity)

SECTION – I : QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for consideration of the technical offer for the CNC HORIZONTAL BORING MACHINE – HEADER PIPE / FITTING BORING & EDGE PREPARATION

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	The BIDDER shall have a minimum of TEN Years of Continuous Experience in the field of Design, Manufacture and Supply of CNC HORIZONTAL BORING MACHINES.	
2	Only those vendors, who have supplied and commissioned at least ONE CNC HORIZONTAL BORING MACHINE of Spindle Diameter 100mm or above in the past ten years (on the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender), should quote. Performance certificate from the customers regarding satisfactory performance of machine supplied to them in attached format to be enclosed along with technical offer.	
2.1	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

SECTION – II

The BIDDER / VENDOR is requested to provide the following information:

3.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where CNC HORIZONTAL BORING MACHINES have been supplied in the past.	
4.0	Details of Quality System followed [Furnish the salient aspects of the Quality Assurance System followed] and Stages of In-House Inspection, including Third Party Inspection Schedule.	

CABS-2-34: CNC Horizontal Boring Machine

5.0	Details of CNC HORIZONTAL BORING MACHINES supplied to other BHEL units (Year of commissioning, Spindle size of machine, Spindle motor power)	
6.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centers in South India	
7.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – III

The BIDDER has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser:

S. No.	PARTICULARS	VENDOR'S RESPONSE
8.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS - Technical Offer [with PART A & PART B] & Commercial and Price Bid.	
9.0	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. A just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
10.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
11.0	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation	
12.0	BIDDER has to indicate the Country of Origin for the supply of main equipment / important bought-out items.	

PERFORMANCE CERTIFICATE

(On Customer's Letter Head)

1. Supplier of the machine :
2. Make & Model of the Equipment :
3. Month & Year of Commissioning :
4. Application :
5. Spindle Size & Spindle Motor Power : Around 110mm/Min 25KW
6. Performance of the Machine : Best in the market /
(Strike off whichever is not applicable) Satisfactory /
Good /
Average /
Not Satisfactory
7. Any other remarks:

Date:

Certificate

Signature & Seal of the Authority
Issuing the Performance

PART – B**TECHNICAL SPECIFICATION FOR CNC HORIZONTAL BORING MACHINE – HEADER PIPE / FITTING BORING & EDGE PREPARATION**

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)
1.0	PURPOSE & WORKPIECE MATERIAL:	
1.1	The machine is meant for Facing, Boring, and Edge Preparation of pipes, Tee & Elbows which are high pressure components for Power Boilers, and Industrial boilers. The machine shall be capable of generating various profiles of edge preparation on the above said components. The Edge preparation shall be done by rotation of tool mounted on the Faceplate and movement of either two or more axes of the machine drive system through CNC control.	
1.2	Material specification:	
	A) CARBON STEEL: SA 106 Gr.B /Gr C (ASTM), AP15L Gr B (ASTM) B) ALLOY STEEL: SA 335 P11, P12 & P22, P91 SA 312 TP304H, SA 312 TP316 L	
1.3	Surface conditions of Tees & Elbows: Elbows and Tees are press formed components and surfaces are rough. The ends are either flame cut or saw cut before loading on the machine for edge preparation.	
1.4	Material Sizes	
1.4.1	Minimum / Maximum turning diameter : 200 mm / 813 mm	
1.4.2	Minimum / Maximum Facing diameter : 200 mm / 813 mm	
1.4.3	Maximum Turning length on OD : 250 mm	
1.4.4	Maximum Boring length : 750 mm	
1.4.5	Pipe length approx. : 1800 mm	

S.No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER (With complete Technical Details)
1.5	Edge Preparation Styles		
1.5.1	Edge Preparation Styles : Refer Annexure 1 Edge preparation to be done: Two ends on Pipes & Elbows, Three ends on Tees. The ends need not be machined simultaneously.		
2.0	MACHINE DETAILS:		
2.1	CONSTRUCTION:		
2.1.1	Vendor to furnish details of material, hardness & constructional details including explanatory drawings of various components/assemblies like Headstock, Facing Unit, Tool Holder Slide, Machine Bed, Feed Transmission System, Feed back System etc. of the machine.	Vendor to Confirm	
2.1.2	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features should be enclosed with the offer	Vendor to Confirm	
2.2	HEADSTOCK:		
2.2.1	Geared Head stock unit shall be of enclosed box type construction With Facing head enabling spindle operation through the faceplate without removing the faceplate. Inter locking to prevent rotation of both face plate and spindle to be provided	Vendor to specify the arrangement of headstock. Brief description to be given.	
2.2.2	Spindle Diameter	Around 110 mm	
2.2.3	Spindle taper	ISO 50	
2.2.4	Spindle speed Range (Infinitely variable)	5 to 1500 rpm	
2.2.5	No. of speed ranges	Vendor to Specify	

S.No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER (With complete Technical Details)
2.2.6	Spindle speed range selection	Electro Hydraulic system through CNC (Hydraulic cylinders to be located conveniently for easy maintenance.)	
2.2.7	Headstock travel Vertical – Y axis	1500 mm (minimum) Vendor to Confirm	
2.2.8	Spindle travel – Z axis	Vendor to Specify	
2.2.9	Feed rate for Y&Z axes	0.5 mm /min to 1500 mm/min Vendor to Confirm	
2.2.10	Rapid Feed rate for Y&Z	3000 mm/min Vendor to Confirm	
2.2.11	Simultaneously controlled axes	Three axes Vendor to Confirm	
2.2.12	KW rating of AC spindle motor (S1duty) (Vendor to furnish complete technical details along with offer)	Minimum 25 kW Vendor to Specify	
2.2.13	Torque-Power-Speed characteristics of the spindle system to be submitted by the vendor along with offer.	Vendor to specify	
2.2.14	Forward and reverse rotation of spindle motor with suitable braking mechanism. (Complete details with drawings, explanations to be submitted along with the offer.)	Vendor to specify	
2.3	FACING UNIT:		
2.3.1	Facing Head Diameter	Vendor to Specify	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
2.3.2	Speed of Rotation	Vendor to Specify	
2.3.3	Facing Slide Traverse – U axis	Vendor to Specify	
2.3.4	Feed rate of U axis	0.5 mm/min to 900 mm/min	
2.4	ROTARY TABLE:		
2.4.1	Table Clamping surface	1200mm X 1500 mm (min)	
2.4.2	Maximum weight of the job (on table)	5,000 kgs.	
2.4.3	Min Height - Table top surface to spindle center	150 mm	
2.4.4	Table travel (Longitudinal) – W axis	Vendor to Specify	
2.4.5	Table travel (Cross) – X axis	Vendor to Specify	
2.4.6	Feed rate for W & X axes	0.5 mm /min to 1500 mm/min	
2.4.7	Rapid Feed rate for W & X axes	3000 mm/min Vendor to Specify / Confirm	
2.4.8	Table rotation – B axis	360°	
2.4.9	Table indexing positions - with locking at	4X90°	
2.4.10	T slot size	28 mm	
2.4.11	T slot pitch	Vendor to specify	
2.5	<u>Metallic Telescopic Covers</u> of rust resistant material shall be provided W & X axes with wipers for guide ways. Joints of telescopic covers should be so sealed to avoid ingress of dust.	Vendor to Confirm	
2.6	FEED DRIVE SYSTEM:		
2.6.1	Feed drive motors [AC servo motors] shall be digital type of either Siemens or Fanuc or any other reputed make (Details of model, make, type etc. to be furnished in the offer)	Vendor to specify	
2.6.2	Feed back system : Siemens/ Fanuc/ Heidenhain Rotary encoders/linear scale. (Details to be furnished in the offer)	Vendor to specify	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
2.6.3	Type of power transmission: Pre-loaded backlash-free re-circulating ball screw drive for feed drive axes. (Complete description of the aforesaid including diameter of Ball Screw for each axis, to be furnished in the offer)	Vendor to specify	
2.7	OPERATION AND CONTROL SYSTEM:		
2.7.1	OPERATOR'S PANEL:		
2.7.1.1	Operator's panel having complete CNC and machine control system with CRT of required configuration shall be provided for convenient and efficient operation. All switches should be within reach of operator. All displays/indications should also be conveniently placed (Layout showing complete details should be submitted with the offer)	Vendor to Confirm	
2.7.2	CNC SYSTEM & FEATURES:		
2.7.2.1	Make: Fanuc / Siemens	Vendor to specify	
2.7.2.2	Type: PC based latest version	Vendor to specify	
2.7.2.3	Model:(Suitable and Latest version, as available at the time of ordering, should be supplied).	Vendor to specify	
2.7.2.4	Details of Standard features	Vendor to specify	
2.7.2.5	Details of optional features, recommended by vendor.	Vendor to specify	
2.7.2.6	Details of other optional features	Vendor to specify	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)
2.7.2.7	The system should have full alphanumeric keyboard, TFT color display (10.4" or more), additional draw-out type Qwerty Key Board and mouse in suitable enclosure, RS232C serial interfaces, parallel interface for printer, COM port for tele diagnostics, electronic hand wheels for all axes (MPG), compact disc drive unit for data input/output, hard disk of sufficient capacity (Largest size available at the time of order shall be supplied), graphic simulation and preinstalled system software & other required soft wares etc (Details should be furnished by the Vendor in the offer)	Vendor to Confirm
2.7.3	HAND HELD UNIT:	
2.7.3.1	Hand Held unit, Type B-MPI of Siemens make or equivalent along with sufficient length (min. 5meters) of interfacing cable which can be taken near to the face plate for job setting and similar other purposes. Is to be offered with complete details.	Vendor to specify
2.8	MACHINE LIGHTS:	
2.8.1	Machine Lights for sufficient illumination of complete working area should be provided for clear visibility. (Details should be furnished in the offer)	Vendor to Confirm
2.8.2	A spot light with sufficiently long cable should also be provided.	Vendor to Confirm
2.8.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to Confirm
2.8.4	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to Confirm
2.9	AIR CONDITIONERS:	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
2.9.1	Air Conditioners with Dehumidifiers of suitable / sufficient capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Detailed specifications of the same are to be submitted.	Vendor to submit	
2.10	HYDRAULICS:		
2.10.1	Hydraulic system should be centralized. Hydraulic Tank shall preferably be located at floor level All hydraulic pipelines to be neatly laid out (Details should be furnished in the offer)	Vendor to Confirm	
2.10.2	Make Rexroth / Vickers Sperry or equivalent from a reputed manufacturer. (Details to be submitted)	Vendor to specify	
2.10.3	Hydraulic hose end fittings shall be of suitable material with female swivel nut (with 24° cone) and o-rings.	Vendor to specify	
2.10.4	All hydraulic hoses shall be preferably of GATES/Aeroquip/Parker hannifin make	Vendor to specify	
2.10.5	Hydraulic circuits shall be designed with minimum number of control valves and to suit oil of ISO VG 46 or 68 only. Also minimum number of check-points to be provided wherever pressure is required to be read for setting and trouble shooting. MINIMESS Pressure Gauge - 1 No with Connecting Hose to be provided.	Vendor to confirm	
2.10.6	The control voltage for all solenoid operated valves	24 V DC	
2.10.7	Filtration System, Details should be submitted.	Vendor to specify	
2.10.8	Failure indication	Vendor to specify	
2.10.9	Automatic shut off provision, Details should be submitted.	Vendor to specify	

S.No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER (With complete Technical Details)
2.10.10	Refrigerant type Cooling system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, and gearbox oil, etc. at a temperature not exceeding 50 deg C irrespective of the ambient conditions. Complete details should be submitted.	Vendor to specify	
2.10.11	Hydraulic pump capacity (flow / pressure)	Vendor to specify	
2.10.12	Each pump should have an independent motor. Tandem pumps should not be used	Vendor to specify	
2.10.13	First filling of all required Oils & Grease etc. should be supplied by vendor. Indigenous (Indian) source or Indian equivalent and specifications of oils/ greases are also to be provided by the vendor.	Vendor to specify	
2.11	ELECTRICAL:		
2.11.1	415V with voltage fluctuation of $\pm 10\%$, 50HZ ± 3 Hz, 3 Phase AC (3 wire system without neutral) power supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor.	Vendor to confirm	
2.11.2	All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply during construction of foundation to be delivered before start of foundation work.	Vendor to confirm	
2.11.3	Tropicalization: All electrical / electronic equipment shall be tropicalized.	Vendor to confirm	
2.11.4	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor to confirm	
2.11.5	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to confirm	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)
2.11.6	All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220Volts, 5/15 Amp AC. All adapters /receptacles should have compatibility with Indian equivalents.	Vendor to confirm
2.11.7	Motors & other electrical components shall conform to IEC or Indian Standards . Motors shall be of SIEMENS/ABB / CROMPTON or such reputed make. All switches and control elements shall be of Seimens / L&T / GEC / Alstom /telemecanique or such reputed make..	Vendor to confirm
2.11.8	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to confirm
2.11.9	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to confirm
2.11.10	In-cycle hour counter with reset facility should be provided.	Vendor to confirm
2.11.11	All Electric enclosures shall have IP 54 protection	Vendor to confirm
2.12	SAFETY ARRANGEMENTS:	
2.12.1	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to confirm
2.12.2	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available.	Vendor to specify

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
2.12.3	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor.	Vendor to specify	
2.12.4	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Vendor to Confirm	
2.12.5	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations and suitably guarded.	Vendor to Confirm	
2.12.6	Emergency Switches at suitable locations as per International Norms should be provided.	Vendor to Confirm	
2.12.7	All lubricated parts like Bed, guide ways shall have provision for collecting the used Lubrication oil from machine guide ways and preventing them from spilling over on to the ground.	Vendor to Confirm	
2.13	ENVIRONMENTAL PERFORMANCE OF THE MACHINE:		
2.13.1	The Machine should confirm to following factors related to environment:	Vendor to Confirm	
2.13.2	Maximum noise level shall be 85 dB(A) at normal load condition, 1meter away from the machine with correction factor for back ground noise.	Vendor to demonstrate compliance to noise level,	
2.13.3	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to confirm	
2.13.4	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to confirm	

S.No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER (With complete Technical Details)
3.0	SERVO VOLATGE STABILIZER:		
3.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc with no undesirable Harmonics in the stabilizer output.	Vendor to confirm	
3.2	Make. : NEEL / DELTA / AEI / POWER AID	Vendor to confirm	
3.3	Model & Rating (Suitable for the machine load. Vendor to specify the noise level also)	Vendor to Specify	
3.4	Spares Package for the Voltage Stabilizer for 2 years working should also be offered.	Vendor to submit	
3.5	Catalogue of the Voltage Stabilizer shall be submitted with the offer.	Vendor to submit	
4.0	ULTRA ISOLATION TRANSFORMER		
4.1	Indian make Ultra Isolation Transformer suitable for complete machine, its drives, controls, PLC etc. shall be supplied	Vendor to confirm	
4.2	Make NEEL / DELTA / AEI / POWER AID	Vendor to confirm	
4.3	Model and Rating	Vendor to specify	
4.4	Spares Package for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor to submit	
4.5	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Vendor to submit	

S.No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER (With complete Technical Details)
5.0	TOOLING:		
5.1	Tooling system shall consist of 1. A base tool holder mounted on faceplate slide using Standard ISO Indexable carbide inserts capable of generating all edge preparation styles as indicated in ANNEXURE-1 for all jobs. Cutting Parameters: Cutting speed: 100-150 m / min Depth of cut: 5-18 mm. Cutting feed: 0.2-0.6 mm / rev.	Vendor to specify	
5.2	Details of special cuttings tools to suit the actual profiles to be machined.	Vendor to specify	
5.3	Limitation regarding length & weight of tool / tool holder clamped in different tool holders for trouble free operation	Vendor to specify	
5.4	5sets of Cutting tools, 2 Nos. of tool holders, 2 Sets of boring tools with sufficient quantity of adapters etc. as recommended by vendor for complete machining of prove out components (at BHEL works) should be offered.	Vendor to confirm	

S.No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER (With complete Technical Details)
6.0	DIAGNOSTIC SYSTEM		
6.1	TELE-DIAGNOSTIC SERVICE:		
6.1.1	Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied CNC system for remote diagnosis and correction of the problems in both CNC System and PLC of the machine. This should be provided free of charge for the guarantee period. The Vendor should inform terms and conditions for the service after guarantee period. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future. BHEL will provide the necessary telephone line near the machine.	Vendor to confirm	
6.2	FAULT DIAGNOSTIC SYSTEM:		
6.2.1	Vendor's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include customized auto-diagnostic system with supporting hardware and software, which shows detailed cause, and remedy for the fault on the display for faults related to mechanical and electrical maintenance.	Vendor to confirm	
6.2.2	Help guide should be provided to use both diagnostic systems	Vendor to confirm	
7.0	LEVELING & ANCHORING SYSTEM:		
7.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc should be supplied.	Vendor to specify	

S.No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER (With complete Technical Details)
8.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE:		
8.1	The Vendor shall bring special tools and equipment required for erection of the machine. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer.	Vendor to confirm	
8.2	Any Test mandrel required for checking & alignment of the machine components etc. should be supplied.	Vendor to confirm.	
9.0	SPARES:		
9.1	Itemized breakup of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered)	Vendor to confirm	
9.2	Mechanical & Hydraulic Spares: All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses/Bearings/Gears etc.	Vendor to confirm	
9.3	Electrical /Electronic / CNC Spares: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, , spares for CNC, PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.	Vendor to confirm	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)
9.4	All types of spares for total machine and accessories should be available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required	Vendor to confirm
9.5	Recommended set of spares for all attachments are to be offered with details.	Vendor to confirm
9.6	Vendor to confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	Vendor to confirm
10.0	DOCUMENTATION:	
10.1	Three sets of following documents (3 Hard copies,) in English language should be supplied along with the machine	Vendor to confirm
10.2	Operating manuals of Machine & CNC system	Vendor to confirm
10.3	Programming Manuals of Machine & CNC system	Vendor to confirm
10.4	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Hydraulic circuit diagrams and hydraulic seals. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also	Vendor to confirm
10.5	Maintenance, Interface & commissioning manuals for CNC system, spindle & feed drives.	Vendor to confirm

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
10.6	Manufacturing drawings for all supplied tool holders, cutting tools, adapters, sleeves, fixtures etc.	Vendor to confirm	
10.7	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.	Vendor to confirm	
10.8	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to confirm	
10.9	Operating Manuals, Maintenance Manuals & Catalogues for supplied Voltage Stabilizer, Isolation Transformer and all supplied Accessories.	Vendor to confirm	
10.10	PLC program printouts with comments in English.	Vendor to confirm	
10.11	PLC program on CD, NC data & PLC data on CD	Vendor to confirm	
10.12	Complete back up of hard disk on GHOST CD and clear written Instructions (3 copies) to take back up and reloading of a new hard disk.	Vendor to confirm	
10.13	The vendor shall submit complete Master List of parts used in the machine.	Vendor to confirm	
10.14	One additional set of all the above documentation on CD	Vendor to confirm	
11.0	TRAINING:		
11.1	The Vendor shall train Four BHEL's Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) of the Machine at Vendor's works Offer should be on per man-week basis	Vendor to confirm	
11.2	The Vendor shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance after the commissioning of the Machine at BHEL works for not less than 8 working days	Vendor to confirm	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
11.3	Airfare, boarding & lodging for the trainees shall be borne by BHEL.	Vendor to Confirm	
11.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to Confirm	
11.5	Vendor to quote for training on per man per week basis for training at vendor's work	Vendor to confirm	
12.0	FOUNDATION:		
12.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Vendor shall submit complete foundation details including static and dynamic loads within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for Voltage Stabilizer, Isolation Transformer, & any other accessories. BHEL shall construct complete foundation for the machine as per the Vendor's recommendation.	Vendor to submit	
12.2	Vendor should arrange equipments required for the testing of foundation, if required by the Vendor. The Vendor shall also indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.	Vendor to confirm	
13.0	ERECTION & COMMISSIONING		

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
13.1	Vendor to take full responsibility for supervision of the erection, vendor shall start up, test the machine, it's control & all types of other supplied equipment, carrying out machining of test pieces etc. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by Vendor in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL.	Details of these requirements should be informed by Vendor in advance	
13.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer & Air Compressor shall also be responsibility of the Vendor.	Vendor to confirm	
13.3	Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. All tests, as mentioned in (clause 17.0) shall form part of the commissioning activity.	Vendor to confirm	
13.4	Tools, Tackles, Test Mandrels, instruments and other necessary equipment including Laser equipment required to carry out all above activities should be brought by the Vendor.	Vendor to confirm	
13.5	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the Vendor on returnable basis.	Vendor to confirm	
13.6	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the Vendor should supply sufficient quantity of touch-up paint of various colours of paint used.	Vendor to confirm	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
13.7	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm	
13.8	Charges, duration, terms & conditions for E&C should be furnished in detail separately by Vendor along with offer.	Vendor to confirm	
14.0	ACCURACY TESTS:		
14.1	GEOMETRICAL ACCURACY		
14.1.1	Geometrical Accuracy Tests shall be in accordance with applicable standard recommended by the Vendor. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall be submitted with the offer.	Vendor to confirm	
14.1.2	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors works and during Erection & Commissioning at BHEL Works.	Vendor to confirm	
14.2	POSITIONING ACCURACIES & REPEATABILITY:		
14.2.1	Positioning accuracy in X, Y, Z, W & U axes (Pa) per 1000 mm	+/-0.1mm vendor to confirm	
14.2.2	Repeatability in X, Y, Z, W & U axis (Ps)	+/- 0.05mm vendor to confirm	
14.2.3	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors works and during Erection & Commissioning at BHEL Works	Vendor to confirm	
15.0	AMBIENT CONDITIONS & THERMAL STABILITY:		

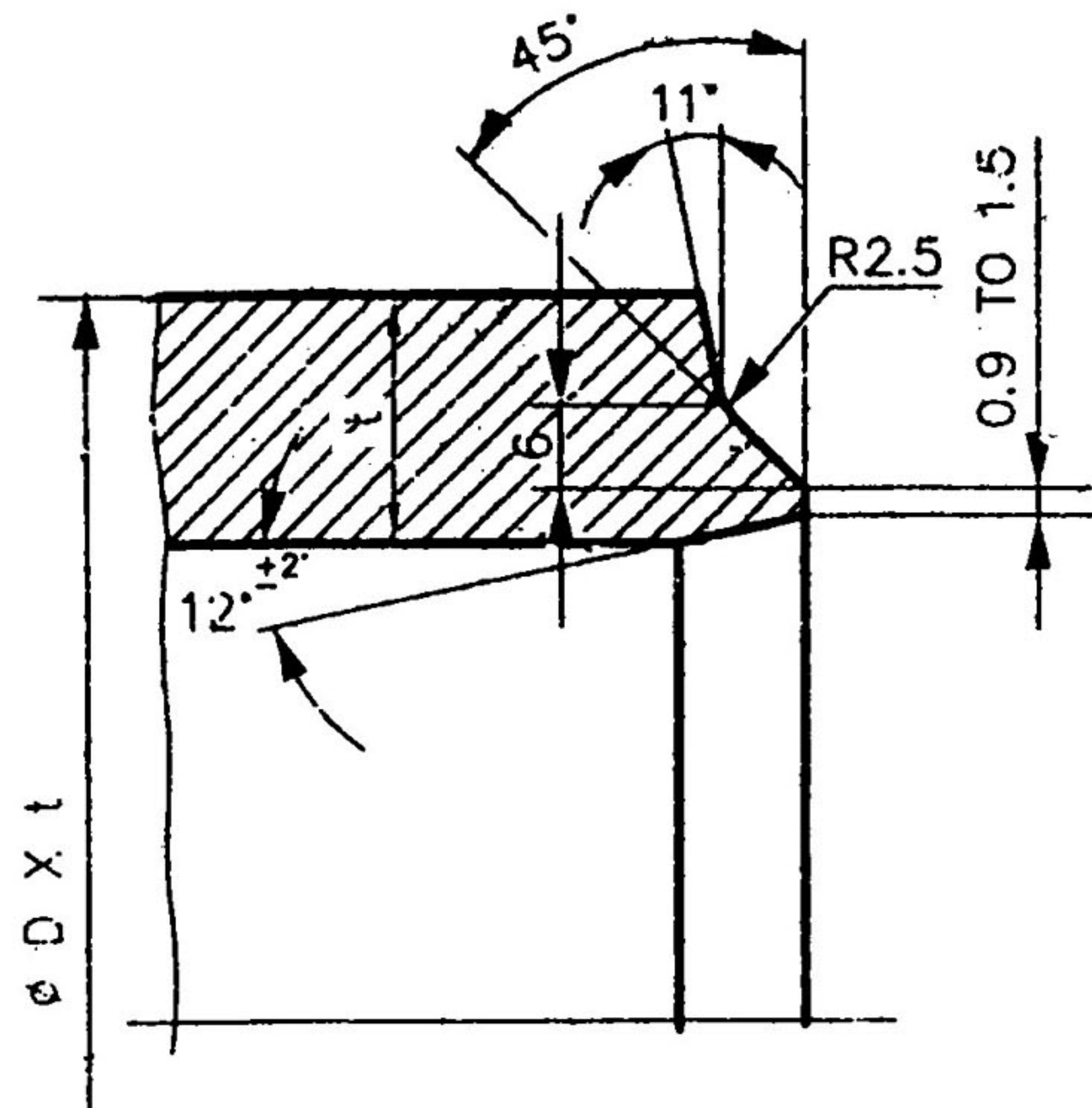
S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
15.1	<p>Total machine including CNC system and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies.</p> <p>Power Supply: Voltage: 415 V with fluctuation of $\pm 10\%$ Frequency: 50 Hz $\pm 3\%$, 3 Phase The machine shall be suitable for an ambient temperature of $+45^{\circ}\text{C}$ and relative humidity of 85 % respectively, but both do not occur simultaneously</p>	Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor	
15.2	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition-	Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor	
15.3	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and vendor should ensure trouble free operation of the machine.	Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same should be furnished by Vendor	
15.4	The machine, including attachments and accessories, should be suitable for 24 hrs. Continuous operation to its full capacity for 24 hour a day and 7 days a week throughout.	Vendor to Confirm	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)
16.0	PROVEOUT OF BHEL COMPONENTS:	
16.1	The prove-out trials of the edge preparation shall be for the straight pipes, Tees & Elbows for sizes given by BHEL during the technical discussions / at the time of releasing the Purchase Order. The ends of pipes / Tees / Elbows for edge preparation will be either flame cut or saw cut.2 jobs each shall be proved in the size range & edge preparation style specification for straight pipe/ tees and elbows	Vendor to confirm
17.0	MACHINE ACCEPTANCE: (Tests/Activities to be Performed by Vendor)	
17.1	Tests/Activities to be carried out at Vendor's works on the machine before dispatch:	
17.1.1	Geometrical accuracies as per applicable standard test chart recommended by the Vendor	Vendor to confirm
17.1.2	Positioning accuracies as per Applicable standard method recommended by the Vendor.	Vendor to confirm
17.1.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to confirm
17.1.4	Demonstration of all features of the machine, control system & accessories	Vendor to confirm
17.2	Tests / Activities to be carried out at BHEL works while commissioning the machine:	
17.2.1	Geometrical accuracies as per. Applicable standard test chart recommended by the Vendor	Vendor to confirm
17.2.2	Positioning accuracies as per Applicable standard method recommended by the Vendor.	Vendor to confirm

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
17.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to confirm	
17.2.4	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine	Vendor to confirm	
17.2.5	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to confirm	
17.2.6	Machining of test pieces to perform the edge preparation profiles.	Vendor to confirm	
17.2.7	Supervision by vendors of independent operation of machine by BHEL after job prove out during the training period of 8 working days	Vendor to confirm	
18.0	PACKING:		
18.1	Sea worthy & rigid packing for all items of complete machine, CNC System, all accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes	Vendor to confirm	
19.0	GUARANTEE:		
19.1	24 months from the date of acceptance of the machine.	Vendor to confirm	
20.0	GENERAL:		
20.1	Machine Model No.	Vendor to specify	
20.2	Total connected load (KVA):	Vendor to specify	
20.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to specify	

S.No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER (With complete Technical Details)	
20.4	Machine lubrication to be Automatic centralized lubrication system preferably with metallic tank	Vendor to confirm	
20.5	Painting of machine / electrical panel	RAL6011 Apple Green (Polyurethane paint)	
20.6	All gears are to be hardened and ground	Vendor to specify.	
20.7	Total weight of the machine	Vendor to specify	
20.8	Weight of heaviest part of machine	Vendor to specify	
20.9	Weight of the heaviest assembly / sub-assembly of the Machine	Vendor to specify	
20.10	Dimensions of largest part/ sub-assembly/ assembly of the machine	Vendor to specify	
20.11	Vendor to submit, along with offer, reference list of customers where similar machines have been supplied mentioning broad specifications of the supplied machine i.e. Model, Load Carrying Capacity, Main Drive Rating, CNC System etc	Vendor to confirm	
20.12	Detailed catalogues, sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to confirm	
20.13	Hydraulic, Pneumatic & oil piping should be preferably metallic except places where flexible piping is essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to confirm	

Enclosures:Annexure 1: **Edge Preparation Styles**

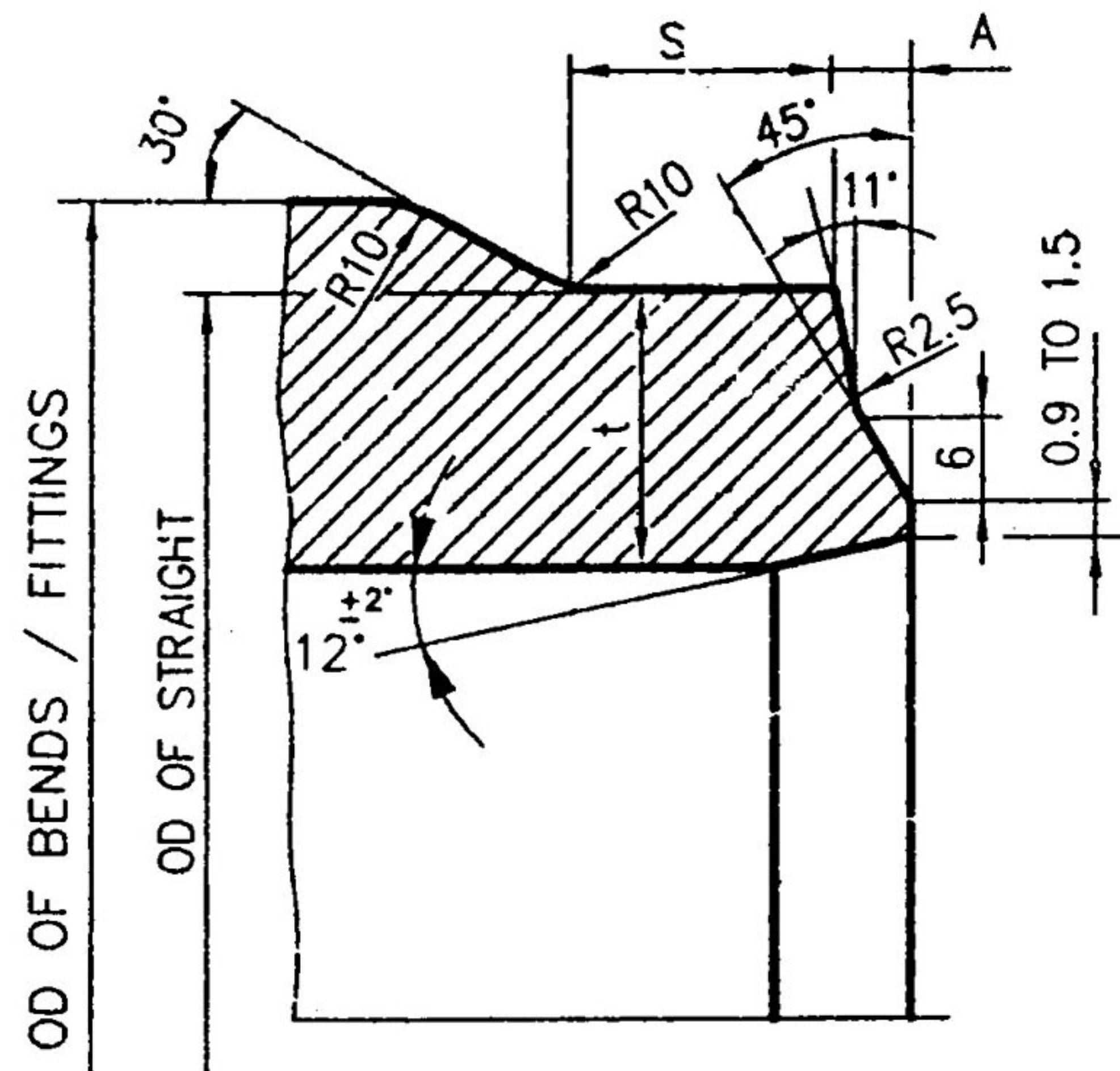


USE WHEN $t \geq 14.2 \text{ mm}$.

STYLE - P

ANNEXURE - 1
Drg No. CABS-1-16 - 01
BHEL, Tiruchirappalli

02. WHEN $t < 65$ $S+A = 65 \text{ Min.}$ & $t > 65, S=65 \text{ Min.}$
 WHERE $t = \text{THK OF CONN. PIPE (STRAIGHT)}$.



STYLE - Pa

ANNEXURE - 1
Drg No. CABS-1-16-02
BHEL, Tiruchirappalli

NOTES: -

01. APPLICABLE FOR P91 MATERIAL
02. FOR OD MISMATCHING REF. FIGURE-Xa.
03. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
04. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm

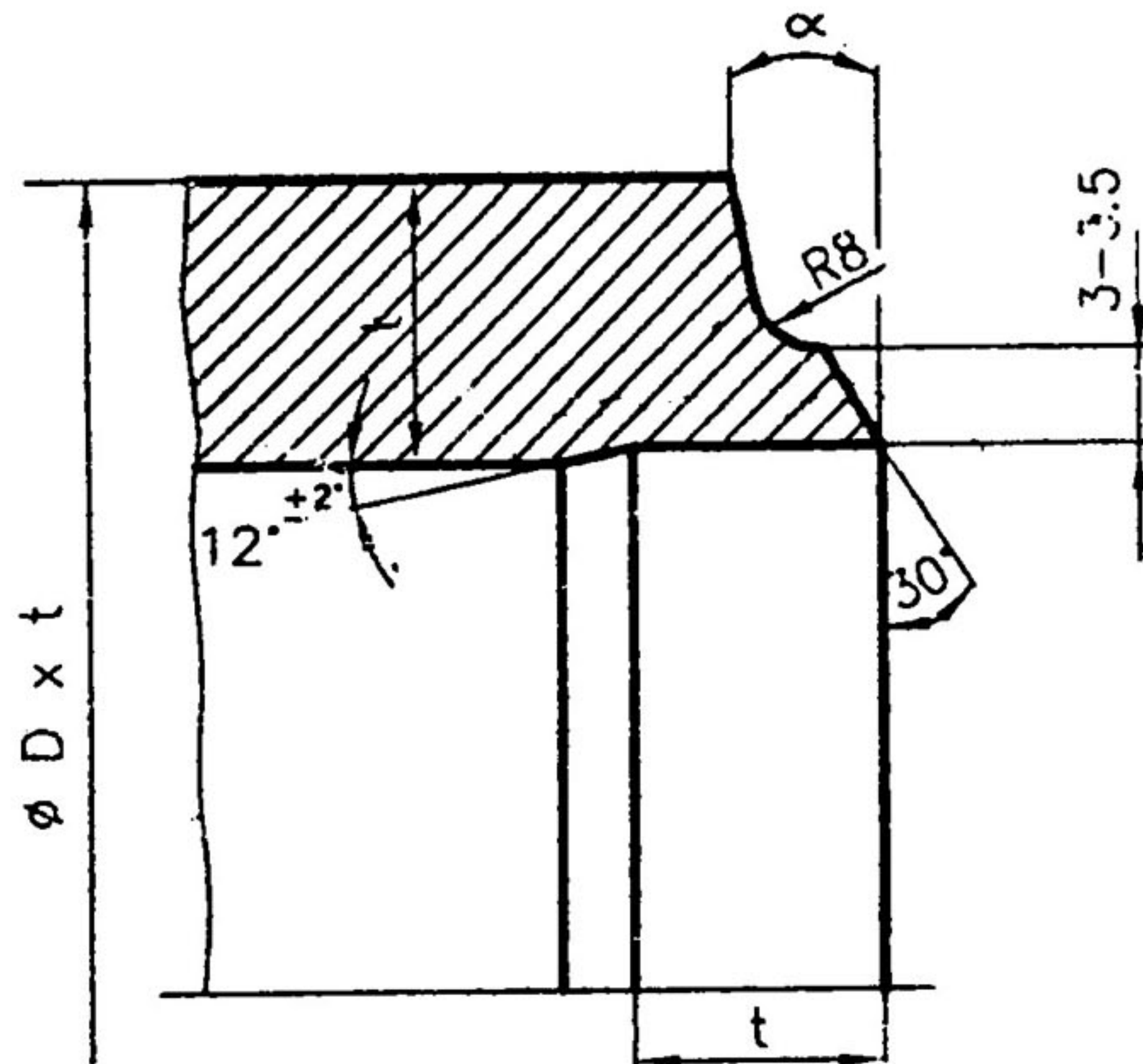


FIGURE - X

NOTES: -

01. OD OF STRAIGHT TO BE PHYSICALLY MEASURED/VERIFIED
02. $\alpha = 6^\circ$ FOR WALL THICKNESS ≤ 30 mm
03. $\alpha = 10^\circ$ FOR WALL THICKNESS > 30 mm

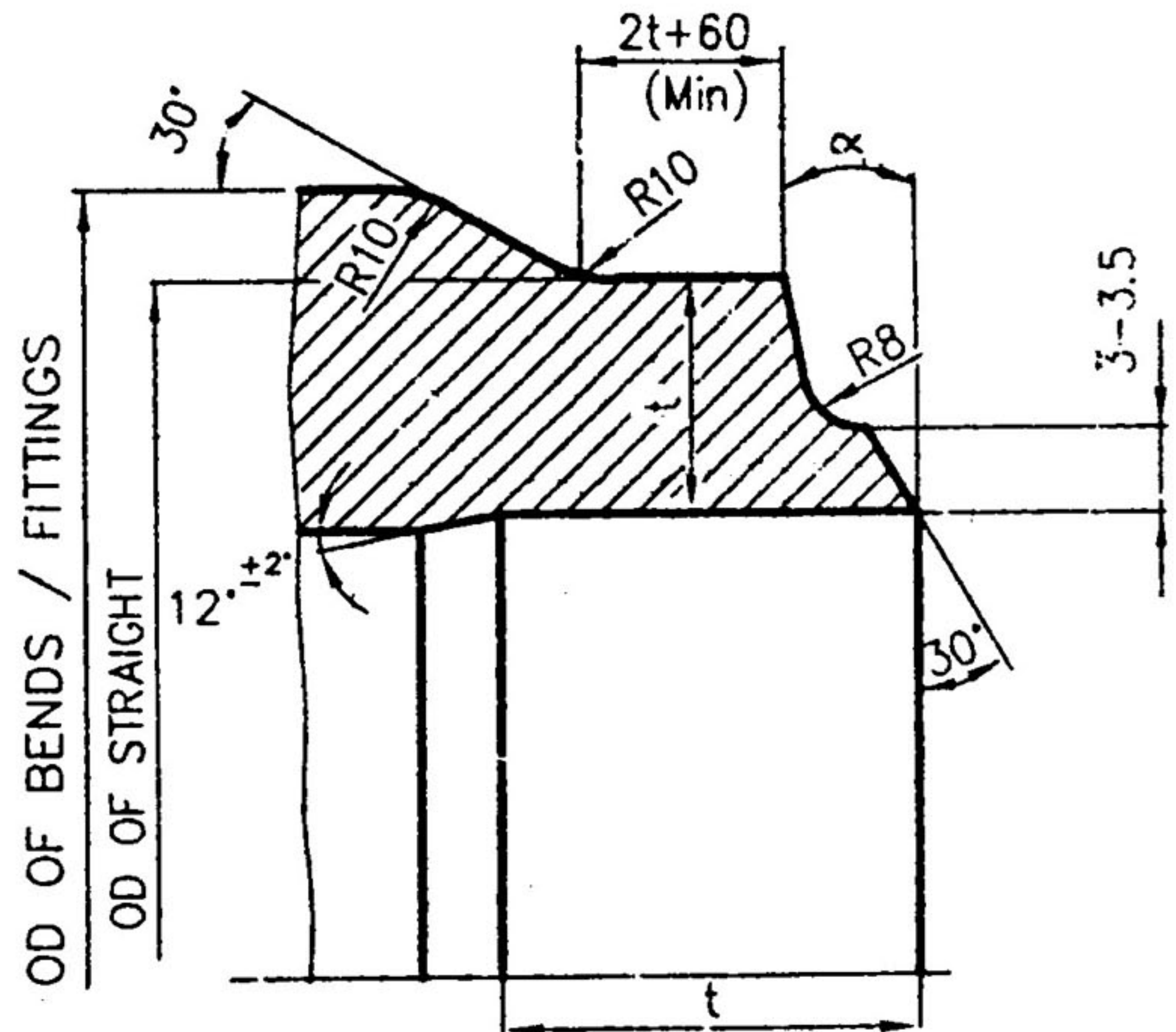


FIGURE - Xa

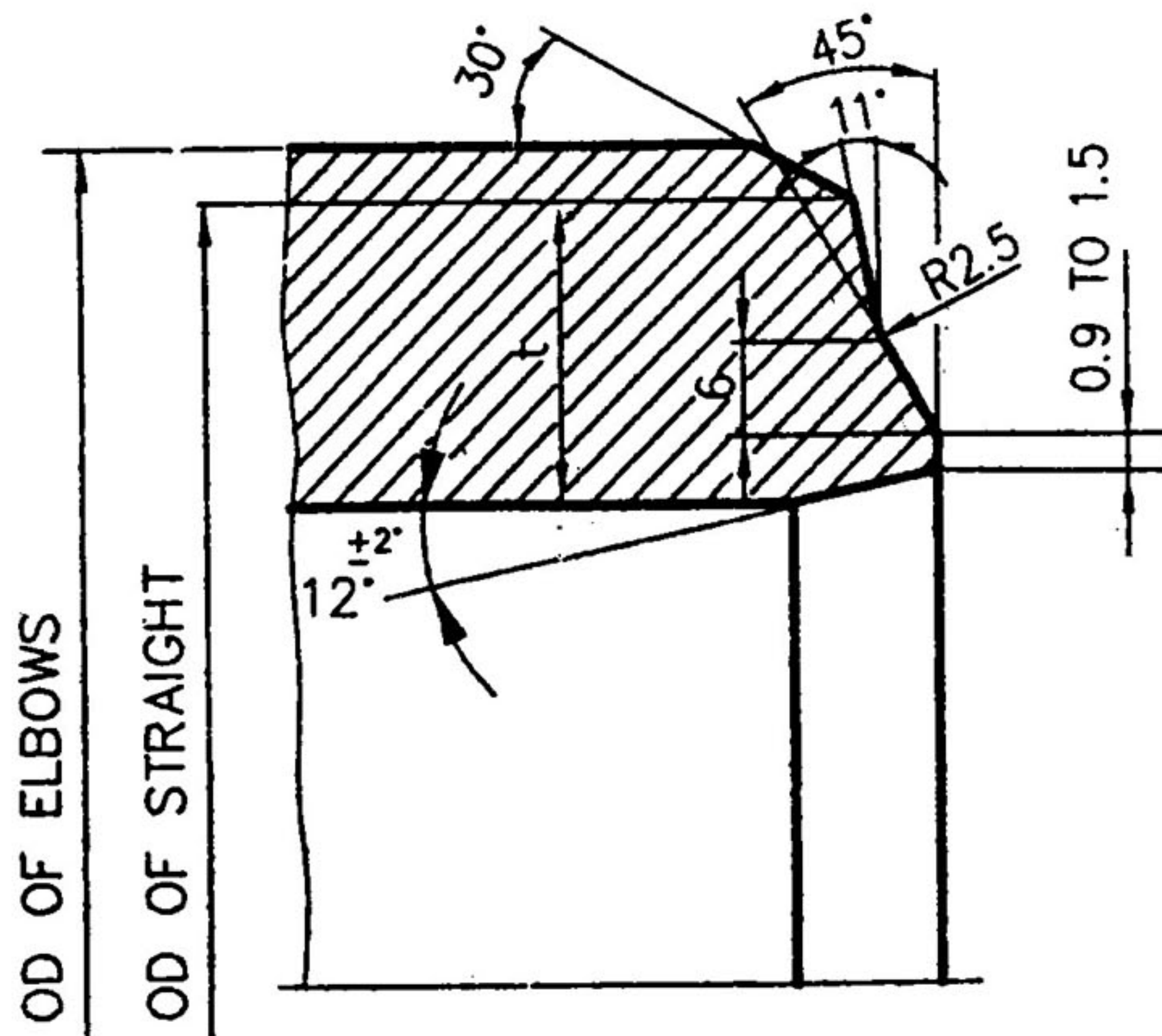
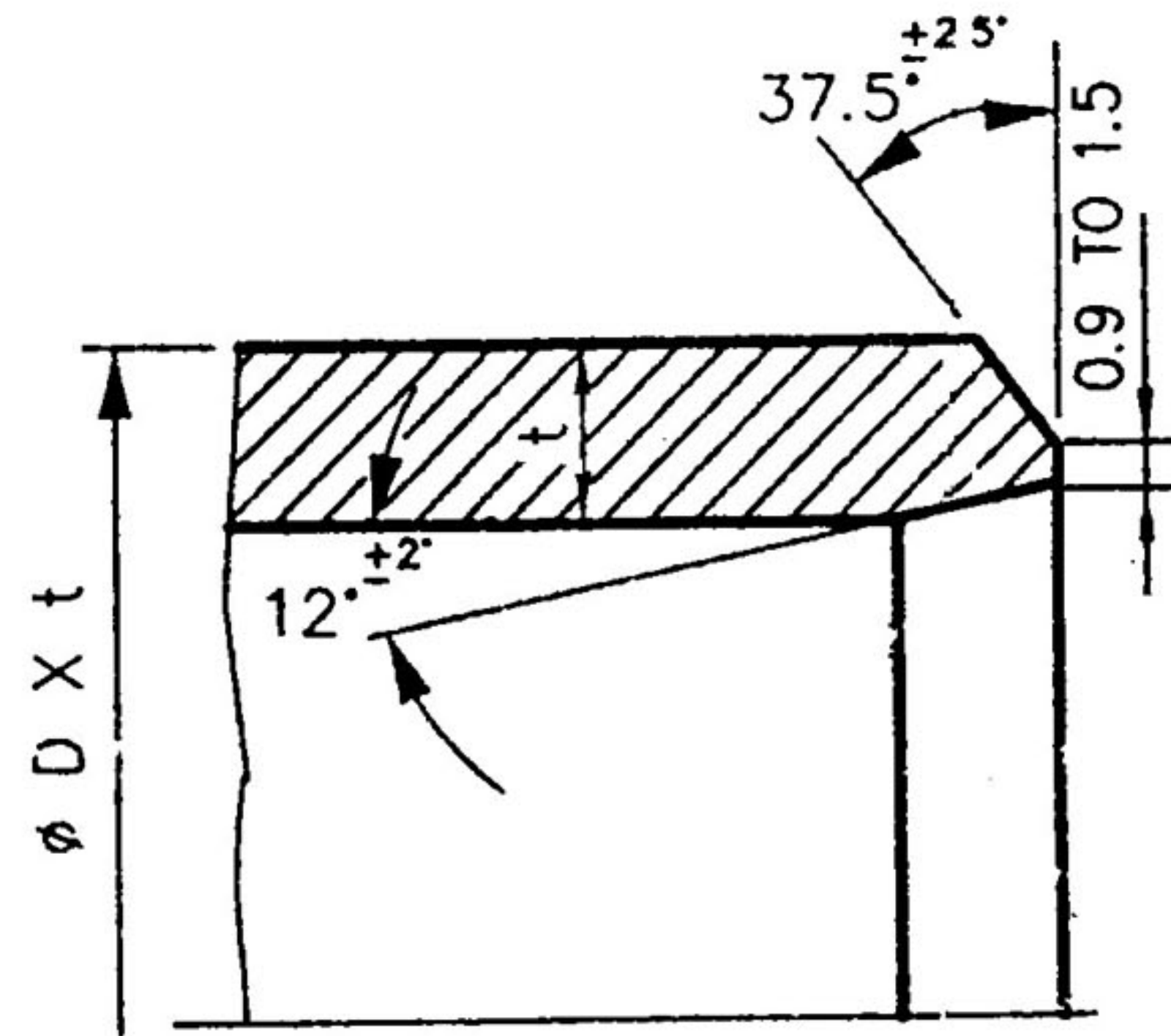


FIGURE - Z



STYLE - D

NOTES: -

01. USE WHEN $t < 14.2$ mm.

ANNEXURE - 1

Drg No CABS-1-16 - 03

BHEL, Tiruchirappalli