OTHER TECHNICAL REQUIREMENTS FOR CLOSED LOOP COOLING SKIDS

1) FLANGES OF FLEX HOSES SHALL BE LOCATED AT THE EDGE OF THE VIBRATION PADS (DWG 310801-201202). CONTRACTOR SHALL ALSO PROVIDE AND INSTALL PIPING, FITTINGS AND SEALS BETWEEN THESE FLANGES AND THE EXISTING 2" DIAMETER PIPING PENETRATING THE WALL OF THE UTILITY MEZZANINE (WITH VICTAULIC ENDS). THIS APPLIES TO BOTH THE SUPPLY AND RETURN, AND INCLUDES ALL CONNECTING HARDWARE.

2) VALVES 1-1/2" AND 2" DIAMETER SHALL BE WORCESTER SERIES 44 BALL VALVES OR ANL APPROVED EQUIVALENT. BODY, BOLTING, ENDS, BALL AND STEM SHALL BE 316 S.S. SEAT AND BODY SEAL SHALL BE TFE. END CONNECTIONS SHALL BE SOCKET WELD. IT SHALL BE POSSIBLE TO REPLACE SEATS AND PACKING IN-SITU.

3) VALVES 1/4", 1/2" AND 3/4" DIAMETER SHALL BE WORCESTER SERIES 44 BALL VALVES OR ANL APPROVED EQUIVALENT. BODY, BOLTING, ENDS, BALL AND STEM SHALL BE 316 S.S. SEAT AND BODY SEAL SHALL BE TFE. END CONNECTIONS SHALL BE FNPT THREADED. IT SHALL BE POSSIBLE TO REPLACE SEATS AND PACKING IN-SITU.

4) CONTROL VALVE SHALL BE WORCESTER MODEL CPT44681TSE-G80/1575-SW 120VAC CHARACTERIZED SEAT BALL VALVE, 316SS CONSTRUCTION, 60 DEGREE V-SEAT, TEFLON DOWNSTREAM SEAT AND SEALS, NPT ENDS, MOUNT TO 15755W-120V/AF17-4 ELECTRIC ACTUATOR, 100% DUTY CYCLE, 120 VOLT WITH INTEGRAL 4-20 mA POSITIONER.

5) CHECK VALVES SHALL BE MISSION DUO-CHECK #72-HHH-3W (316 SS).

6) FLOW SWITCH SHALL BE FLOW & LEVEL CONTROLS, INC. MODEL FX-L-1000-S (WITH HIGH FLOW OPTION), 1" MNPT MOUNTED IN A 1" FNPT HALF-COUPLING PERPENDICULAR TO THE FLOW DIRECTION. CIRCUIT BOARD MOUNTED INSIDE CONDUIT HUB PROVIDED WITH SWITCH. CONTRACTOR SHALL INSTALL SWITCH SO THAT THERE IS AT LEAST 5 PIPE DIAMETERS OF STRAIGHT PIPE UPSTREAM AND 5 PIPE DIAMETERS DOWNSTREAM OF SWITCH.

7) PRESSURE INDICATORS SHALL BE ASHCROFT MODEL 25-1009SW-04L-200 PSI OR ANL APPROVED EQUIVALENT. INDICATORS ARE ALL 316 S.S., 2.5" DIAL, 1/2" MNPT CONNECTION, LOWER MOUNTING, 0-200 PSIG RANGE.

8) DIFFERENTIAL PRESSURE GAUGES SHALL BE ORANGE RESEARCH CO.

   ** PUMP D-P: 1516-DG-1C-2.5L 0-50 PSI 316SS
   ** FILTER D-P: 1201-PG-1C-2.5L 0-10 PSI 316SS

9) TEMPERATURE INDICATORS SHALL BE AS RECOMMENDED BY CONTRACTOR. THESE SHALL BE THERMOMETER TYPE INDICATORS ACCURATE TO WITHIN .25°F OR BETTER.

10) LEVEL INDICATOR SHALL BE:
KOBOLD NBK-0361-KA-L8"-R2, (INCLUDES 2 SWITCHES)

11) THERMOWELL SHALL BE OMEGA MODEL HWA/NBS-2/TYPE 2-2/DH-1-20-J-1/.75"-260A/U1.625"-316SS OR ANL APPROVED EQUAL.

12) LEVEL SWITCHES MOUNTED IN THE EXPANSION TANKS SHALL BE INCORPORATED INTO LEVEL INDICATOR.

13) FLEXHOSES SHALL BE FLEXONICS 401M SERIES OR EQUAL, 2" (NOM) I.D. X 18" LIVELENGTH; ONE END PROVIDED WITH ANSI 150# F.F. FLANGE; OTHER END PROVIDED WITH FEMALE SOCKET WELD, 2" NPS, 150# RATING; DESIGN PRESSURE 180 PSIG; TEST PRESSURE 270 PSIG; DESIGN TEMPERATURE 100°F.

14) FLANGES SHALL BE 150#, VAN-STONE TYPE BACKING FLANGE W/ TYPE "A" SCH. 10, 304SS STUB END. GASKETS SHALL BE GARLOCK GYLON 3500. BOLTING SHALL BE GRADE 5 STUDS AND NUTS, TORQUED TO 48 FT-LBS. ALL FLANGES AND SHALL COMPLY WITH ANSI B16.5, CLASS 150.

15) COMPONENTS AND DESIGN SHALL BE SUCH THAT MAINTENANCE AND REPLACEMENT ARE CONVENIENT AFTER INSTALLATION OF PIPING SYSTEM IS COMPLETE. PIPING UNIONS SHALL BE INSTALLED TO THE EXTENT NECESSARY TO BE ABLE TO REMOVE FROM THE SKID ANY COMPONENT WHICH IS SUPPLIED WITH THREADED CONNECTIONS.

16) THREADED CONNECTIONS SHALL BE NPT TYPE. CONNECTIONS SHALL BE MADE USING LOCTITE THREAD SEALANT NO. 569 AND APPROPRIATE USE OF PRIMER "T" (#747).

17) THE EXPANSION TANK SHALL BE MOUNTED WITH ITS AXIS PARALLEL TO THE HORIZONTAL PLANE. ITS LOWEST POINT SHALL BE NO LESS THAN 12 INCHES ABOVE THE HIGHEST OF EITHER THE HIGHEST POINT OF 2" DIAMETER PIPING, THE PUMPS, THE FILTER OR THE HEAT EXCHANGER.

18) CONNECTION OF 480 VAC POWER TO CONTROL PANEL, SUPPLY AND INSTALLATION OF PANEL, AND ALL WIRING FROM PANEL TO COOLING SKID COMPONENTS (SUCH AS MOTOR, INSTRUMENTS, ETC.) WILL BE PERFORMED BY OTHERS.

19) THE USE OF COPPER OR COPPER BASED ALLOYS IS STRICTLY FORBIDDEN IN THE CLOSED LOOP PORTION OF THE SKID (IE, IN THE PIPING LABELED ON THE P&ID AS "2" DIAM SUPPLY" AND "2" DIAM. RETURN", OPERATING AT THE NOMINAL 75°F TEMPERATURE).

20) ENVIRONMENT: INDOOR AREA; GENERAL PURPOSE, NON-HAZARDOUS

21) TEMPERATURE RANGE: 60-95°F AMBIENT

22) ALL COMPONENTS PROVIDED BY CONTRACTOR SHALL BE COMMERCIALLY AVAILABLE ITEMS WHICH CAN BE READILY REPLACED AND PROCURED.

23) CONTRACTOR SHALL SUPPLY AND INSTALL ALL MATERIALS NECESSARY TO PROPERLY SUPPORT AND ANCHOR EQUIPMENT AND PIPING LINES.

   23.1 PIPE SUPPORT SYSTEM COMPONENTS SHALL BE CAPABLE OF WITHSTANDING DEAD LOADS IMPOSED BY THE WEIGHT OF THE PIPES FILLED WITH WATER AND SHALL HAVE A MINIMUM SAFETY FACTOR OF 5.

   23.2 PIPING SHALL BE SUPPORTED IN MANNER WHICH SHALL PREVENT UNDUE STRESSES (INCLUDING THERMAL STRESS) ON ANY VALVE, FITTING, OR PIECE OF EQUIPMENT. IN ADDITION, PIPE SUPPORTS SHALL BE PROVIDED AT CHANGES IN DIRECTION OR ELEVATION OR ADJACENT TO FLEXIBLE COUPLINGS. PIPE SUPPORTS AND HANGERS SHALL NOT BE INSTALLED IN EQUIPMENT ACCESS AREAS.

24) PIPING SHALL BE INSTALLED AS DIRECTLY AS POSSIBLE BETWEEN CONNECTING POINTS. ANL SHALL APPROVE FINAL PIPING LAYOUT PRIOR TO INSTALLATION.

25) PIPING SHALL BE INSTALLED WITH PROPER ALIGNMENT AND SLOPE. PIPING SHALL BE INSTALLED SO THAT THE SYSTEM CAN BE PROPERLY DRAINED AND VENTED.

26) PIPING SHALL BE CUT ACCORDING TO FINAL MEASUREMENTS TAKEN AT SITE, NOT FROM DRAWINGS.

27) PIPING IN THE 2" DIAMETER SUPPLY AND RETURN (CLOSED LOOP PIPING) SHALL BE TESTED AT 175 PSIG FOR 90 MINUTES AND AT 270 PSIG FOR 30 MINUTES.

28) NEW PIPING IN THE CHILLED WATER CIRCUIT SHALL BE TESTED AT 175 PSIG FOR TWO HOURS.

29) ALL PRESSURE TESTING SHALL BE PERFORMED HYDROSTATICALLY.

30) ALL PIPING MATERIALS SHALL BE 304 OR 316 STAINLESS STEEL.

31) PIPING SHALL BE HANDLED SO AS TO AVOID DAMAGE, BENDING, OR ENTRANCE OF DIRT AND DEBRIS. PIPING SHALL BE DELIVERED IN A PRE-CLEANED AND SEALED CONDITION FREE OF SCALE, LIQUID CONTAMINANTS AND PARTICULATES.

32) CONTRACTOR SHALL PROVIDE ALL MECHANICAL COUPLINGS REQUIRED FOR CONNECTING TO EXISTING PIPING SYSTEMS (EG. VICTAULIC FITTINGS).

33) ALL FASTENERS AND BOLTS SHALL BE IDENTIFIABLE BY APPROPRIATE MARKINGS SUCH AS GRADE 5 OR GRADE 8.

34) CONTRACTOR SHALL ENSURE THAT ALL PIPES ARE PROVIDED WITH IDENTIFYING MARKERS INDICATING FLOW DIRECTION AND FLUID TYPE PER ANSI A13.1.

35) CONTRACTOR SHALL SUPPLY DRAIN VALVES AT ALL LOW POINTS IN THE PIPING SYSTEM.

36) CONTRACTOR SHALL SUPPLY AIR BLEED VALVES AT ALL HIGH POINTS IN THE SYSTEM.

37) THE FOLLOWING SHALL BE OBSERVED WITH REGARD TO PIPE HANGERS:

   37.1 HANGERS AT STEEL JOISTS SHALL BE LOCATED AT THE JOIST PANEL POINTS.

   37.2 PIPE HANGERS SHALL BE AS MANUFACTURED BY ELCEN, GRINNELL, FEE AND MASON, UNISTRUT, OR ANL APPROVED EQUIVALENT.

   37.3 CONTRACTOR MAY USE EXISTING HANGERS WHERE THEY ARE ADEQUATE.

   37.4 NO WIRE OR PERFORATED STRAP HANGERS SHALL BE PERMITTED IN ANY PERMANENT PIPING INSTALLATION.

   37.5 FOR HORIZONTAL PIPING, UNLESS OTHERWISE SPECIFIED OR INDICATED, SPACE HANGERS AS FOLLOWS:

PIPE SIZE	CENTER TO CENTER SPACING
THROUGH 2"	8'
2-1/2" AND 3"	10'
4" AND 5"	13'
6"-14"	15'

38) CONTRACTOR SHALL PERFORM ALL WELDING BY THE GTAW PROCESS (GAS TUNGSTEN ARC) WITH APPROPRIATE BACKUP PURGE.

KEY TO INSTRUMENT SYMBOLOGY

- PANEL MOUNTED
- SKID MOUNTED
- BALL VALVE
- ANGLE VALVE
- INDICATING LAMP
- CONTROL VALVE W/ACTUATOR
- CHECK VALVE
- INTERLOCK
- FLEX HOSE

KEY TO ABBREVIATIONS

1ST LETTER	2ND LETTER	3RD LETTER
E - EMERGENCY	A - ALARM	D - DOWN
F - FLOW	E - ELEMENT	H - HIGH
H - HAND	L - LIGHT	L - LOW
L - LEVEL	I - INDICATING	
P - PRESSURE	S - SWITCH OR SHUT	
T - TEMPERATURE		
U - GENERAL		

ITEM	DWG/PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL / SPEC	QTY
		PARTS LIST		

REVISIONS				
DWG	CHANGE DESCRIPTION	BY	CHKD	DATE
01	SEE DCN NO. 941003-05	MAL		9/16

LAS NUMBER	A1830001	ARGONNE NATIONAL LABORATORY	
DRAWN BY	R.L.KEITHLEY 9/16/94	CHECKED BY	S. SHARMA 9/16/94
DESIGNED BY		PROJECT MGR	
ENGINEER	R. DORTWEGT 9/16/94	APPROVED/RELEASED	

TITLE: ADVANCED PHOTON SOURCE
STORAGE RING WATER SYSTEM
VACUUM CHAMBERS - COOLING
GENERAL ALL SECTORS AT LEVEL #2
CLOSED-LOOP COOLING SKID
PIPING & INSTRUMENT DIAGRAM

SCALE: NTS | SIZE: D | SHEET 2 of 2 | DRAWING NUMBER: 310801-200204-01

(D) | PLOT SCALE: 1=1 | DWG. SCALE: 1 | A183000

NOTES:

1. SYSTEM DESIGN PRESSURE: 180 PSIG
2. HYDROSTATIC TEST PRESSURE: 270 PSIG
3. ALL PIPING TO BE 304 OR 316 SST.
4. PIPING PER ANSI B31.1
5. DESIGN TEMPERATURE: 100°F
6. AREA CLASSIFICATION: GENERAL PURPOSE, NON-HAZARDOUS

CONTROL PANEL (BY OTHERS)
SIGNAL TO CONTROL ROOM
PUMP ON OFF
LOW LEVEL ALARM
LOW-LOW LEVEL ALARM AND PUMP SHUTDOWN
PUMP CONTROL (TIMER)
TEMP INDICATING CONTROLLER (TIC)
LOW FLOW LOGIC

FILTER
PALL HOUSING PC042LG32J
WITH 4 ELEMENTS PFY2UY0450
5 MICRON ABSOLUTE FILTRATION
CLEAN PRESSURE DROP ≤ 2 PSI
2" NPT CONNECTIONS

10 PSIG NOMINAL GN2 BLANKET (BY OTHERS)
P.I.
15 GAL. EXPANSION TANK (12"ø X 25" TK LG) MAWP=180 PSIG
LSL
LI
LSLL
INCORPORATE 2 SWITCHES WITH KOBOL LEVEL INDICATOR
PLUG
(3/4" FNPT ON VESSEL) (TYP 4X)

EXISTING 2"ø SUPPLY WITH VICTAULIC FITTINGS (SEE ITEM 1, SHT 2)
UTILITY MEZZANINE WALL
AIR VENT MANUAL AT HIGH POINT
LOCATE AT EDGE OF SKID (SEE ITEM 1, SHT2)
BY CONTRACTOR (TO UTILITY MEZZ WALL)
2"ø X 18" LG (LIVE LENGTH) FLEX HOSE
OUTLET CONDITIONS: 52 GPM, 55 PSIG, 75° F
T.I.
FLOW SWITCH MOUNTED ON 1" ø FNPT HALF COUPLING
P.I.
FSL
TE
THERMOWELL
LOCATE REDUCERS ADJACENT TO HEAT EXCHANGER
TO VALVE
CHILLED WATER SUPPLY (45° F, 40 PSIG, 18.2 GPM)
1" VEE BALL VALVE (S.S.)
2"ø (BLACK,INSULATE)
2-1/2"ø VICTAULIC VALVE
EXISTING

HEAT EXCHANGER
HOT OUTLET
HOT INLET
COLD INLET
COLD OUTLET
BELL & GOSSETT GPX-151-17 (OR EQUIVALENT) PLATE & FRAME
53.0 KW (181,000 BTU/HR)
316 SST, 2" NPT CONNECTIONS
DESIGN PRESSURE: 200 PSI
TEST PRESSURE: 300 PSI
NOTE: EXCHANGER PROVIDED WITH 200% EXCESS SURFACE FOR FUTURE CAPACITY REQUIREMENTS.

T.I.
CONTRACTOR SUPPLY & INSTALL VICTAULIC TO NPS TRANSITION HERE (TYPICAL 2X)
(BLACK,INSULATE)
CHILLED WATER RETURN (55° F, 25 PSIG, 18.2 GPM)
2-1/2"ø VICTAULIC VALVE
EXISTING

2"ø
1/4"ø
1/2"ø
1-1/2"ø
DPI
1/4"ø AT HIGH POINT
PUMP DISCHARGE CONDITIONS: 52 GPM, 60 PSIG, 78.5° F

2" X 1" REDUCER
PUMP
SPARE
FLUSH PLAN 11A OF MECHANICAL SEAL, TYP 2 PLCS, FLUSH PIPING PROVIDED BY ANL
1/2" DRAINS WITH VALVES BY CONTRACTOR (2 PLACES)

PUMPS
INGERSOLL-DRESSER 2X1X10 H0C2
1800 RPM, 5 HP, 52 GPM AT 104' TDH
FLUSH PLAN 11A
ANL P.O. 41570034

3/4"ø
D.I. WATER FILL
IAS-2 AIR SEPARATOR (SUPPLIED BY ANL)
1/2"
INLET CONDITIONS: DE-I WATER 3 M-OHM, 52 GPM, 15 PSIG (NOM), 78.0° F
2"ø X 18" LG (LIVE LENGTH) FLEX HOSE
BY CONTRACTOR (TO UTILITY MEZZ WALL)
LOCATE AT EDGE OF SKID (SEE ITEM 1, SHT2)
AIR VENT MANUAL (AT HIGH POINT)
EXISTING 2"ø RETURN WITH VICTAULIC FITTINGS (SEE ITEM 1, SHT 2)
UTILITY MEZZANINE WALL

ITEM	DWG/PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL / SPEC	QTY

PARTS LIST

SYM	CHANGE DESCRIPTION	BY	CHKD	DATE
01	SEE DCN NO. 941003-05	MAL		11-1-94

REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN INCHES
TOLERANCES: DECIMALS .X ±.X, .XX ±.XX, .XXX ±.XXX; ANGULAR ±.XX°
SURFACE ROUGHNESS
REMOVE ALL BURRS AND BREAK SHARP EDGES .03 MAX.
SURFACE TEXTURE TO BE IN ACCORDANCE WITH LATEST ANSI Y14.36M
DIMENSIONING & TOLERANCING IN ACCORDANCE WITH LATEST ANSI Y14.5
DO NOT SCALE DRAWING

LOG NUMBER: A1830001
THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

DRAWN BY	DATE	GP LEADER	DATE
R.L.KEITHLEY	4/25/94	S. SHARMA	8/11/94
CHECKED BY		PROJECT MGR	
DESIGNER		APPROVED/RELEASED	
RESPONSIBLE ENGINEER	R. DORTWEGT 8/11/94		
MATERIAL			

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