

Notes from Pixel Mechanics Meeting
March 5, 2001

Present: Anderssen, Weber, Taylor, Wirth, Gilchriese, Goozen, Johnson, Hartman

The meeting was devoted entirely to status and immediate plans for coolant connections. Appended after these notes you will find some material presented at the meeting.

- a. Drawings of aluminum test fittings for (mostly) seal and brazing tests.
- b. Preliminary schedule
- c. Test plan for seals (Variseals and C-rings)

1. Parts to be made for brazing/seal tests

Some of the parts in the drawing package are already under fabrication at LBNL. Jon to determine how many of what will be finished at LBNL and obtain quote for outside fabrication of additional parts.

Number of total parts desired is as follows (see drawing package)

DWG 21F3471	38	Al6063 (for brazing)
DWG 21F3482	64	can be 6061
DWG 21F3491	120	can be 6061
DWG 21F3661	36	can be 6061

2. Seal tests plan

Seal test plan was discussed and is summarized in attached drawing from Neal. Some of the basic steps are repeated here.

- a. Vacuum test at room temperature
- b. Proof test to 8 bar absolute for 1 hour
- c. Differential pressure bleed-down test at room temperature
- d. Vacuum test again at room temperature
- e. Vacuum test cold (exactly how to do this was discussed but not concluded)
- f. Differential bleed down cold

Assuming seals pass room temperature proof test, would irradiate assembled objects (as in assembly drawing 21F3462, with seals in liquid C_3F_8 and then repeat tests, at least room temperature vacuum test and proof test again. Repeating cold tests depends on what is seen with unirradiated samples, but is likely also required (not included in test plan drawing for seals).

3. Brazing and seal surface

Short length of square-to-round tubing would be brazed into 21F3471 on both ends. 21F3482 would be drilled to allow pressurization and mated to one end with seal. Other end would be blanked off with a 21F3482. Not clear length of short piece possible to braze on both ends but length of 1.375" is desired. One sample to be made and brazed by Tom. This sample would then go through test protocol given above. Then judge where to go from there after first tests.

4. Glue trials

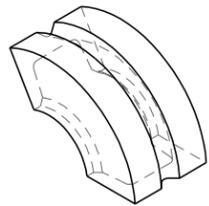
There are a number of existing aluminum and PEEK parts for glue trials. Fred will take these and make first trials using revised gluing procedure. This will be done first without chromic acid etch with fixtures and procedures to be defined by Fred. First priority will be given to simulating piece to be glued to sector.

5. CGL in C_3F_8 vapor

This was not shown at the meeting but the first trial of effect of C_3F_8 vapor on CGL is complete. CGL was screened onto silicon as is proposed for modules. One sample was

put in 100% C₃F₈ vapor at room temperature for five days. Another(control) sample was left in air. Visual inspection of sample in C₃F₈ vapor shows little or no effect - no running of CGL, no significant damage observed. Sample will be put back into C₃F₈ vapor. Next step is to take sector test piece that has been irradiated(this is part of sector with heaters) and put it into C₃F₈ vapor and then remeasure thermal performance.

ITEM	PART NO	REQD	DESCRIPTION	MATERIAL
7	W48-MS-A-0103-Z80		VARISEAL	UHMWPE
6	21F366		SECTOR FITTING CENTERING RING	ALUMINUM
5	21F349		SECTOR FITTING SPLIT CLAMP	ALUMINUM
4	21F349		SECTOR FITTING SPLIT CLAMP	ALUMINUM
3	21F349		SECTOR FITTING SPLIT CLAMP	ALUMINUM
2	21F348-MOD		SEAL TEST FITTING THRU	ALUMINUM
1	21F348		SEAL TEST FITTING	ALUMINUM



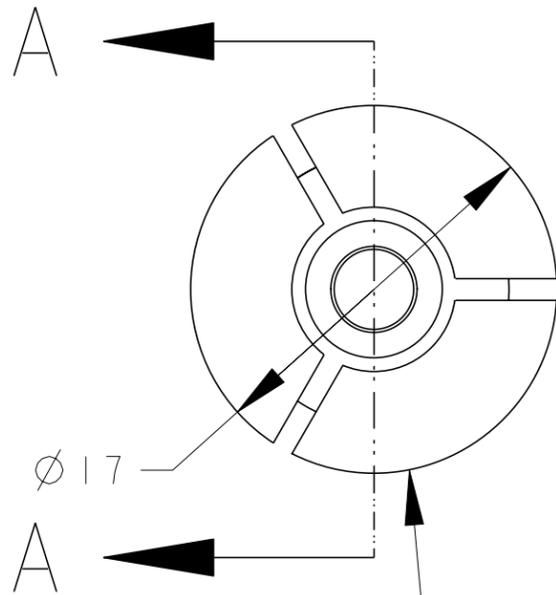
SPLIT CLAMP
SCALE 2/1



VARISEAL
SCALE 2/1

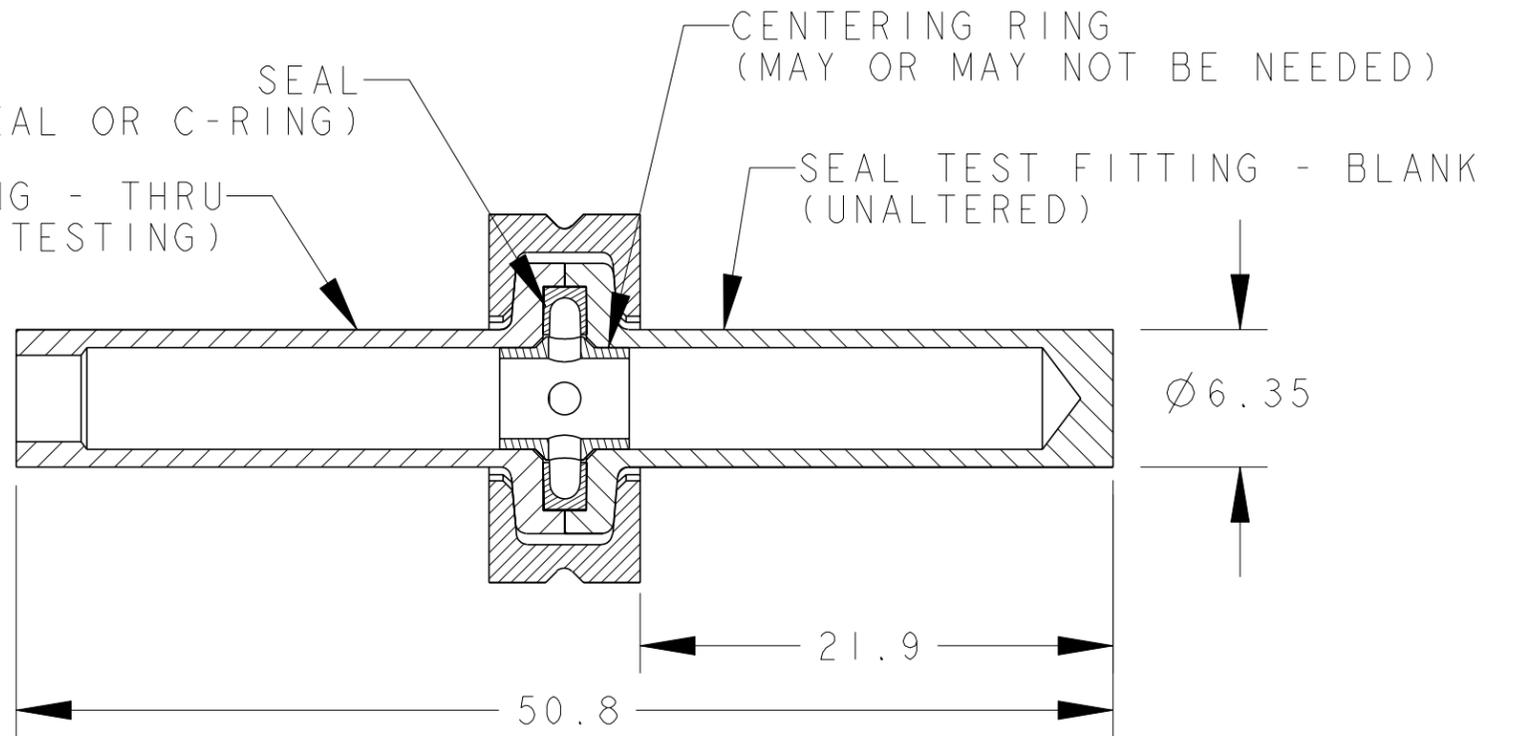


CENTERING RING
SCALE 2/1



SPLIT CLAMP (3)

(VARISEAL OR C-RING)
SEAL TEST FITTING - THRU (DRILLED THRU FOR TESTING)
SEAL (VARISEAL OR C-RING)
CENTERING RING (MAY OR MAY NOT BE NEEDED)
SEAL TEST FITTING - BLANK (UNALTERED)



SECTION A - A

NOTES:
1. SPLIT CLAMP SHOWN WITHOUT FIXING MECHANISM (POTENTIALLY WIRE LOOP).
2. ASSEMBLY SHOWN WITH VARISEAL (NOT C-RING) IN PLACE.

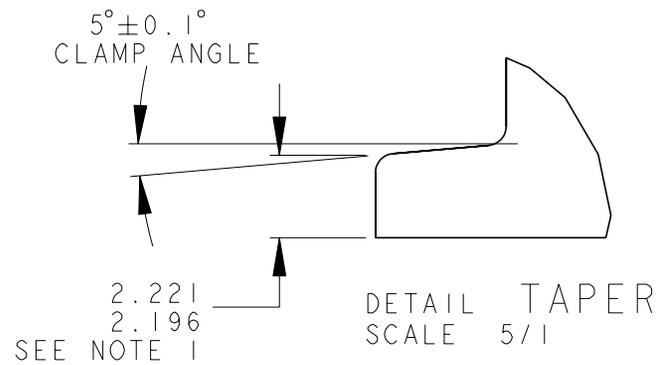
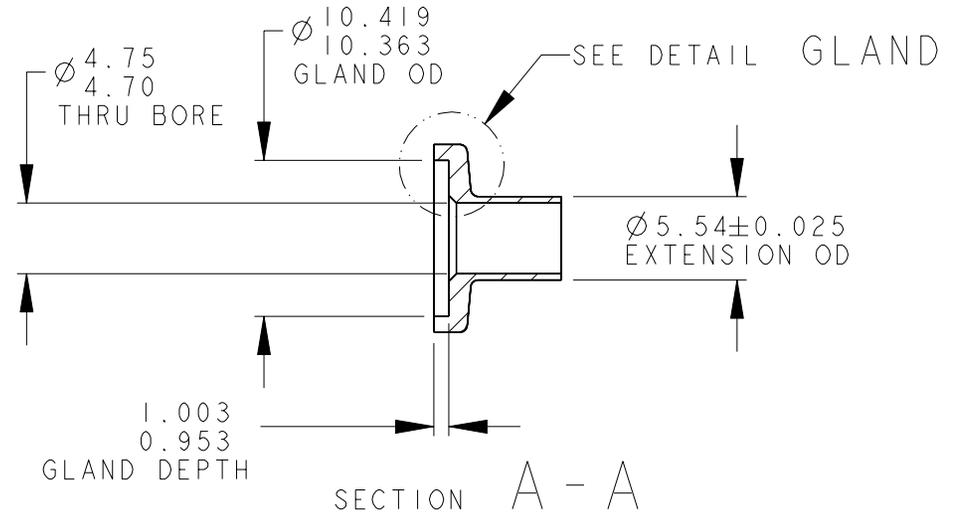
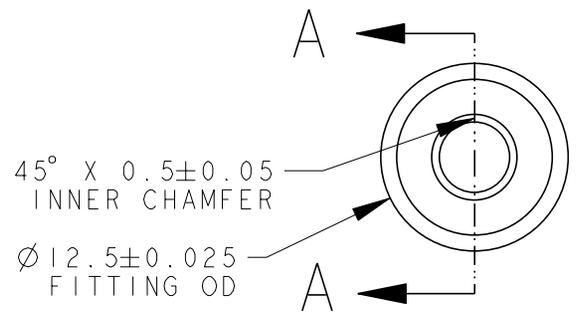
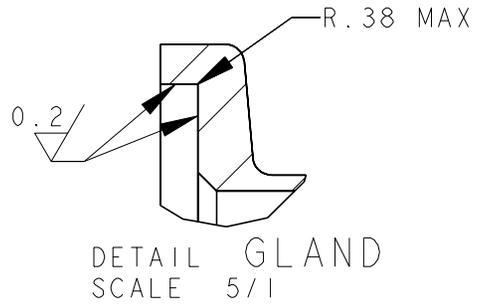
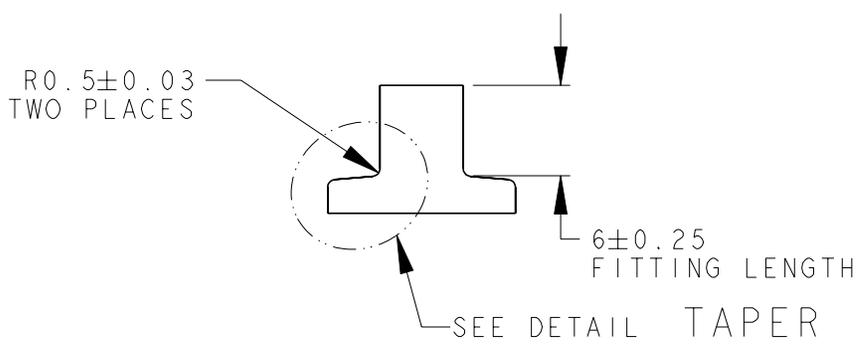
UNLESS OTHERWISE SPECIFIED		SHOP ORDERS		SER. NO.
TOLERANCES	X.X ± 0.1	FRAC. ± 1/64	ACCT NO.	-
	X.XX ± 0.03	Angles ± 1.00°	NO. REQD	-
	X.XXX ± 0.010	FINISH $125\sqrt{\mu in}$	DEL TO	-
DO NOT SCALE PRINT		IDENT METHOD TAG		DATE ISSD
THREADS ARE CLASS 2		PROJECT NUMBER N/A		DATE REQD
CHAMFER ENDS OF ALL SCREW TREADS 30°		PROJECT NAME		
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS		DWG BY N. HARTMAN		DATE 01-Mar-01
BREAK EDGES .016 MAX. ON MACHINED WORK		CHK BY None		DATE
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE		APR BY E. ANDERSSON		DATE
IN ACCORDANCE WITH ASME Y14.5M & B46.1				

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BERKELEY NATIONAL LABORATORY**
UNIVERSITY OF CALIFORNIA - BERKELEY



ATLAS PIXEL DETECTOR
COOLING SERVICES
SEAL TEST FITTING ASSEMBLY

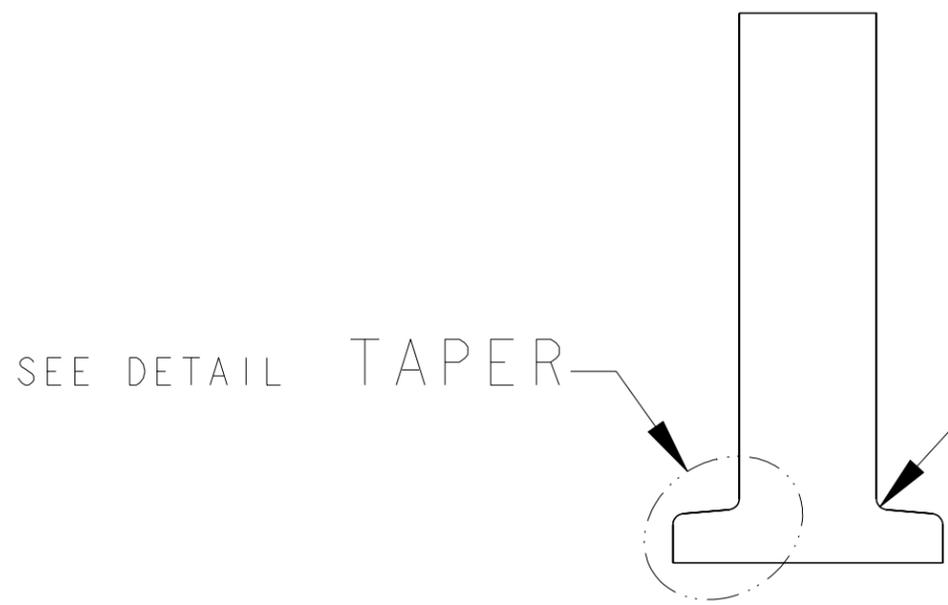
MICROFILMED:	DWG. TYPE ASSEM	SHOWN ON	SCALE: 3/1	DO NOT SCALE PRINTS
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE AP8220	SHEET 1 OF 1	
			DWG. NO. 21F3462	SIZE 1



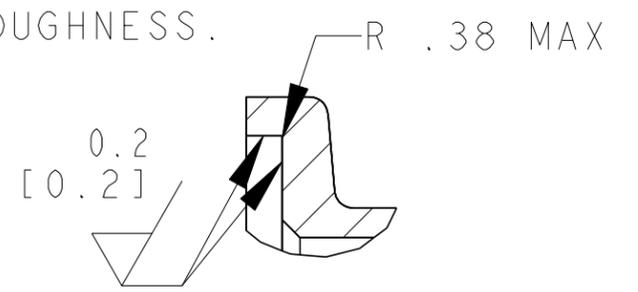
- NOTES:
1. TAPER POSITION IS DIMENTIONED TO OD OF FITTING PRIOR TO FILLETING.
 2. SURFACE FINISH GIVEN IN MICRONS AVERAGE ROUGHNESS.
 3. ALL DIMENSIONS IN MM.

REV	DWG	CHK	DATE	CHANGES	DESCRIPTION	ALUMINUM MATERIAL
UNLESS OTHERWISE SPECIFIED				SHOP ORDERS		
TOLERANCES	X.X ±0.1	FRAC. ±1/64	ACCT NO.	NO. RECD	DATE ISSD	
	X.XX ±0.03	Angles ±0.25°	DEL TO		DATE RECD	
	X.XXX ±0.015	FINISH 125 μm	SURFACE TREATMENT DEGREASE			
DO NOT SCALE PRINT				IDENT METHOD	TAG	
THREADS ARE CLASS 2				PROJECT NUMBER		
CHAMFER ENDS OF ALL SCREW THREADS 30°				PROJECT NAME		
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS				DWG BY N. HARTMAN	DATE 01-Mar-01	
BREAK EDGES .016 MAX. ON MACHINED WORK				CHK BY	DATE	
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE				APR BY E. ANDERSSON	DATE	
IN ACCORDANCE WITH ASME Y14.5M & B46.1						
ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA - BERKELEY						
ATLAS PIXEL DETECTOR COOLING SERVICES SECTOR COOLANT FITTING						
MICROFILMED:		DWG. TYPE		SCALE: 2/1		DO NOT SCALE PRINTS
		PART		SHOWN ON		
PATENT CLEAR:		DESIGN ACCT. NO.		CATEGORY CODE		
		AP8220		DWG. NO. 21F3471		REV. 2
SHEET 1 OF 1						

- NOTES:
 1. TAPER POSITION IS DIMENSIONED TO THEORETICAL OD OF FITTING WITHOUT FILLET.
 2. SURFACE FINISH GIVEN IN MICRONS AVERAGE ROUGHNESS.
 3. ALL DIMENSIONS IN MM.



R0.5±0.03
TWO PLACES



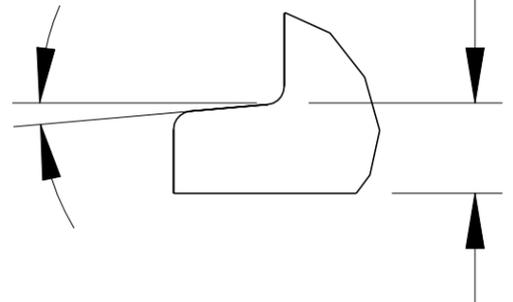
DETAIL GLAND
SCALE 5/1

45° X 0.5±0.05
INNER CHAMFER

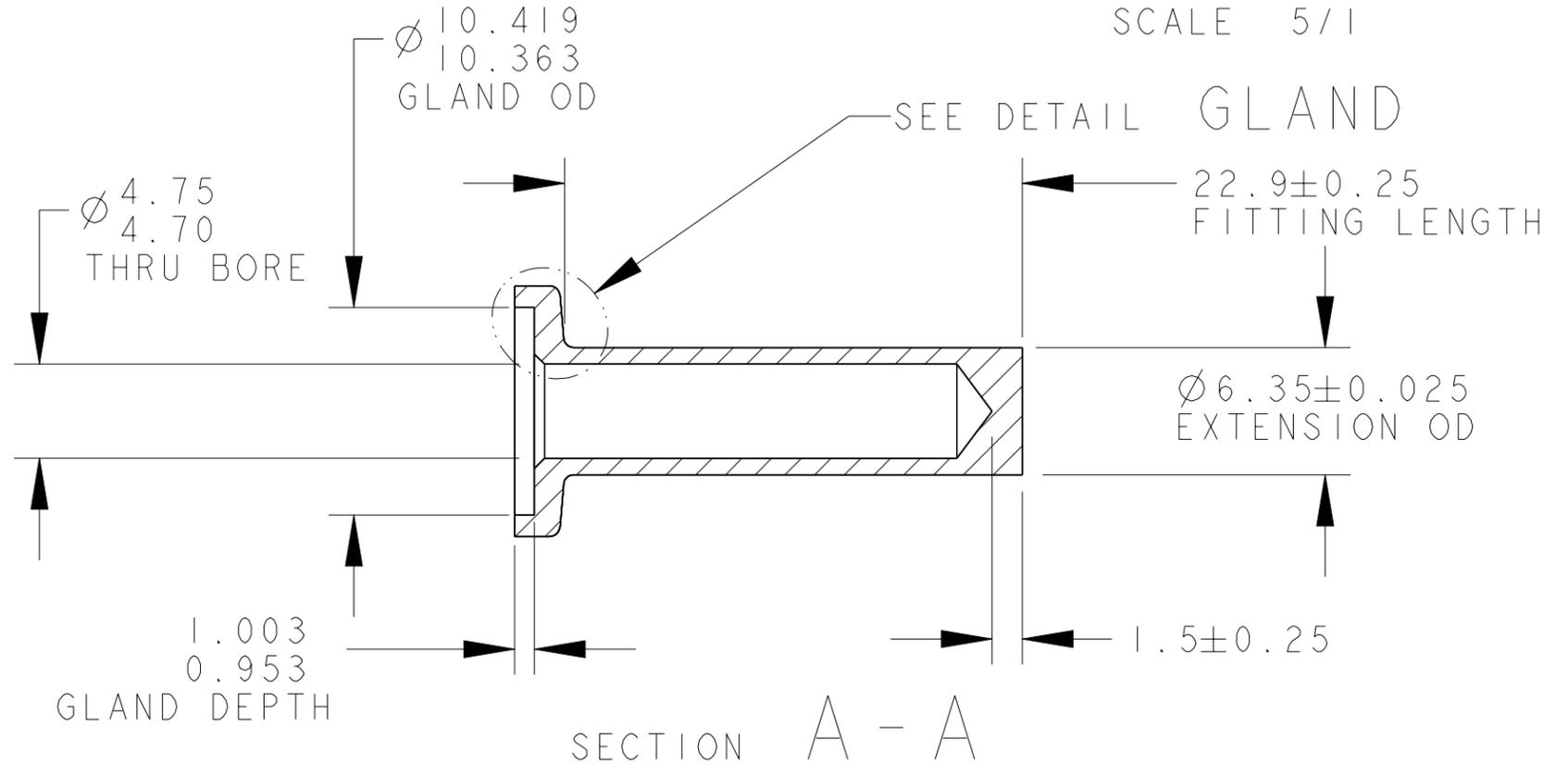
Ø 12.5±0.025
FITTING OD

5°±0.1°
CLAMP ANGLE

2.5^{+0.025}₀
FITTING THICKNESS
SEE NOTE 1



DETAIL TAPER
SCALE 5/1



SECTION A - A

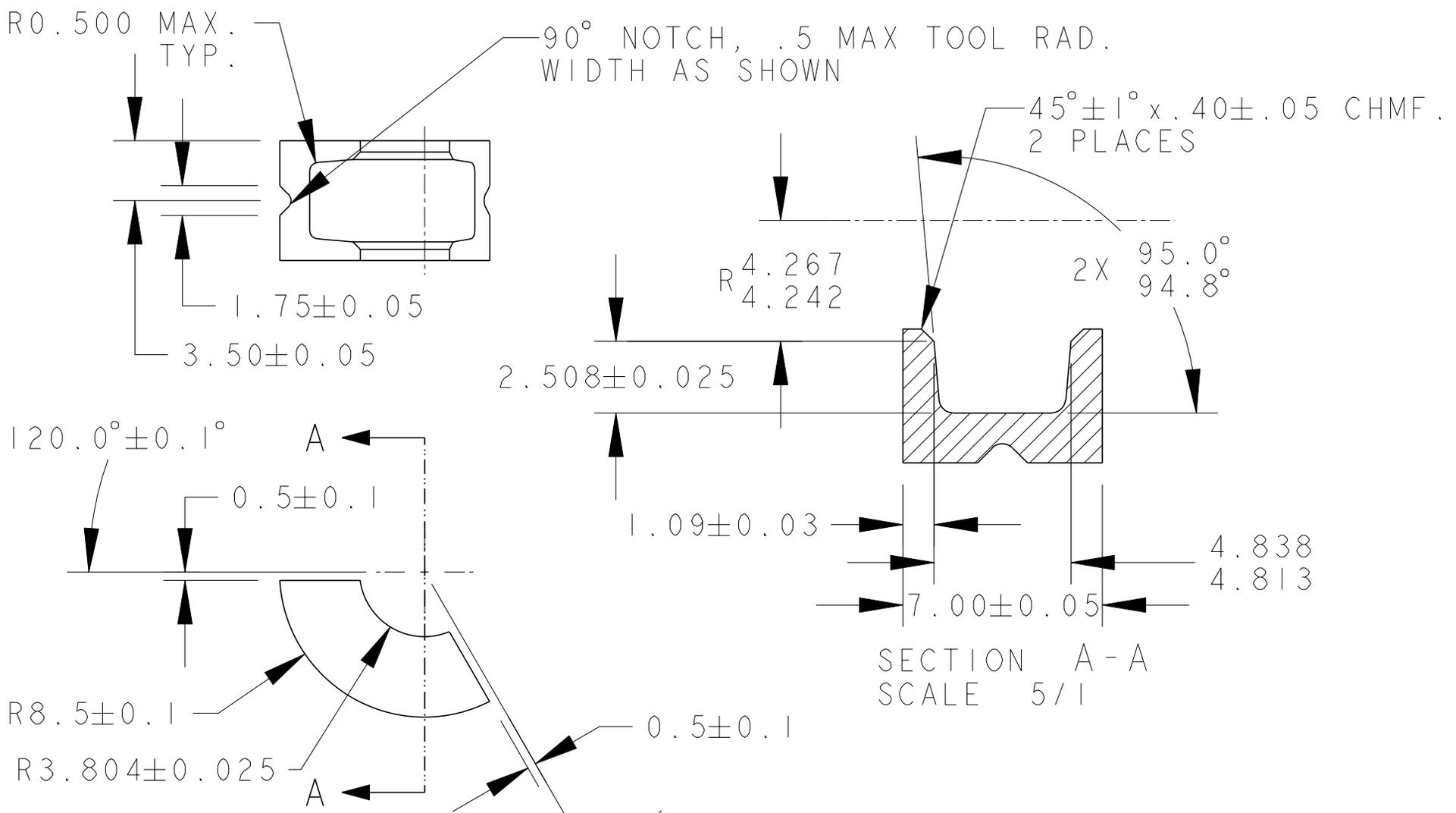
UNLESS OTHERWISE SPECIFIED		SHOP ORDERS		SER. NO.
TOLERANCES	X.X ± 0.1	FRAC. ± 1/64	ACCT NO.	-
	X.XX ± 0.03	Angles ± 0.25°	NO. REQD	DATE ISSD -
	X.XXX ± 0.015	FINISH 125√(µin)	DEL TO	DATE REQD -
DO NOT SCALE PRINT		SURFACE TREATMT DEGREASE		
THREADS ARE CLASS 2		IDENT METHOD TAG		
CHAMFER ENDS OF ALL SCREW TREADS 30°		PROJECT NUMBER		
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS		PROJECT NAME		
BREAK EDGES .016 MAX. ON MACHINED WORK		DWG BY N. HARTMAN		DATE 01-Mar-01
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE		CHK BY		DATE
IN ACCORDANCE WITH ASME Y14.5M & B46.1		APR BY E. ANDERSSON		DATE

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UNIVERSITY OF CALIFORNIA - BERKELEY



ATLAS PIXEL DETECTOR
COOLING SERVICES
SEAL TEST FITTING

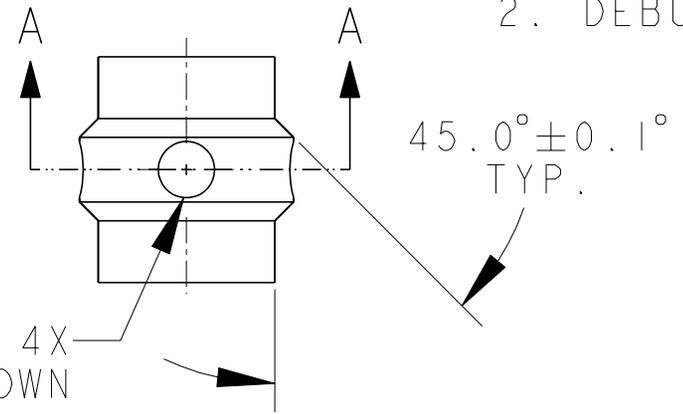
MICROFILMED:	DWG. TYPE PART	SHOWN ON	SCALE: 3/1	DO NOT SCALE PRINTS
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE AP8220	SHEET 1 OF 1	
			DWG. NO. 21F3482	SIZE 1



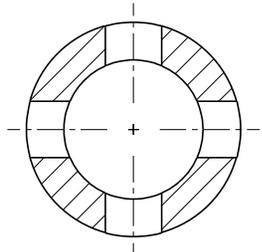
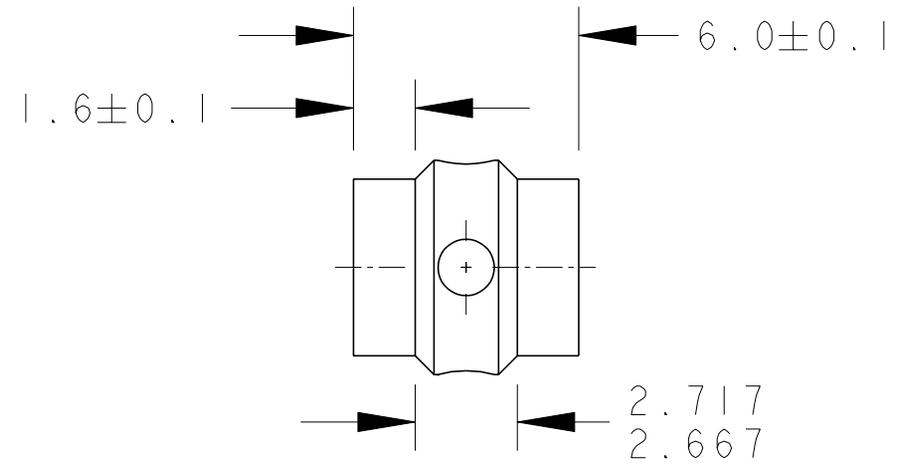
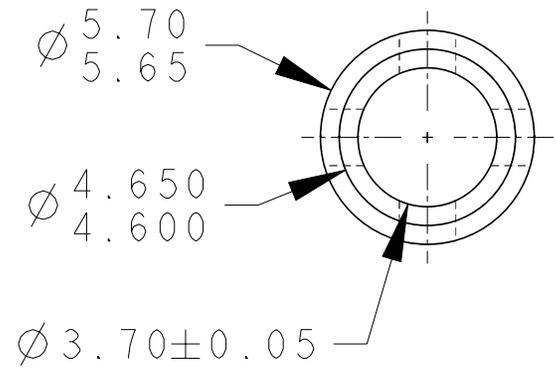
NOTES:
 1. ALL DIMENSIONS IN MM.
 2. DEBUR ALL EDGES AFTER MACHINING.

REV	DWG	CHK	DATE	CHANGES	DESCRIPTION	MATERIAL
UNLESS OTHERWISE SPECIFIED				SHOP ORDERS		ALUMINUM
TOLERANCES				ACCT. NO. 24	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA - BERKELEY	ALUMINUM
X.X ± 0.1	FRAC. ± 1/64	DEL. TO	JON WIRTH	DATE ISSD		
X.XX ± 0.03	Angles ± 0.25°	SURFACE TREATMENT		DEGREASE	ATLAS PIXEL DETECTOR	
X.XXX ± 0.015	FINISH 125 μm	IDENT. METHOD		TAG	COOLING SERVICES	
DO NOT SCALE PRINT				PROJECT NUMBER		SECTOR FITTING SPLIT CLAMP
THREADS ARE CLASS 2				PROJECT NAME		MICROFILMED:
CHAMFER ENDS OF ALL SCREW THREADS 30°				DWG. BY N. HARTMAN		DWG. TYPE PART
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS				DATE 01-Mar-01		SHOWN ON
BREAK EDGES .016 MAX. ON MACHINED WORK				CHK BY		SCALE: 3/1
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE				APR BY E. ANDERSSON		DO NOT SCALE PRINTS
IN ACCORDANCE WITH ASME Y14.5M & B46.1				DATE		SHEET 1 OF 1
				DESIGN ACCT. NO. AP8220		DWG. NO. 21F3491
						SIZE 1
						REV. 1

NOTES:
 1. ALL DIMENSIONS IN MM.
 2. DEBUR ALL EDGES AFTER MACHINING.



Ø 1.5 ± .2 THRU 4X
 PLACED AS SHOWN



SECTION A-A

REV	DWG	CHK	DATE	CHANGES			ITEM	PART NO	REQD	DESCRIPTION	
UNLESS OTHERWISE SPECIFIED				SHOP ORDERS			SER NO.	ERNEST ORLANDO LAWRENCE			
TOLERANCES	X.X ± 0.1	FRAC.	± 1/64	ACCT NO.	NO.	DATE	BERKELEY NATIONAL LABORATORY				
	X.XX ± 0.03	Angles	± 0.25°	DEL TO	JON WIRTH	DATE	UNIVERSITY OF CALIFORNIA - BERKELEY				
	X.XXX ± 0.015	FINISH	125 μm	SURFACE TREATMENT	DEGREASE	DATE	ATLAS PIXEL DETECTOR				
DO NOT SCALE PRINT				IDENT	TAG	COOLING SERVICES					
THREADS ARE CLASS 2				PROJECT NUMBER	SECTOR FITTING CENTERING RING						
CHAMFER ENDS OF ALL SCREW THREADS 30°				PROJECT NAME	MICROFILMED:						
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS				DWG BY	N. HARTMAN	DATE	01-Mar-01	DWG. TYPE	PART		
BREAK EDGES .016 MAX. ON MACHINED WORK				CHK BY		DATE		SHOWN ON	SCALE: 5/1		
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE				APR BY	E. ANDERSSON	DATE		PATENT CLEAR:	DESIGN ACCT. NO.	AP8220	
IN ACCORDANCE WITH ASME Y14.5M & B46.1							CATEGORY CODE	DWG. NO.	21F3661	SIZE	1
							REV.	SHEET 1 OF 1			

ID	Task Name	Start	Duration	February			March			April					
				2/11	2/18	2/25	3/4	3/11	3/18	3/25	4/1	4/8	4/15	4/22	4/29
1	Joining Techniques	Fri 2/23/01	27 days												4/2
2	E-Beam/Laser Welding	Fri 3/2/01	20 days												
3	Request Laser/E Beam Samples	Fri 3/2/01	0 days												3/2
4	contract	Fri 3/2/01	20 days												Contract
5	Fab preparation	Fri 2/23/01	25 days												
6	Fab Sector Tubes and Fittings for Test	Fri 2/23/01	10 days												Shop
7	Fab Sector Braze Jigging	Fri 3/9/01	10 days												Shop[50%],Tech[50%]
8	Fab Test U-tube Pieces to Validate Mate up Tolerances	Fri 3/23/01	5 days												Shop
9	Joint Testing	Fri 3/23/01	7 days												
10	Perform Test Brazes and Leak Check	Fri 3/23/01	2 days												Tech
11	Braze and Leak Check U-tubes	Fri 3/30/01	2 days												Tech
12	Glue-up Sector Terminations and Leak Check	Fri 3/23/01	3 days												Tech
13	Variseal Testing	Fri 3/2/01	46 days												5/4
14	Fab Test Setup for variseal validation	Fri 3/2/01	5 days												Shop[50%],Tech[50%]
15	Fab Clamps and centering rings for Seals	Fri 3/9/01	5 days												Shop
16	Test Variseals with Clamps	Fri 3/16/01	3 days												Tech
17	Revise Clamp Geometry	Tue 4/3/01	10 days												Tech
18	Re-test Variseal and Fitting Clamps	Tue 4/17/01	3 days												Tech
19	Test Brazed Sector Terminations with U-tubes	Fri 4/20/01	3 days												Tech
20	Test Laser/E Beam Terms with U-tube	Fri 4/20/01	3 days												Tech
21	Test Glued Sector with U-tube	Wed 4/25/01	3 days												Tech
22	Perform Thermal Shock Tests on All Samples	Mon 4/30/01	5 days												Tech
23	Evaluate Tests and Make Decision for Baseline	Fri 5/4/01	0 days												5/4

Project: Sector Termination 030501 Date: Mon 3/5/01	Task		Rolled Up Task		Project Summary	
	Split		Rolled Up Split		External Milestone	
	Progress		Rolled Up Milestone		Deadline	
	Milestone		Rolled Up Progress			
	Summary		External Tasks			

Seal Validation Testing Flowchart

