

REVISIONS			
REV	DATE	DESCRIPTION	APPROVED
1	-	UPDATE TO ALIGN WITH NEW DESIGN	W.MARCUM
























GENERAL REQUIREMENTS
 Flow Rate 150 gpm max.
 Temperature (Bundle inlet) 360°C
 Temperature (Max) 550°C
 Wetted Fuel Bundle Length 2.5 m

























POWER REQUIREMENTS
 Heater Rod Power 1 MW
 Sodium Support 200 kW
 Pump Power 127 kW
 Cooling 9 kW
 Total 1.336 MW

HEATER ROD REQUIREMENTS
 1. 7.43mm [293"] diameter
 2. 8.86mm [349"] rod radial pitch
 3. 57.6mm [2.27"] inside F-F shroud
 4. 500mm [19.68"] Plenum length
 5. 1000mm [39.37"] Upper Length
 6. 1000mm [39.37"] Heated length
 7. 1000mm [19.68"] lower length
 8. 160mm [6.30"] straightener length (200 per 8mm tubes)
 9. 50 mm [2"] Screen length 40% screen 3" Dia.

 Maximum 37-pin bundle.
 1.2 Power
 The following constraints are placed on the heater rod power requirements:
 1.) 37-pin bundle is divided in to 8 separate power banks.
 1 bank with 1 rod
 3 banks with 4 rods
 1 bank with 5 rods
 2 banks with 6 rods
 1 bank with 7 rods
 2.) The total power requirement for the bundle shall not exceed 1 MW.

EQUIPMENT:






-  ELECTRO-PNEUMATIC CONVERTER
-  CORIOLIS FLOW ELEMENT
-  ELECTROMAGNETIC FLOW ELEMENT
-  ELECTROMAGNETIC FLOW METER
-  FLOW TRANSMITTER
-  FIBER OPTIC TRANSMITTER
-  HEATER
-  DIFFERENTIAL PRESSURE TRANSMITTER
-  LEVEL DIFFERENTIAL PRESSURE TRANSMITTER
-  PRESSURE INDICATING TRANSMITTER
-  LEVEL SWITCH LOW
-  LEVEL SWITCH HIGH
-  LEVEL TRANSMITTER
-  TEMPERATURE INDICATING CONTROLLER
-  THERMOCOUPLE MEASURING FLUID TEMPERATURE
-  THERMOCOUPLE MEASURING SURFACE TEMPERATURE
-  RTD (HEAT TRACE)
-  PRESSURE INDICATOR (GAUGE)
-  DC CONDUCTION PUMP
-  MAIN CIRCULATING PUMP
-  DC POWER SUPPLY
-  SILICON-CONTROLLED RECTIFIER
-  VARIABLE FREQUENCY DRIVE

-  AUTOMATIC VENT VALVE [AVV]
-  SAFETY VALVE [PSV]
-  PRESSURE REGULATING VALVE [PRV]
-  FLOW REGULATING VALVE [FRV]
-  MANUAL PRESSURE REGULATING VALVE [PRV]
-  BALL VALVE [HV]
-  BUTTERFLY VALVE, [HV]
-  GLOBE VALVE (BELLOWS SEAL)
-  BALL VALVE , ACTUATED [BVA]
-  CHECK VALVE [CV]
-  SOLENOID VALVE [SV]
-  ROOT VALVE [RV]
-  NEEDLE VALVE [HV]
-  BLEED VALVE [VV]
-  ORIFICE PLATE [FO]
-  SEAL [S]
-  FILTER [F]
-  REMOTE DIAPHRAGM SEAL
-  IN-LINE STRAINER [STR]
-  DRAIN
-  DRY BREAK COUPLER, [DBC]
-  MIXER, SEALESS [MXS]
-  AIR COOLED HEAT EXCHANGER [HX]
-  GRAYLOC COUPLING












SYSTEM ACRONYMS:

- A AIR SYSTEM
- CA COOLING AIR SYSTEM
- CV CHECK VALVE
- CW COOLANT WASTE SYSTEM
- DA DAMPER ACTUATOR
- DV DRAIN VALVE
- FCV FLOW CONTROL VALVE
- HV HAND VALVE
- HWWT HEATER WIRE WRAPPED TEST SECTION
- HX HEAT EXCHANGER
- IV ISOLATION VALVE
- LCV LEVEL CONTROL VALVE
- MCP MAIN CIRCULATING PUMP
- OSU OREGON STATE UNIVERSITY
- PCS PRIMARY COOLANT SUPPLY SYSTEM
- PCL PRIMARY COOLANT LOOP SYSTEM
- PCR PRIMARY COOLANT RETURN SYSTEM
- PSV PRESSURE SAFETY VALVE
- PZR PRESSURIZER SYSTEM
- TIC TEMPERATURE INDICATING CONTROLLER
- SoFIE SODIUM FLOW INVESTIGATION EXPERIMENT
- TST TEST SECTION
- VAC VACUUM
- VTA VENT TO ATMOSPHERE
- VV VENT VALVE

LINE TYPES:

-  FLUID/ELECTRICAL SUPPLY LINE
-  LOGIC FUNCTION OR ELECTRICAL
-  PCS LINE
-  FLEXIBLE HOSE
-  FLOW PATH

COLORS:

-  GENERAL PURPOSE / PRIMARY COOLANT LOOP / TEST SECTION
-  PRIMARY COOLANT SUPPLY
-  PRIMARY COOLANT RETURN / TEMPERATURE SENSING
-  LEVEL SENSING / HEATERS
-  COOLING AIR / PRESSURE SENSING
-  PRESSURIZER SYSTEM / ARGON & VACUUM
-  COMPRESSED AIR
-  COOLANT WASTE SYSTEM
-  FLOW MEASUREMENT
-  CLEANING CONNECTIONS
-  VENT TO ATMOSPHERE

NOTES:

- 1) PIPE CALL OUT (A"-BBB-SSC-DDD-IN-HT)
 A = PIPE DIA (INCHES)
 BBB =SYSTEM ACRONYM
 SSC = SYSTEM SPECIFICATION CODE
 SS1 316SS PIPE 10S
 SS3 316SS PIPE 40S
 SST 316SS TUBING
 DDD = PIPE IDENTIFICATION TAG
 IN = INSULATION CALLOUT(TYPE-INCH)
 HT = HEAT TRACE TYPE
- 2) SoFIE SYSTEM COMPONENT NUMBERING BREAKDOWN
 PCS PRIMARY COOLANT SUPPLY (Na) = 0XX
 PCL PRIMARY COOLANT LOOP = 1XX
 PCR PRIMARY COOLANT RETURN = 2XX
 COLD TRAP = 21X
 PLUGGING METER = 22X
 PZR PRESSURIZER (ARGON GAS) = 3XX
 TST TEST SECTION = 4XX
 CA COOLING AIR = 7XX
 A AIR SYSTEM = 8XX
 CW COOLANT WASTE = 9XX
 VAC VACUUM = 98X -989
 VTA VENT TO ATMOSPHERE(OUTSIDE) = 99X-999
- 3) INSTRUMENT/VALVE CALL-OUT: WWW-XYZ WHERE
 WWW = INSTRUMENT VALVE TYPE,
 X = SERVICE DESIGNATOR (FROM ABOVE)
 Y = SEQUENCE / SUBSYSTEM/ AREA REFERENCE
 X = SEQUENCE NUMBER IN DIRECTION OF FLOW
 a-z = MULTIPLE DEVICES/LINES AT SAME FUNCTIONAL LEVEL

EXAMPLE (1) - FIRST VALVE TO BE IDENTIFIED IN THE PRIMARY COOLANT LOOP




EXAMPLE (2) - THIRD HAND VALVE TO BE IDENTIFIED IN THE PRIMARY COOLANT RETURN SYSTEM (2) FOR THE COLD TRAP (1)



EXAMPLE (3) - FIRST LEVEL DIFFERENTIAL PRESSURE TRANSMITTER IN THE PRIMARY COOLANT LOOP (1)



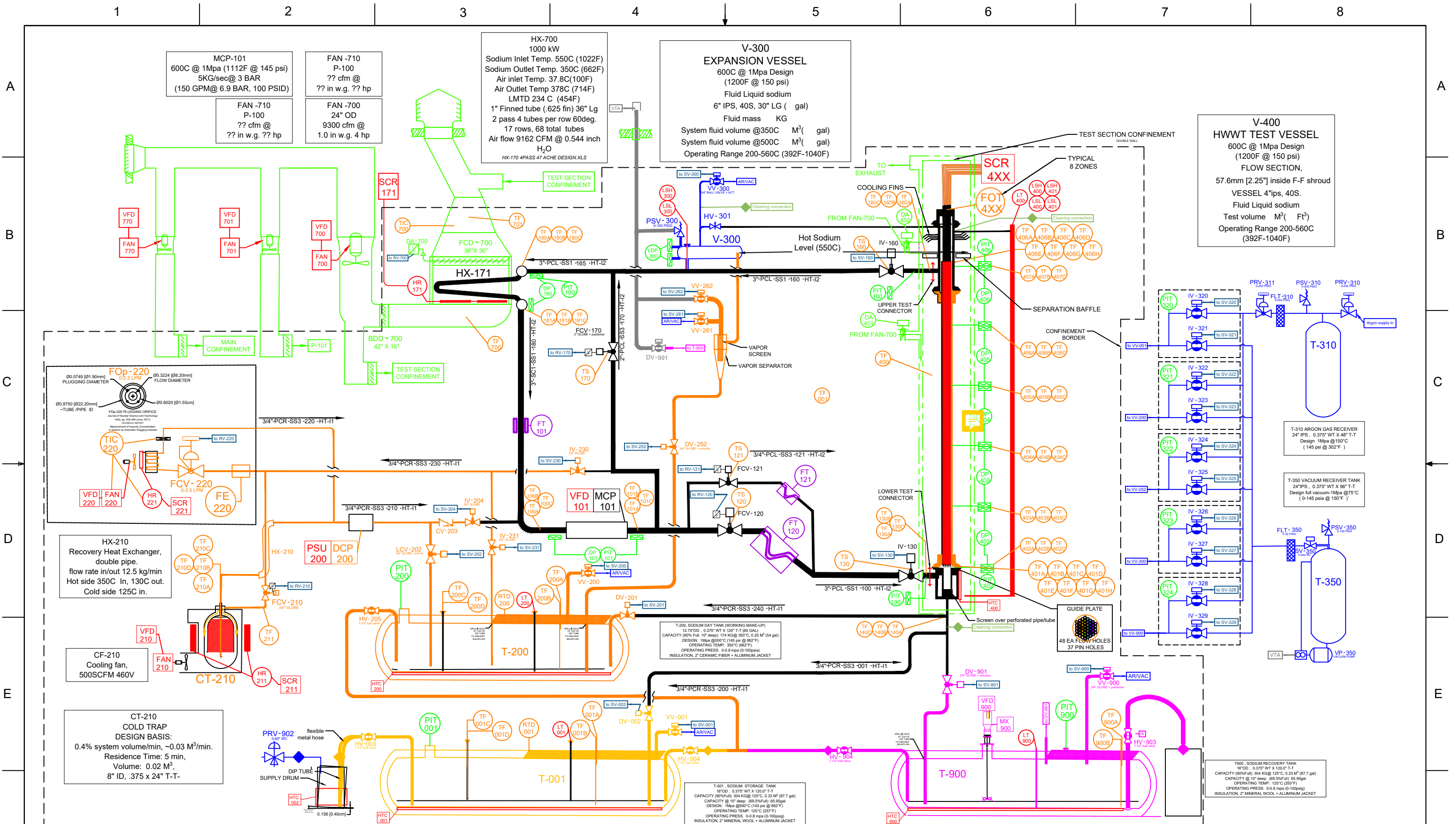


Oregon State UNIVERSITY

NUCLEAR SCIENCE & ENGINEERING THERMAL HYDRAULICS
 SCHOOL OF NUCLEAR SCIENCE AND ENGINEERING
 OREGON STATE UNIVERSITY
 RADIATION CENTER, CORVALLIS, OREGON 97331
 TELEPHONE: (541) 737-2341 FAX: (541) 737-0480

SoFIE

DRAWN BY A. WEISS	DATE 04/26/2023	TITLE PIPING AND INSTRUMENTATION DIAGRAM (P&ID)		
REVIEWED BY T.K. HOWARD	DATE 04/26/2023	SIZE B	DWG NO. OSU-SoFIE-000000-DWG-001	REV 1
APPROVED BY W. MARCUM	DATE 04/28/2023	SCALE AS NOTED	PROJECT SoFIE	PAGE 1 of 3



MCP-101
600C @ 1Mpa (1112F @ 145 psi)
5KG/sec @ 3 BAR
(150 GPM @ 6.9 BAR, 100 PSID)

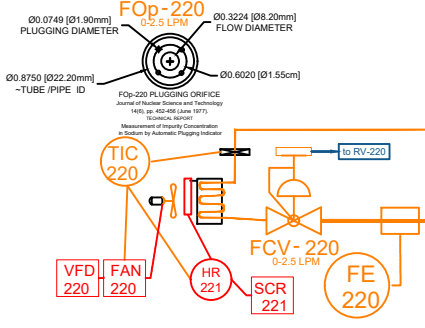
FAN -710
P-100
?? cfm @
?? in w.g. ?? hp

FAN -700
24" OD
9300 cfm @
1.0 in w.g. 4 hp

HX-700
1000 kW
Sodium Inlet Temp. 550C (1022F)
Sodium Outlet Temp. 350C (662F)
Air inlet Temp. 37.8C(100F)
Air Outlet Temp 378C (714F)
LMTD 234 C (454F)
1" Finned tube (.625 fin) 36" Lg
2 pass 4 tubes per row 60deg.
17 rows, 68 total tubes
Air flow 9162 CFM @ 0.544 inch
H₂O
HX-170 4PASS 47 ACHE DESIGN.XLS

V-300
EXPANSION VESSEL
600C @ 1Mpa Design
(1200F @ 150 psi)
Fluid Liquid sodium
6" IPS, 40S, 30" LG (gal)
Fluid mass KG
System fluid volume @350C M³(gal)
System fluid volume @500C M³(gal)
Operating Range 200-560C (392F-1040F)

V-400
HWWT TEST VESSEL
600C @ 1Mpa Design
(1200F @ 150 psi)
FLOW SECTION,
57.6mm [2.25"] inside F-F shroud
VESSEL 4"IPS, 40S.
Fluid Liquid sodium
Test volume M³(Ft³)
Operating Range 200-560C
(392F-1040F)



HX-210
Recovery Heat Exchanger,
double pipe.
flow rate in/out 12.5 kg/min
Hot side 350C in, 130C out.
Cold side 125C in.

CF-210
Cooling fan,
500SCFM 460V

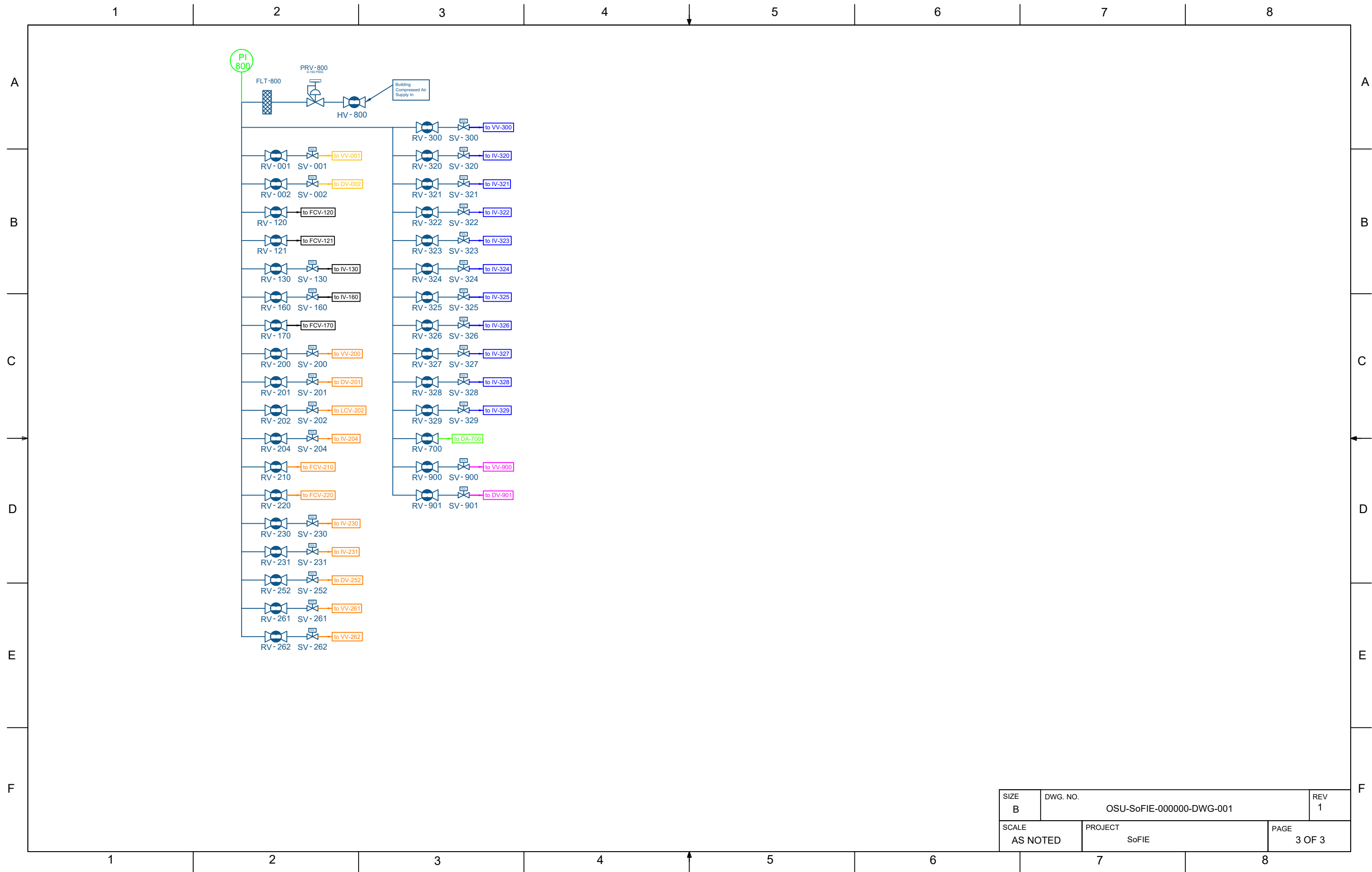
CT-210
COLD TRAP
DESIGN BASIS:
0.4% system volume/min, ~0.03 M³/min.
Residence Time: 5 min,
Volume: 0.02 M³,
8" ID, .375 x 24" T-T

T-200 SODIUM DAY TANK (WORKING MAKE-UP)
12.75"OD, 0.375" WT X 120" T-T (80 GAL)
CAPACITY (90% Full, 10" deep): 174 KG @ 350°C, 0.20 M³ (84 gal)
DESIGN: 1Mpa (8500°C) (145 psi @ 862°F)
OPERATING TEMP: 350°C (662°F)
OPERATING PRESS: 0-0.8 mpa (0-100psia)
INSULATION: 2" CERAMIC FIBER + ALUMINUM JACKET

T-001 SODIUM STORAGE TANK
16"OD, 0.375" WT X 120" T-T
CAPACITY (90% Full, 10" deep): 304 KG @ 125°C, 0.33 M³ (87.7 gal)
CAPACITY @ 10" deep: (69.5% Full) 65.95gal
DESIGN: 1Mpa (8500°C) (145 psi @ 862°F)
OPERATING TEMP: 125°C (257°F)
OPERATING PRESS: 0-0.8 mpa (0-100psia)
INSULATION: 2" MINERAL WOOL + ALUMINUM JACKET

T-900 SODIUM RECOVERY TANK
16"OD, 0.375" WT X 120" T-T
CAPACITY (90% Full, 10" deep): 304 KG @ 125°C, 0.33 M³ (87.7 gal)
CAPACITY @ 10" deep: (69.5% Full) 65.95gal
DESIGN: 1Mpa (8500°C) (145 psi @ 862°F)
OPERATING TEMP: 125°C (257°F)
OPERATING PRESS: 0-0.8 mpa (0-100psia)
INSULATION: 2" MINERAL WOOL + ALUMINUM JACKET

SIZE B	DWG. NO. OSU-SoFIE-000000-DWG-001	REV 1
SCALE AS NOTED	PROJECT SoFIE	PAGE 2 OF 3



SIZE B	DWG. NO. OSU-SoFIE-000000-DWG-001	REV 1
SCALE AS NOTED	PROJECT SoFIE	PAGE 3 OF 3