

Technical Specification for

FABRICATION AND SUPPLY OF COMPONENTS OF BPM FOR INJECTOR LINAC

962
02/9/16
A.D. (69)
11/9/16

1. **Scope of the tender:** Procurement of the material, testing, machining, inspection, packaging and supply of finished UHV compatible components including con-flat flanges according to the specifications. Acceptance test/inspection reports, supply of the test report and supply of test certificates for all the tests mentioned in this document. Safe packaging and transport to purchaser's site.

2. **Qualification of Bidder:** Bidders will be evaluated on the basis of proven record of successfully manufacturing precision machining job.

The supplier shall be required to have a minimum experience of the last 2 years in the field of manufacturing the similar jobs including non-magnetic stainless steel material procurement i.e. ultra high vacuum (UHV) related jobs made of non-magnetic stainless steel (Relative Magnetic Permeability ≤ 1.05) with similar level of dimensional precision. The documents supporting the minimum experience like purchase order with specification shall be attached with the quotation.

3. **Drawing:** Drawing Sheets are attached. As per drawing no.

RRCAT/ACBDD/BDS/IL/2016/01/GA no. of sheets 1

RRCAT/ACBDD/BDS/IL/2016/01/DD no. of sheets 6

4. **Quantity:** 04 Sets.

Sets: Consist of components listed in BOM in assembly drawing (RRCAT/ACBDD/BDS/IL/2016/01/GA).

5. **Technical requirement**

Note- Refer to assembly drawing (RRCAT/ACBDD/BDS/IL/2016/01/GA) for details of below mentioned item numbers.

5.1. Material:

5.1.1. Material of flanges and plates (for item no-1, 1A, 4 & 6) shall be SS 316L (C<.03%) conforming **ASTM A240**.

5.1.2. Material of pipe and/or tube (for item no-2, 3 & 5) shall be seamless SS 316L (C<.03%) conforming **ASTM A312**.

5.1.3. Finished part or components of Stainless Steel material shall be non-magnetic (**Relative Magnetic permeability ≤ 1.05**). The permeability shall be checked by permeability meter on the finished part or components.

5.1.4. A single material source shall be used for all the similar items.

5.2. Process:

Pl. upload on website
Senet Div.

- 5.2.1. Prior to fabrication all surfaces of the material must be thoroughly examined for damage and free of pitting, cracks, scale and indentations.
- 5.2.2. Machining shall not cause contaminants to be embedded into the surface of the component. Therefore, the use of Grinding, polishing, abrasive resin/rubber bonded wheels and abrasive cloths of any kind are prohibited.
- 5.2.3. Ceramic bonded abrasives, tungsten carbide or diamond wheels/tools may be used. These tools shall be new or have been previously used on 300 series stainless steel only.
- 5.2.4. Heavy organic lubricants or coolants with sulfur or silicone based cutting fluids shall not be used since these can be retained to some extent by the component surface.
- 5.2.5. Only water soluble cutting fluids shall be used. The vendor must submit to RRCAT a specification of any other lubricant to be used and will not proceed until written permission has been obtained from RRCAT.
- 5.2.6. The finish of any surface exposed in vacuum shall be 0.8 μm (32 micro inches) or better. Higher quality surface finish gives great benefits in the subsequent cleaning procedures, reducing efforts to achieve the necessary out-gassing rate.
- 5.2.7. Burnishing and honing shall not be used.
- 5.2.8. For improving and cleaning of the vacuum surface appearance the use of harsh abrasives or files, and bead, sand or shot blasting is prohibited.
- 5.2.9. Knife edge dimensions must be as per attached drawing.
- 5.2.10. All remarks/noting given in the drawing shall be clearly taken into consideration during the finalization of "operation sheet" and machining process. Even small dent or scratch on sealing area, knife, and edges may make the whole part unacceptable.

6. General Condition:

- 6.1. The samples of raw materials shall be supplied in following condition
 - 6.1.1. As cut condition
 - 6.1.2. Machined sample with N6 surface finish and a drilled hole of 6.6 mm Diameter
- 6.2. Supplier shall prepare geometrical and tolerance inspection report for every component and shall submit before the supply of material.

7. Inspection and testing:

- 7.1. Raw material samples shall be supplied along with the following test certificates issued by the Govt. approved / reputed laboratory after getting purchase order
 - 7.1.1. Composition test: Raw material shall be examined for its chemical composition at suppliers end as per **ASTM E34**.
 - 7.1.2. Mechanical Property test: Material shall be examined for Ultimate Tensile Strength and Yield Strength at suppliers end as per **ASTM E8** and for hardness as per **ASTM E18**.

- 7.1.3. The chemical treatment (electro-polishing) will be done by the RRCAT on the supplied raw material samples before executing the machining work. The samples shall show the proper finish without pits/color change etc after this chemical treatment.
- 7.1.4. Dimensional Inspection: Each item shall be inspected and inspection report submitted before supply of material.
- 7.1.5. Finished product will be tested for leak at purchasers end.
- 7.1.6. Finished product will be tested for ultimate pressure at purchasers end.
8. **Marking:** Each individual item shall be clearly identified with serial no. these identification mark shall be mentioned in inspection report clearly
9. **Acceptance criteria :** The listed item will be accepted only when following conditions will be satisfied
 - 9.1. The samples of raw materials with test certificates conforming magnetic permeability, mechanical properties and chemical composition requirements.
 - 9.2. Inspection report conforming to specification.
 - 9.3. Detailed inspection report specifying the geometrical tolerance (Perpendicularity, parallelism and positioning of all mentioned features) should be within acceptable tolerance zone.
 - 9.4. Finished product shall qualify for the functional requirement at purchaser's site.
10. Further, proper care shall be taken during transportation and delivery of job in order to protect its features.
11. **The duly filled, stamped and signed mandatory technical questionnaire sheet must be returned by the party along with their quotation failing to which the quotation will not be considered at all.**
12. In case of partly acceptance of the specification. Clear details shall be given in the quotation and on this sheet itself.

-----** End of the Specification**-----

MANDATORY TECHNICAL QUESTIONNAIRE

(TO BE FILLED IN BY THE BIDDER & SUBMITTED ALONGWITH THE OFFER)

1. Table A.1: The rightmost column should be filled in by the Bidder.
2. Tables A.2: The "Offered Parameters" Column and where applicable, the "Deviations / Remarks" Column of this format shall be filled in by the Bidder. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
3. **Failure to submit a fully completed, duly signed and stamped questionnaire may result in the rejection of the offer.**

Table-A.1: General Information

A.1.1	Name of manufacturer	
A.1.2	Contact details of the manufacturer (Give full address, email, phone and fax numbers.)	
A.1.3	Have you worked on jobs involving precision machining and UHV compatibility? If yes, then please furnish document like copy of previous purchase orders with detailed specification in support of your claim.	
A.1.4	Are you familiar with the features of knife edge flanges. Have you machined and supplied the knife-edge flanges? If yes, then please furnish document like copy of previous purchase orders with detailed specification in support of your claim.	
A.1.5	Do you have experience of purchasing SS316L having permeability ≤ 1.08 ? If yes, then please furnish document in support of your claim.	
A.1.6	Have you manufactured and supplied the UHV compatible component earlier? If yes, then please furnish document like copy of previous purchase orders with detailed specification in support of your claim.	
A.1.7	Delivery Periodmonths after confirmed order.
A.1.8.	Delivery Terms - F.O.R. RRCAT Stores, Indore	Yes/No (strike out the inapplicable items)
A.1.9.	Do you certify that you will be able to supply the item required within the delivery period mentioned in your offer?	Yes/No (strike out the inapplicable items)
A.1.10.	Are you aware that any request for delivery period extension would lead to cancellation of the Purchase Order?	Yes/No (strike out the inapplicable items)

Signature:

Name of Authorised Signatory:

Stamp of the bidding firm:

Table-A.2: Technical Specification

S. No	Parameter	Description / Specification	Bidder to specify	Deviations/Remarks
A.2.1.	Material of flanges	SS 316L conforming ASTM A240		
A.2.2.	Material of pipes	Seamless SS 316L conforming ASTM A312		
A.2.3.	Material of pipes	SS 316L (C<.03%) conforming ASTM A312.		
A.2.4.	Magnetic permeability	≤ 1.08 on finished SS 316L product.		
A.2.5.	Sample and test certificate for each source	Sample of raw material shall be supplied in required condition with its test certificate confirming relative magnetic permeability, mechanical properties and chemical composition.		
A.2.6.	Tests on raw material under bidders scope	1. Chemical composition test 2. Tensile test		
A.2.7.	Inspection	Dimensional inspection for each part in scope and its report		
A.2.8.	Functional requirement	Finished parts must be assembled and checked for its features.		

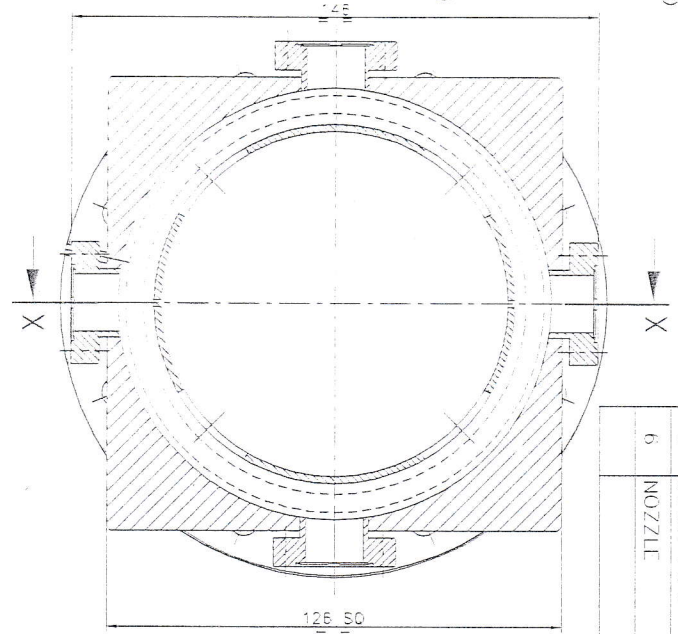
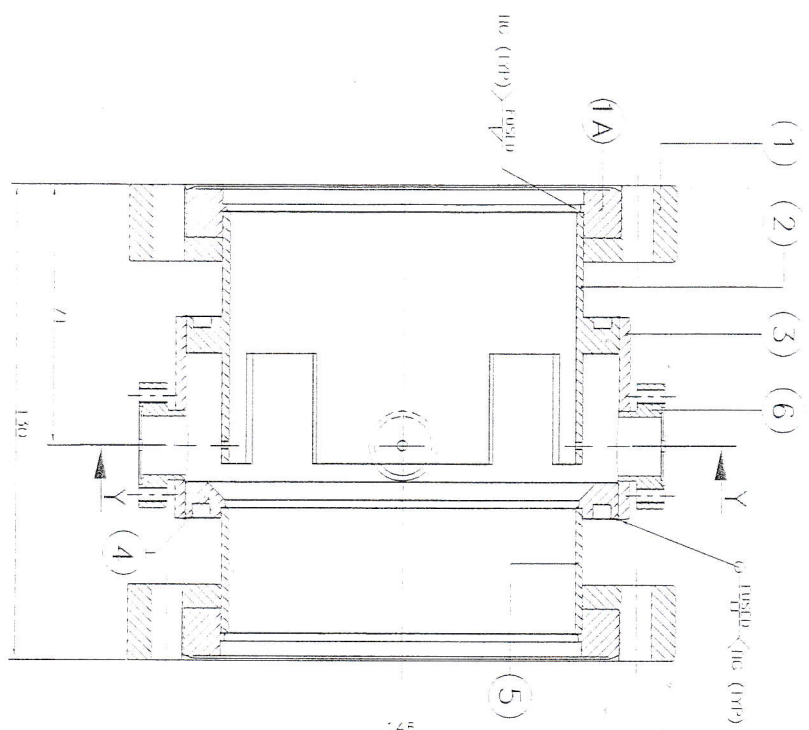
Signature:

Name of Authorised Signatory:

Stamp of the bidding firm:

BILL OF MATERIAL

ITEM No.	DESCRIPTION	MATERIAL	QTY	REMARKS
1	152 O.D. ROUINABLE FLANGE	S.S. 316L	2	
1A	ROUINABLE FLANGE INNER RING	S.S. 316L	2	
2	STRIP	S.S. 316L	1	
3	OUTER PIPE	S.S. 316L	1	
4	END PLATE	S.S. 316L	1	
5	INNER PIPE	S.S. 316L	1	
6	NOZZLE	S.S. 316L	4	



SECTION - XX

SECTION - YY

ALL DIMENSIONS ARE IN mm

GENERAL TOLERANCES

LINEAR DIMENSIONS

0 TO 50	±0.2
50 TO 515	±0.5
515 TO 1000	±0.8
1000 TO 2000	±1.2
HOLE 112.5 DIA T h 12	

UNLESS OTHERWISE SPECIFIED 3/8 THE SURFACE FINISH SHALL BE

Govd Ref: Akhlesh-2K16/Injector Line
 GOVERNMENT OF INDIA
 DEPARTMENT OF ATOMIC ENERGY
 RAJA RAMANNA CENTRE FOR ADVANCED TECHNOLOGY
 ACCELERATOR PROGRAMME

TITLE
 ASSY OF 152 O.D. X 98 I.D.
 STRIPLINE FOR INJECTOR LINAC

DESIGN	DATE	CHK	DATE	SCALE
A. Kothnawar				1=1
DRAWN	DATE	APP'D.	DATE	
R. K. Yadav	01.02.16			
ORIGINATING SECTION / GROUP	BEAM DIAGNOSTICS SECTION			

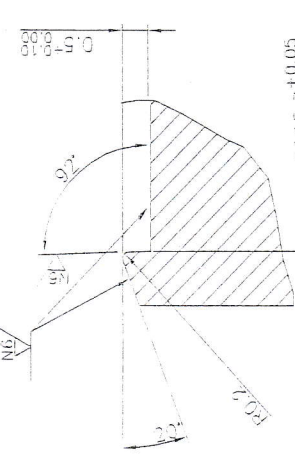
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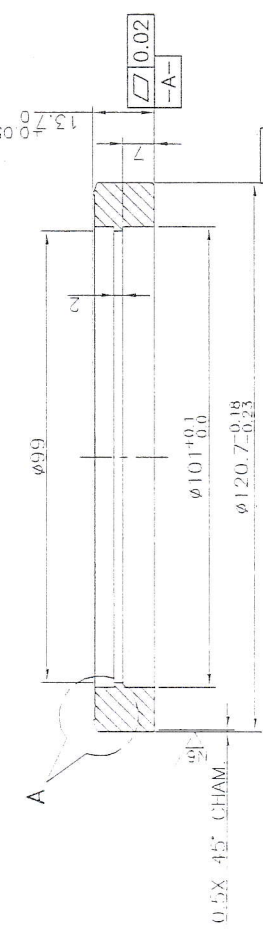
8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

16X Ø8.40 THRU HOLES AT
130.2 PCD EQUI-SPACED
AS SHOWN

Φ 4(0) P R



ENLARGE DETAIL AT-'A'



ITEM NO. : 1A
MATL : S.S. 316L
QTY : 2 NOS.

NOTES :-

1. SURFACE FINISH, UNLESS NOTED OTHERWISE IS N7
2. DEBURR ALL EDGES AND BREAK SHARP CORNERS EXCEPT KNIFE EDGE
3. PROTECT KNIFE EDGE SHARPNESS IN HANDLING
4. PCD HOLES SHALL BE DRILLED BEFORE TURNING KNIFE EDGE
5. ITEM NO 1A SHOULD BE PROPERLY FIT TO SUIT ITEM NO 2 & 5

1 NO EACH.

Accord ref:- D/Akhlesh-2K16/Injector Linoc

GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
RAJA RAMANNA CENTRE FOR ADVANCED TECHNOLOGY
ACCELERATOR PROGRAMME

SECTION-AA

ITEM NO. : 1
MATL : S.S. 316L
QTY : 2 NOS.

ALL DIMENSIONS ARE IN mm

GENERAL TOLERANCES

LINEAR DIMENSIONS	0 TO 30	30 TO 50	50 TO 100	100 TO 2000	HOLE FITS	SHAFT FITS
LINEAR DIMENSIONS	±0.2	±0.5	±0.8	±1.2	H7	H8

UNLESS OTHERWISE SPECIFIED THE SURFACE FINISH SHALL BE AS

REV	LOCATION	DATE	APPD
1			

1:1 VISION

DETAILS OF 152 O.D. ROTATABLE FLANGE

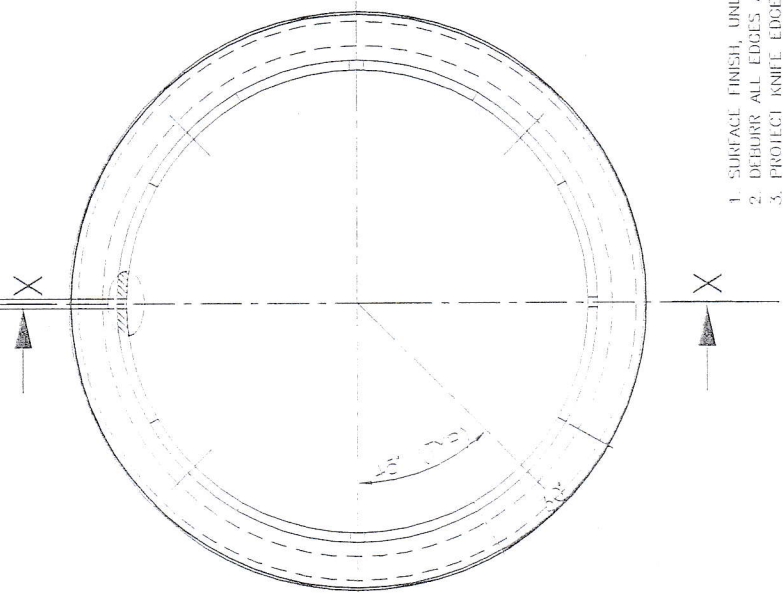
DATE	CHK	SCALE
01.02.16	APPD.	1=1

BEAM DIAGNOSTICS SECTION

DRG No.:	SHEET	REVNO
RRCAT/10BDDD/BDS/IL/2016/001/DD	1 OF 6	0

ITEM No.		DESCRIPTION		MATERIAL		QTY		REMARKS.	
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4 x 9/2 HIRD. HOLES
EQUISPACED AS SHOWN



1. SURFACE FINISH, UNLESS NOTED OTHERWISE IS N7
2. DEBURR ALL EDGES AND BREAK SHARP CORNERS EXCEPT KNIFE EDGE
3. PROTECT KNIFE EDGE SHARPNESS IN HANDLING
4. PCD HOLES SHALL BE DRILLED BEFORE TURNING KNIFE EDGE
5. THIS PAIRT SHOULD BE PROPERLY FIT TO SUIT ITEM NO 1 & 3.

Accord ref:- D/Akntesh-2K16/Injector Linoc

GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
RAJA RAMANNA CENTRE FOR ADVANCED TECHNOLOGY
ACCELERATOR PROGRAMME

TITLE		DETAIL OF 152 O.D. X 96 I.D. STRIP	
DN	DATE	CHK	SCALE
A. Nandwar			1=1
DRN	DATE	APPD.	
R. K. Yadav	01.02.16		
ORIGINATING SECTION / GROUP		BEAM DIAGNOSTICS SECTION	

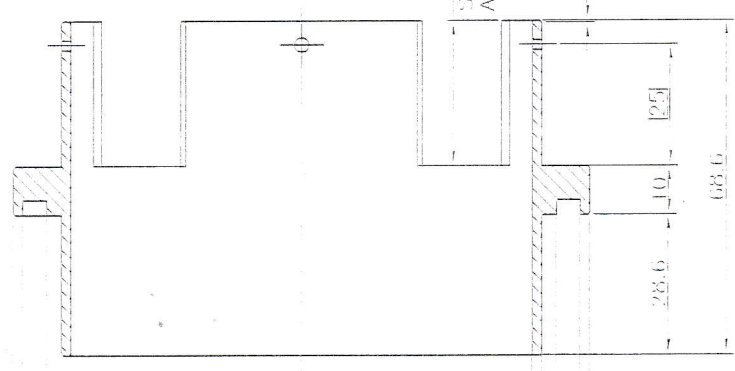
DRG No.:	RRCAT/IOBDDD/BDS/IL//2016/001/DD	SHEET	2 OF 6	REVNO	01
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ALL DIMENSIONS ARE IN mm

GENERAL TOLERANCES	
LINEAR DIMENSIONS :-	
0 TO 50	±0.2
50 TO 515	±0.5
515 TO 1000	±0.8
1000 TO 2000	±1.2
1011 TO 2 SHAFT b, 12	
UNLESS OTHERWISE SPECIFIED 3/2 THE SURFACE FINISH SHALL BE	

4 X 30 DEEP
SLOTS EQUISPACED
AS SHOWN

0.5 X 4.5 CIAM.
(TOP)

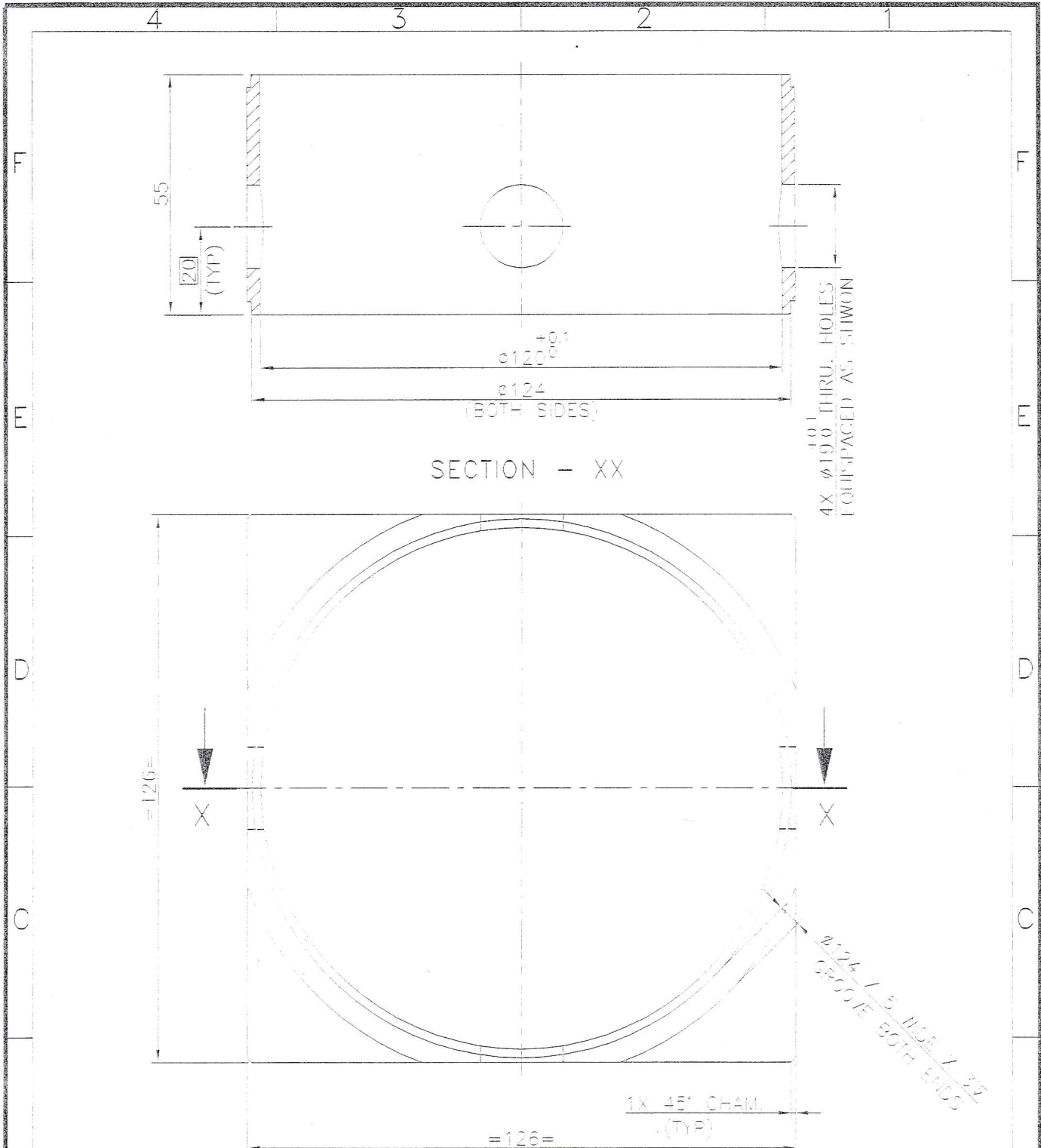


ITEM NO. : 2
MATL : S.S. 316L
QTY : 1NO.

REV.	LOCATION	DESCRIPTION	DRN/DATE	APPD.

REVISIONS

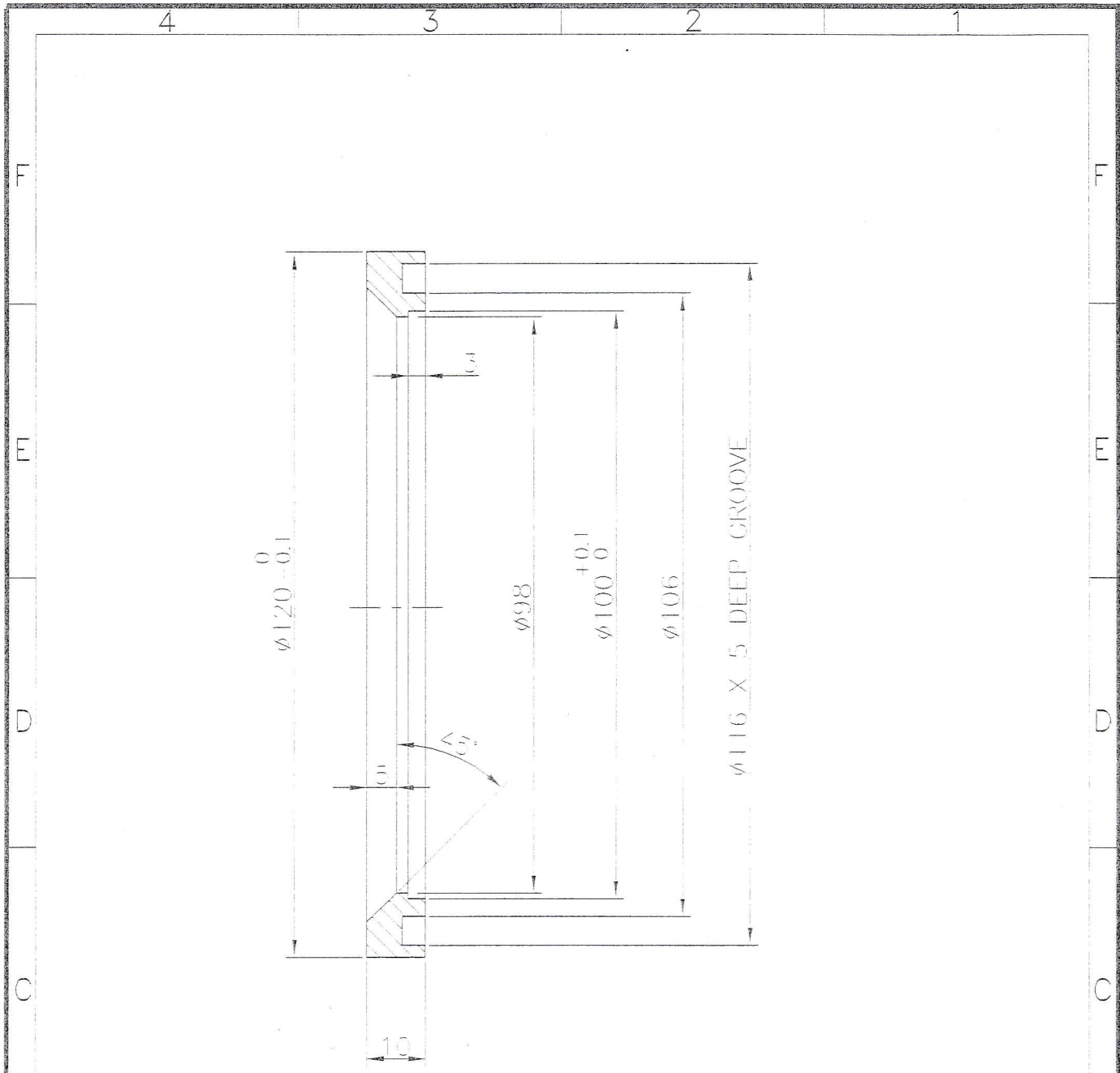
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ITEM NO. : 3
 MATL : S.S. 316L
 QTY : 1NO.

- NOTES: -
- 1) ALL DIMENSIONS ARE IN mm.
 - 2) DEBUR ALL EDGES AND BREAK SHARP CORNERS.
 - 3) THIS PART PROPERLY FIT TO SUIT WITH ITEM NO. 2 & 4.

A	DRN	R.K. Yadav	DATE	01.02.16	GOVERNMENT OF INDIA DEPARTMENT OF ATOMIC ENERGY RAJA RAMANNA CENTRE FOR ADVANCED TECHNOLOGY ACCELERATOR PROGRAMME		SCALE	1=1	A
	CHK.	<i>[Signature]</i> Karnawar	DATE				TITLE	DETAIL OF OUTER PIPE	
	APPD.						REV. NO	01	



ITEM NO. : 4
 MATL : S.S. 316L
 QTY : 1NO.

NOTES:-

- 1) ALL DIMENSIONS ARE IN mm.
- 2) DEBUR ALL EDGES AND BREAK SHARP CORNERS.
- 3) THIS PART PROPERLY FIT TO SUIT WITH ITEM NO. 3 & 5.

A	DRN	R.K. Yadav	DATE	01.02.18	GOVERNMENT OF INDIA DEPARTMENT OF ATOMIC ENERGY RAJA RAMANNA CENTRE FOR ADVANCED TECHNOLOGY ACCELERATOR PROGRAMME		SCALE	1=1	A
	CHK.	A. Karmawar	DATE				TITLE	DETAIL OF END PLATE	
	APPD.				DPC No. BRCAT/ICRDDD/RDS/II/2016/001		4 OF 6		

4 3 2 1

F

F

E

E

D

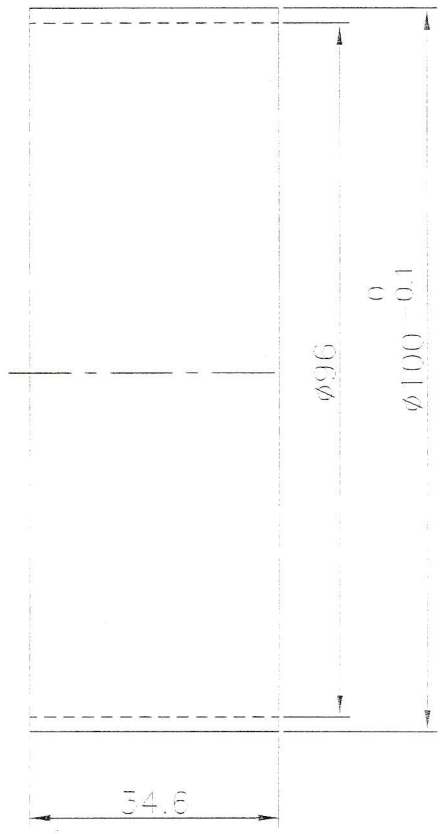
D

C

C

B

B



ITEM NO. : 5
 MATL : S.S. 316L
 QTY : 1NO.

NOTES:-

- 1) ALL DIMENSIONS ARE IN mm.
- 2) DEBUR ALL EDGES AND BREAK SHARP CORNERS.
- 3) THIS PART PROPERLY FIT TO SUIT WITH ITEM NO. 4 & 1.

A

A

DRN	P.K. Yadav	DATE	01.02.16	GOVERNMENT OF INDIA DEPARTMENT OF ATOMIC ENERGY RAJA RAMANNA CENTRE FOR ADVANCED TECHNOLOGY ACCELERATOR PROGRAMME		SCALE	1=1
CHK.	A. Karnewar	DATE				TITLE	DETAIL OF INNER PIPE
APPD.				DRG No.	BRCAT/IOBDDD/BDS/II/2016/001	REV.NO	

