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सत्यमेव जयते

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भारत सरकार  
GOVERNMENT OF INDIA  
भाभा परमाणु अनुसंधान केन्द्र  
BHABHA ATOMIC RESEARCH CENTRE  
Centre for Design and Manufacture  
Quality Control and Industrial Engineering Section

ट्रॉम्बे,  
मुंबई-४०० ०८५.  
TROMBAY,  
MUMBAI -400 085

Tender Start Date: 15/02/2022  
Tender Closing Date: 14/03/2022

Ref: BARC/MF/CDM/402/2021-22/76.

February 11, 2022

**Sub: Minor Fabrication, Assembly & Supply of Industrial Fluoroscope System (IFS)**  
**(Qty.- 02 Nos.) as per Annexure-I**

Dear Sir/Madam

1. Quotations are invited by Head CDM, BARC on behalf of president of India, for the minor fabrication of Industrial Fluoroscope System (IFS) as per Annexure-I.
2. Bidders shall quote for fabrication of Industrial Fluoroscope System (IFS) including material cost. **Applicable GST shall be quoted separately.**
3. The quotation shall reach **Head, CDM** on or before **14/03/2022** and must be sent in a **sealed envelope by Registered Post/ Speed Post and super scribed with the above reference no. and due date. Quotation sent by email / ordinary post / courier / hand delivery is not acceptable.**
4. The address on the envelope should read: **HEAD, CENTRE FOR DESIGN AND MANUFACTURE (Attn: Shri Lalit Mohan, SO/E), BHABHA ATOMIC RESEARCH CENTRE, TROMBAY, MUMBAI-400085.**
5. Supplier must clearly specify the **delivery charges, any other charges, delivery period & the validity period of the offer.**
6. Acceptance of this fabrication work shall be subjected to inspection by our engineer at supplier's works against acceptance criteria mentioned in Annexure-I.
7. The bidder shall deliver the item **within 4 months** from the date of issue of work order. The finished items shall be delivered to **Stores Officer, Centre for Design and Manufacture Zonal Store, BARC, Trombay, Mumbai-400085.**

Encl: Annexure-I.

*Lalit Mohan*  
*14/02/2022*  
(Lalit Mohan)  
SO/E, QC&IES

*W*  
*14/2/22*  
Through: Head, QC&IES

Approved by: Head, CDM

*S. P. Srivastava*  
*15/02/2022*  
एस. पी. श्रीवास्तव / S. P. Srivastava  
अध्यक्ष, अधिकल्पन एवं विनिर्माण केन्द्र  
Head, Centre for Design and Manufacture  
भारत सरकार / Government of India  
भाभा परमाणु अनुसंधान केन्द्र / Bhabha Atomic Research Centre,  
ट्रॉम्बे, मुंबई - ४०००८५ / Trombay, Mumbai - 400085

Government of India  
Bhabha Atomic Research Centre  
**Centre for Design & Manufacture**  
Quality Control & Industrial Engineering Section

## **Technical Specifications**

**for**

**Fabrication, Assembly & Supply of Industrial  
Fluoroscope System (IFS)**

**(Technical Specification No: BARC/MF/CDM/2022/01)**

**Mumbai – 400085**

**February, 2022**

## 1. INDEX

<b>S. No.</b>	<b>Description</b>	<b>Page Nos.</b>
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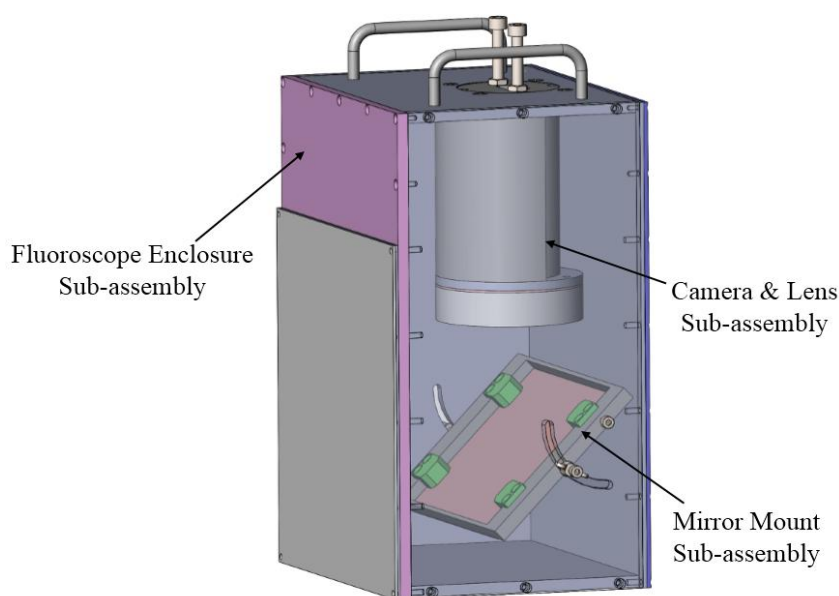
# Part-I: Technical Specification of Industrial Fluoroscope System (IFS)

## 1.0 Introduction

Industrial Fluoroscope System (IFS) is a low cost real time radiography system developed at Centre for Design and Manufacture, BARC, Mumbai. It consists of following three main sub-assemblies: (refer fig. 1)

- 1) Fluoroscope Enclosure Sub-assembly
- 2) Camera & Lens Sub-assembly
- 3) Mirror Mount Sub-assembly

Complete assembly weighs around 34 kg, and can be lifted easily using handles. Materials used in fabrication of Fluoroscope are Stainless steel (SS) plates & rods, Aluminium plates, Lead plates & blocks, Perspex sheets, Rubber gaskets, Fasteners, Helicoils etc. All SS and Aluminium parts shall be powder coated for good aesthetic look.



**Fig.1: Industrial Fluoroscope System Assembly**

## 2.0 Scope of Work

### 2.1 Fabrication of Industrial Fluoroscope System (IFS):

Scope of work involves Fabrication, Assembly and supply of Industrial Fluoroscope System (IFS). The overall dimensions of Fluoroscope are 250mm (Length) x 191mm (Width) x 378mm (Height) with 8mm wall thickness (Refer Drg. No: C-058-1272-200).

#### List of Drawings of Fluoroscope

S. No.	Description of the Job	Drawing No.	Remarks
1	<b>General Assembly of Fluoroscope</b>	C-058-1272-200	All the Fasteners mentioned in Drawings C#200, C#100 and C#175 are in the scope of supply.
2	<b>Fluoroscope Enclosure Sub-Assembly</b>	C-058-1272-100	
		D-058-1272-102	
		D-058-1272-103	
	D-058-1272-104		

		D-058-1272-105 D-058-1272-106 D-058-1272-107 D-058-1272-108 D-058-1272-109 D-058-1272-110 D-058-1272-112 D-058-1272-150 E-058-1272-113	
3	<b>Camera &amp; Lens Sub-assembly</b>	C-058-1272-175 D-058-1272-177 E-058-1272-178 E-058-1272-179 E-058-1272-185 E-058-1272-186 E-058-1272-187	
4	<b>Mirror Mount Sub-Assembly</b>	D-058-1272-201 E-058-1272-203	

It consists of following sub-assemblies:

**2.1.1 Fluoroscope Enclosure Sub-assembly (Refer Drg. No: C-058-1272-100):**

This sub-assembly is fabricated by fastening 8 numbers of plates. Out of these eight number of plates, five are 8 mm thick SS, one is 3 mm thick SS, one is 3 mm thick lead and one is 4.5 mm thick SS plate. These plates are to be machined as per drawings and assembled as per assembly procedure (refer section 2.2) using required fasteners as shown in sub-assembly drawing (Refer list of drawings).

*Screen (I. No. 101) is not in the scope of supply. Remaining all the items mentioned in this drawing are in the scope of supply.*

**2.1.2 Camera & Lens Sub-assembly (Refer Drg. No: C-058-1272-175):**

This sub-assembly is made up of a welded component of pipe with flanges, Lead block, Lead Glass, Lead Glass housing, Camera adjuster unit and Fasteners. Pipe Lead Block weldment (I. No. 177) is to be fabricated as per drawing no. D-058-1272-177. Camera adjuster (I.No.178) and lead glass housing (I.No.179) shall be fabricated as per drawing no. E-058-1272-178 & E-058-1272-179 respectively. All the components shall be assembled as per drawing no. C-058-1272-175. Helicoils shall be used with the threaded joints in aluminium.

Complete sub-assembly (I.No.175) shall be assembled with the top plate (I. No.103) of Fluoroscope Enclosure Sub-assembly as shown in drawing no. C-058-1272-200 (Refer list of drawings of each item).

*Camera with Lens (I. No. 176) & Lead Glass (I. No. 180) are not in the scope of supply. Remaining all the items mentioned in this drawing are in the scope of supply.*

**2.1.3 Mirror Mount Sub-assembly (Refer I. No. 201, 202, 203, 210, 211, 212, 216 in Drg. No: C-058-1272-200):**

This sub-assembly is made up of a Plain Mirror, Mirror Mounting Plate, Clamps and fasteners etc. The Plain mirror is assembled with the Mirror Mounting Plate using Mirror Clamps and complete sub-assembly is assembled with Fluoroscope Enclosure Sub-assembly as shown in drawing no: C-058-1272-200 (Refer list of drawings of each item).

*Plain Mirror (I. No. 202) is not in the scope of supply. Remaining all the items mentioned in this drawing are in the scope of supply.*

**Note:** All the Fasteners mentioned in Drawings C-058-1272-200, C-058-1272-100 and C-058-1272-175 are in the scope of supply.

## **2.2 Assembly Procedure:**

Assembly procedure for the Fluoroscope is as follows:

1. Assemble Fluoroscope enclosure sub-assembly as per drawing no. C-058-1272-100 except screen (I.No.101) & back side plates (I. No. 107 &108)
2. Assemble Camera & Lens sub-assembly using I. Nos. 177, 178 & 179 with suitable fasteners.
3. Assemble Mirror Mount sub-assembly using Mirror Mounting Plate (I. No. 201), Clamps (I. No. 203) and required fasteners as per drawing no. C-058-1272-200.
4. Assemble the Camera & Lens Sub-Assembly and Mirror Mount sub-assembly with the Fluoroscope Enclosure sub-assembly using suitable fasteners as per drg no. C-058-1272-200.
5. Assemble the Screen (I. No. 101) & Perspex sheet (I. No. 112) with the Fluoroscope Enclosure sub-assembly (I. No. 100) per drg no. C-058-1272-100 using suitable fasteners.
6. Assemble the Back plates (I. No. 107 & 108) and Back Plate (I. No. 107) as per drawing no. C-058-1272-100.
7. This completes the assembly of Fluoroscope.

## **2.3 Powder Coating & Painting:**

Powder coating & painting with brownish black colour with matte finish shall be done on parts in such a way that coating shall be visible on all over the outer surface of fluoroscope assembly. During powder coating proper care shall be taken of tapped holes. Tapped holes shall be re-tapped after powder coating, if required.

**Note:**

- i. Supplier must confirm the color and take approval from purchaser before powder coating.
- ii. The supplier shall obtain permission of the purchaser before repair work is under-taken. If repairs are likely to affect the results of the tests already completed appropriate re-inspection and re-tests shall be carried out. The procedure for repair shall be approved by the purchaser.

## **3.0 Acceptance Criteria**

- Supplier shall furnish chemical composition certificate for SS, Lead and Aluminium metals to be used for fabrication of components. Raw material should also be provided for making three standard size tensile test specimens from the material to be used for fabrication. Testing cost shall not be in the scope of supplier. Tensile test will be conducted at purchaser's place as per ASTM E8 on sample taken from the supplier. Test result shall match with ASME/ASTM or equivalent standard. **Fabrication work can only be started after getting approval from purchaser or its representative.**
- All the items to be used for final assembly shall be free from any crack, corrosion, deformation or any other material and manufacturing defect.
- Dimension inspection reports as per drawings for all the items to be used in final assembly shall be supplied to user.
- Supplier has to demonstrate the assembly and proper functionality as per specification during Pre-Dispatch Inspection.
- Supplier has to ensure safe delivery of Fluoroscope.

## **4.0 Inspection and Testing at Supplier's Works:**

- The supplier shall carry out visual & dimensional inspection of the Fluoroscope at their works. The supplier shall also carry out functional test for smooth movement of item no. 179

'Camera adjuster' and item no. 201 'Mirror mounting plate' after final assembly etc. as specified in the drawings. The purchaser shall have the right to perform additional inspection and testing as deemed necessary.

- The purchaser or his authorized representative shall have access to witness manufacturing, inspection and testing of the system at his discretion. **Supplier shall maintain the records of inspection of all the components as mentioned in acceptance criteria (point no. 3) and two copies of the same shall be submitted to the purchaser.**

#### **5.0 Transportation:**

- The Fluoroscope shall be properly packed according to the safe transportation requirements.
  - Fluoroscope shall be handled carefully during transportation and supplier should ensure that fluoroscope is well-protected against any damage.
  - Any damages incurred during transportation shall be repaired by the supplier without any extra cost.
-

## **Part-II: General Terms and Conditions**

1. Any doubts/discrepancies regarding dimensions shall be clarified from the purchaser. The dimensions shall not be obtained by measuring from the drawing.
  2. In the event that certain requirements of drawings conflict with the requirements of the specifications, the governing requirements shall be at the discretion of the purchaser. The purchaser reserves the right to revise the drawings without altering the scope of work. Minor changes or modifications in the design that may be incorporated at this stage for ease of fabrication/erection or to improve the performance of the product shall be considered within the scope of the specified work.
  3. The supplier shall meet the dimensional tolerances specified in the drawings listed above and the drawings generated subsequently. He shall execute the job with high-class workmanship and meet committed delivery schedules.
  4. Fitting and alignment shall be carried out to comply with the drawings and the specifications.
  5. The supplier shall ensure that all the joints fit uniformly over their respective mating surfaces.
  6. In case of any doubt, the purchaser or his authorized representative should be consulted before proceeding further at each stage of execution of the work.
  7. The fabricated components shall be transported only after approval in writing by the purchaser's representative for shipping.
  8. **The supplier shall deliver complete Fluoroscope assembly to the CDM Zonal Stores, Centre for Design & Manufacture, BARC, Mumbai-400085**
  9. Damages during packing and transportation, if any, will be the responsibility of the supplier.
  10. Supplier has to provide warranty for satisfactory performance against manufacturing defects or any faulty workmanship for **a period of 6 months** from date of final acceptance. Faulty components found at later stage shall be replaced within warranty period (free of cost). Supplier has to bear the shipping cost during replacement of parts.
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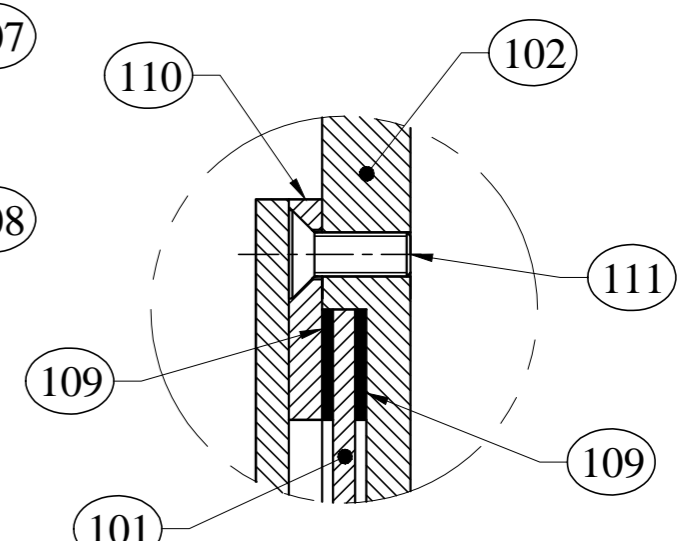
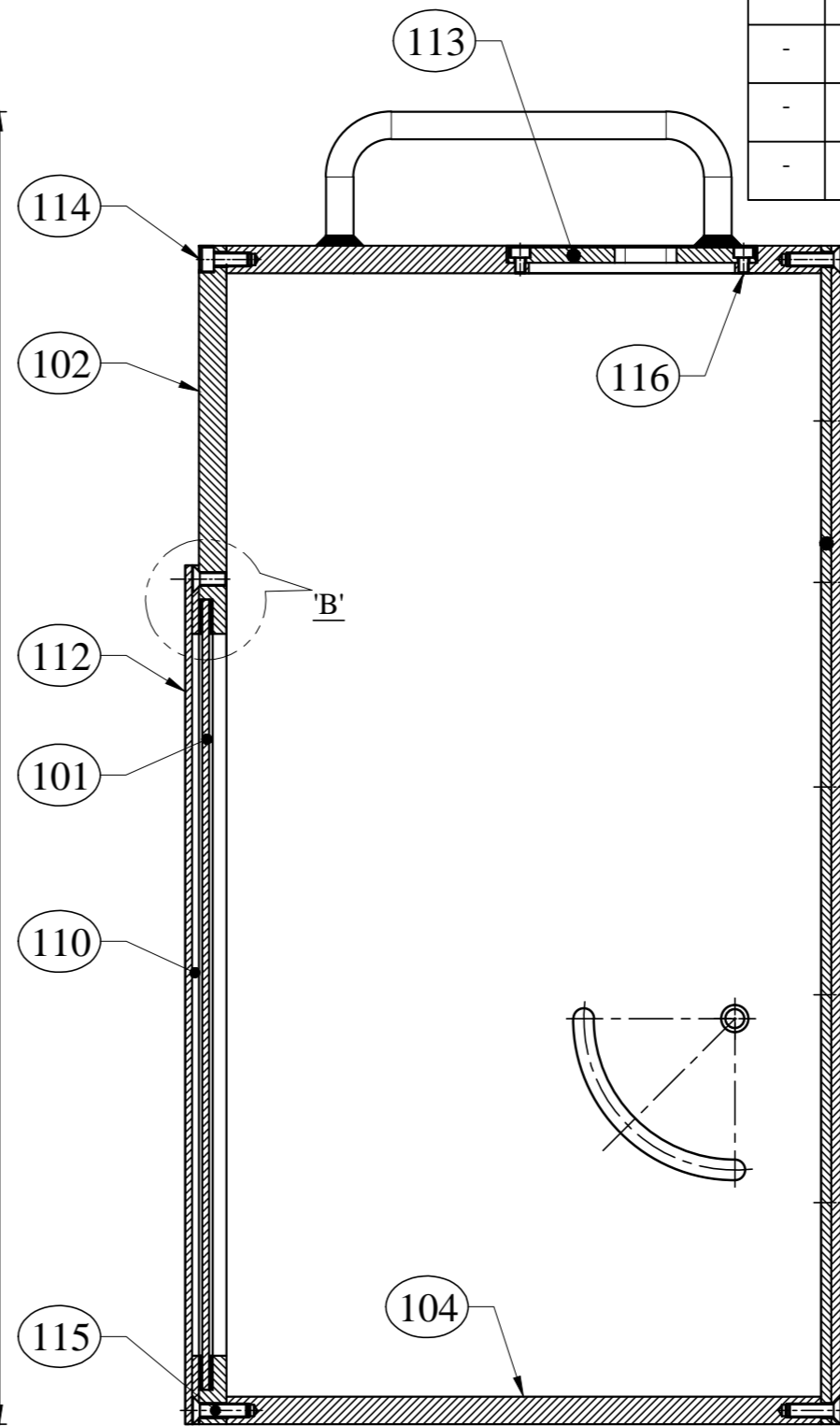
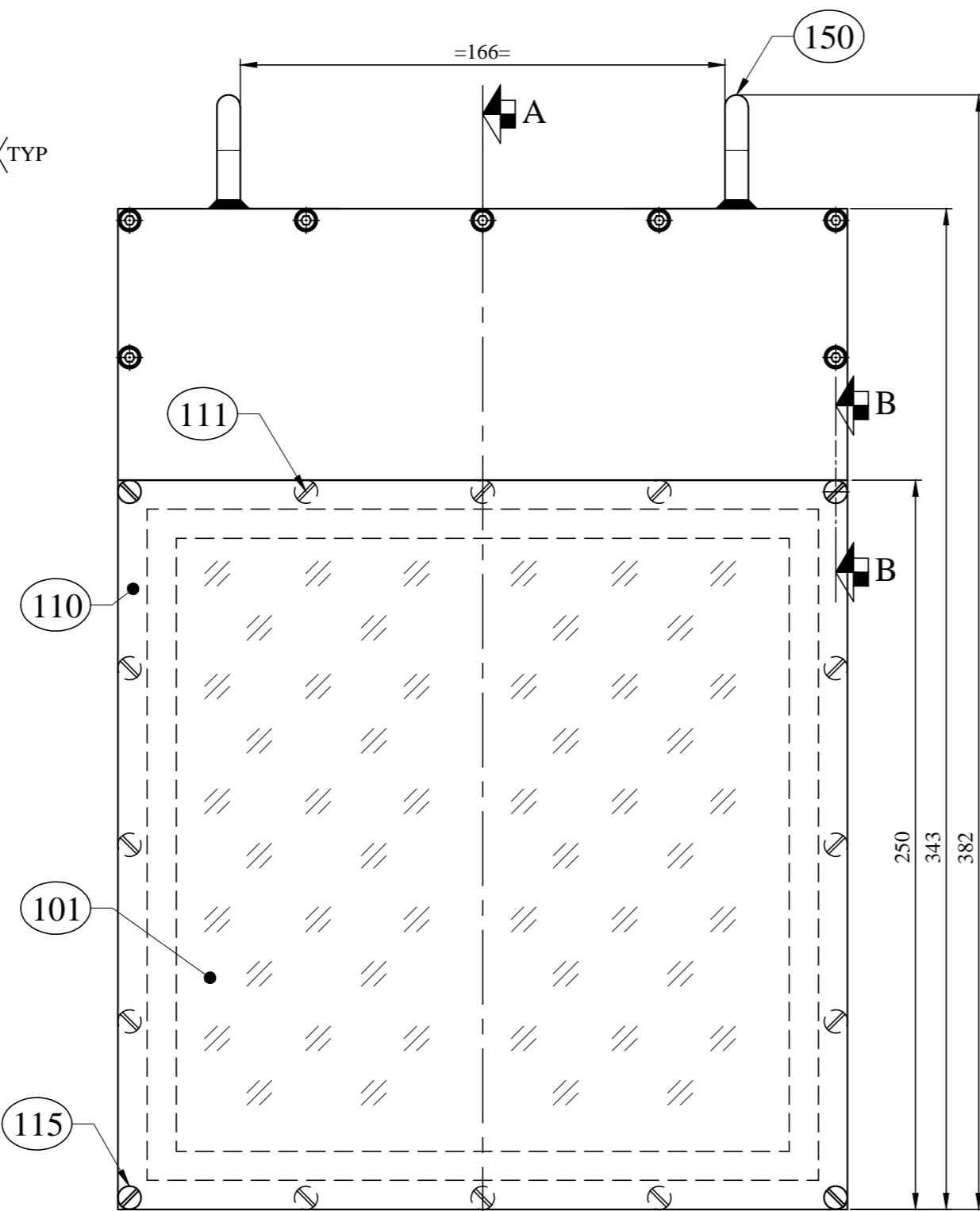
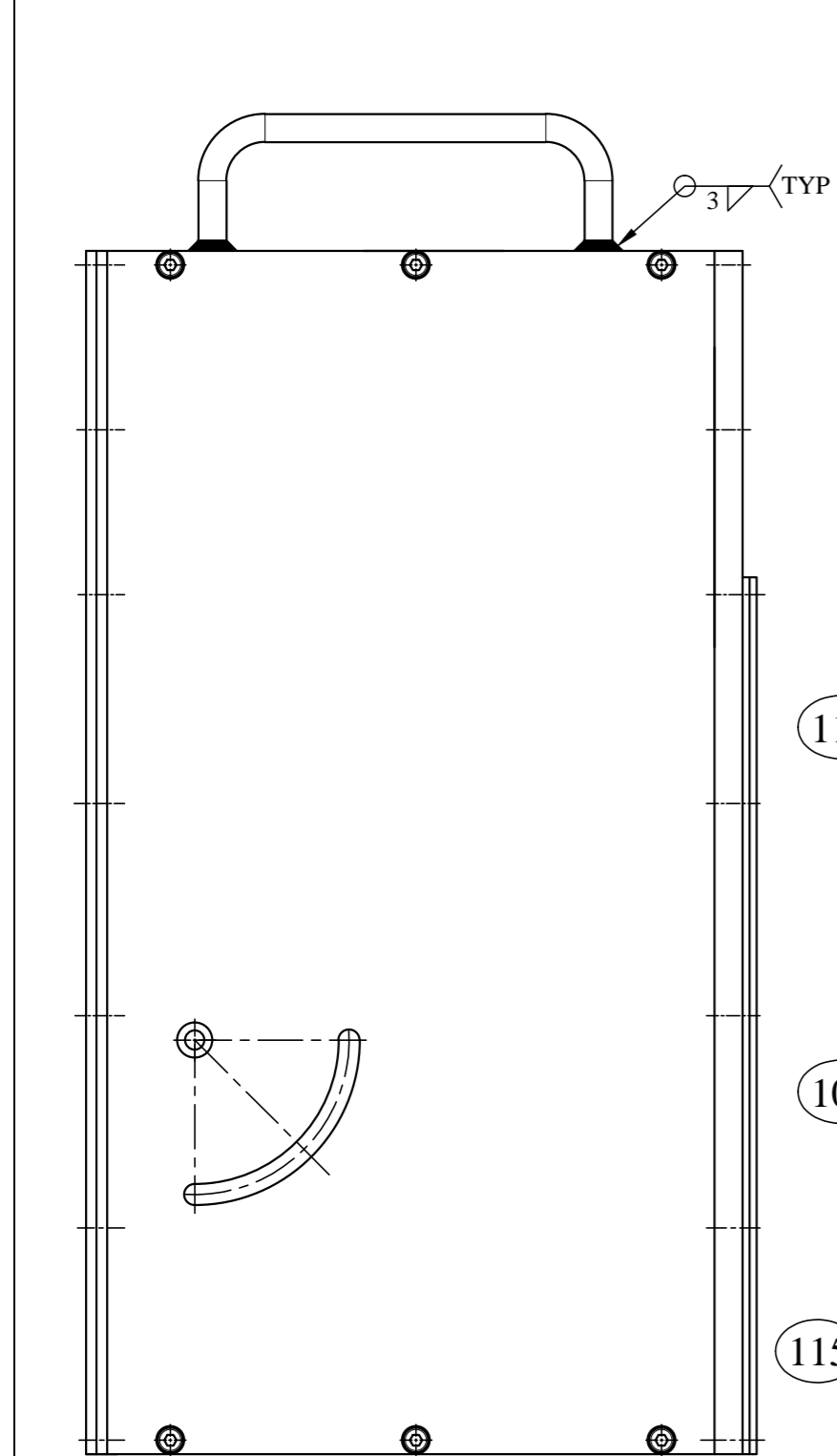
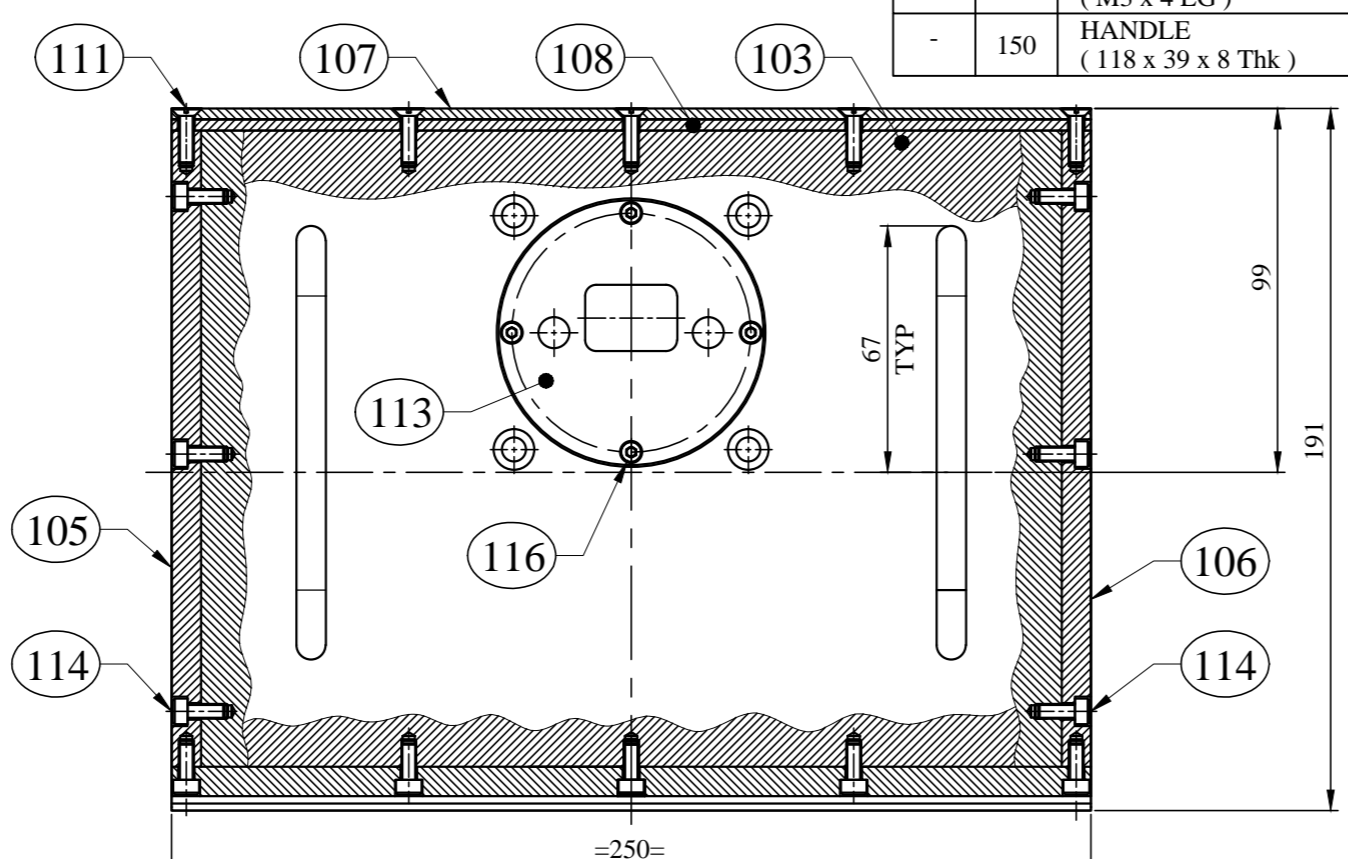
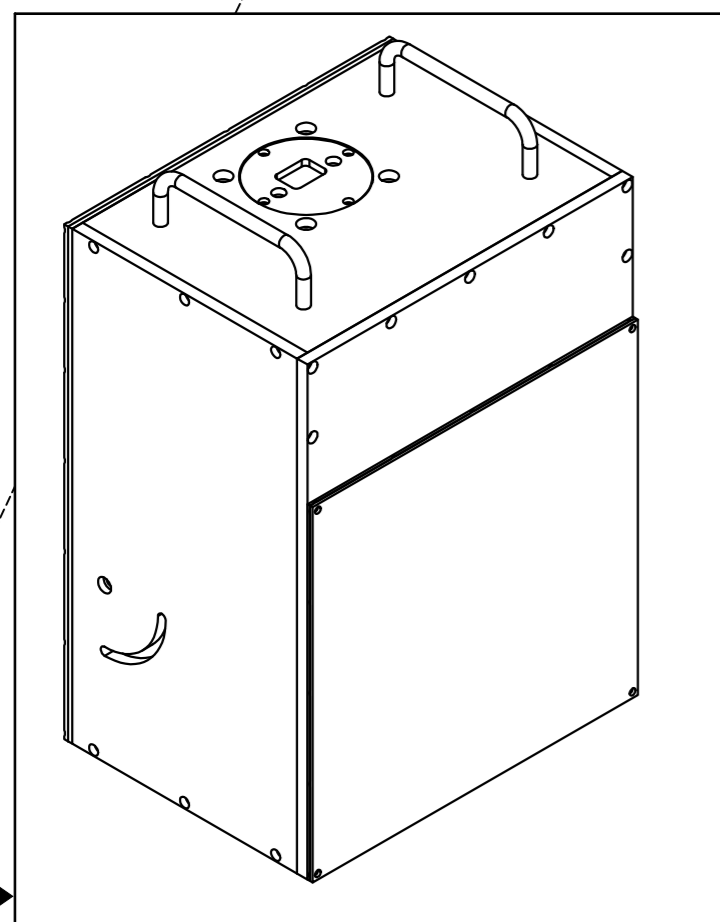


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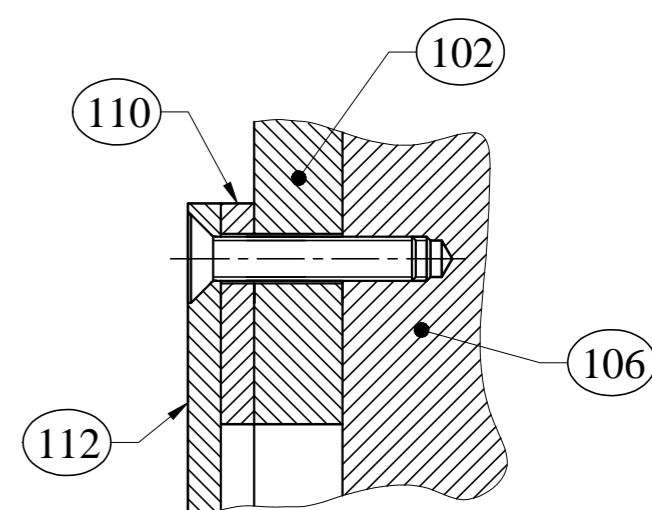
-	116	SOC HD CAP SCREW (M3 x 4 LG)	S.S.	04	STD ITEM	-
-	150	HANDLE (118 x 39 x 8 Thk)	S.S.	02	D#150	-

**BILL OF MATERIAL**

ITEM NO.	PART NO.	DESCRIPTION	MATL.	QTY.	REFERENCE DRG. NO.	REMARKS
100	-	FLUOROSCOPE ENCLOSURE S. A. (250 x 191 x 382 LG)	S.S.	01	THIS DRG	-
-	101	SCREEN (230 x 230 x 1 Thk)	STD	01	STD ITEM	-
-	102	FRONT PLATE (250 x 343 x 8 Thk)	S.S.	01	D#102	-
-	103	TOP PLATE (234 x 173 x 8 Thk)	S.S.	01	D#103	-
-	104	BOTTOM PLATE (234 x 173 x 8 Thk)	S.S.	01	D#104	-
-	105	SIDE PLATE LH (343 x 173 x 8 Thk)	S.S.	01	D#105	-
-	106	SIDE PLATE RH (343 x 173 x 8 Thk)	S.S.	01	D#106	-
-	107	BACK SIDE PLATE (250 x 343 x 3 Thk)	S.S.	01	D#107	-
-	108	BACK SIDE LEAD PLATE (250 x 343 x 3 Thk)	LEAD	01	D#108	-
-	109	RUBBER SHEET (230 x 230 x 1 Thk)	RUBBER	02	D#109	-
-	110	FRONT SHEET (250 x 250 x 2 Thk)	S.S.	01	D#110	-
-	111	SLOTTED CSK SCREW (M4 x 10 LG)	S.S.	32	STD ITEM	-
-	112	PERSPEX SHEET (250 x 250 x 2 Thk)	PERSPEX	01	D#112	-
-	113	TOP COVER (Ø72 x 4.5 Thk)	S.S.	01	E#113	-
-	114	SOC HD CAP SCREW (M4 x 15 LG)	S.S.	19	STD ITEM	-
-	115	SLOTTED CSK SCREW (M4 x 20 LG)	S.S.	04	STD ITEM	-



TYPICAL ENLARGED VIEW 'B'



SECTION-BB

REFERENCE DRG.	REF_DRG_NO	NO.	LOC.	DESCRIPTION	DRN DATE	APPD.
REFERENCE DRAWINGS	DRG. NOS.	REVISIONS			DRN DATE	APPD.

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED		
LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE	SURFACE FINISH
UPTO 6 ± 0.1	1- 6 ± 1°	IN MICRONS 3.15√CLA
6 - 30 ± 0.2	6- 30 ± 0° 30'	CHAMFER 1 x 45°
30 - 120 ± 0.3	30 - 120 ± 0° 20'	
120 - 315 ± 0.5	120 - 400 ± 0° 10'	
315 - 1000 ± 0.8		
1000 - 2000 ± 1.2		
2000 - 4000 ± 2.0		

PROJECT OR SECTION
DR'N /DATE
DRG. CHKD.
DES'D.

AutoCad File No.-	W.O. No.	CODE NO.
TITLE : <b>FLUOROSCOPE ENCLOSURE S.A. (ITEM No-100)</b>		
APP'D		
SHEET NO. OF SHTS.		
SCALE: 1:2		
PROJN.		
DRG NO. C-058-1272-100		REV. 0

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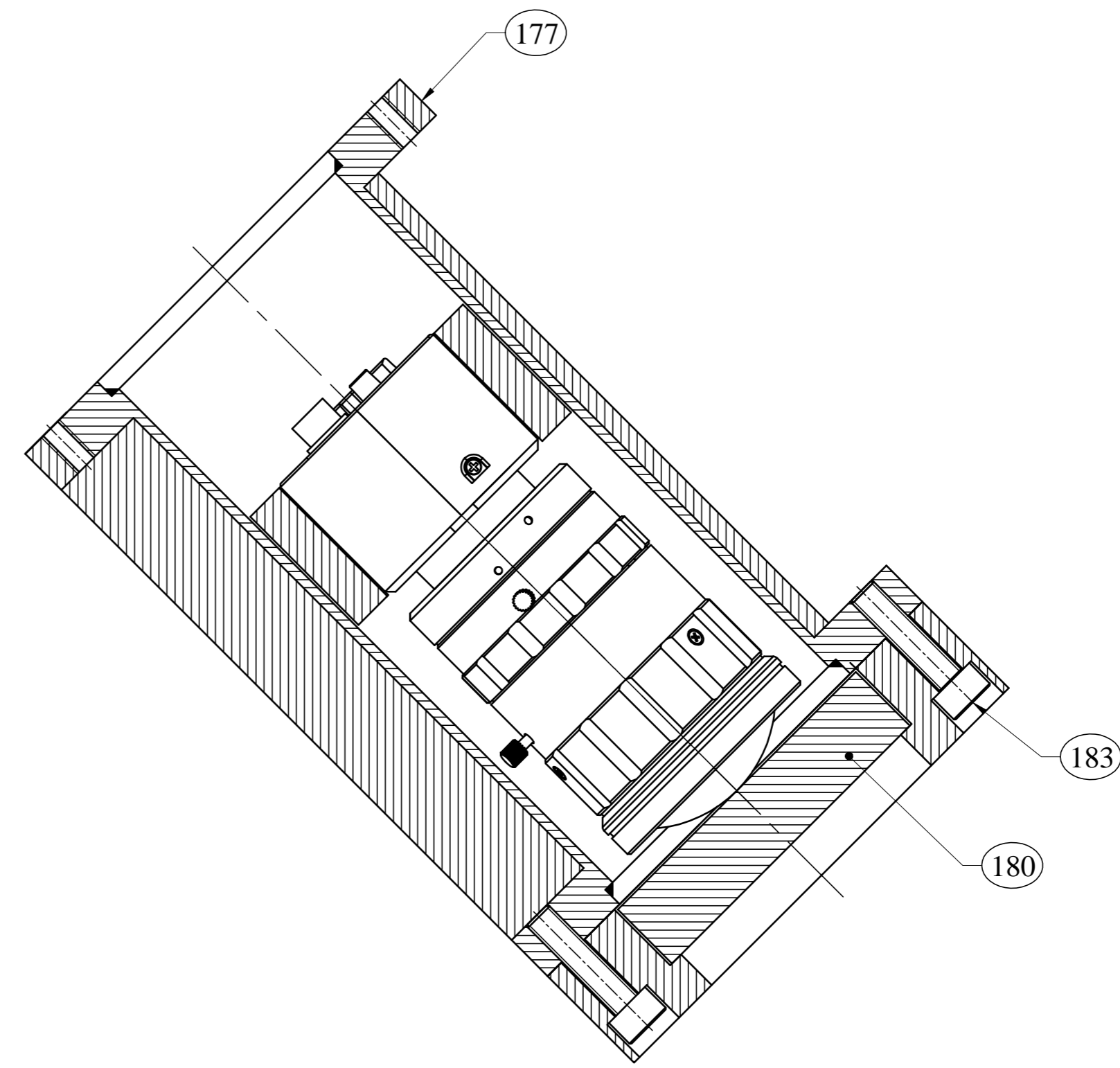
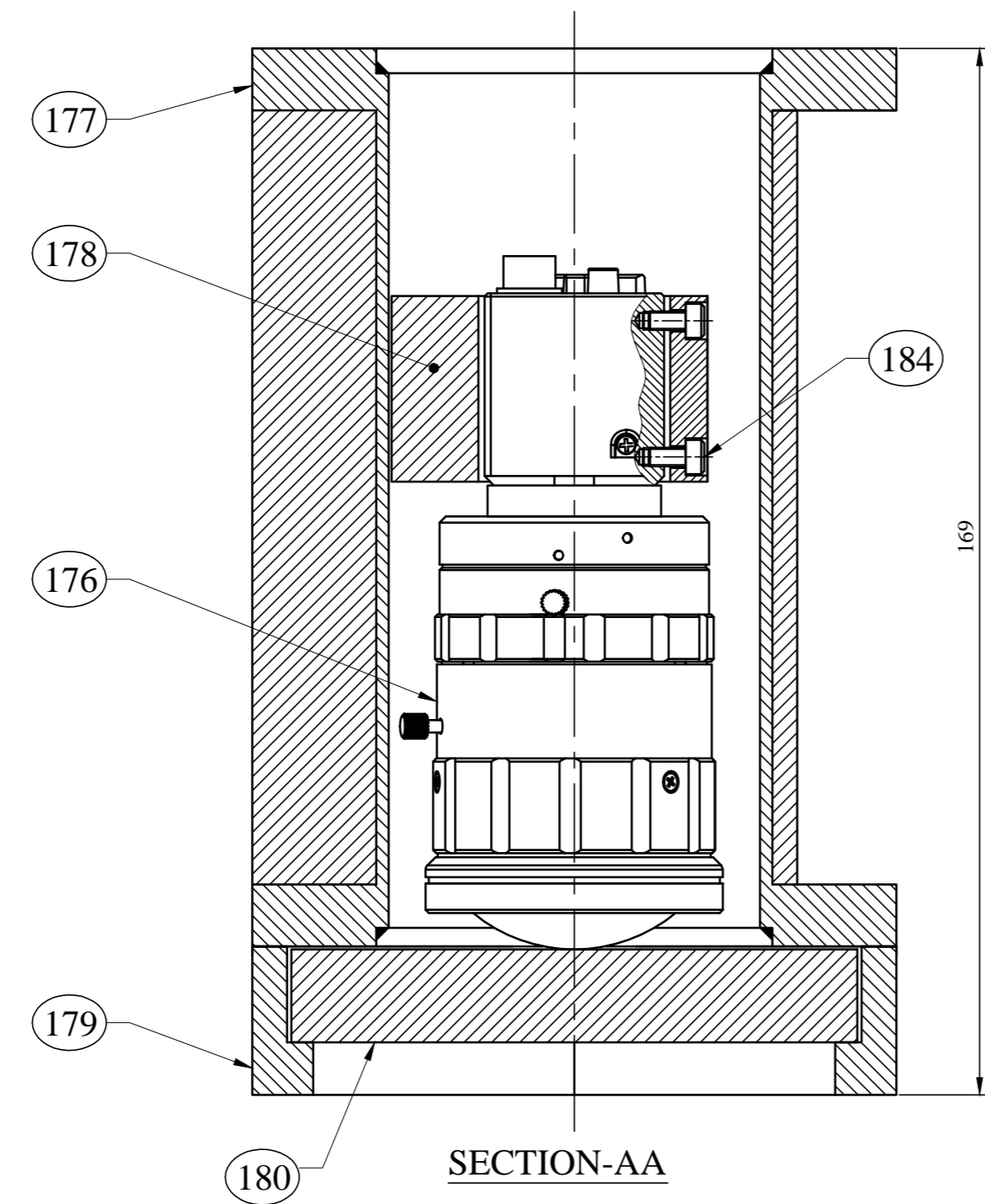
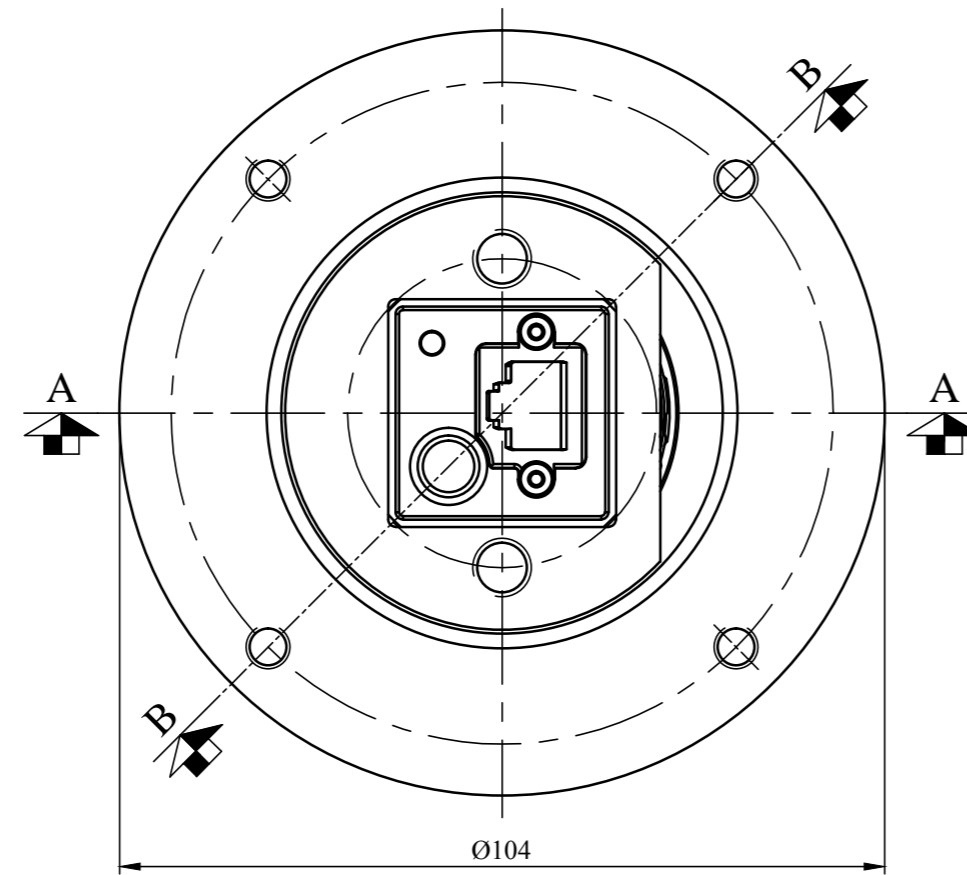
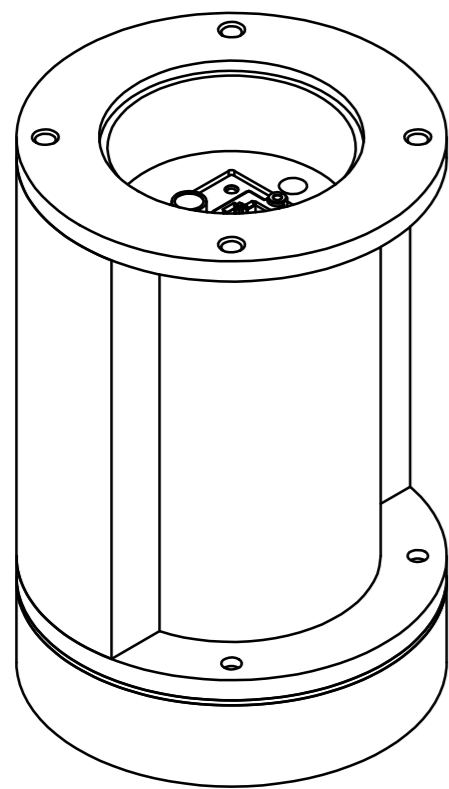
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IF IN DOUBT, ASK.

**BILL OF MATERIAL**

ITEM NO.	PART NO.	DESCRIPTION	MATL.	QTY.	REFERENCE DRG. NO.	REMARKS
175	-	CAMERA & LENS S. A. (Ø104 x 172 HT)	-	01	THIS DRG	-
-	176	CAMERA WITH LENS (Ø48 x 112 LG)	-	01	STD ITEM	-
-	177	PIPE LEAD BLOCK WELDMENT (Ø104 x 145 LG)	-	01	D#177	-
-	178	CAMERA ADJUSTER (Ø59 x 30 Thk)	AL.	01	E#178	-
-	179	LEAD GLASS HOUSING (Ø104 x 24 Thk)	PERSPEX / AL.	01	E#179	-
-	180	LEAD GLASS (66 x 66 x 15 Thk)	Pb	01	STD ITEM	-
-	183	SOC HD CAP SCREW (M6 x 22 LG)	S.S.	04	STD ITEM	-
-	184	SOC HD CAP SCREW (M3 x 8 LG)	S.S.	04	STD ITEM	-



**SECTION-BB**

REFERENCE_DRG.	REF_DRG_NO	NO.	LOC.	DESCRIPTION	DRN DATE	APPD.
REFERENCE DRAWINGS	DRG. NOS.	REVISIONS			DRN DATE	APPD.

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED		
LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE	SURFACE FINISH
UPTO 6 ± 0.1	1- 6 ± 1°	IN MICRONS 3.15√CLA
6 - 30 ± 0.2	6 - 30 ± 0° 30'	CHAMFER 1 x 45°
30 - 120 ± 0.3	30 - 120 ± 0° 20'	
120 - 315 ± 0.5	120 - 400 ± 0° 10'	
315 - 1000 ± 0.8		
1000 - 2000 ± 1.2	1. ALL DIMENSIONS ARE IN MILLIMETRES.	
2000 - 4000 ± 2.0	2. REMOVE SHARP CORNERS AND BURRS.	

AutoCad File No.-	W.O. No.	CODE NO.
TITLE : <b>CAMERA &amp; LENS S.A.</b> <b>(ITEM No-175)</b>		
DR'N /DATE	DRG. CHKD.	DES'D.
APP'D	SHEET NO. OF SHTS.	SCALE: 1:1
PROJN.	DRG NO.	REV.
	C-058-1272-175	0

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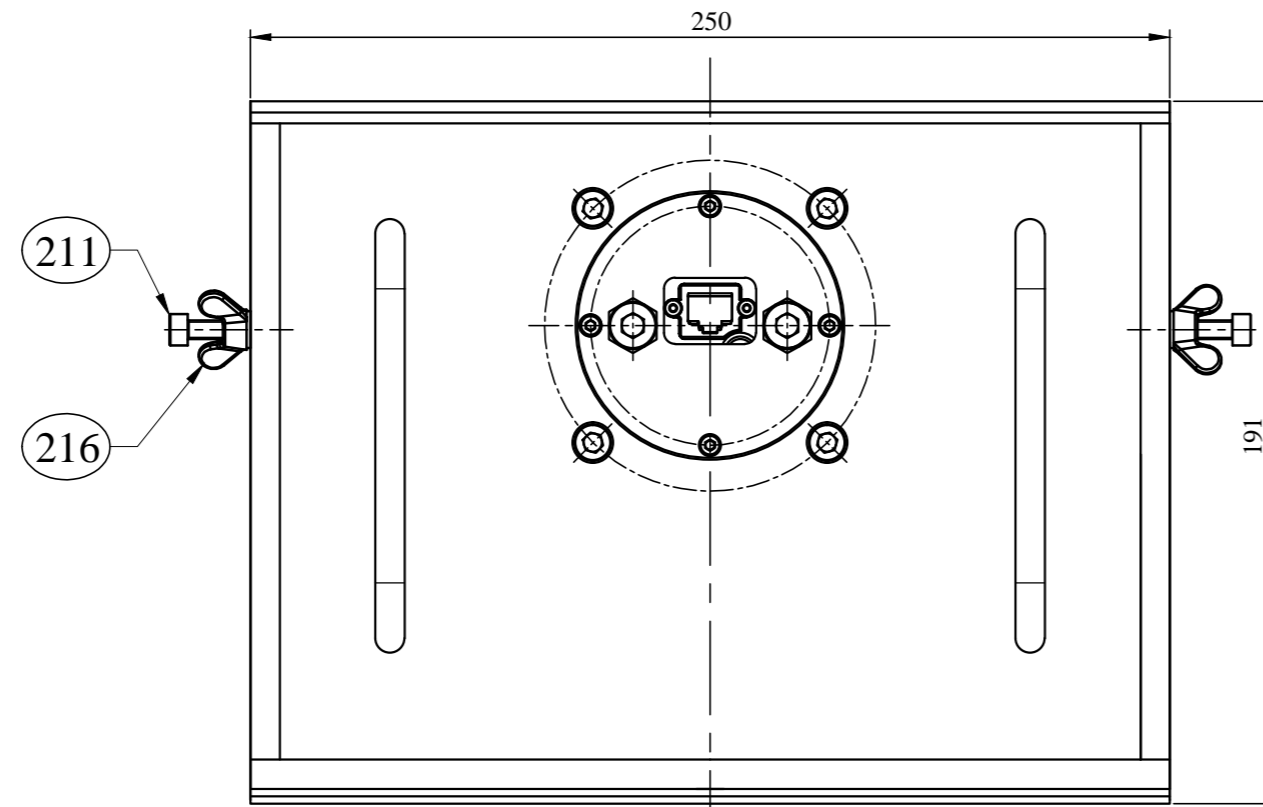
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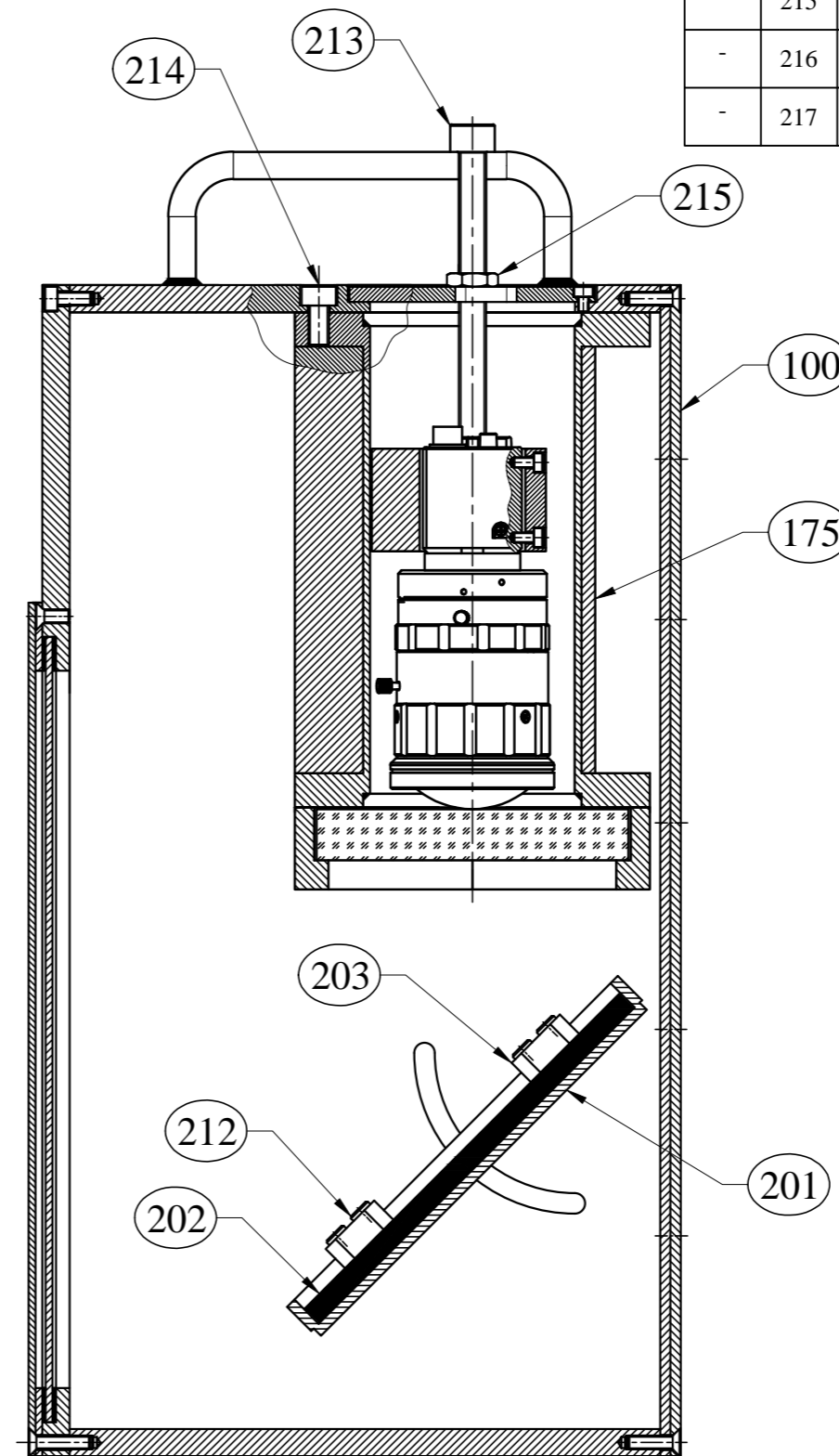
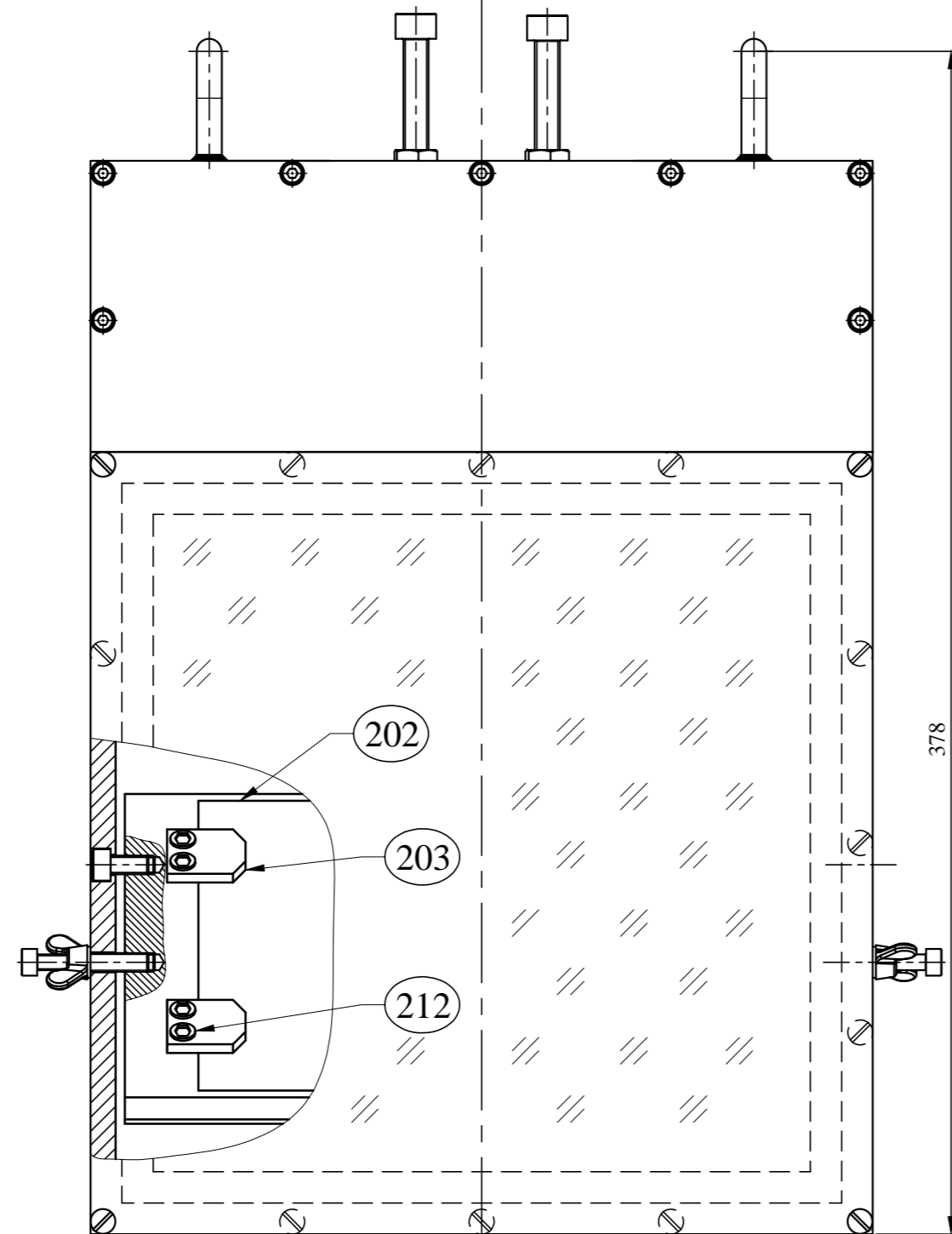
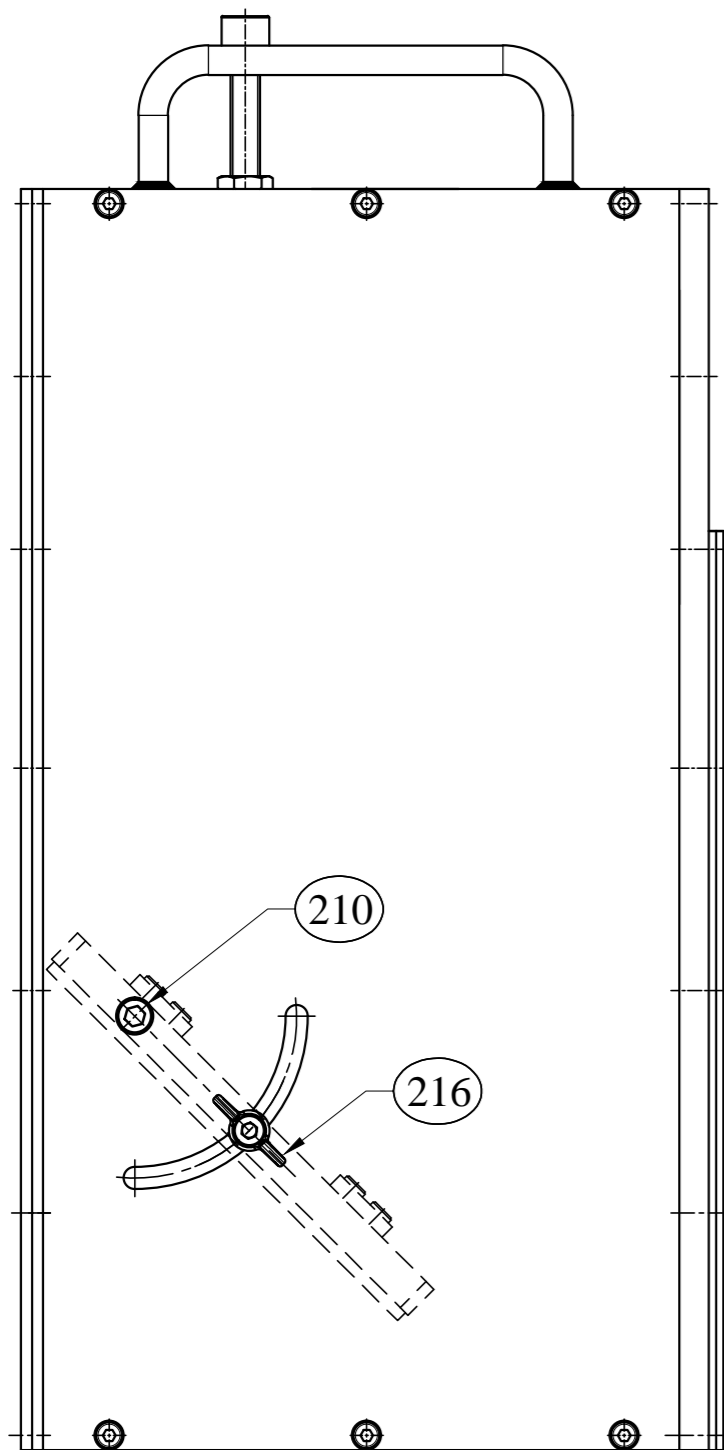
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IF IN DOUBT, ASK.



**BILL OF MATERIAL**

ITEM NO.	PART NO.	DESCRIPTION	MATL.	QTY.	REFERENCE DRG. NO.	REMARKS
200	-	GENERAL ASSY of FLUOROSCOPE (250 x 191 x 390 LG)	-	01	THIS DRG	-
	100	FLUOROSCOPE ENCLOSURE S. A. (250 x 191 x 382 LG)	-	01	C#100	-
	175	CAMERA & LENS S. A. (Ø104 x 172 HT)	-	01	C#175	-
-	201	MIRROR MOUNTING PLATE (228 x 137 x 13 Thk)	S.S.	01	D#201	-
-	202	PLAIN MIRROR (180 x 130 x 6 Thk)	GLASS	01	STD ITEM	-
-	203	MIRROR CLAMP (25 x 20 x 7Thk)	S.S.	04	E#203	-
-	210	SOC HD CAP SCREW (M6 x 12 LG)	S.S.	02	STD ITEM	-
-	211	SOC HD CAP SCREW (M5 x 35 LG)	S.S.	02	STD ITEM	-
-	212	SOC HD CAP SCREW (M4 x 10 LG)	S.S.	08	STD ITEM	-
-	213	SOC HD CAP SCREW (M8 x 80 LG)	S.S.	02	STD ITEM	-
-	214	SOC HD CAP SCREW (M6 x 12 LG)	S.S.	04	STD ITEM	-
-	215	HEX. NUT (M8)	S.S.	02	STD ITEM	-
-	216	WING NUT WITH WASHER (M5)	S.S.	02	STD ITEM	-
-	217	HELICOIL (MC8) (FOR M8)	S.S.	02	STD ITEM	-



SECTION-AA

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

LINEAR DIMENSIONS UPTO 6 ± 0.1 6 - 30 ± 0.2 30 - 120 ± 0.3 120 - 315 ± 0.5 315 - 1000 ± 0.8 1000 - 2000 ± 1.2 2000 - 4000 ± 2.0	LENGTH OF SHORTER SIDE OF ANGLE 1- 6 ± 1° 6 - 30 ± 0° 30' 30 - 120 ± 0° 20' 120 - 400 ± 0° 10'	SURFACE FINISH IN MICRONS 3.15√CLA CHAMFER 1 x 45°
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1. ALL DIMENSIONS ARE IN MILLIMETRES.  
2. REMOVE SHARP CORNERS AND BURRS.

PROJECT OR SECTION

DR'N /DATE  
DRG. CHKD.  
DES'D.

TITLE :  
**GENERAL ASSY OF FLUOROSCOPE  
( ITEM No-200 )**

W.O. No.

CODE NO.

APP'D

SHEET NO. OF SHTS.

SCALE: 1 : 2

PROJN.

DRG NO.

REV. 0

REFERENCE_DRG.	REF_DRG_NO	NO.	LOC.	DESCRIPTION	DRN DATE	APPD.
REFERENCE DRAWINGS	DRG. NOS.	REVISIONS				

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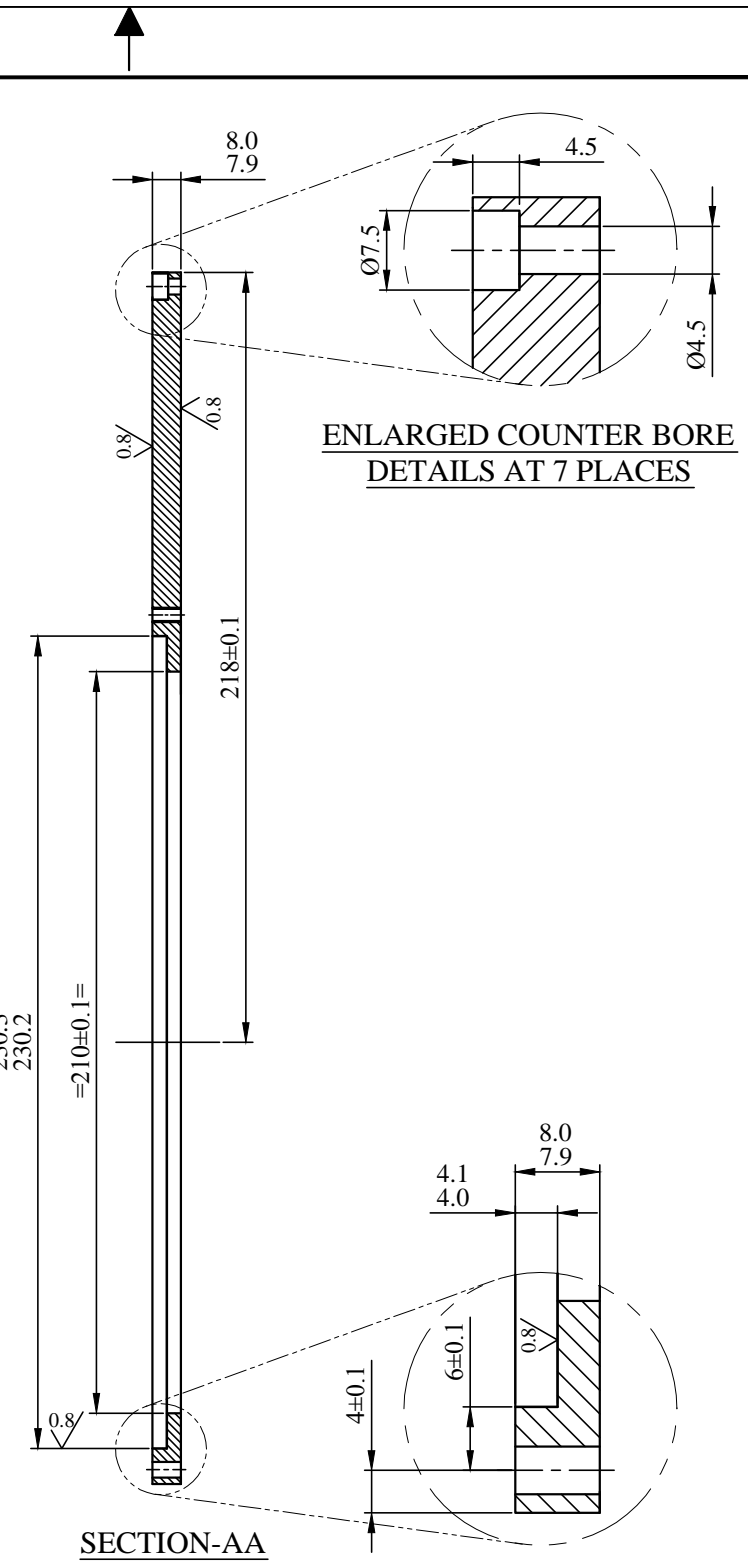
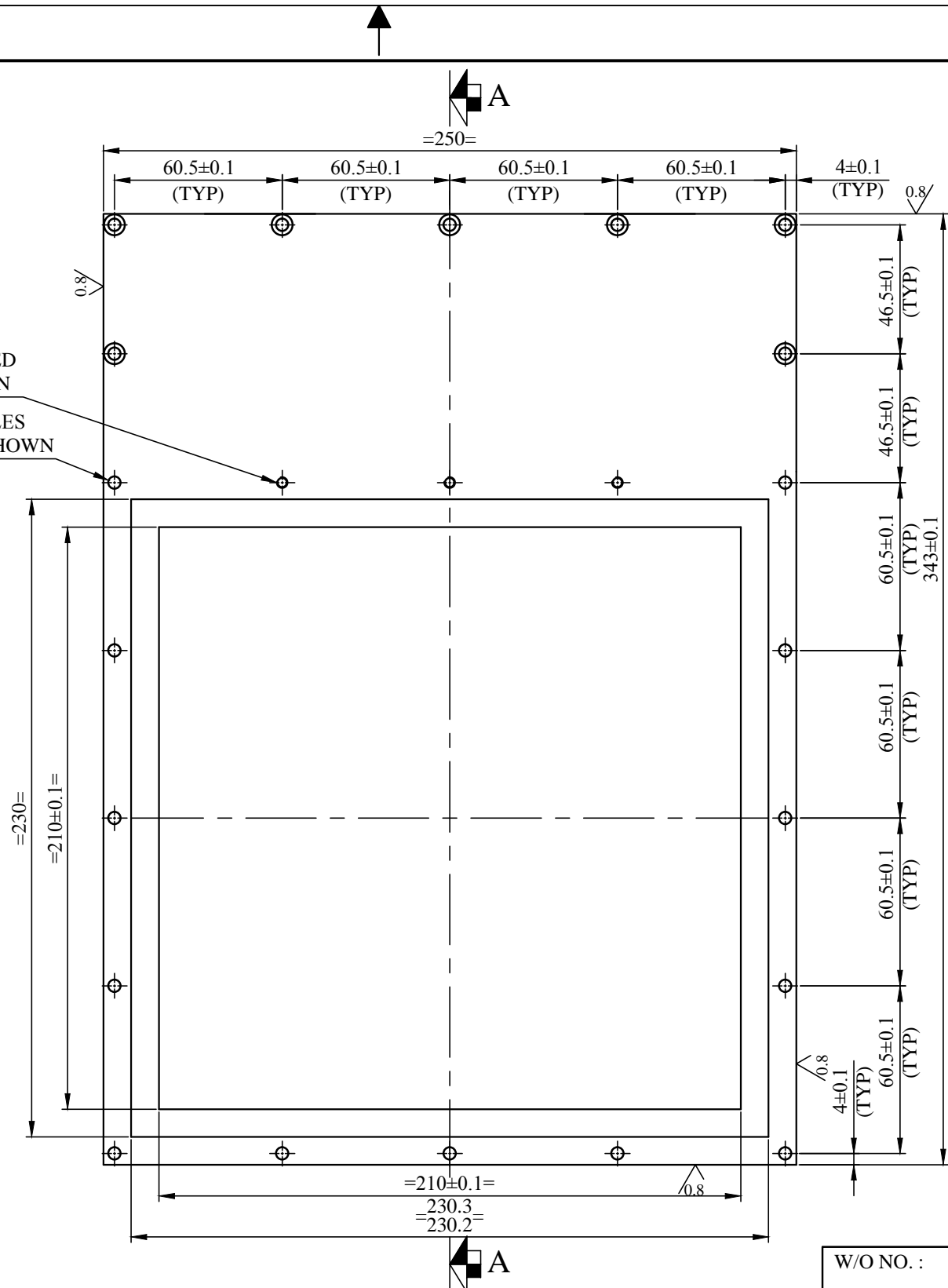
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3-M4 THRU TAPPED HOLES AS SHOWN  
 13-Ø4.5 THRU HOLES AS SPACED, AS SHOWN



ENLARGED COUNTER BORE DETAILS AT 7 PLACES

SECTION-AA

102 -FRONT PLATE  
 QTY : - 1No.  
 MATL.: - S.S.  
 SCALE : 1 : 2

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

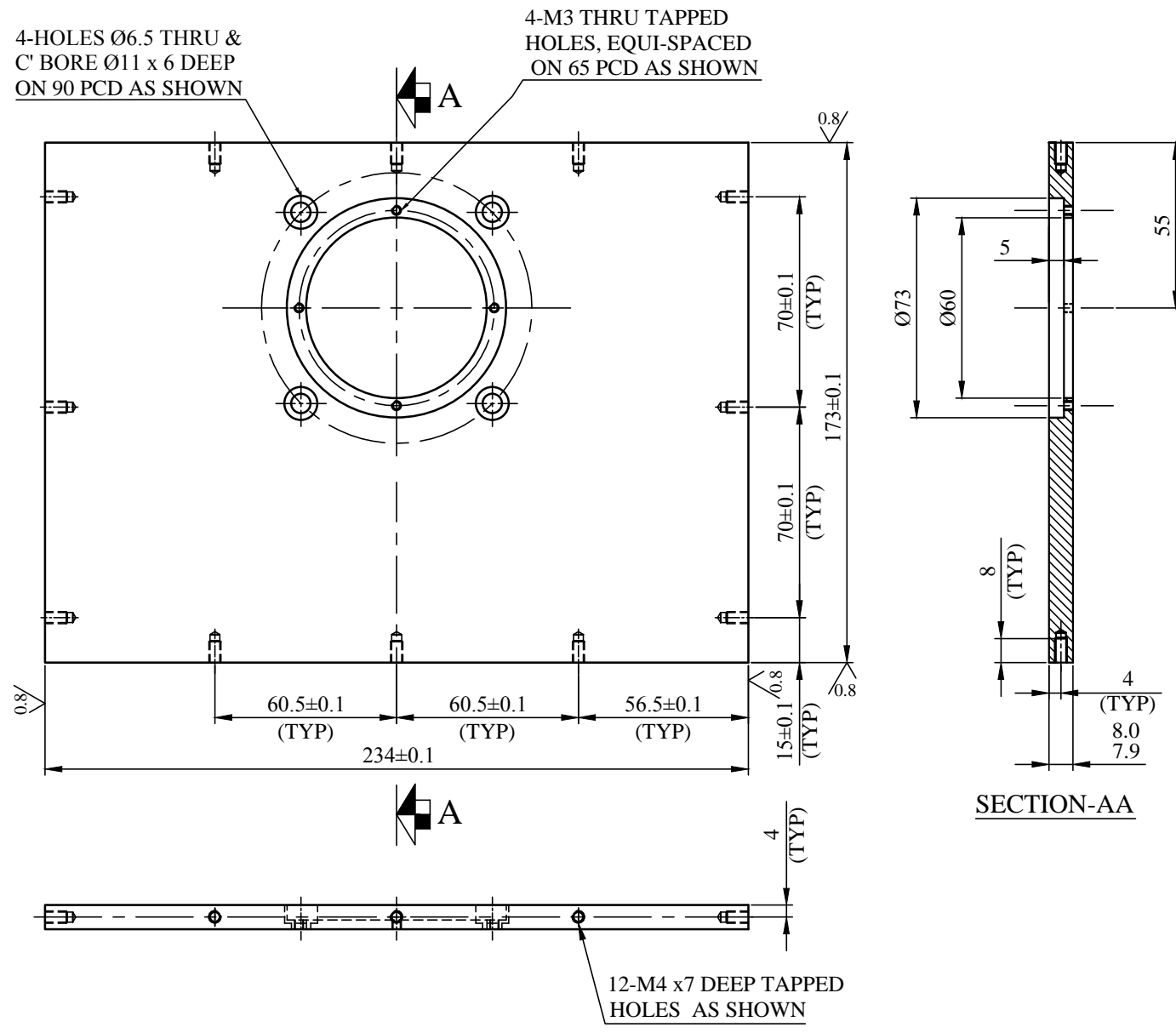
LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

SURFACE FINISH IN MICRONS 3.15/CLA CHAMFER 1 x 45°

NOTES:- 1. IF IN DOUBT ASK.  
 2. ALL DIMENSIONS ARE IN MILLIMETRES.  
 3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>FRONT PLATE (PART No-102)</b>	SHEET NO OF SHEETS
		SCALE:- 1 : 2
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-102
DES'D. CHK'D.		



103 -TOP PLATE  
 QTY : - 1No.  
 MATL.: - S.S.  
 SCALE : 1 : 2

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

SURFACE FINISH  
 IN MICRONS 3.15/CLA  
 CHAMFER 1 x 45°

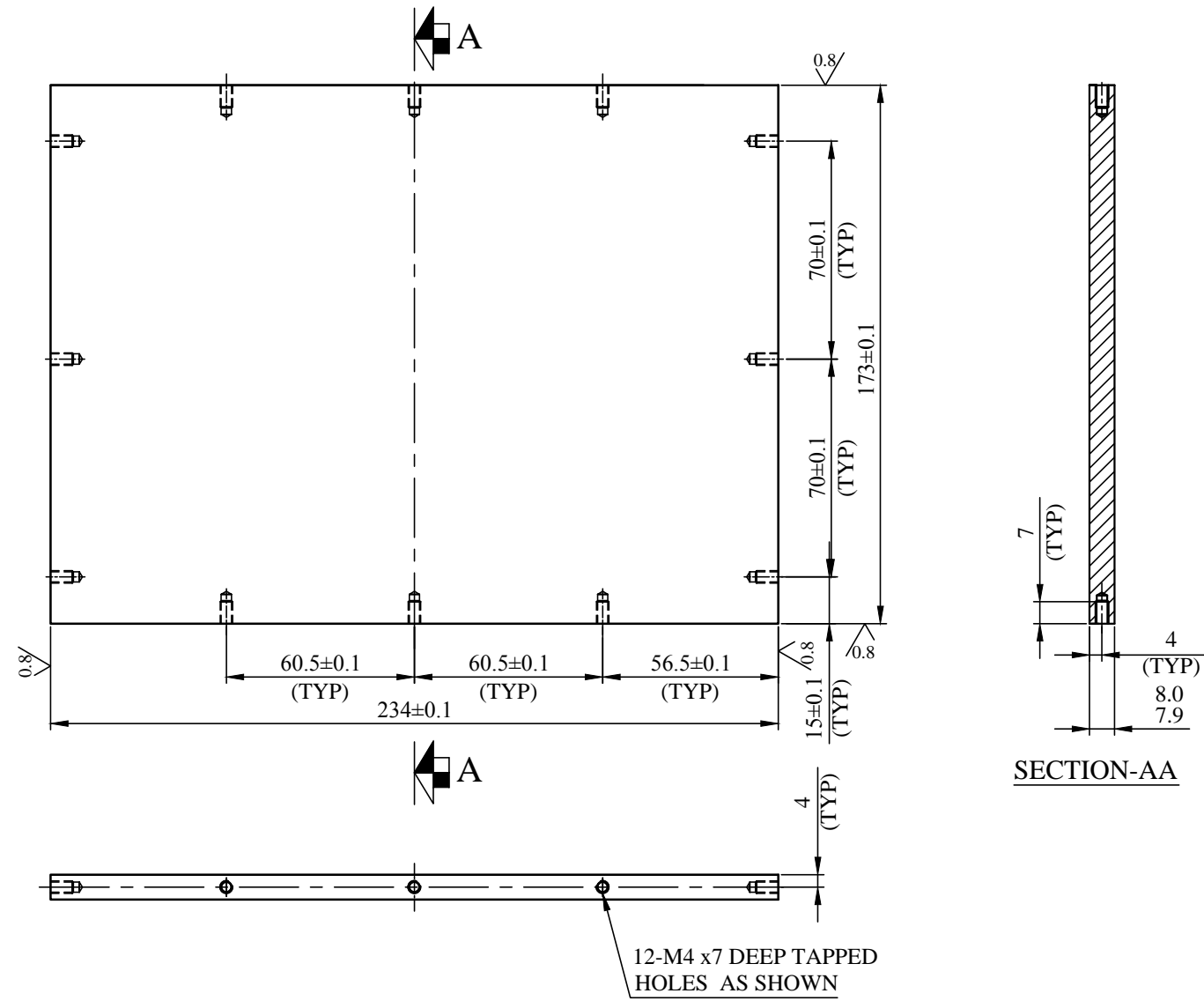
NOTES:-  
 1. IF IN DOUBT ASK.  
 2. ALL DIMENSIONS ARE IN MILLIMETRES.  
 3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.
PROJECT OR SECTION :	TITLE
DR'N./DATE	
DRG. CHK'D.	
DES.	
DES'D. CHK'D.	

CODE NO. :	APP'D.
SHEET NO OF SHEETS	
SCALE:- 1 : 2	
PROJECTION: THIRD ANGLE	
DRG. NO.	REV. 0

CODE NO. :	
APP'D.	
SHEET NO OF SHEETS	
SCALE:- 1 : 2	
PROJECTION: THIRD ANGLE	
DRG. NO.	REV. 0
D-058-1272-103	



104 -BOTTOM PLATE  
 QTY : - 1No.  
 MATL.: - S.S.  
 SCALE : 1 : 2

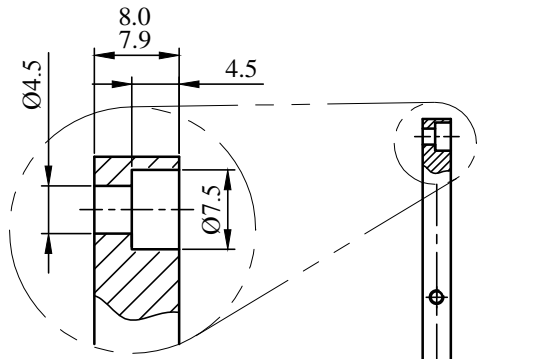
GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED	
LINEAR DIMENSIONS UPTO - 6 ± 0.1 6 - 30 ± 0.2 30 - 120 ± 0.3 120 - 315 ± 0.5 315 - 1000 ± 0.8	LENGTH OF SHORTER SIDE OF ANGLE 1 - 6 ± 1° 6 - 30 ± 0.30' 30 - 120 ± 0.20' 120 - 400 ± 0.10'
SURFACE FINISH IN MICRONS 3.15/CLA CHAMFER 1 x 45°	
NOTES:- 1. IF IN DOUBT ASK. 2. ALL DIMENSIONS ARE IN MILLIMETRES. 3. REMOVE SHARP CORNERS AND BURRS.	

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

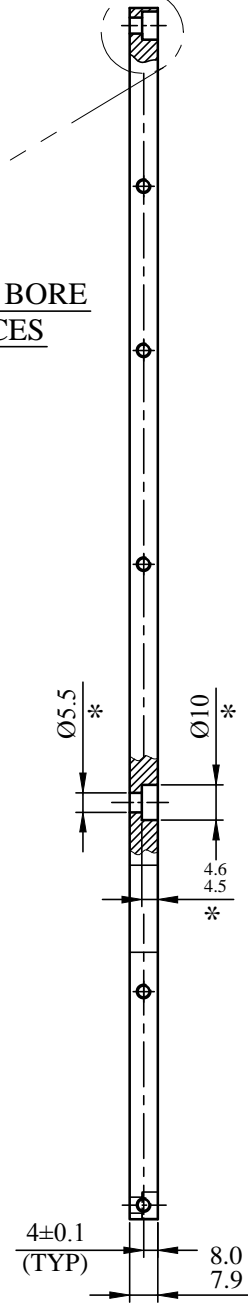
W/O NO. :	Auto-CAD FILE NO.
PROJECT OR SECTION :	TITLE
DR'N./DATE	<b>BOTTOM PLATE</b> <b>( PART No-104 )</b>
DRG. CHK'D.	
DES.	
DES'D. CHK'D.	

CODE NO. :	APP'D.
SHEET NO OF SHEETS	SCALE:- 1 : 2
PROJECTION: THIRD ANGLE	DRG. NO.
REV. 0	

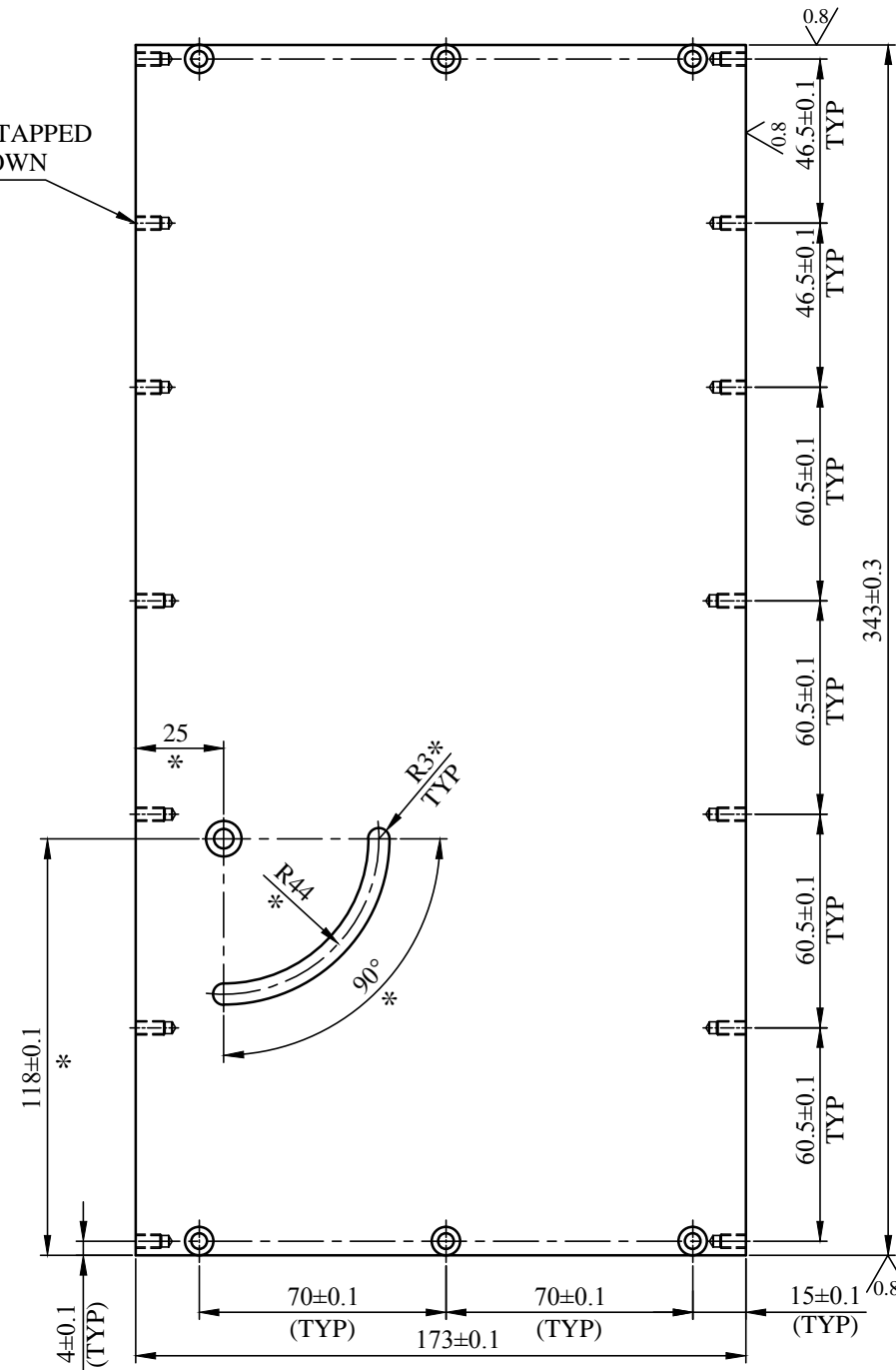
D-058-1272-104	
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ENLARGED COUNTER BORE  
DETAILS AT 9 PLACES



14-M4 x7 DEEP TAPPED  
HOLES AS SHOWN



105 - SIDE PLATE LH  
QTY : - 1No.  
MATL.: - S.S.  
SCALE : 1 : 2

NOTE- \* MARKED SLOT AND HOLE ARE TO BE MACHINED AFTER  
CLAMPING I No-105 & 106 TOGETHER

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

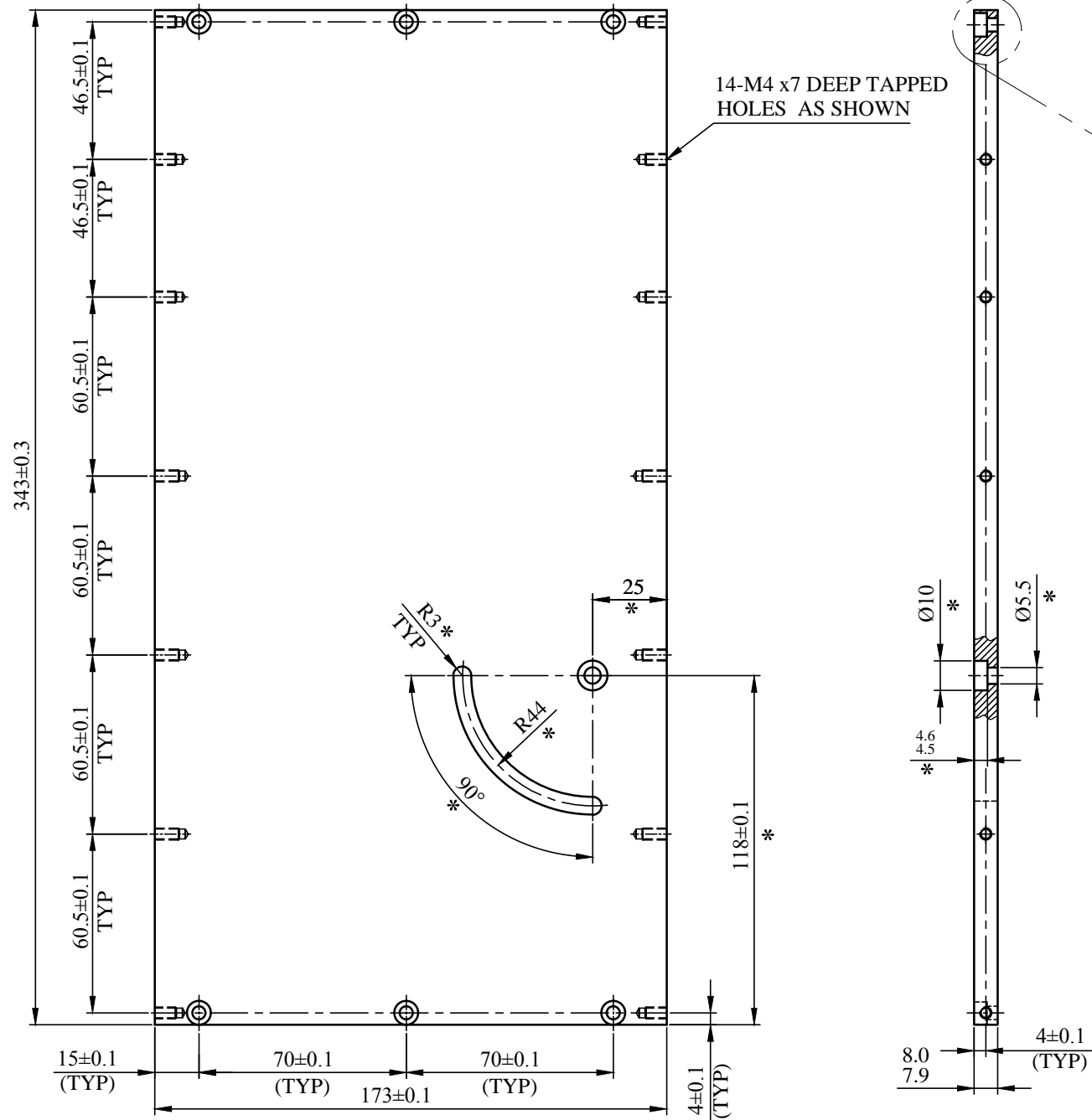
LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30°
30 - 120 ± 0.3	30 - 120 ± 0.20°
120 - 315 ± 0.5	120 - 400 ± 0.10°
315 - 1000 ± 0.8	

SURFACE FINISH  
IN MICRONS 3.15/CLA  
CHAMFER 1 x 45°

NOTES:- 1. IF IN DOUBT ASK.  
2. ALL DIMENSIONS ARE IN MILLIMETRES.  
3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>SIDE PLATE LH (PART No-105)</b>	SHEET NO OF SHEETS
		SCALE:- 1 : 2
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-105
DES'D. CHK'D.		



ENLARGED COUNTER BORE  
DETAILS AT 9 PLACES

106 - SIDE PLATE RH  
QTY : - 1No.  
MATL.: - S.S.  
SCALE : 1 : 2

NOTE:- \* MARKED SLOT AND COUNTERBORE ARE TO BE MACHINED  
AFTER CLAMPING I No-105 & 106 TOGETHER

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30°
30 - 120 ± 0.3	30 - 120 ± 0.20°
120 - 315 ± 0.5	120 - 400 ± 0.10°
315 - 1000 ± 0.8	

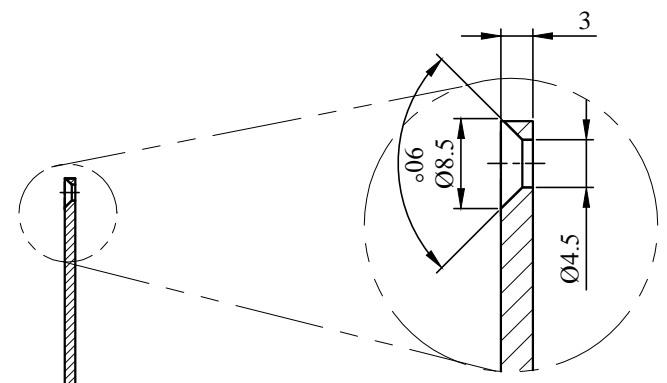
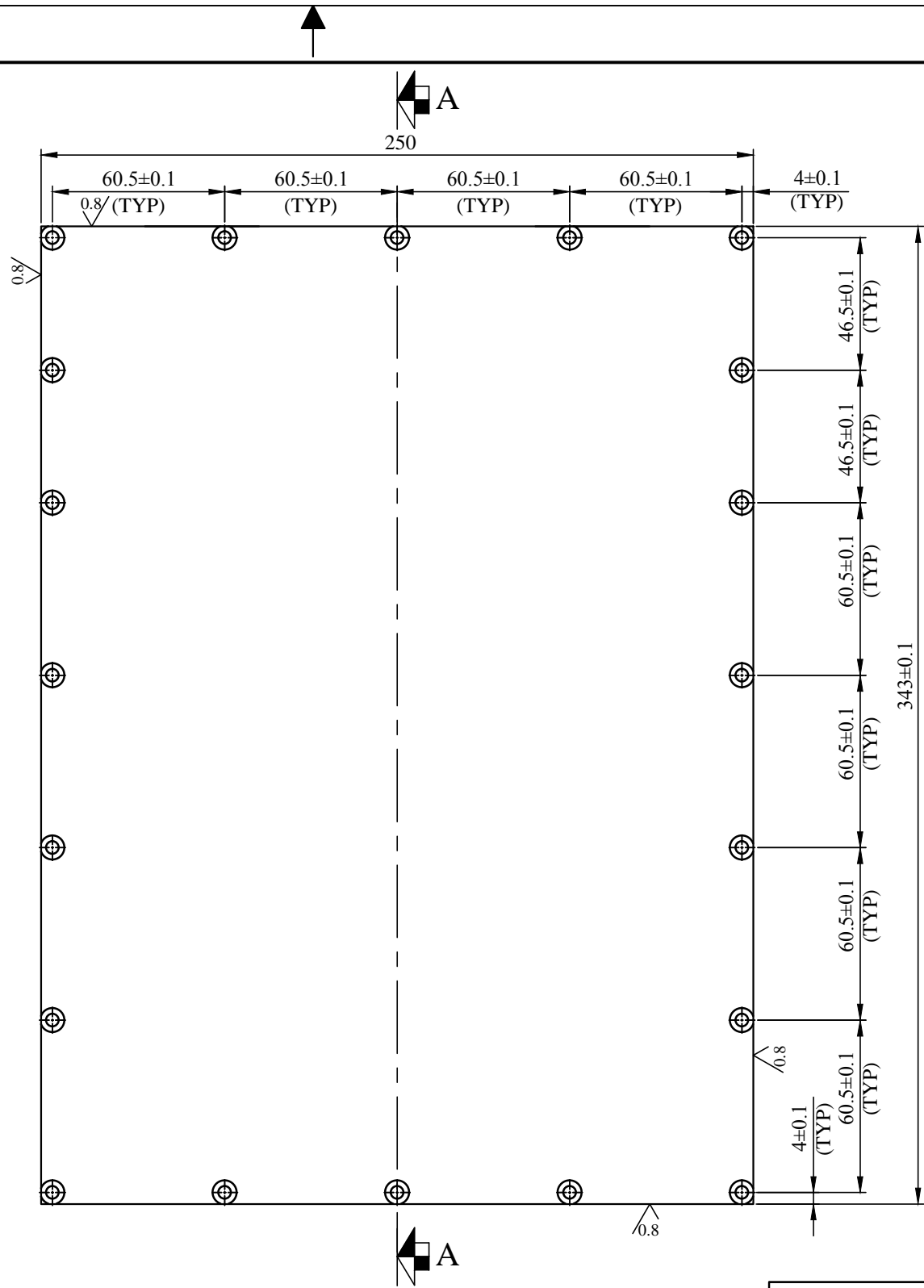
SURFACE FINISH  
IN MICRONS 3.15/CLA  
CHAMFER 1 x 45°

NOTES:- 1. IF IN DOUBT ASK.  
2. ALL DIMENSIONS ARE IN MILLIMETRES.  
3. REMOVE SHARP CORNERS AND BURRS.

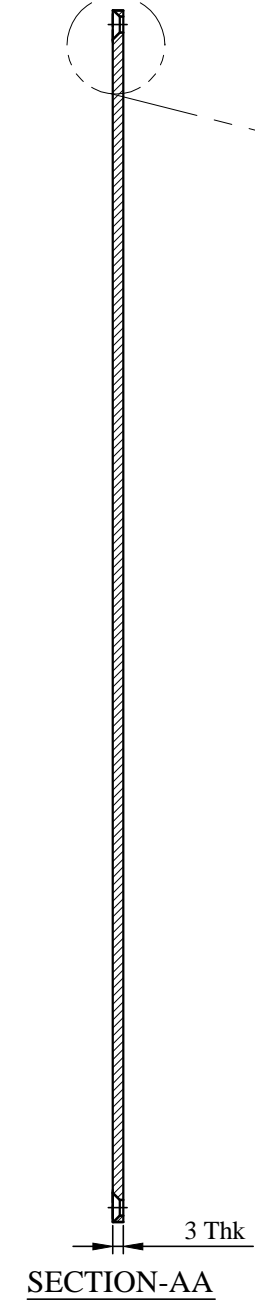
NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>SIDE PLATE RH (PART No-106)</b>	SHEET NO OF SHEETS
		SCALE:- 1 : 2
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-106
DES'D. CHK'D.		





ENLARGED COUNTER SUNK  
DETAILS AT 20 PLACES



107 - BACK SIDE PLATE  
QTY : - 1No.  
MATL.: - S.S.  
SCALE : 1 : 2

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

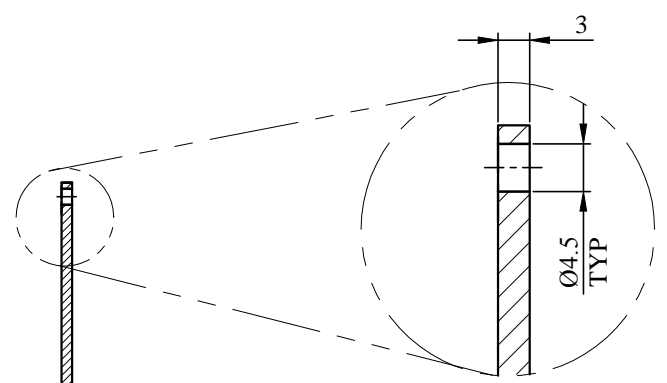
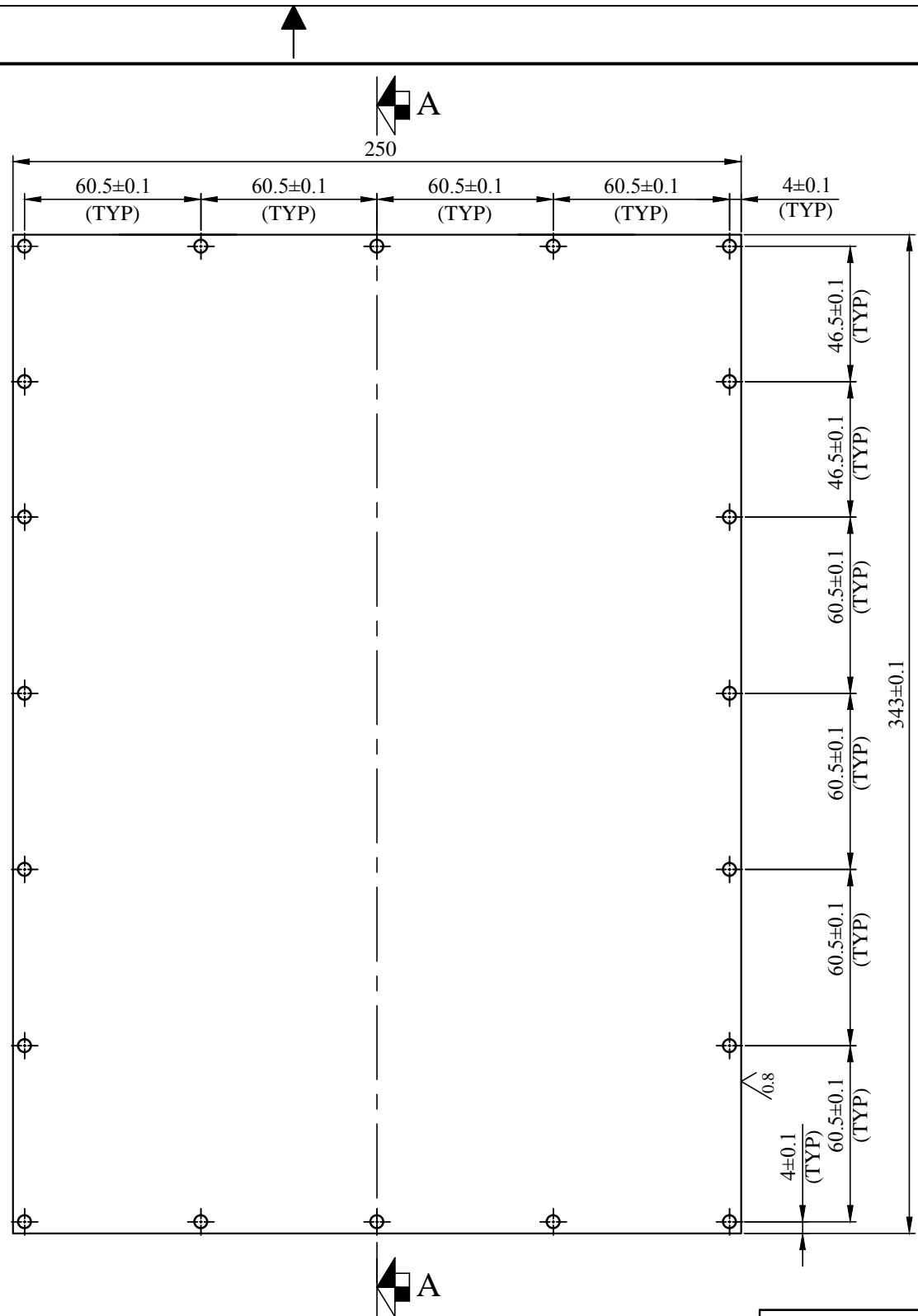
SURFACE FINISH  
IN MICRONS 3.15/CLA  
CHAMFER 1 x 45°

NOTES:-  
1. IF IN DOUBT ASK.  
2. ALL DIMENSIONS ARE IN MILLIMETRES.  
3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.
PROJECT OR SECTION :	TITLE
DR'N./DATE	<p align="center"><b>BACK SIDE PLATE</b> <b>(PART No-107)</b></p>
DRG. CHK'D.	
DES.	
DES'D. CHK'D.	

CODE NO. :	APP'D.
SHEET NO OF SHEETS	SCALE:- 1 : 2
PROJECTION: THIRD ANGLE	DRG. NO. REV. 0
D-058-1272-107	



108 - BACK SIDE LEAD PLATE  
 QTY : - 1No.  
 MATL.: - LEAD  
 SCALE : 1 : 2

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

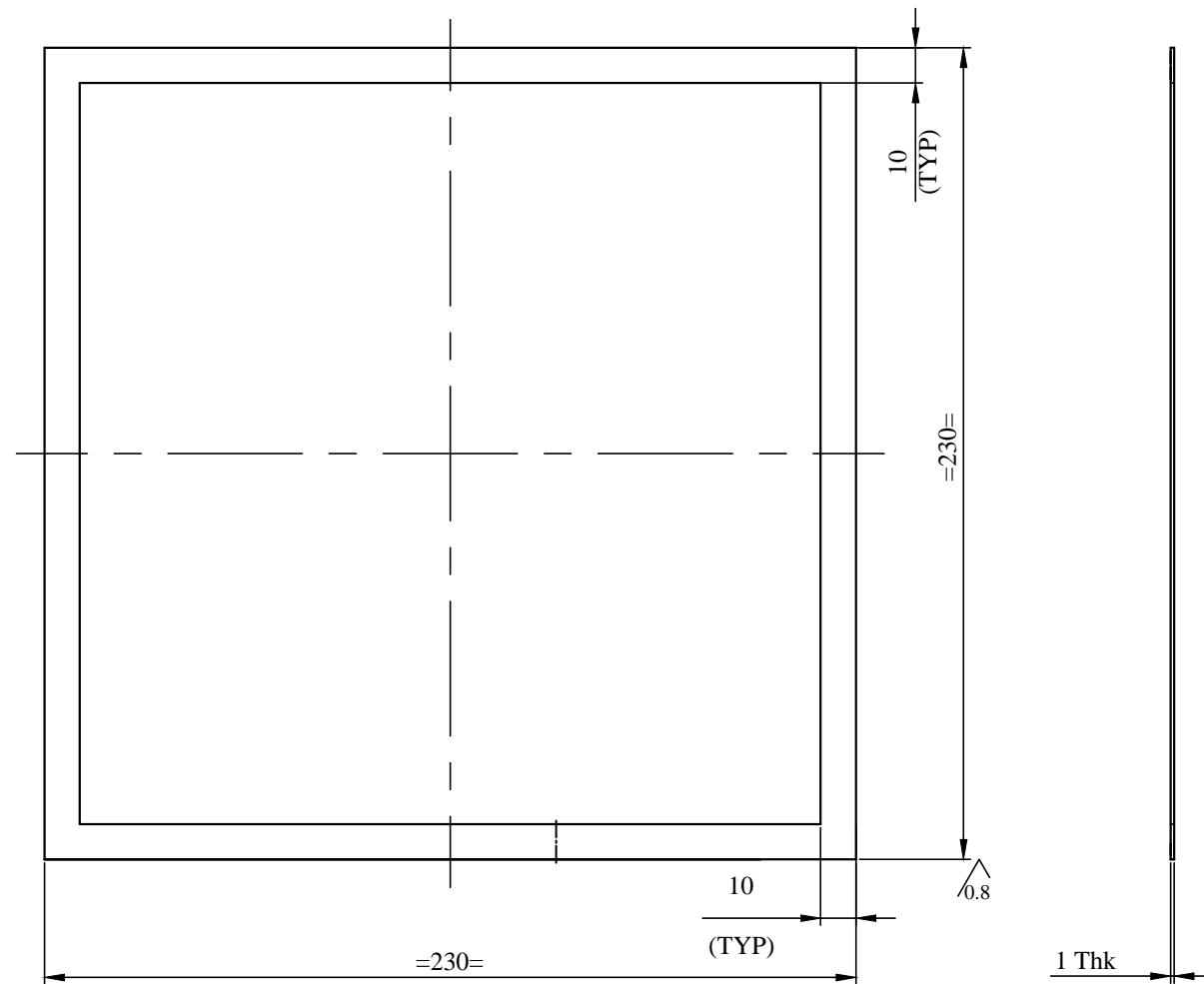
SURFACE FINISH  
 IN MICRONS 3.15/CLA  
 CHAMFER 1 x 45°

NOTES:-  
 1. IF IN DOUBT ASK.  
 2. ALL DIMENSIONS ARE IN MILLIMETRES.  
 3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

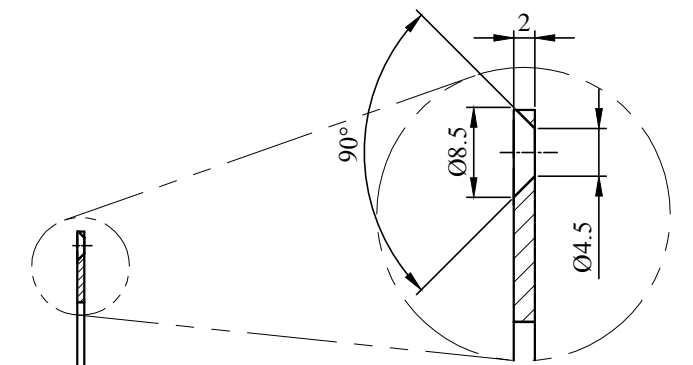
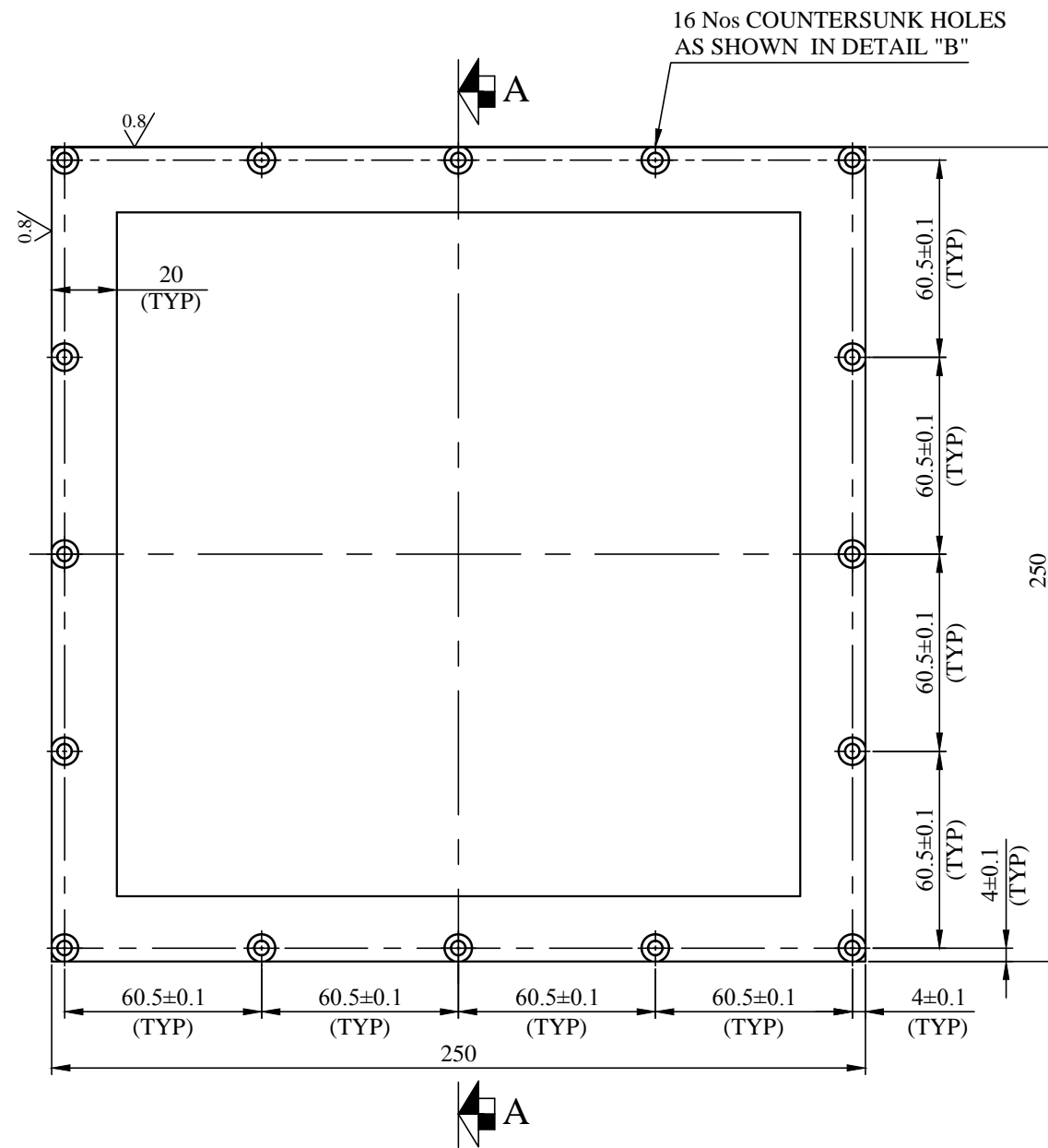
W/O NO. :	Auto-CAD FILE NO.
PROJECT OR SECTION :	TITLE
DR'N./DATE	<b>BACK SIDE LEAD PLATE</b> <b>( PART No-108 )</b>
DRG. CHK'D.	
DES.	
DES'D. CHK'D.	

CODE NO. :	APP'D.
SHEET NO OF SHEETS	SCALE:- 1 : 2
PROJECTION: THIRD ANGLE	DRG. NO. REV. 0
D-058-1272-108	



109 - RUBBER SHEET  
 QTY : - 2Nos.  
 MATL.: - RUBBER.  
 SCALE : 1 : 2

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED				W/O NO. :		Auto-CAD FILE NO.		CODE NO. :	
LINEAR DIMENSIONS		LENGTH OF SHORTER SIDE OF ANGLE		PROJECT OR SECTION :		TITLE		APP'D.	
UPTO - 6 ± 0.1		1 - 6 ± 1°				<b>RUBBER SHEET</b> <b>( PART No-109)</b>		SHEET NO OF SHEETS	
6 - 30 ± 0.2		6 - 30 ± 0.30'						SCALE:- 1 : 2	
30 - 120 ± 0.3		30 - 120 ± 0.20'						PROJECTION: THIRD ANGLE	
120 - 315 ± 0.5		120 - 400 ± 0.10'						DRG. NO. REV. 0	
315 - 1000 ± 0.8								D-058-1272-109	
NOTES:- 1. IF IN DOUBT ASK. 2. ALL DIMENSIONS ARE IN MILLIMETRES. 3. REMOVE SHARP CORNERS AND BURRS.		SURFACE FINISH IN MICRONS 3.15/CLA CHAMFER 1 x 45°		NO. LOC. DESCRIPTION		DRN. DATE APP'D		REVISIONS	
						DR'N./DATE			
						DRG. CHK'D.			
						DES.			
						DES'D. CHK'D.			



ENLARGED DETAIL "B"  
(AT 16 PLACES)

SECTION-AA  
2 Thk

110 - FRONT SHEET  
QTY : - 1No.  
MATL.: - S.S..  
SCALE : 1 : 2

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

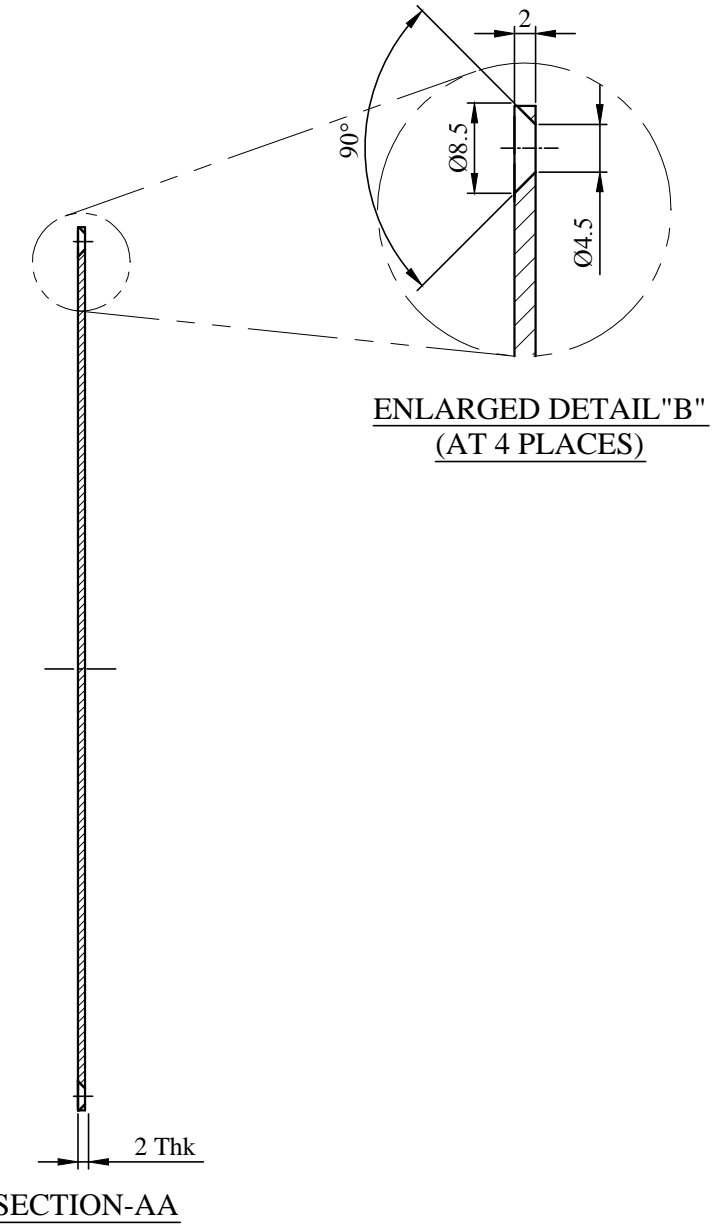
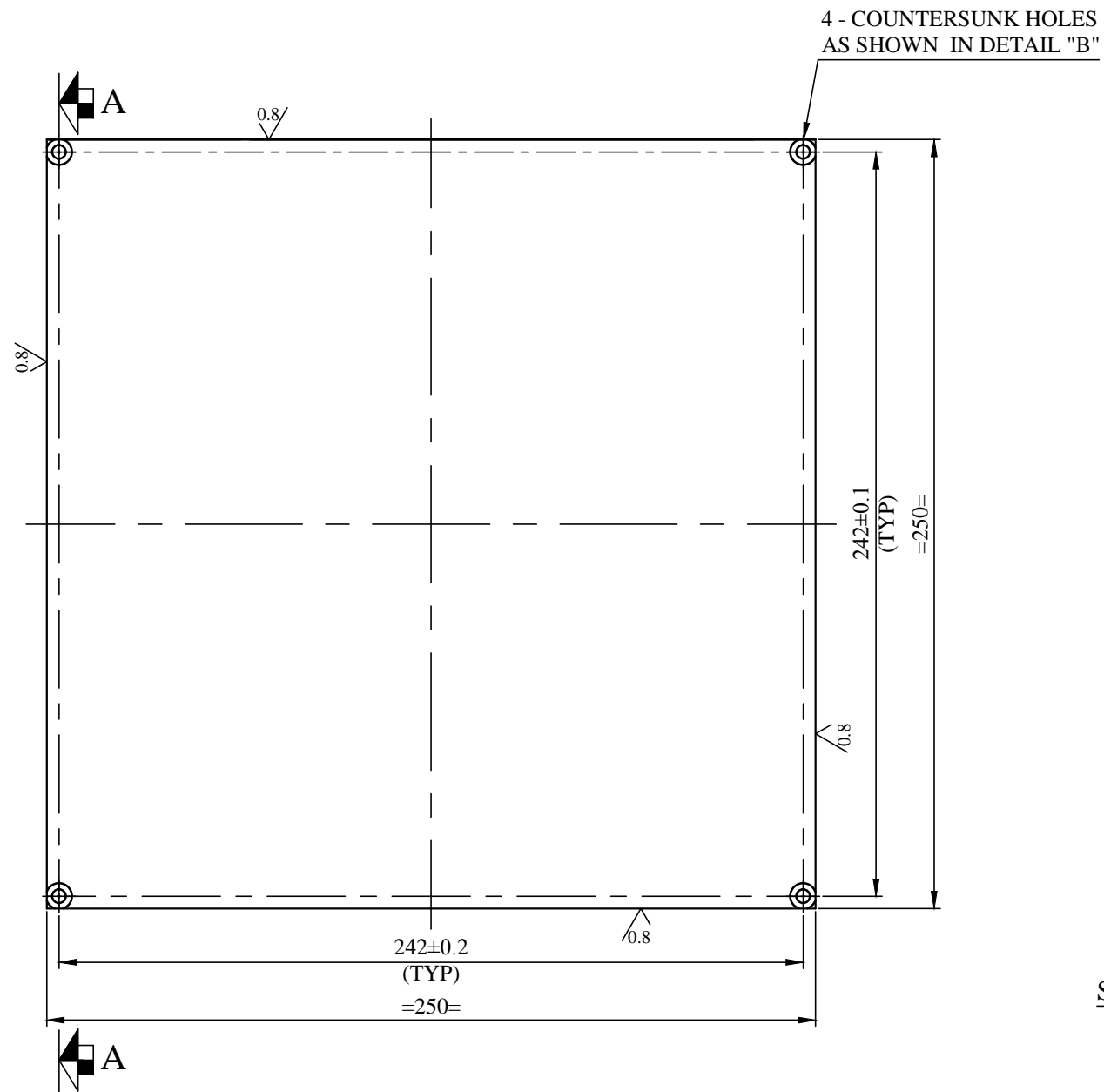
LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

SURFACE FINISH  
IN MICRONS 3.15/CLA  
CHAMFER 1 x 45°

NOTES:-  
1. IF IN DOUBT ASK.  
2. ALL DIMENSIONS ARE IN MILLIMETRES.  
3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>FRONT SHEET ( PART No-110 )</b>	SHEET NO OF SHEETS
		SCALE:- 1 : 2
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-110
DES'D. CHK'D.		



112-PERSPEX SHEET  
 QTY : - 1No.  
 MATL.: - PERSPEX  
 SCALE : 1 : 2

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

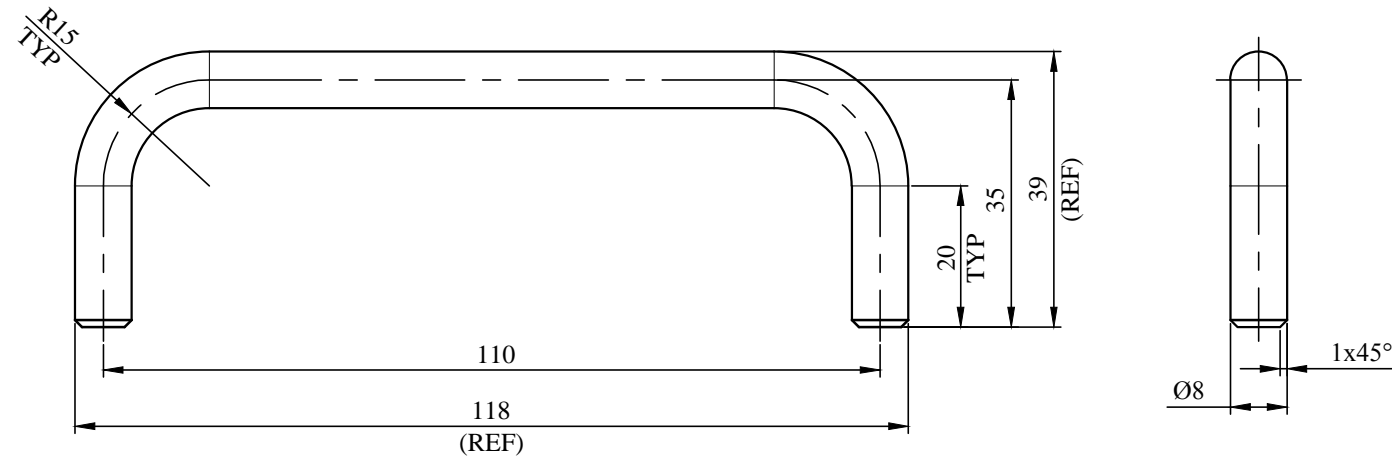
LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

SURFACE FINISH  
 IN MICRONS 3.15/CLA  
 CHAMFER 1 x 45°

NOTES:-  
 1. IF IN DOUBT ASK.  
 2. ALL DIMENSIONS ARE IN MILLIMETRES.  
 3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>PERSPEX SHEET ( PART No-112 )</b>	SHEET NO OF SHEETS
		SCALE:- 1 : 2
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-112
DES'D. CHK'D.		



DEVELOPMENT LENGTH = 167mm

150 - HANDLE  
 QTY : - 2Nos.  
 MATL.: - S.S.  
 SCALE : 1 : 1

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

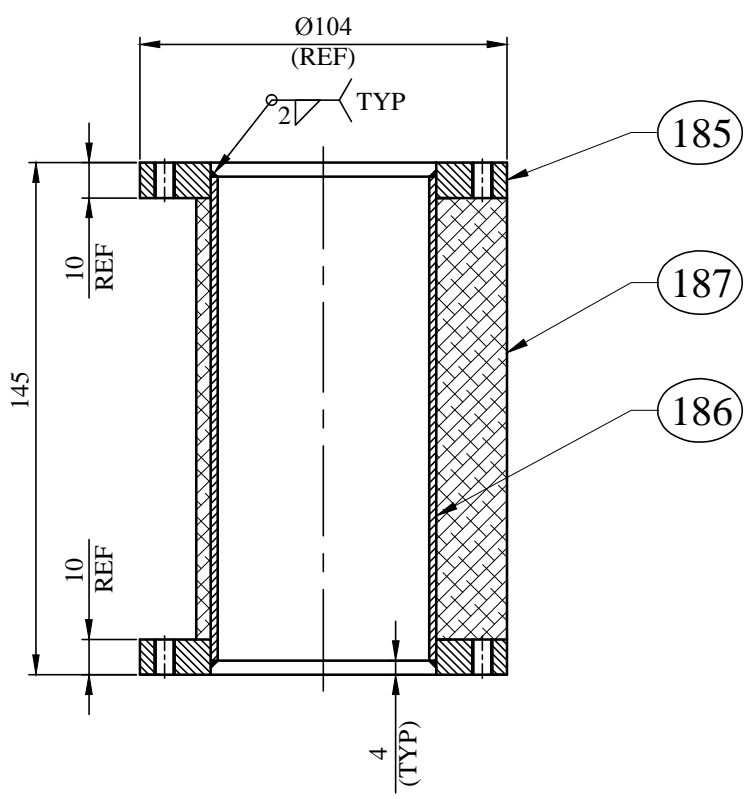
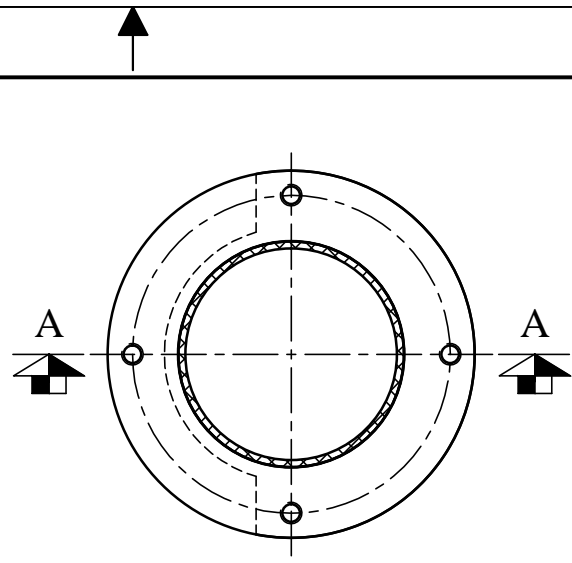
LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

SURFACE FINISH  
 IN MICRONS 3.15/CLA  
 CHAMFER 1 x 45°

NOTES:-  
 1. IF IN DOUBT ASK.  
 2. ALL DIMENSIONS ARE IN MILLIMETRES.  
 3. REMOVE SHARP CORNERS AND BURRS.

NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>HANDLE</b> <b>( PART-150 )</b>	SHEET NO OF SHEETS
		SCALE:- 1 : 1
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-150
DES'D. CHK'D.		



SECTION-AA

ITEM NO.	PART NO.	DESCRIPTION	MATL.	QTY.	REFERENCE DRG. NO.	REMARKS
177	-	PIPE LEAD BLOCK WELDMENT ( Ø104 x 145 LG )	BOM	01	THIS DRG.	-
-	185	FLANGE ( Ø104 x 10 Thk )	S.S.	02	E#185	-
-	186	PIPE ( OD=64 x ID= 60 x 137 LG )	S.S.	01	E#186	-
-	187	LEAD BLOCK ( Ø104 x 125 LG )	LEAD	01	E#187	-

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

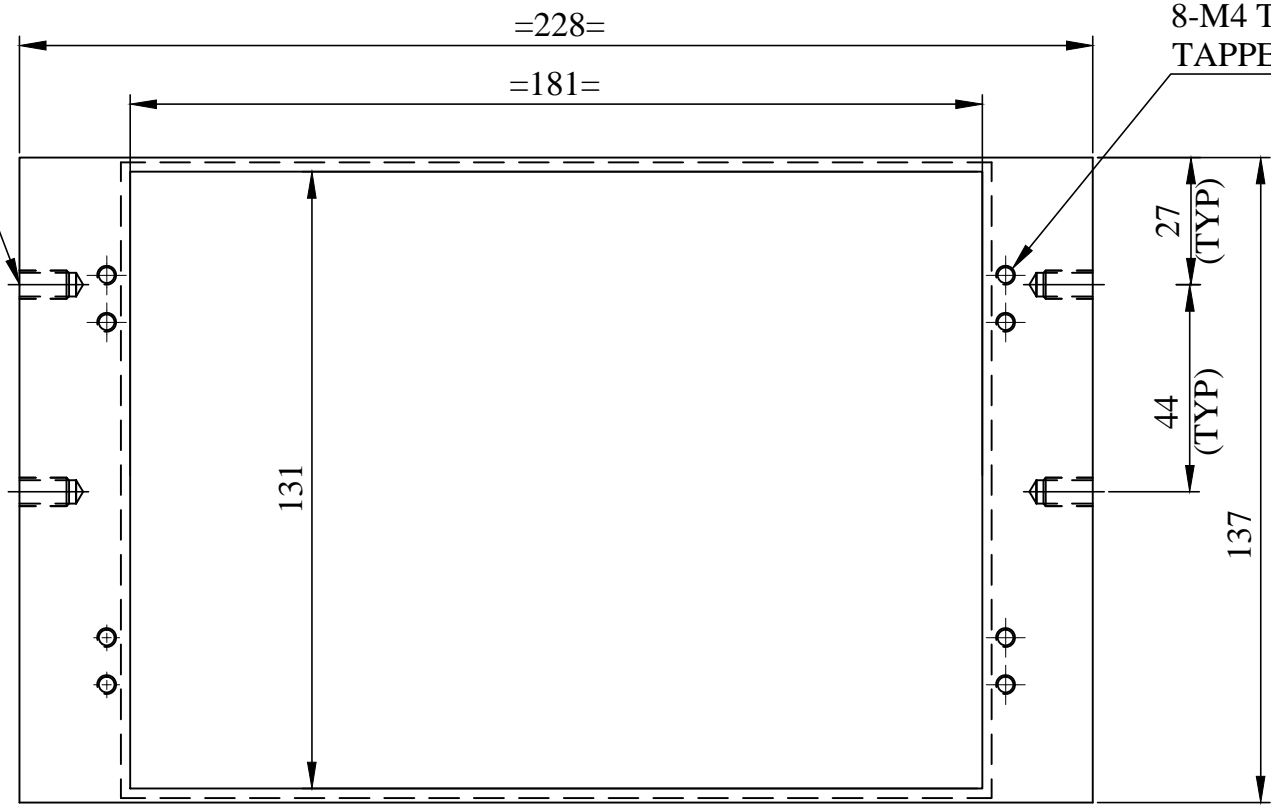
SURFACE FINISH IN MICRONS 3.15/CLA CHAMFER 1 x 45°

NOTES:- 1. IF IN DOUBT ASK.  
2. ALL DIMENSIONS ARE IN MILLIMETRES.  
3. REMOVE SHARP CORNERS AND BURRS.

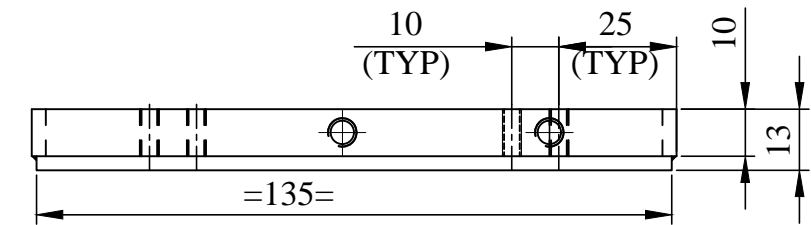
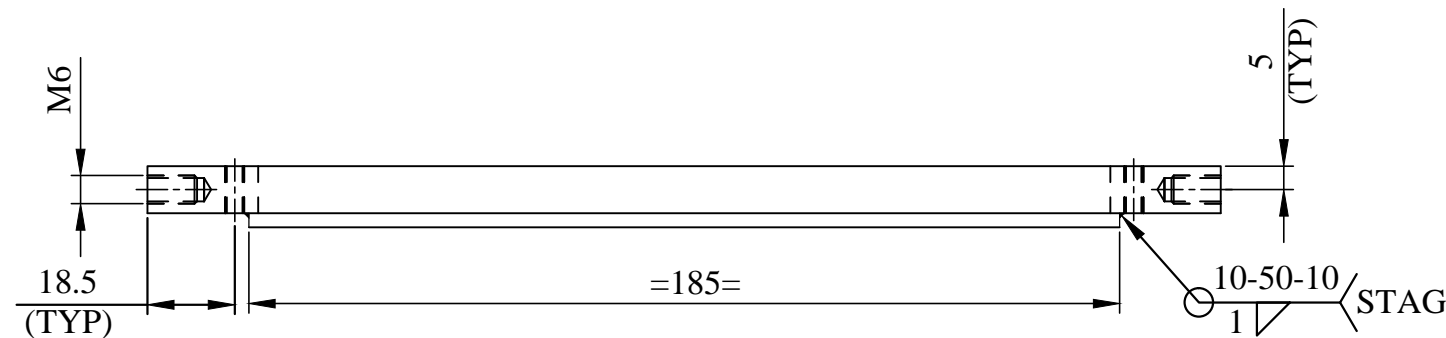
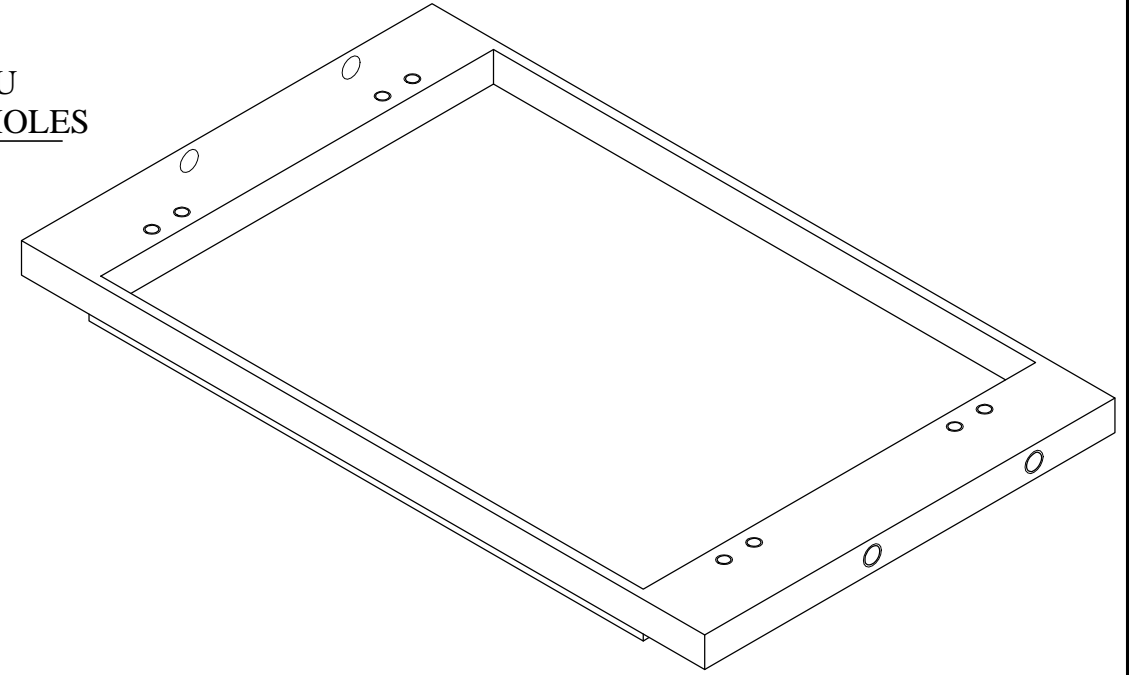
NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>PIPE LEAD BLOCK WELDMENT</b> ( PART No-177 )	SHEET NO OF SHEETS
		SCALE:- 1 : 2
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-177
DES'D. CHK'D.		

4-M6X10 DEEP TAPPED HOLES



8-M4 THRU TAPPED HOLES



**MIRROR MOUNTING PLATE**

QTY : - 1 No.

MATL.: - S.S.

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED

LINEAR DIMENSIONS	LENGTH OF SHORTER SIDE OF ANGLE
UPTO - 6 ± 0.1	1 - 6 ± 1°
6 - 30 ± 0.2	6 - 30 ± 0.30'
30 - 120 ± 0.3	30 - 120 ± 0.20'
120 - 315 ± 0.5	120 - 400 ± 0.10'
315 - 1000 ± 0.8	

SURFACE FINISH  
IN MICRONS 3.15/CLA  
CHAMFER 1 x 45°

- NOTES:-
1. IF IN DOUBT ASK.
  2. ALL DIMENSIONS ARE IN MILLIMETRES.
  3. REMOVE SHARP CORNERS AND BURRS.

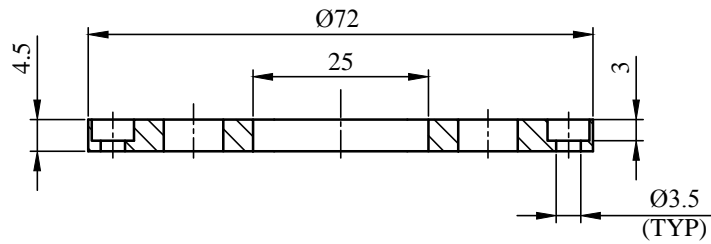
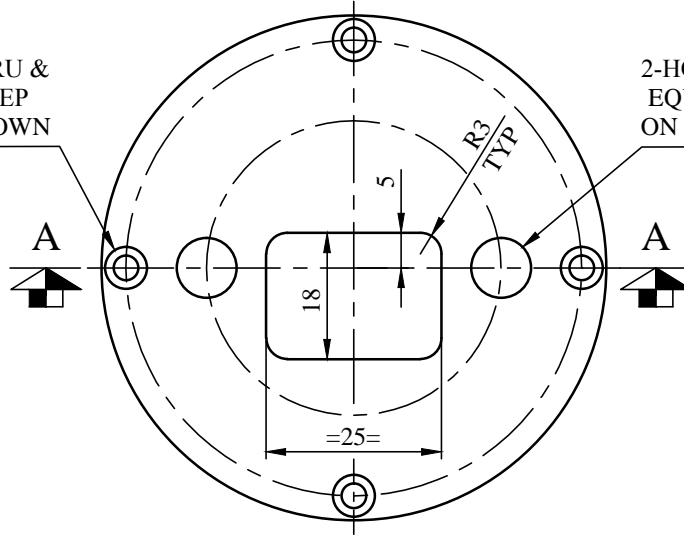
NO.	LOC.	DESCRIPTION	DRN. DATE	APP'D
REVISIONS				

W/O NO. :	Auto-CAD FILE NO.	CODE NO. :
PROJECT OR SECTION :	TITLE	APP'D.
	<b>MIRROR MOUNTING PLATE</b> ( PART No-201 )	SHEET NO OF SHEETS
		SCALE:- 1 : 2
DR'N./DATE		PROJECTION: THIRD ANGLE
DRG. CHK'D.		DRG. NO. REV. 0
DES.		D-058-1272-201
DES'D. CHK'D.		



4-HOLES Ø3.5 THRU &  
C' BORE Ø6 x 3 DEEP  
ON 65 PCD AS SHOWN

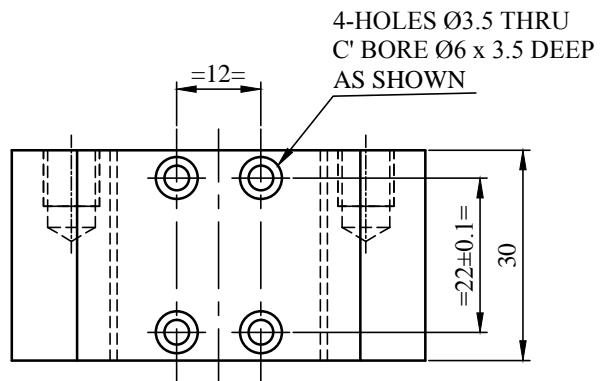
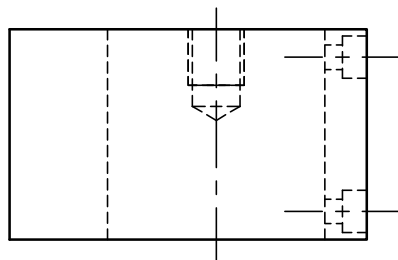
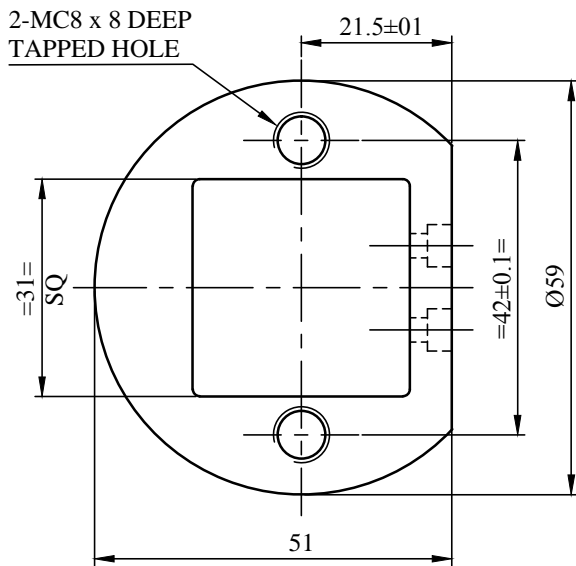
2-HOLES Ø8.5 THRU,  
EQUIP SPACED  
ON 42 PCD AS SHOWN



**SECTION-AA**

113 TOP COVER  
QTY : - 1No.  
MATL.: - S.S.  
SCALE : 1 : 1

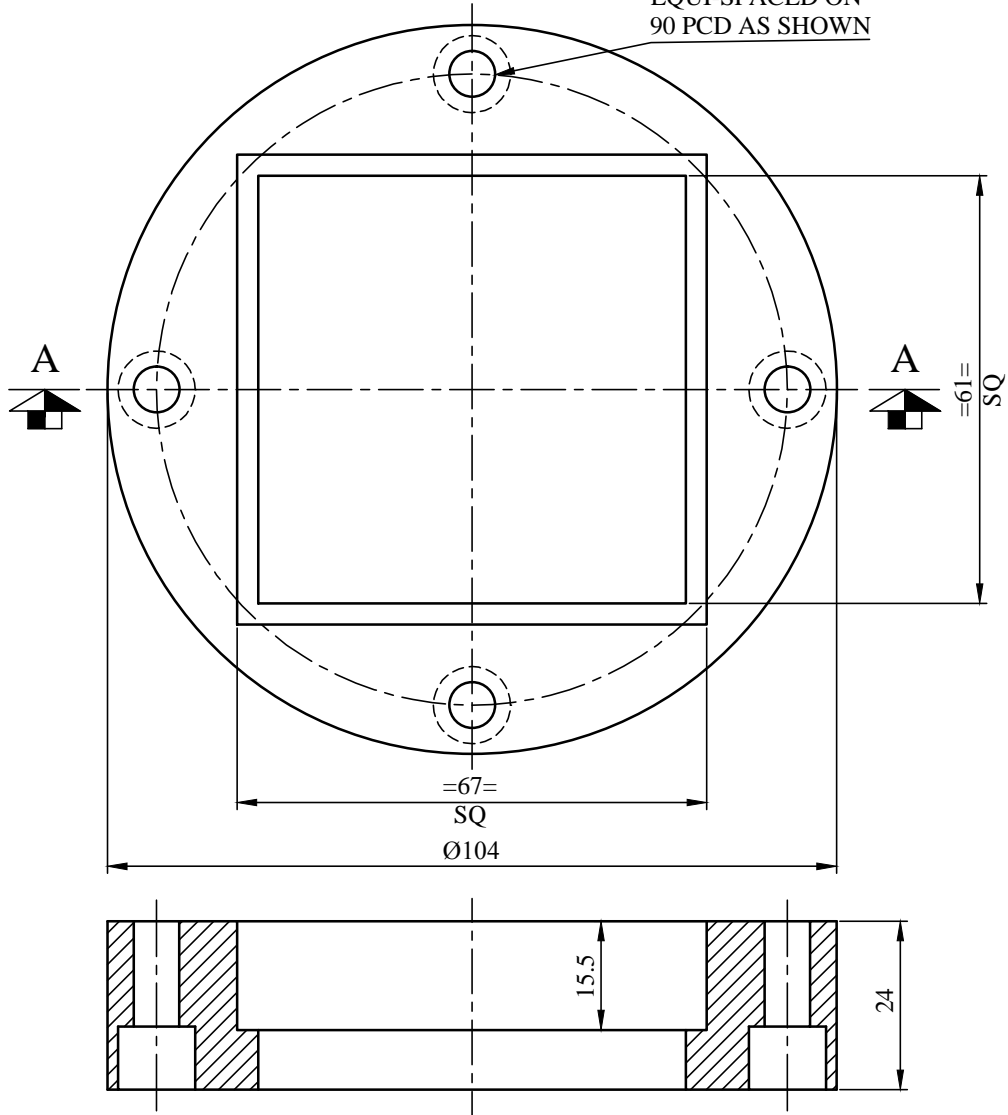
				W/O NO. :		
NO.	LOC.	DESCRIPTION		Auto-CAD FILE NO.		
<b>REVISIONS</b>				DRN. / DATE	APP'D./DATE	CODE NO. :
PROJECT OR SECTION :		TITLE			APP'D.	
		<b>TOP COVER ( PART No-113)</b>			SCALE:- 1 : 1	
DR'N.	DATE				PROJECTION: THIRD ANGLE	
DRG. CHK'D.	DATE				DRG. NO.	REV.
DES'D.	DES'D. CHK'D.				E-058-1272-113	0



178 CAMERA ADJUSTER  
 QTY : - 1No.  
 MATL.: - PERSPEX / AL  
 SCALE : 1 : 1

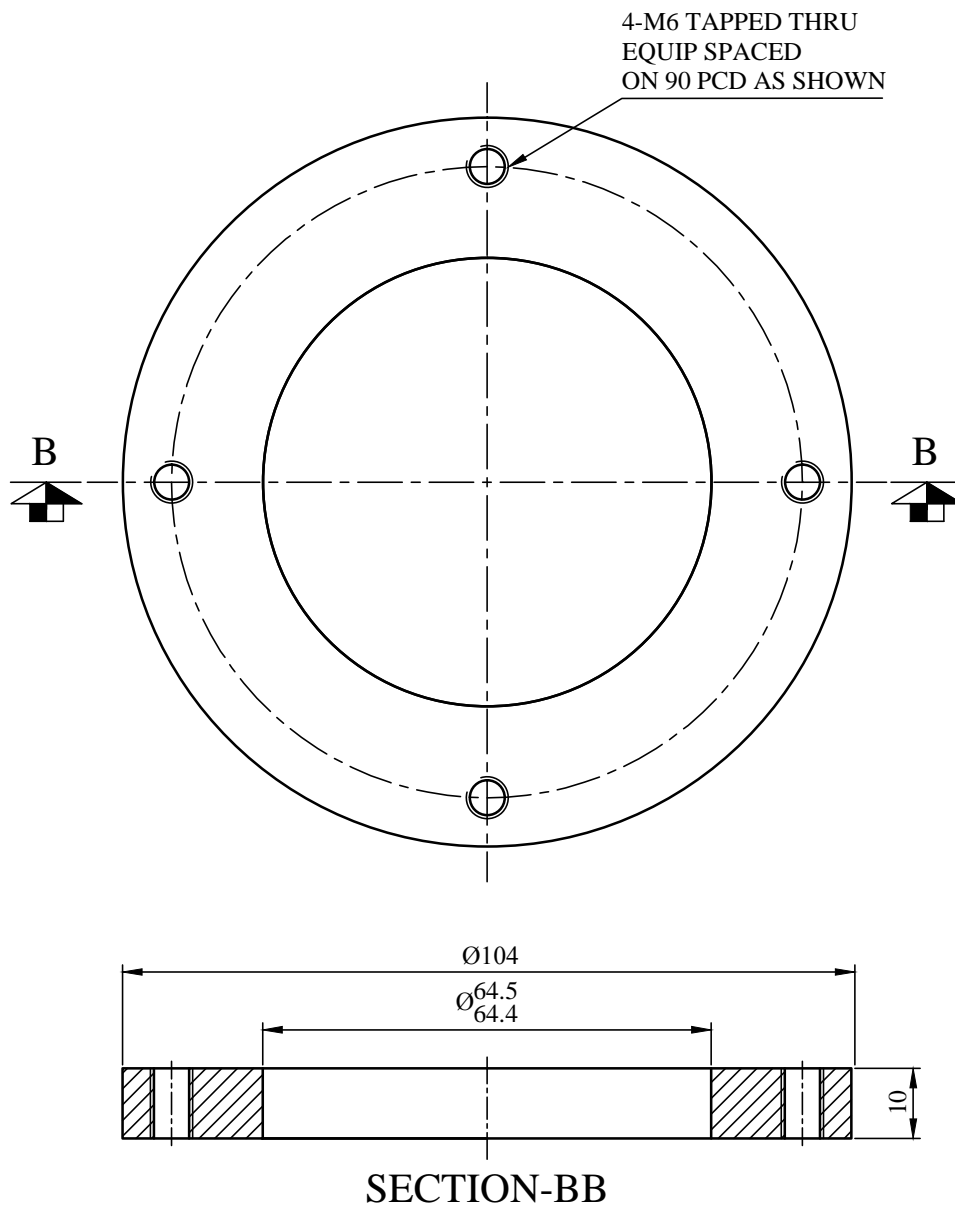
				W/O NO. :		
NO.	LOC.	DESCRIPTION		Auto-CAD FILE NO.		
<b>REVISIONS</b>				DRN. / DATE	APP'D./DATE	CODE NO. :
PROJECT OR SECTION :		TITLE			APP'D.	
		<u>CAMERA ADJUSTER</u> ( PART No-178 )			SCALE:- 1 : 1	
DR'N.	DATE				PROJECTION: THIRD ANGLE	
DRG. CHK'D.	DATE				DRG. NO.	REV.
DES'D.	DES'D. CHK'D.				E-058-1272-178	0

4-HOLES Ø6.5 THRU  
C' BORE Ø11 x 9 DEEP  
EQUI-SPACED ON  
90 PCD AS SHOWN



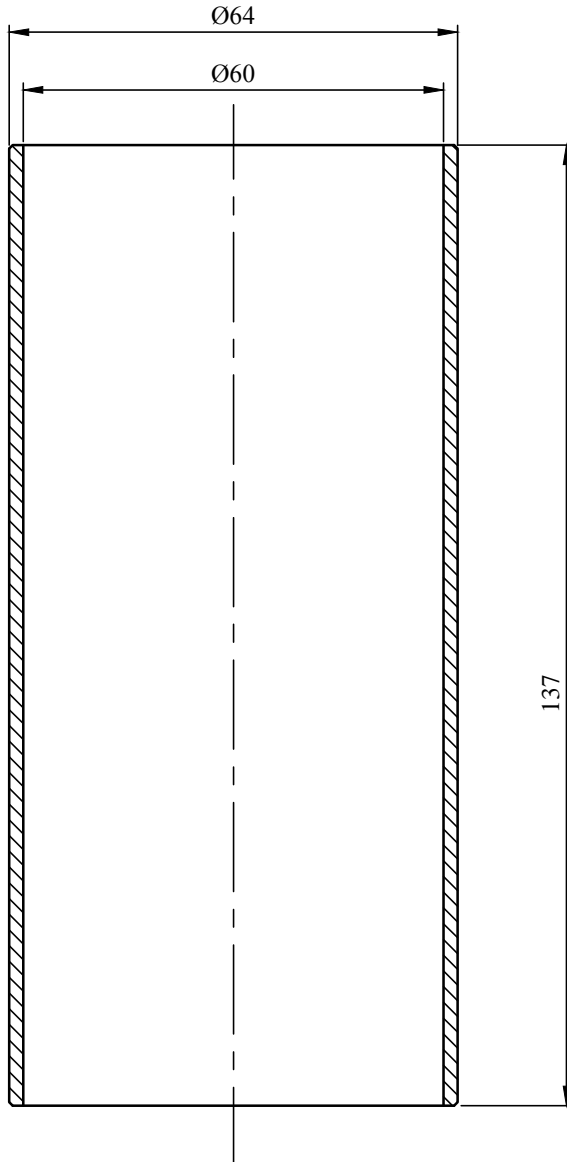
179 LEAD GLASS HOUSING  
QTY : - 1No.  
MATL: - PERSPEX / AL  
SCALE :- 1 : 1

				W/O NO. :			
NO.	LOC.	DESCRIPTION		Auto-CAD FILE NO.			
<b>REVISIONS</b>				DRN. / DATE	APP'D./DATE	CODE NO. :	
PROJECT OR SECTION :			TITLE			APP'D.	
			<b>LEAD GLASS HOUSING</b> <b>( PART No-179 )</b>			SCALE:- 1 : 1	
DR'N.	DATE					PROJECTION: THIRD ANGLE	
DRG. CHK'D.	DATE					DRG. NO.	REV.
DES'D.	DES'D. CHK'D.					E-058-1272-179	0



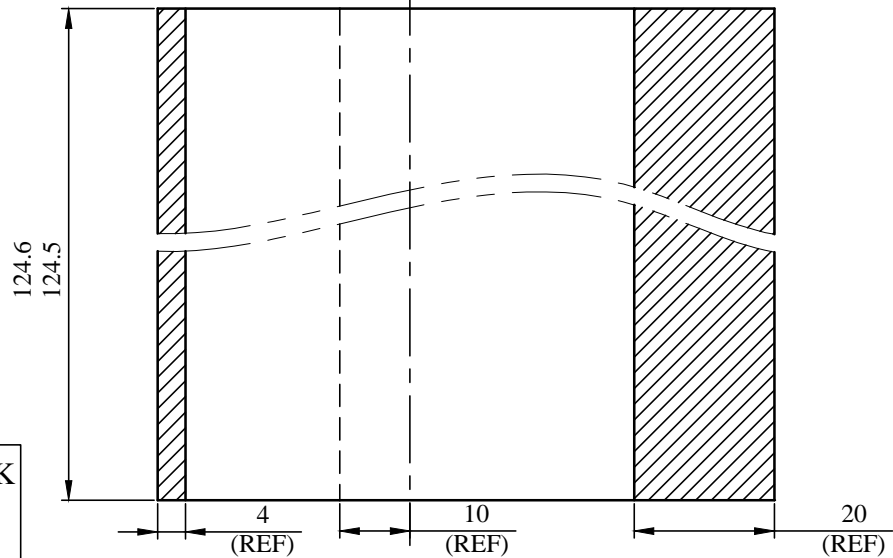
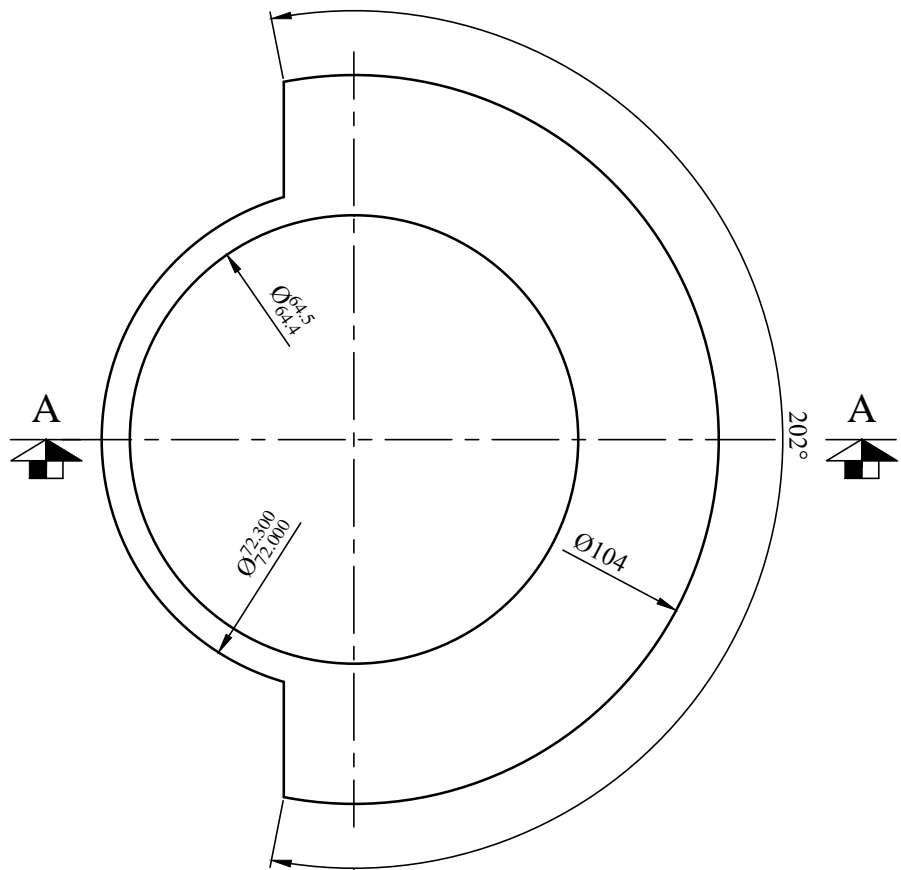
185- FLANGE  
QTY : - 2 Nos.  
MATL: - S.S.  
SCALE :- 1 : 1

				W/O NO. :			
NO.	LOC.	DESCRIPTION		Auto-CAD FILE NO.			
<b>REVISIONS</b>				DRN. / DATE	APP'D./DATE	CODE NO. :	
PROJECT OR SECTION :			TITLE			APP'D.	
			<b>FLANGE</b> <b>( PART No-185)</b>			SCALE:- 1 : 1	
DR'N.	DATE					PROJECTION: THIRD ANGLE	
DRG. CHK'D.	DATE					DRG. NO.	REV.
DES'D.	DES'D. CHK'D.					E-058-1272-185	0



186 - PIPE  
 QTY : - 1No.  
 MATL: - S.S.  
 SCALE :- 1 : 1

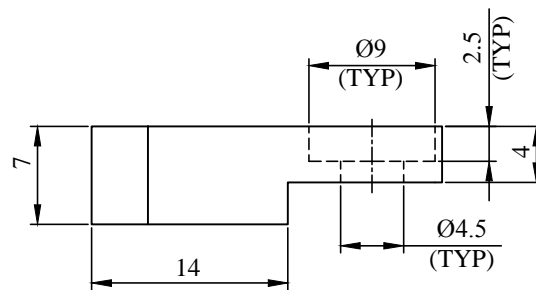
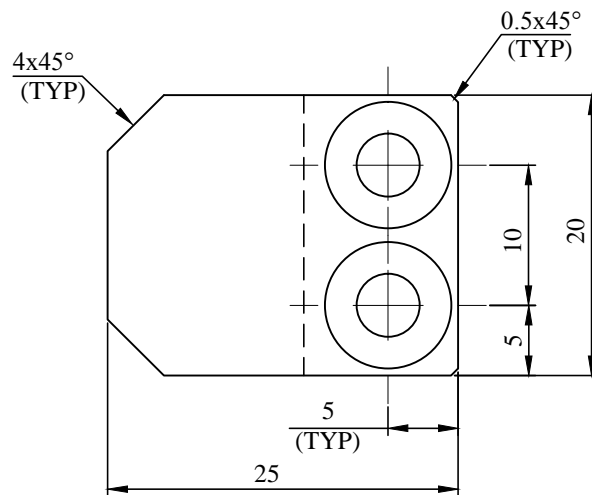
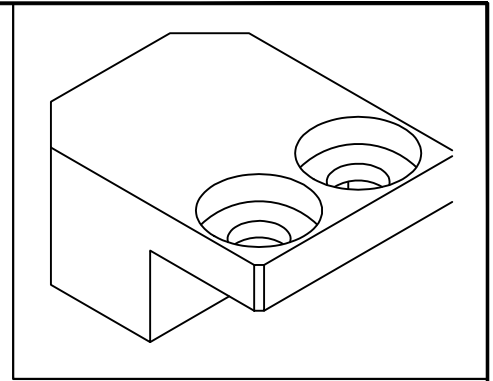
					W/O NO. :	
NO.	LOC.	DESCRIPTION			Auto-CAD FILE NO.	
<b>REVISIONS</b>			DRN. / DATE	APP'D./DATE	CODE NO. :	
PROJECT OR SECTION :		TITLE			APP'D.	
		<u>PIPE</u> ( PART No-186)			SCALE:- 1 : 1	
DR'N.	DATE				PROJECTION: THIRD ANGLE	
DRG. CHK'D.	DATE				DRG. NO.	REV.
DES'D.	DES'D. CHK'D.				E-058-1272-186	0



187 LEAD BLOCK  
 QTY : - 1No.  
 MATL: - LEAD  
 SCALE :- 1 : 1

**SECTION-AA**

				W/O NO. :		
NO.	LOC.	DESCRIPTION		Auto-CAD FILE NO.		
<b>REVISIONS</b>				DRN. / DATE	APP'D./DATE	CODE NO. :
PROJECT OR SECTION :		TITLE		APP'D.		
		<b>LEAD BLOCK ( PART No-187 )</b>		SCALE:- 1 : 1		
DR'N.	DATE			PROJECTION: THIRD ANGLE		
DRG. CHK'D.	DATE			DRG. NO.	REV.	
DES'D.	DES'D. CHK'D.			E-058-1272-187	0	



203 MIRROR CLAMP  
 QTY : - 4 Nos.  
 MATL.: - S.S.

				W/O NO. :		
NO.	LOC.	DESCRIPTION		Auto-CAD FILE NO.		
<b>REVISIONS</b>				DRN. / DATE	APP'D./DATE	CODE NO. :
PROJECT OR SECTION :		TITLE			APP'D.	
		<u>MIRROR CLAMP</u> (PART No-203)			SCALE:- 2 : 1	
DR'N.	DATE				PROJECTION: THIRD ANGLE	
DRG. CHK'D.	DATE				DRG. NO.	REV.
DES'D.	DES'D. CHK'D.				E-058-1272-203	0