





# Critical Interfaces to the Pixel Global Support

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**ATL-IP-ES-0045**

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## ATLAS PIXEL GLOBAL SUPPORT CRITICAL INTERFACES

The critical interfaces to the ATLAS Pixel Global Support  Structure are described.

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Distribution List 

***History of Changes***

<i>Rev. No.</i>	<i>Date</i>	<i>Pages</i>	<i>Description of changes</i>

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**Appendices**

## 1 Introduction

This note describes the critical mechanical interfaces to the Global Support Frame. The global support frame consists of a flat-panel space frame in three sections - a barrel section and two, identical disk sections as shown in Figure 1. These sections are joined to make the complete frame.

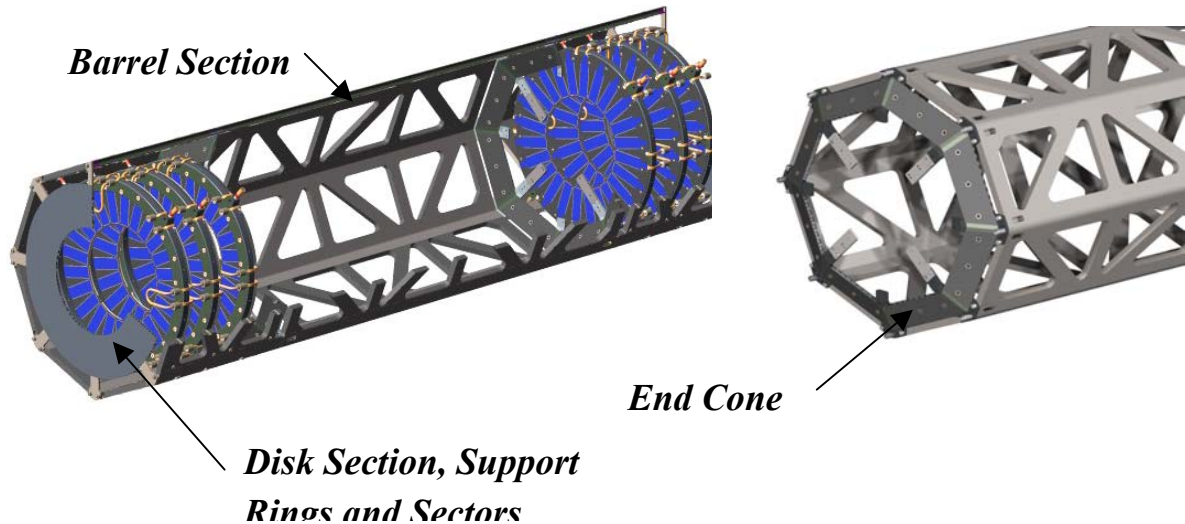


Figure 1. ATLAS Pixel global support frame, which consists of three sections - barrel and two disk sections. The barrel and two disk sections are shown joined on the left. One of the support cones for the barrel shells is shown in the right model.

## 2 Overview

The critical mechanical interfaces to the Global Support Frame are the following:

- Interface of the end-cones(fingers) to the barrel shell structures
- Interface of the disk sections of the Frame to the Disk Support Rings
- Interface of the end plates to the mounts that hold the Frame inside the Pixel Support Tube(PST)
- Interface of the end plates to the service panel and beam pipe support structure one either end of the Frame
- Interface to services(coolant pipes/fittings and cables) from the disk region
- Interface to services(coolant pipes/fittings) from the barrel region

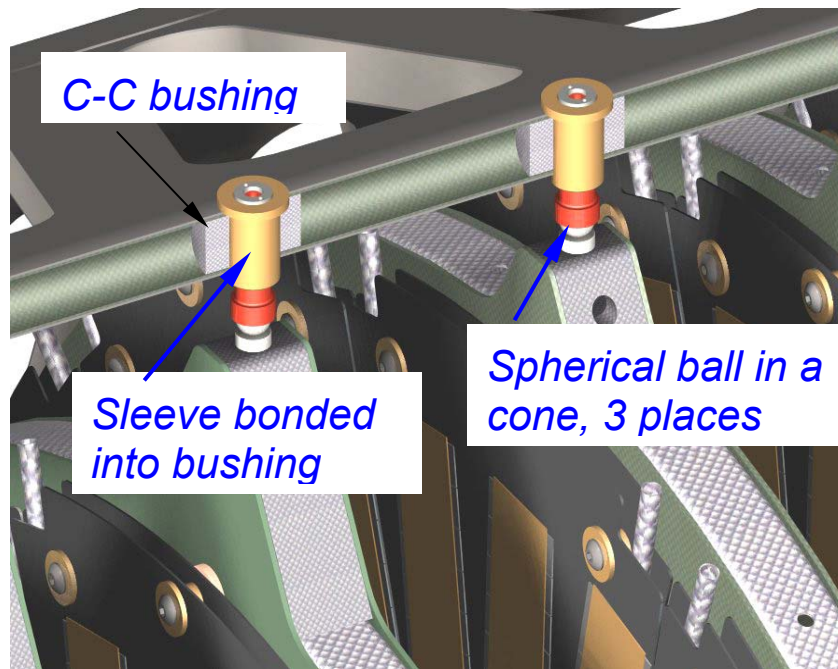
Each of these interfaces is summarized in the sections that follow.

## 3 Interface to Barrel Support Shells

The interface between the barrel support shells(for Layer 1 and Layer 2) and the end-cone fingers is controlled by drawing (<http://edms.cern.ch/document/309757/3>) – see Appendix A. In addition, solid models of the barrel shells and of the Global Support Frame are also exchanged and kept on EDMS(insert references).

## 4 Interface to Disk Support Rings

The concept for the interface of the disk sections of the Frame to a Disk Support Ring is given in Figure 2. The holes for locating the mounts for the Disk Support Ring are drilled into Frame after fabrication of the frame is complete. The mounts are bonded into the holes and into the ring using a precision fixture. This procedure has been verified by the construction of a complete prototype. The interface is controlled by creating a combined model(as in Figure 1) of the Disk Support Rings, mounting locations and Frame. This model is available on EDMS(insert reference).



**Figure 2. Concept for the interface between the Global Support Frame and a Disk Support Ring.**

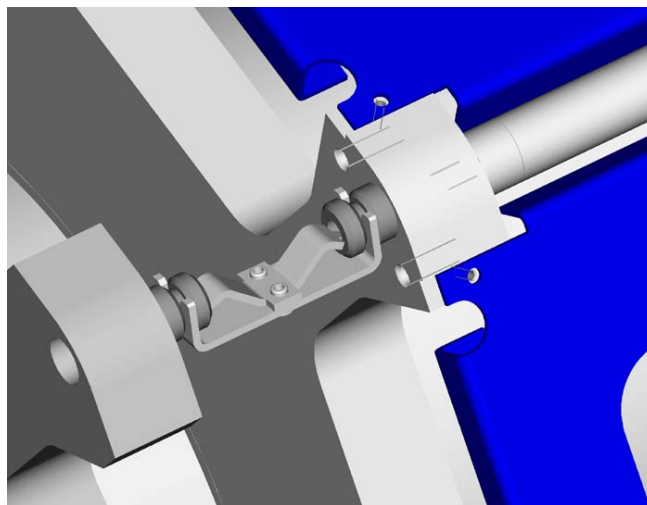
## 5 Interface to Pixel Mounts and PST

*The interface to the four mounts that hold the Frame inside the Pixel Support Tube (PST) is made to the end plates of the frame. The controlling drawing is LBNL21F565 – Appendix B.*

*The pixels mounts are the only direct interfaces to the PST structures. However, the Frame and the PST structures must respect envelopes, as indicated in drawing LBNL21F566 – Appendix C. A joint module of the Global Support Frame and PST and mounts is being created but is not currently complete. When completed it will be available on EDMS.*

## 6 Interface to Service Panel/Beam Pipe Support Structure

*The interface to the service panel and beam pipe support structure is made by “clips” that attach these support structures to the end plates. The concept is illustrated in Figure 3. Drawing LBNL21F566 (Appendix B) defines the connection to the endplate on the frame.*



**Figure 3. Concept for attachment of the service panel and beam pipe support structure to the end plates of the Global Support Frame.**

## 7 Interface to Disk Services

A complete model of the disks with coolant connections along with the frame is maintained and a view from this model is given in Figure 4. The routing of pipes from the disks to the end of the frame has not yet been modelled. However, the space available for these pipes and the Type 0 cables that route electrical signals from the disk modules to a patch panel (PP0) on the service support structure is defined by the envelopes shown in drawing LBNL21F566 (Appendix C).

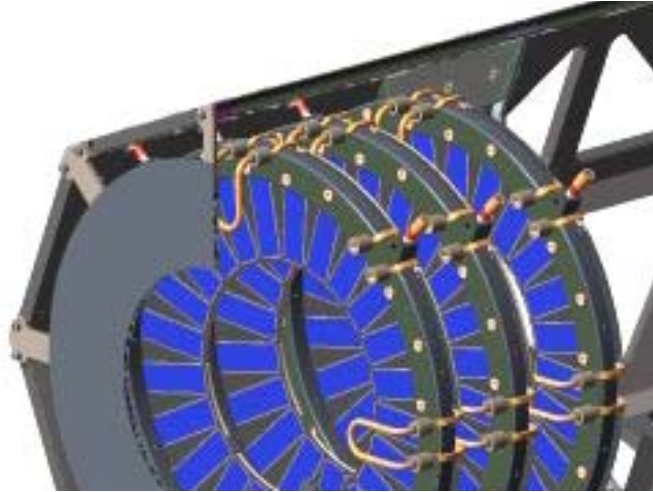


Figure 4. Disk region showing cooling connections to the disks.

## 8 Interface to Barrel Services

The interface of the barrel services to the end cones and to the outer service of the disk sections of the Global Support are given as envelopes. The controlling drawing for the endcone region is drawing (<http://edms.cern.ch/document/322965/1>) – Appendix D. A complete model of the barrel services and Frame has not yet been created. Barrel services must respect the allocated envelopes given in drawing LBNL21F566 (Appendix C)

## 9 Interface to Final Assembly

A conceptual design of the final assembly and testing of the pixel detector has been developed. A concept for holding the frame elements is shown in Figure 5 and explained in (insert EDMS reference here).

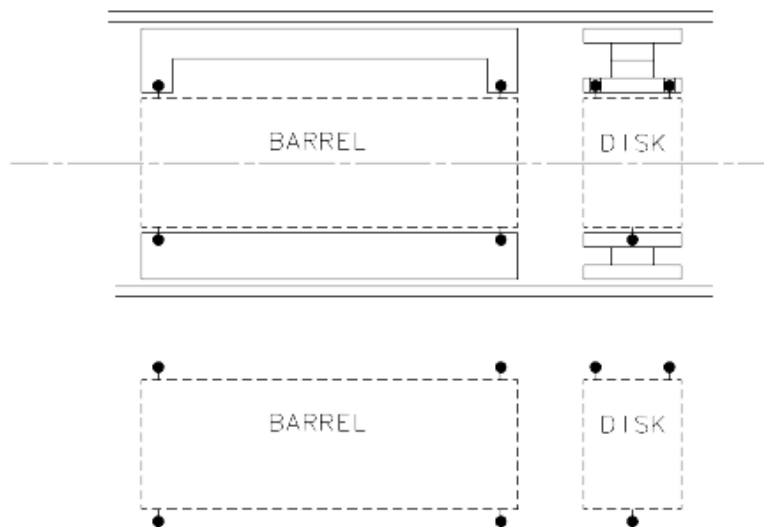
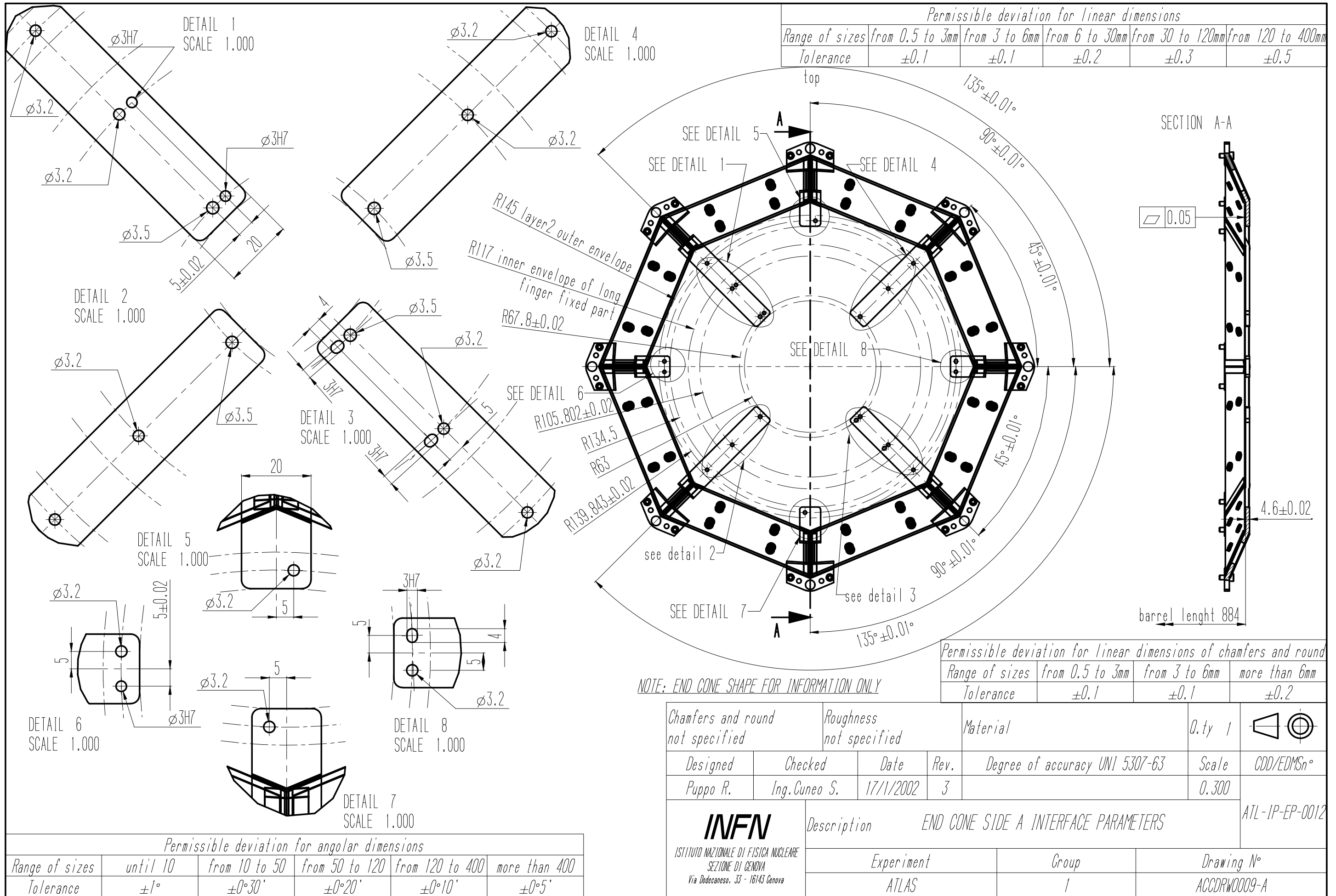


Figure 5. Concept for holding frame elements during surface assembly.



Permissible deviation for linear dimensions

Range of sizes	from 0.5 to 3mm	from 3 to 6mm	from 6 to 30mm	from 30 to 120mm	from 120 to 400mm
Tolerance	±0.1	±0.1	±0.2	±0.3	±0.5

Permissible deviation for linear dimensions of chamfers and round

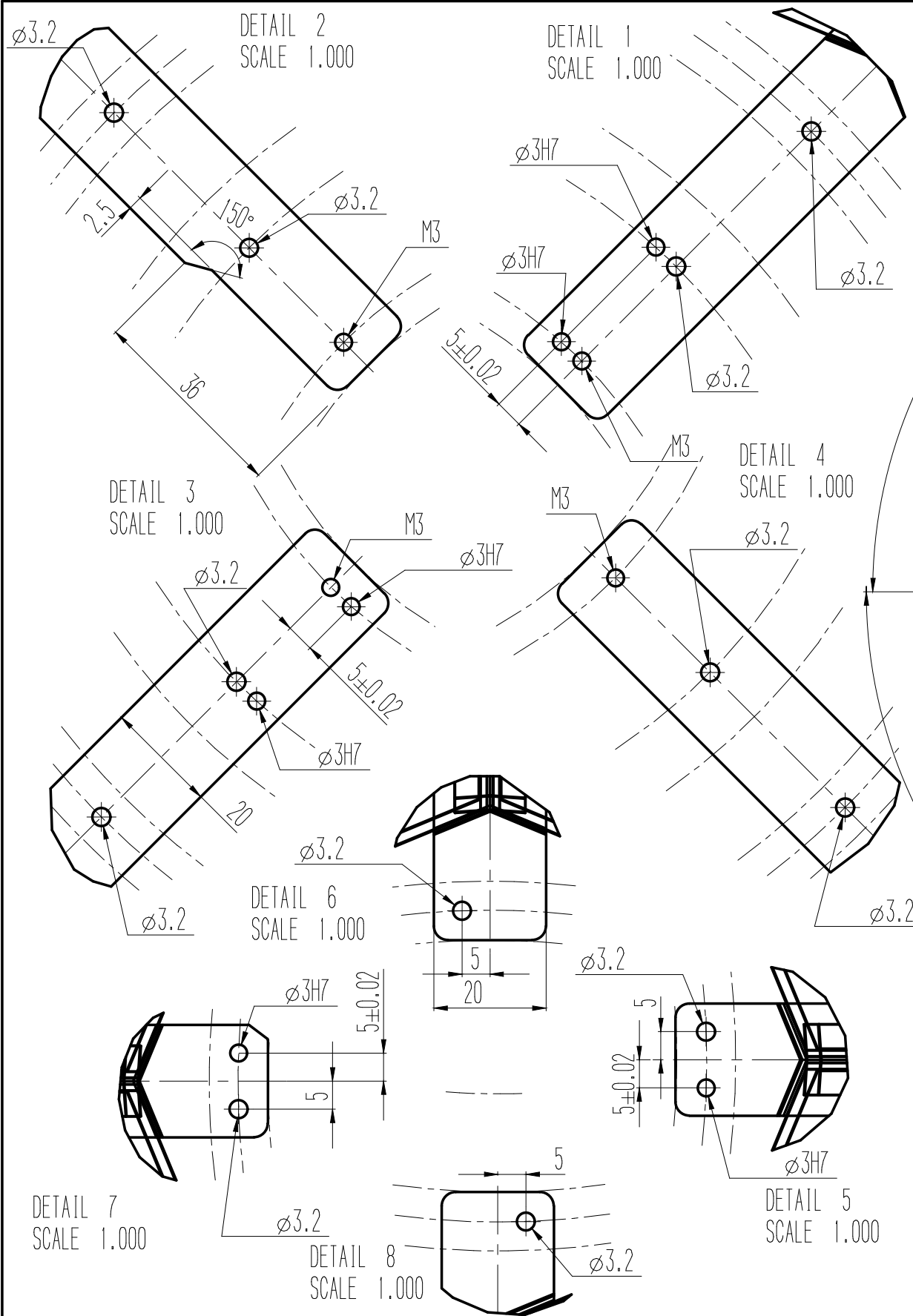
Range of sizes	from 0.5 to 3mm	from 3 to 6mm	more than 6mm
Tolerance	±0.1	±0.1	±0.2

Permissible deviation for angular dimensions

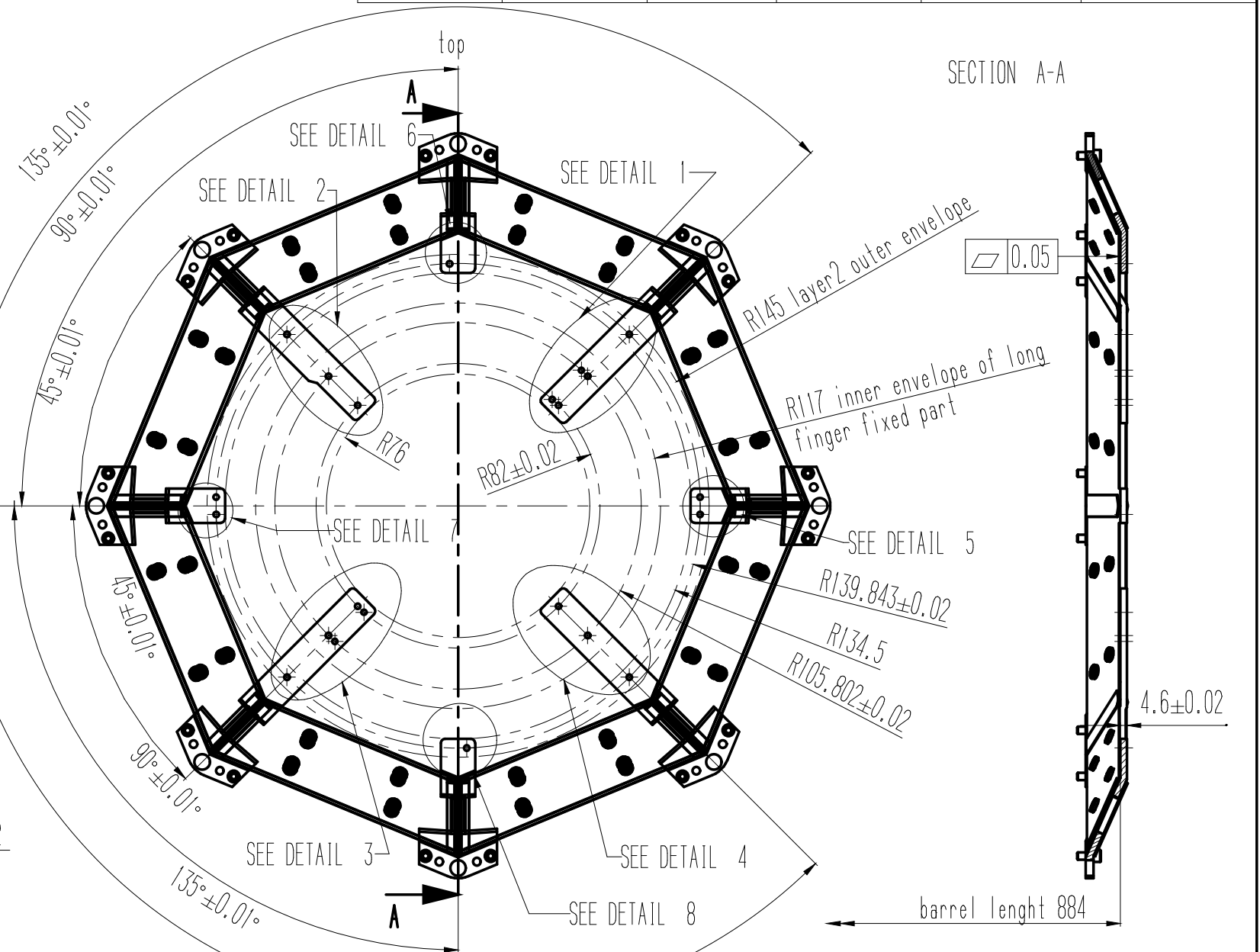
Range of sizes	until 10	from 10 to 50	from 50 to 120	from 120 to 400	more than 400
Tolerance	±1°	±0°30'	±0°20'	±0°10'	±0°5'

NOTE: END CONE SHAPE FOR INFORMATION ONLY

Chamfers and round not specified	Roughness not specified	Material	Q.ty 1	
Designed Puppo R.	Checked Ing. Cuneo S.	Date 17/1/2002	Rev. 3	Degree of accuracy UNI 5307-63 Scale 0.300
<b>INFN</b> ISTITUTO NAZIONALE DI FISICA NUCLEARE SEZIONE DI GENOVA Via Dodecaneso, 33 - 16143 Genova		Description END CONE SIDE A INTERFACE PARAMETERS		ATL-IP-EP-0012
Experiment ATLAS		Group 1	Drawing N° ACCDRW0009-A	



Permissible deviation for linear dimensions					
Range of sizes	from 0.5 to 3mm	from 3 to 6mm	from 6 to 30mm	from 30 to 120mm	from 120 to 400mm
Tolerance	±0.1	±0.1	±0.2	±0.3	±0.5



Permissible deviation for linear dimensions of chamfers and round		
Range of sizes	from 0.5 to 3mm	from 3 to 6mm more than 6mm
Tolerance	±0.1	±0.2

NOTE: END CONE SHAPE FOR INFORMATION ONLY

Permissible deviation for angular dimensions					
Range of sizes	until 10	from 10 to 50	from 50 to 120	from 120 to 400	more than 400
Tolerance	±1°	±0°30'	±0°20'	±0°10'	±0°5'

Chamfers and round not specified		Roughness not specified		Material		Q.ty 1	
Designed	Checked	Date	Rev.	Degree of accuracy UNI 5307-63		Scale	CDD/EDMSn°
Puppo R.	Ing. Cuneo S.	17-1-2002	4			0.300	
<b>INFN</b> ISTITUTO NAZIONALE DI FISICA NUCLEARE SEZIONE DI GENOVA Via Dodecaneso, 33 - 16143 Genova		Description		END CONE SIDE C INTERFACE PARAMETERS		ATL-IP-EP-0012	
		Experiment	Group	Drawing N°			
		ATLAS	1	ACCDRW0009-C			



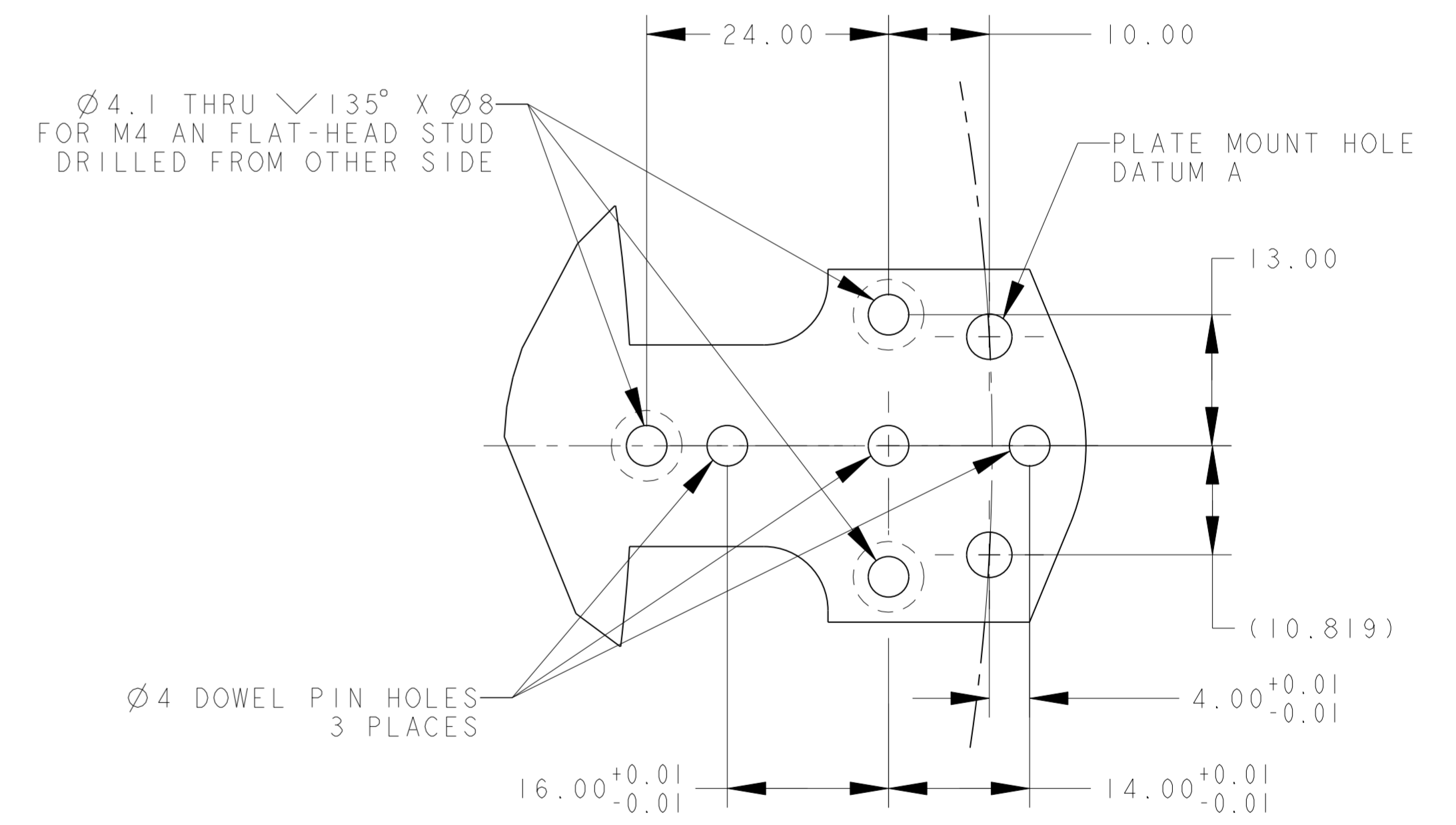
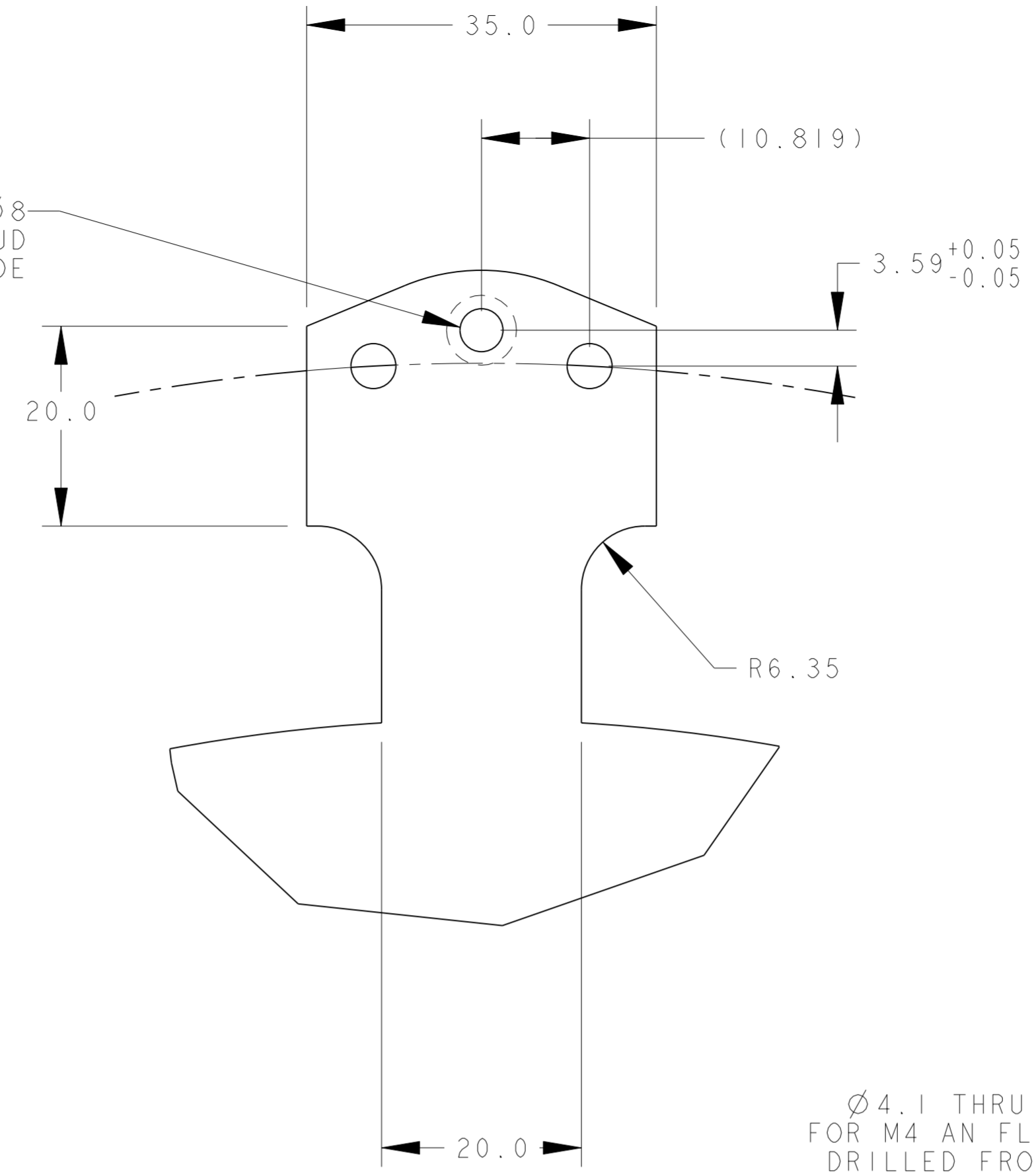
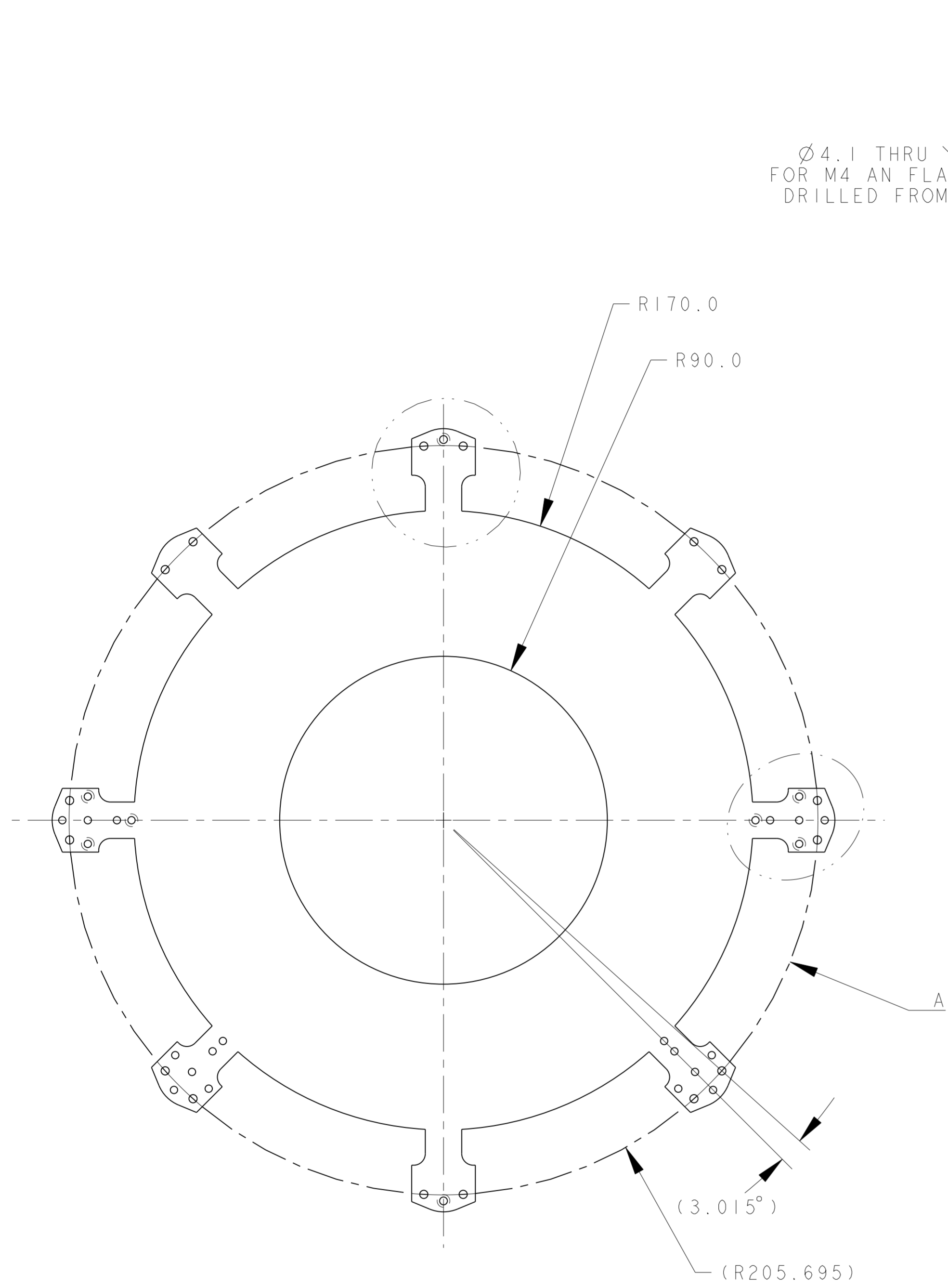
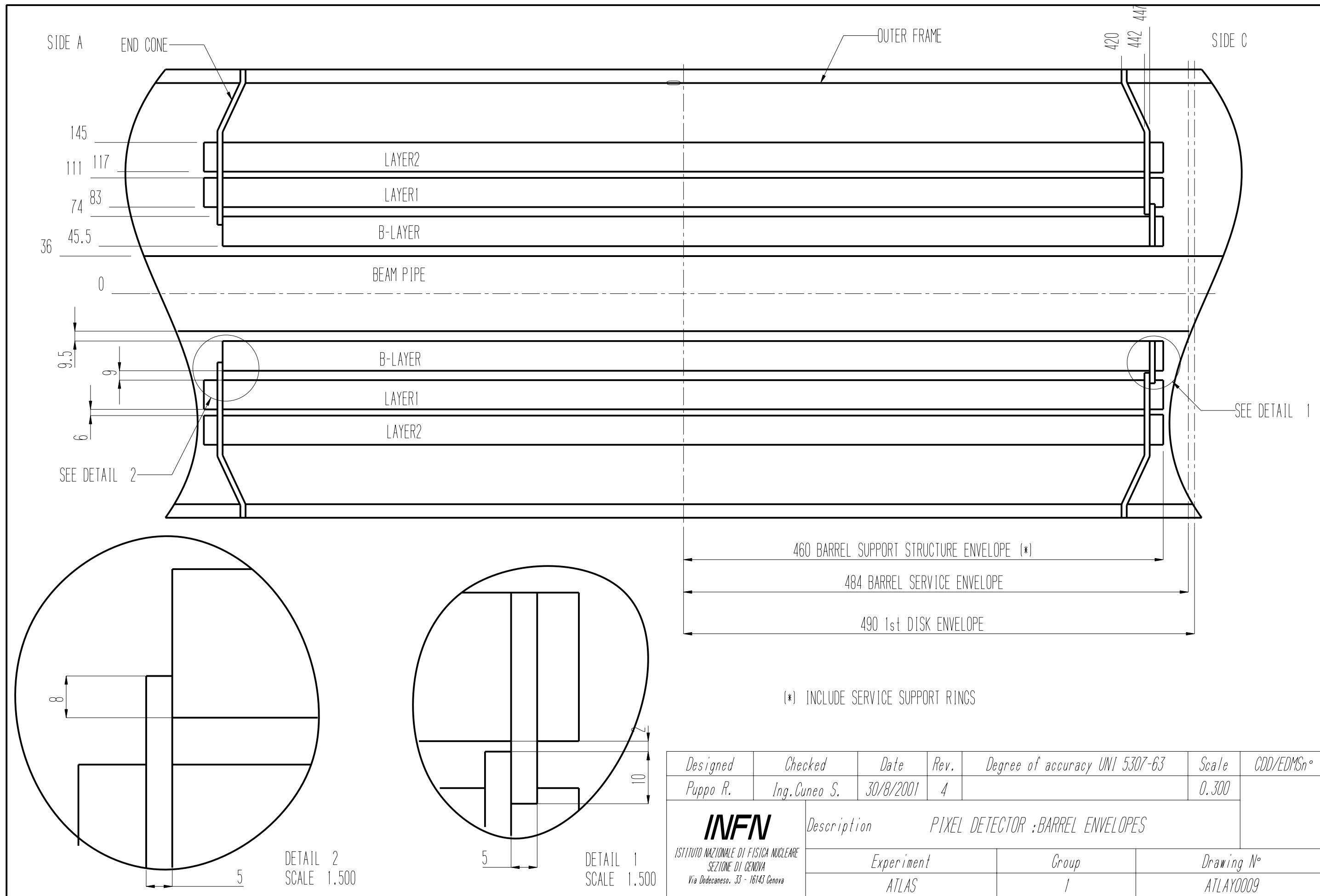


PLATE MOUNT HOLES INTERFACE TO END FRAME. HOLES FOR ASSEMBLY TOOLING PINS NOT SHOWN.

Appendix B

UNLESS OTHERWISE SPECIFIED				SHOP ORDERS		SER. NO. -		ERNEST ORLANDO LAWRENCE	
TOLERANCES		FRAC. ± 1/64		ACCT. NO.		NO. REQD.		BERKELEY NATIONAL LABORATORY	
X.X ± 0.5		X.XX ± 0.05		X.XXX ± 0.010		FINISH 125 $\sqrt{\text{RMS}}$		UNIVERSITY OF CALIFORNIA - BERKELEY	
ANGLES ± 1.00°		DO NOT SCALE PRINT		PROJECT NAME		PROJECT NUMBER		ATLAS PIXEL DETECTOR	
CHAMFER ENDS OF ALL SCREW THREADS 30°		THREADS ARE CLASS 2		PROJECT NAME		PROJECT NUMBER		GLOBAL SUPPORT FRAME	
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS		BREAK EDGES .016 MAX. ON MACHINED WORK		PROJECT NAME		PROJECT NUMBER		ENDPLATE STIFFENER INTERFACE DRAWING	
REMOVE BURRS, WELD SPATTER & LOOSE SCALE		IN ACCORDANCE WITH ASME Y14.5M & B46.1		PROJECT NAME		PROJECT NUMBER		SCALE: 1/2	
REV		CHK		ZONE		DATE		CHANGES	
DWG		BY		DATE		DATE		DATE	
ANDERSSON		31-JAN-02		MILLER		31-JAN-02		GILCHRISTE	
DATE		DATE		DATE		DATE		DATE	
PATENT CLEAR:		DESIGN ACCT. NO.		CATEGORY CODE		DWG. NO.		SIZE	
PIAPII		AP6300		21F5654		REV.		DO NOT SCALE PRINTS	
SHEET 1 OF 1		21F5654		REV.		DO NOT SCALE PRINTS		DO NOT SCALE PRINTS	



Appendix D