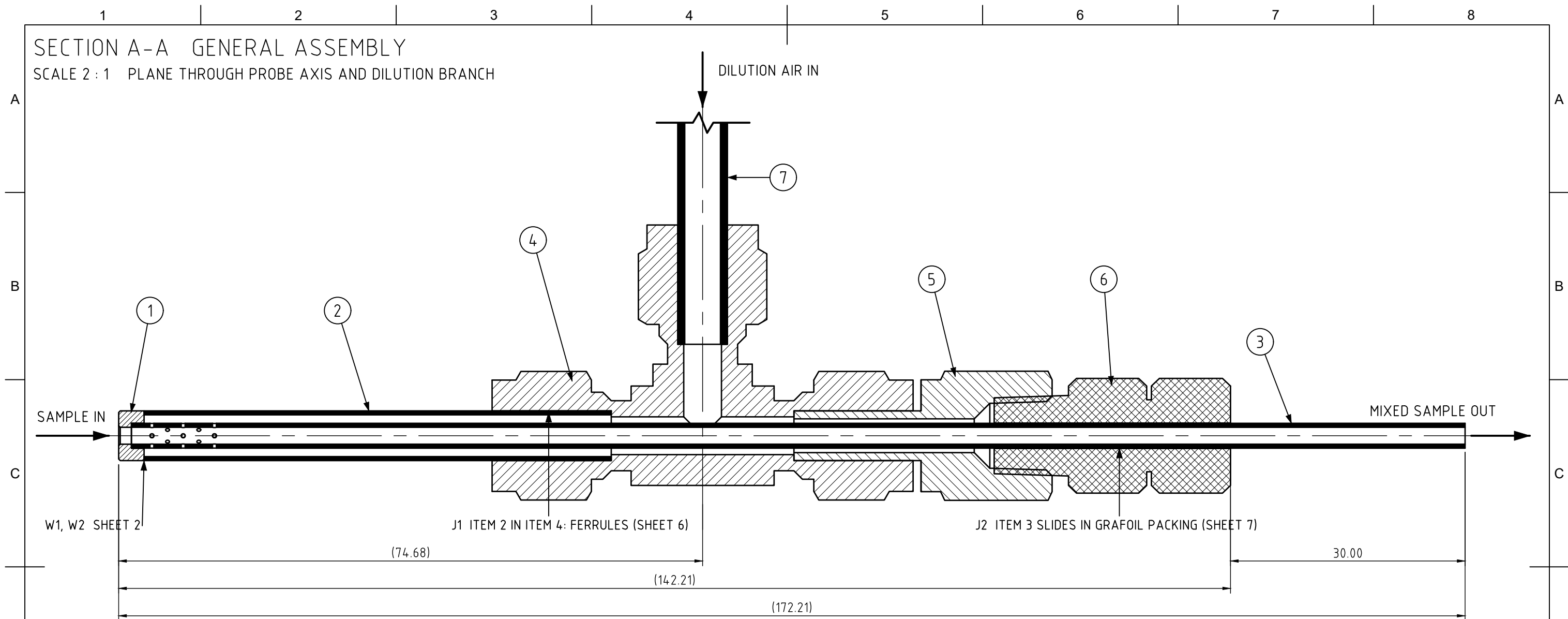




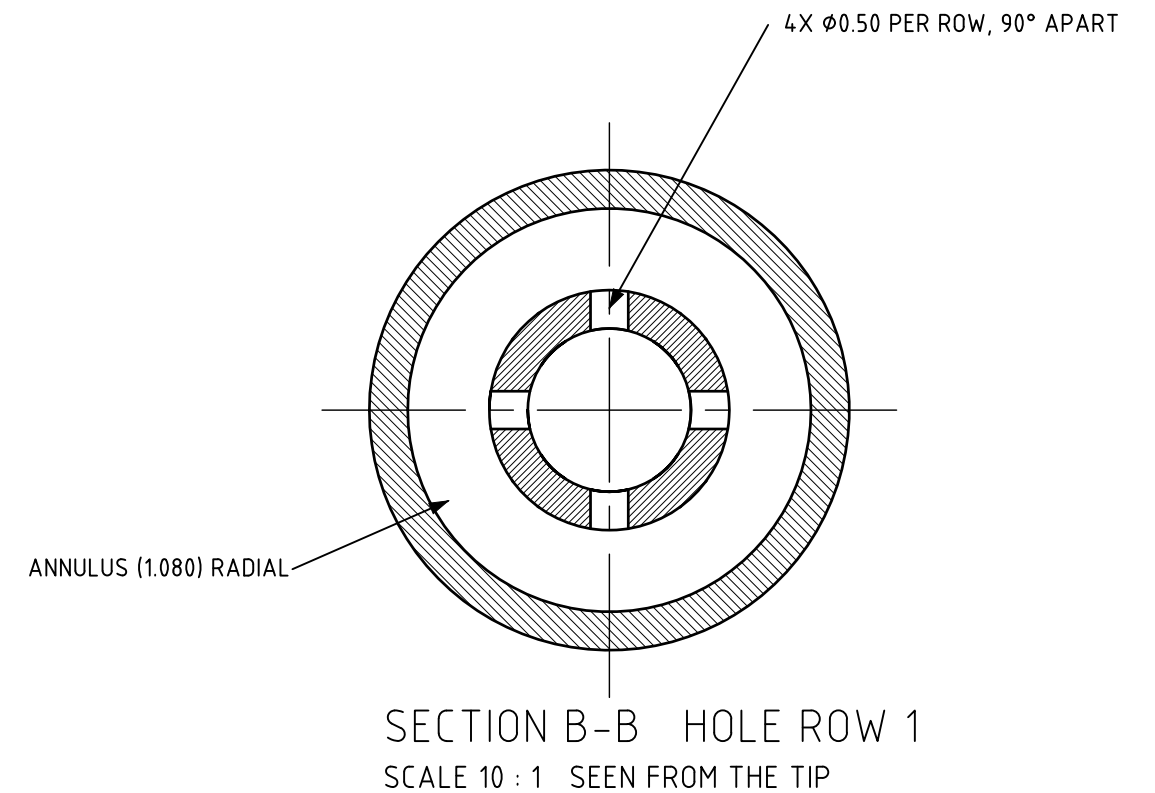
LIST OF MATERIAL						
ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL	SOURCE	SHEET
1	1	PS-RB1-SCT-003	COLLAR, SEATED	316L SS BAR	UBC DESIGN	3
2	1	PS-RB1-SCT-004	OUTER TUBE 1/4 X .020 WALL	316/316L SS	UBC DESIGN	4
3	1	PS-RB1-SCT-005	INNER TUBE 1/8 X .020, PERFORATED	316/316L SS	UBC DESIGN	5
4	1	SWAGELOK SS-400-3	UNION TEE 1/4 IN, NUTS + FERRULES	316 SS	SWAGELOK - COTS	6
5	1	SWAGELOK SS-4-TA-7-2	FEMALE TUBE ADAPTER 1/4 X 1/8 NPT	316 SS	SWAGELOK - COTS	7
6	1	CONAX MPG-125-A-G	PACKING GLAND 1/8 NPT, GRAFOIL	303 SS (316L OPT.)	CONAX - COTS	7
7	1	SWAGELOK SS-T4-S-035	DILUTION TUBE 1/4 X .035, CUT 76.2	316/316L SS	SWAGELOK - STOCK	4
ALT	-	SWAGELOK SS-2-UT-A-4BT	J2 ALTERNATE, ULTRA-TORR (NOT FITTED)	316 SS / FKM	SWAGELOK - COTS	7

1. ITEMS 1-3: UBC DESIGN. ITEMS 4-7 AND ALT: PURCHASED PARTS - DO NOT MODIFY.
2. MATERIAL 316/316L SS (TENTATIVE); INCONEL 600/625 UNDER CONSIDERATION.
3. WETTED PARTS STAINLESS: ICAO ANNEX 16 VOL II APP 3, SAE ARP1256.
4. ITEM 3 IS FIXED AT W2 ONLY AND SLIDES AXIALLY AT J2.
5. J1: TUBE-SAMPLE QUALIFICATION AND TESTS PER SHEET 8.
6. NUTS SHOWN FINGER-TIGHT. () = REFERENCE.

JOINTS			
MARK	JOINT	TYPE	SHEET
W1	ITEM 2 TO ITEM 1	WELD, SQUARE-GROOVE, ALL ROUND	2
W2	ITEM 3 TO ITEM 1 SOCKET	WELD, FILLET 0.20, ALL ROUND	2
J1	ITEM 2 IN ITEM 4	SWAGELOK FERRULES (FIXED)	6
J2	ITEM 3 THROUGH 5 + 6	GRAFOIL PACKING (SLIDES)	7
J3	ITEM 7 IN ITEM 4	SWAGELOK FERRULES	6
J4	ITEM 6 IN ITEM 5	1/8-27 NPT, ASME B1.20.1	7

GENERAL TOL. ISO 2768-m GEOMETRY ISO 22081 TOLERANCING ISO 8015 mm			
() = REFERENCE SURFACE ISO 21920-1 EDGES ISO 13715 3RD ANGLE			
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SCALE: AS NOTED THIRD-ANGLE PROJECTION		Document type MFG DRAWING	Document status PRELIMINARY
 THE UNIVERSITY OF BRITISH COLUMBIA Mechanical Engineering Faculty of Applied Science		Title GAS SAMPLING PROBE B.1-SC-T ASSEMBLY SECTION + LIST OF MAT.	DWG No. PS-RB1-SCT-001
		Rev. A	Date of issue 2026-10-07
		Sheet 1/8	

SCALE 10 : 1



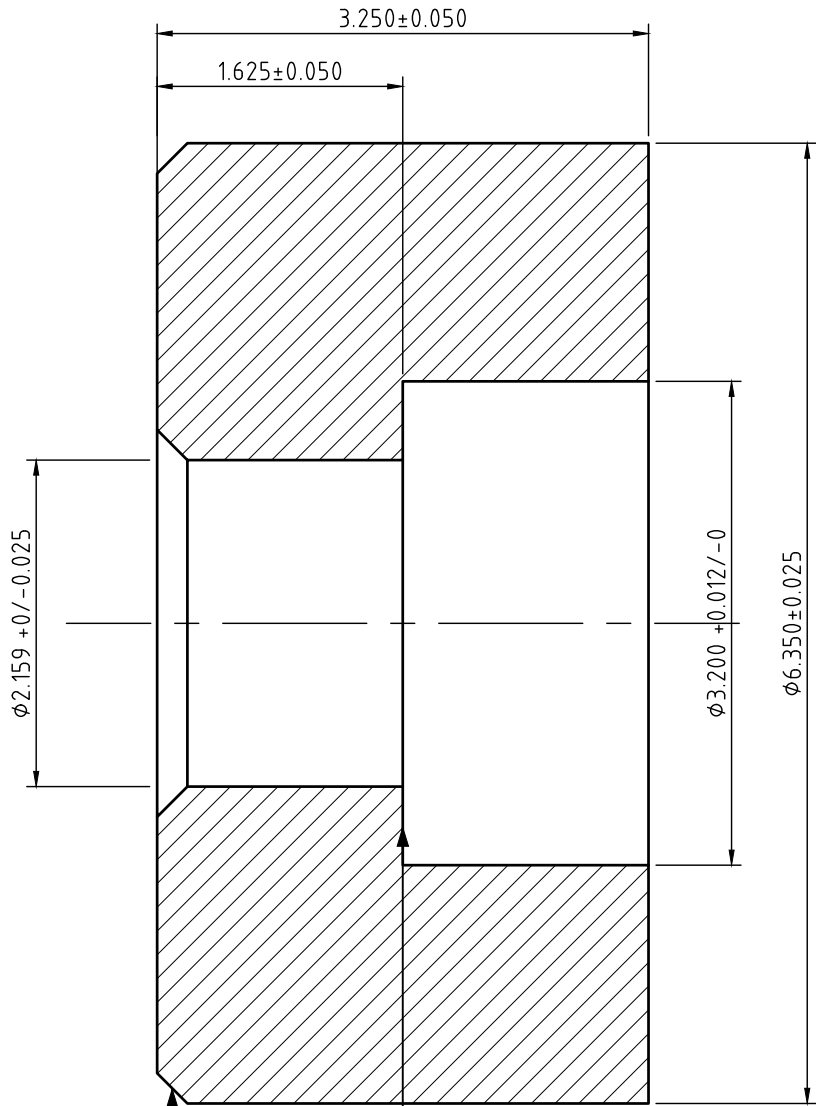
MARK	JOINT	TYPE	SIZE	PROCESS / QUALITY
W2	ITEM 3 TO ITEM 1 SOCKET	FILLET, ALL ROUND	0.20 LEG MAX	MICRO-TIG / LASER, AUTOGENOUS
W1	ITEM 2 TO ITEM 1 REAR FACE	SQUARE-GROOVE, ALL ROUND	FULL PEN.	ISO 5817-B / ISO 13919-1-B

- | FEATURE | VALUE | NOTE |
|-----------------|-------------------------------|-----------------|
| SOCKET, ITEM 1 | $\varnothing 3.200 +0.012/-0$ | REAMED, H7-LIKE |
| TUBE OD, ITEM 3 | $\varnothing 3.175 \pm 0.013$ | PRECISION TUBE |
| CLEARANCE | 0.012 TO 0.050 | DIAMETRAL |

() = REFERENCE SURFACE ISO 21920-1 EDGES ISO 13715 3RD ANGLE

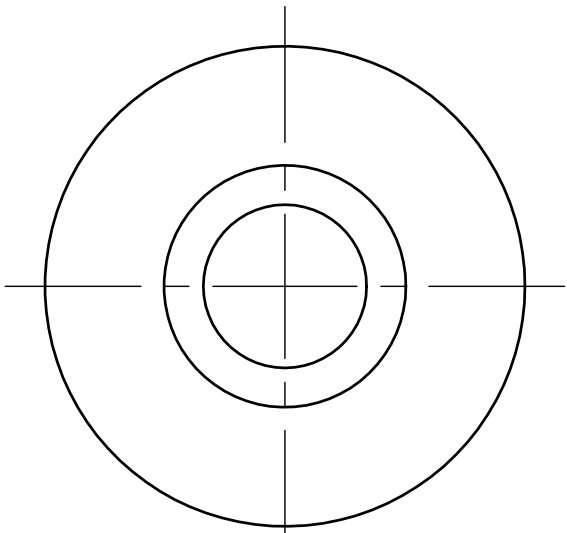
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		Title GAS SAMPLING PROBE B.1-SC-T PROBE TIP SEATED JOINT + WELDS	DWG No. PS-RB1-SCT-002		
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SECTION A-A ITEM 1 COLLAR
SCALE 20 : 1



0.2 X 45°, 2 PLACES (OD + BORE, TIP FACE)

SHOULDER: SHARP, SQUARE - ITEM 3 SEATS HERE



VIEW F FROM THE REAR
SCALE 10 : 1

COLLAR DATA

FEATURE	SIZE	TOLERANCE
COLLAR LENGTH	3.250	±0.050
TIP TO SHOULDER	1.625	±0.050
SEAT DEPTH	1.625	REF
SOCKET DIA	Ø3.200	+0.012 / -0
BORE DIA (= ITEM 3 ID)	Ø2.159	+0 / -0.025
COLLAR OD (= ITEM 2 OD)	Ø6.350	±0.025
SOCKET / BORE COAXIAL	-	0.02 TIR
SHOULDER SQUARE TO BORE	-	0.02

- ITEM 1
- 316L SS BAR Ø1/4 IN TO ASTM A479 (ALT. A276). CERTIFICATES EN 10204 3.1.
 - BORE AND SOCKET IN ONE SET-UP (0.02 TIR).
 - BREAK THE SOCKET MOUTH 0.05 MAX ONLY.
 - Ra 0.8 SOCKET + SHOULDER, Ra 1.6 BORE.
 - SOCKET FITS THE MEASURED ITEM 3 LOT:
SOCKET = TUBE OD + 0.025 (SHEET 4).
 - W1, W2: SHEET 2.

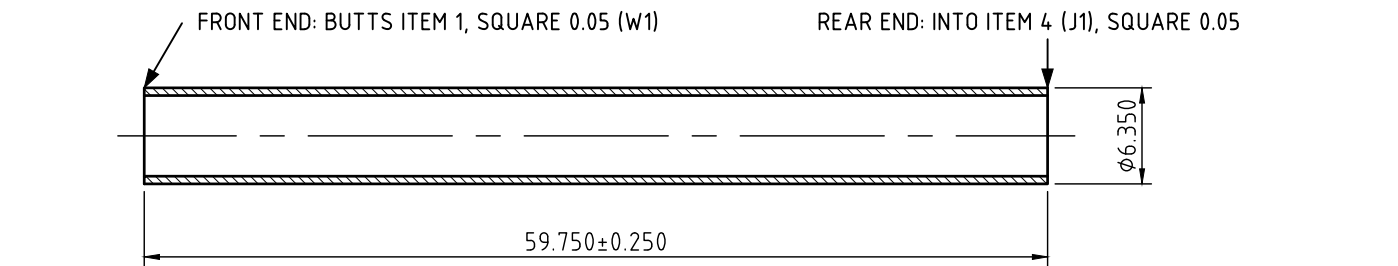
GENERAL TOL. ISO 2768-m GEOMETRY ISO 22081 TOLERANCING ISO 8015 mm

() = REFERENCE SURFACE ISO 21920-1 EDGES ISO 13715 3RD ANGLE

Dept. MECH	Technical reference FUSION B.1-SC-T v5	Created by Siddharth Sharma	Approved by	
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			Rev. A	Date of issue 2026-10-07
			Sheet 3/8	

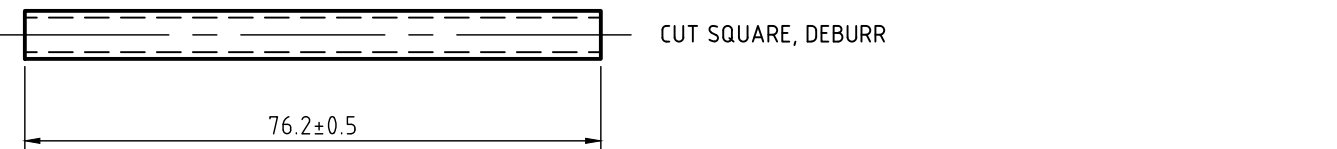
ITEM 2 OUTER TUBE

SCALE 2 : 1 SECTION A-A, PLAIN TUBE



ITEM 7 DILUTION SUPPLY TUBE

SCALE 1:1 1/4 X .035 WALL (Ø6.35 X 0.89)



ITEM 2 - WHAT IS CONTROLLED

FEATURE	SIZE	TOLERANCE / NOTE
CUT LENGTH	59.750	±0.250
ENDS SQUARE TO AXIS	-	0.05
OD	Ø6.350	AS SUPPLIED, ASTM A632
ID	(Ø5.334)	REF - ANNULUS 1.080 TO ITEM 3

TUBE STOCK

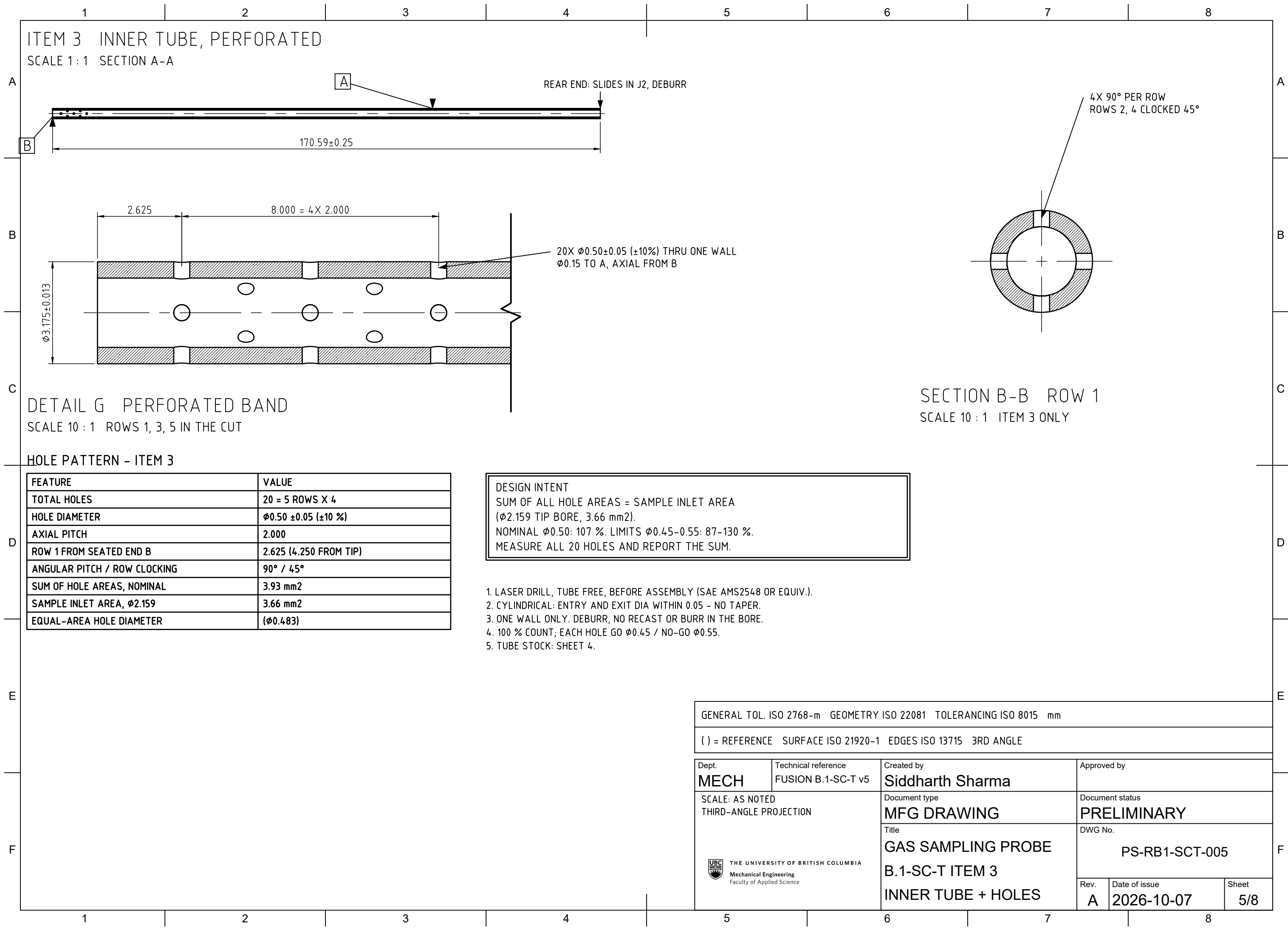
ITEM	STOCK	SPEC / TEMPER	OD TOLERANCE	SUGGESTED SOURCE	ALTERNATE SOURCE
2	1/4 OD X .020 W (6.350 X 0.508)	316 SMLS, ANNEALED, A632	+0.004/-0 IN	MICROGROUP 316F20250X020SL	VITA NEEDLE; ACCU-TUBE
3	1/8 OD X .020 W (3.175 X 0.508)	316 SMLS, ANNEALED, A632	±0.013 mm (NOTE 2)	MICROGROUP 316F20125X020SL	VITA NEEDLE; ACCU-TUBE
7	1/4 OD X .035 W (6.350 X 0.889)	316/316L SMLS, A269	MILL	SWAGELOK SS-T4-S-035-20	TITAN ST6-04-0.035
ALT	SAME AS 2, 3	INCONEL 600 (B167) / 625 (B444)	-	MICROGROUP (ALLOY 600)	-

1. ALL TUBES SEAMLESS 316/316L, FULLY ANNEALED (90 HRB MAX) FOR SWAGelok FERRULE JOINTS. CERTIFICATES EN 10204 3.1.
2. ITEM 3: IF THE MEASURED TUBE OD EXCEEDS $\phi 3.188$, MACHINE THE ITEM 1 SOCKET TO TUBE OD + 0.025 (SHEET 3).
3. MATERIAL 316 IS TENTATIVE; INCONEL 600/625 UNDER CONSIDERATION FOR HIGHER TIP TEMPERATURE.
4. CUT, DEBURR INSIDE AND OUT, CLEAN AND DRY. NO MACHINING OF OD OR ID.

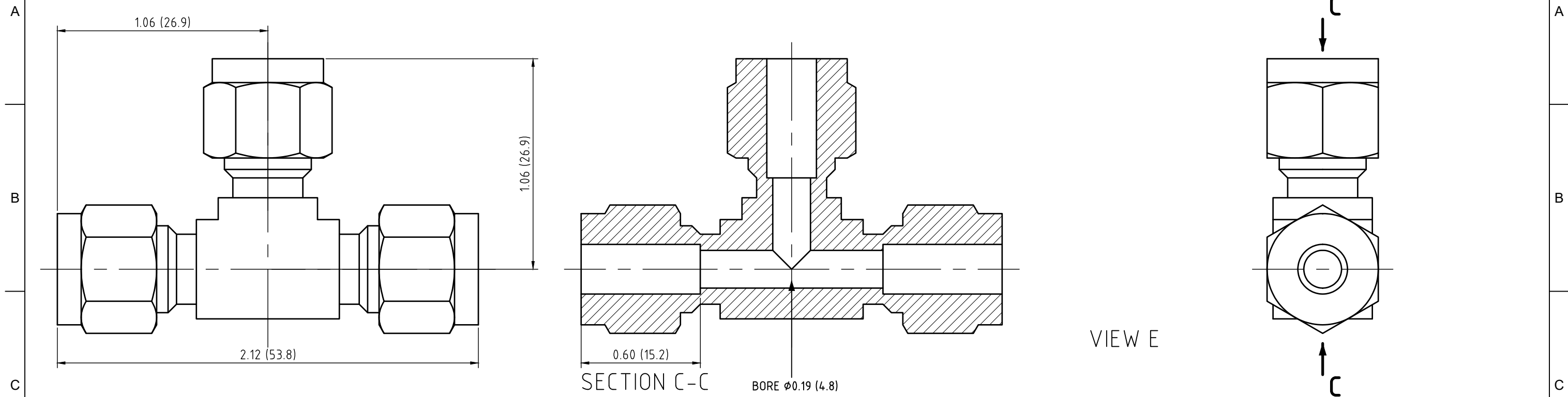
GENERAL TOL. ISO 2768-m GEOMETRY ISO 22081 TOLERANCING ISO 8015 mm

() = REFERENCE SURFACE ISO 21920-1 EDGES ISO 13715 3RD ANGLE

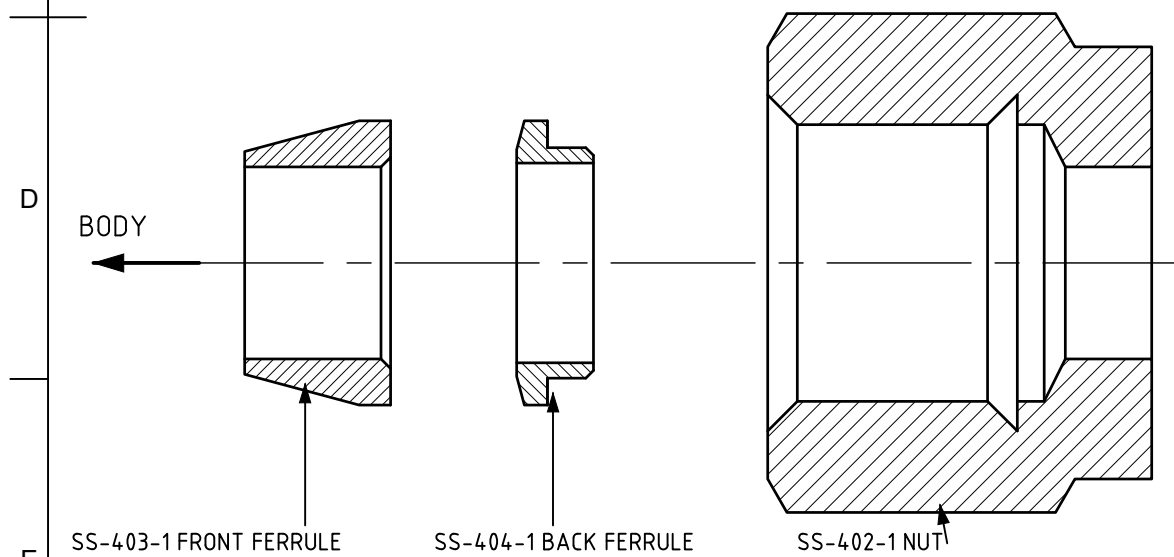
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SCALE: AS NOTED THIRD-ANGLE PROJECTION  THE UNIVERSITY OF BRITISH COLUMBIA Mechanical Engineering Faculty of Applied Science		Document type MFG DRAWING	Document status PRELIMINARY		
		Title GAS SAMPLING PROBE B.1-SC-T ITEMS 2 + 7 TUBES + SOURCING	DWG No. PS-RB1-SCT-004		
			Rev. A	Date of issue 2026-10-07	Sheet 4/8



ITEM 4 SWAGELOK SS-400-3 UNION TEE, 1/4 IN
SCALE 2 : 1 NUTS FINGER-TIGHT



DETAIL F 1/4 IN NUT + FERRULES, EXPLODED
SCALE 4 : 1 ONE SET PER PORT OF ITEM 4



PURCHASED PART - SWAGELOK. REFERENCE ONLY, DO NOT MANUFACTURE.
VIEWS SHOW BODY, NUTS AND FERRULES AS ONE PIECE; SEPARATE PARTS IN DETAIL F.

CATALOG DATA (SWAGELOK MS-01-140)

DIMENSION	in	mm
OVERALL A	2.12	53.8
CENTRE TO NUT END, FINGER-TIGHT	1.06	26.9
TUBE INSERTION D	0.60	15.2
BORE E	Ø0.19	Ø4.8
WRENCH PAD / NUT HEX	1/2, 9/16	-
MAKE-UP FROM FINGER-TIGHT	1-1/4 TURN	-

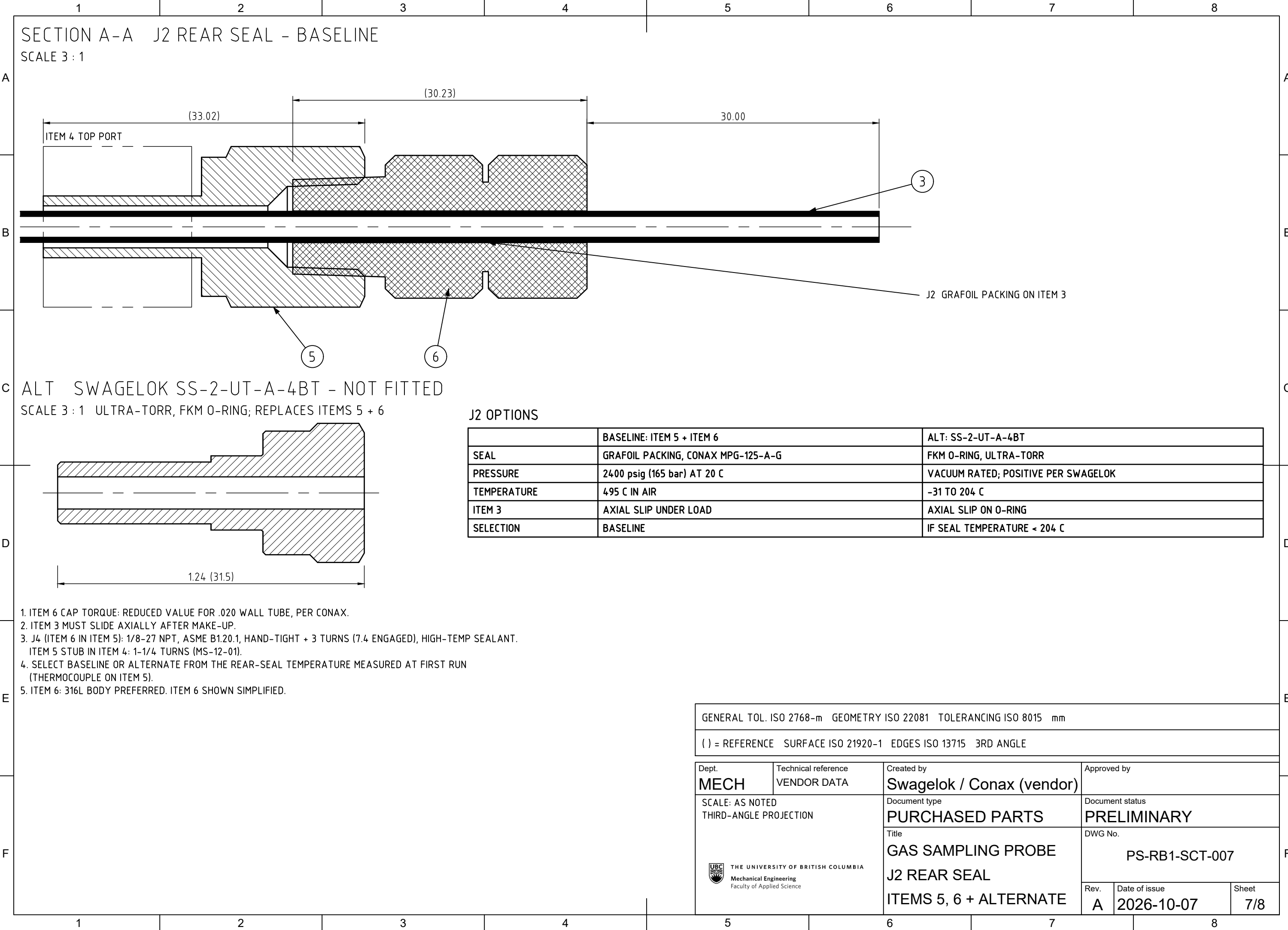
SUPPLIED ASSEMBLED:
BODY + 3 NUTS SS-402-1
+ 3 FRONT SS-403-1
+ 3 BACK SS-404-1.
316 SS, SC-10 CLEAN.

1. INSTALL TO SWAGELOK MS-12-01: TUBE BOTTOMED ON STOP, 1-1/4 TURNS, GAP GAUGE CHECK.
2. J1 (ITEM 2, .020 WALL): QUALIFY ON A TUBE SAMPLE WITH SWAGELOK, THEN PROOF AND LEAK TEST (SHEET 8).
3. TOP PORT: ITEM 5 STUB (SHEET 7).
4. DO NOT MIX OTHER BRANDS' FERRULES OR NUTS.

GENERAL TOL. ISO 2768-m GEOMETRY ISO 22081 TOLERANCING ISO 8015 mm

() = REFERENCE SURFACE ISO 21920-1 EDGES ISO 13715 3RD ANGLE

Dept. MECH	Technical reference SWAGELOK STEP	Created by Swagelok (vendor CAD)	Approved by
SCALE: AS NOTED THIRD-ANGLE PROJECTION		Document type PURCHASED PART	Document status PRELIMINARY
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		Rev. A	Date of issue 2026-10-07
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A

ASSEMBLY SEQUENCE

STEP	OPERATION	SHEET
1	LASER DRILL ITEM 3 (TUBE FREE); INSPECT ALL HOLES	5
2	SEAT ITEM 3 IN ITEM 1 ON A MANDREL; WELD W2	2
3	CHECK W2 BEAD + RUNOUT; SLIDE ITEM 2 ON; WELD W1	2
4	BUBBLE-TEST W1 + W2	8
5	ITEM 4 OVER ITEM 3 ONTO ITEM 2 (J1): BOTTOM ON STOP, 1-1/4 TURNS	6
6	ITEM 5 OVER ITEM 3 INTO ITEM 4 TOP PORT, 1-1/4 TURNS	7
7	ITEM 6 OVER ITEM 3 INTO ITEM 5 (J4): SEALANT, HAND-TIGHT + 3 TURNS	7
8	ITEM 6 CAP TO CONAX TORQUE - CHECK ITEM 3 STILL SLIDES	7
9	ITEM 7 INTO ITEM 4 BRANCH (J3), 1-1/4 TURNS	6
10	PROOF + LEAK TEST; FIT THERMOCOUPLE ON ITEM 5 FOR RUN 1	8

INSPECTION

NO	ITEM	CHARACTERISTIC	REQUIREMENT	METHOD
1	1	SOCKET DIA	Ø3.200 +0.012/-0 (OR LOT OD+0.025)	PLUG GAUGE
2	1	TIP TO SHOULDER	1.625 ±0.050	DEPTH GAUGE
3	1	BORE DIA	Ø2.159 +0/-0.025	PIN GAUGE
4	1	SOCKET / BORE COAXIAL	0.02 TIR	INDICATOR
5	3	TUBE OD	Ø3.175 ±0.013	MICROMETER
6	3	HOLE DIA, EACH	Ø0.50 ±0.05	GO / NO-GO
7	3	HOLE COUNT	20 = 5 X 4	COUNT
8	3	SUM OF HOLE AREAS	REPORT; TARGET 3.66 mm2	OPTICAL
9	3	NO TAPER	ENTRY - EXIT 0.05 MAX	OPTICAL, BOTH SIDES
10	3	CUT LENGTH	170.59 ±0.25	CALIPER
11	2	CUT LENGTH	59.75 ±0.25	CALIPER
12	ASSY	W1, W2	ISO 5817-B / 13919-1-B, LEAK-TIGHT	VISUAL 10X + LEAK
13	ASSY	ITEM 3 RUNOUT	Ø0.20 TO ITEM 1 OD	INDICATOR
14	ASSY	J1, J3 MAKE-UP	GAP GAUGE NO-GO	SWAGelok GAUGE
15	ASSY	ITEM 3 AXIAL SLIP AT J2	REPORT FORCE	PUSH GAUGE

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