Piping and Instrumentation Drawings

Version: V7.1

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Corporate

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Contents

Introduction

Note: *The drawings represented in the following document are superseded by the drawings contained in the* ***AspenTech\Economic Evaluation V7.0\Program\Docs\PIDs*** *folder. Please refer to this location for the latest drawing revisions. This document should be used solely as a drawing reference for internal volumetric models not depicted elsewhere*.

This book contains piping and instrumentation drawings (P&IDs) representing Aspen Icarus Volumetric Models. Volumetric Models develop material quantities and are based on recognized design methods and construction standards. Volumetric Models are the key components behind Aspen Icarus' unique method of designing and estimating.

Volumetric Models determine the field materials (type, quantity, weights, and sizes) required to install an equipment item. Volumetric Models generate the material takeoff for equipment handling and setting, piping, civil, structural steel, instrumentation, electrical, insulation and paint materials. For example, a tower's pipe diameter and length is determined by the diameter, height, pressure, temperature, number of trays, and estimated flow rates. Each run of pipe is consistent with the tower materials, and of a specific length, diameter, schedule, valve, and fitting count, and so on, to fulfill the functionality assigned to that line of pipe. Thus, the Volumetric Models create materials to be installed.

P&IDs come in either a standard (STD) or a more fully instrumented (FULL) configuration that may be specified at the Project and Area levels. Both the standard and full versions are shown in this book. The 600 series drawings represent the full versions.

How Project Instrumentation is Developed

Aspen Icarus systems develop the cost of project instrumentation based upon the direct costs of materials and manpower for the following major items:

- Primary element hook-up
- Signal transmission
- Field/panel hook-up
- Final element hook-up
- Control Center
- Operator Center

Primary Element Hook-Up

The primary element is a field-mounted component with all the necessary accessories for process connection and signal transmission to a centrally located field junction box. For pneumatic systems, it includes all the piping, tubing, fittings, valves, and filter-regulators necessary for connecting the impulse piping and air supply to the transmitter, and the process signal tubing to the field junction box. Aspen Icarus systems group this process signal tubing into one or more field junction boxes. For electronic systems, the system assumes a two-wire control loop where power for the transmitter is taken from a power supply in the Control Center. A 4-20 ma DC signal is assumed. Aspen Icarus systems calculate material and manpower costs for fabricating and installing all pipe, valves, and fittings for the impulse piping connection to the transmitter, and all wiring and electrical fittings to the field junction box. Single or multiple twisted pairs of insulated stranded copper wire are used for the control system. You may specify the type of wiring in the Area date. If “IM” is selected, the complete control wiring system is costed using control wire and multi-conductor cable. The twisted pair consists of stranded copper wire with a mylar tape separator and an extruded PVC jacket.

Signal Transmission

At each junction box, the system differentiates between Control and Indicating function for grouping into multi-tube bundles to be sent to the Control Building for connection to the back of the control panel. For example, two tubes are required for the transmission signal of a control loop from a junction box: one tube for the process transmitter signal to the control and another tube for the control signal from the controller to the final element, as opposed to an indicating loop that is “deadended” at the indicating instrument in the control panel and requires only one tube for signal transmission. Pneumatic transmission tubing is 0.25 INCHES [8 MM] OD, singly or bundled. If the transmission distance between Control Center and the field junction box exceeds 300 FEET [90 M], the system provides a WARNing message. In such an instance, you should consider using an electronic system rather than a pneumatic control system to improve dynamic response. The type of control system, electronic or pneumatic, is specified in the Area data.

Like pneumatic systems, electronic systems differentiate between the different types of instrumentation loops. For example, in control loops, two pairs of signal transmission wire are required: one pair for the transmitter signal and the other pair for the control signal. Both pairs tie-in in the junction box

back of the control panel to the field junction box located in the Area. At the field junction box, the transmission wires are collected and sent to the control room in multi-conductor cable in conduit or on cable trays. Aspen Icarus systems allow the user to select three different types of cables for transmission: multi-conductor wire; cable with interlocked armor; and cable pulled in rigid conduit.

Field/Panel Hook-Up

Aspen Icarus systems calculate the material and man-power cost for connecting each tube from the multi-tube bundle to the bulkhead plate in back of the control panel in the main control building. For an electronic control system, the system calculates the cost of material and manpower to connect all signal wiring to and from the field junction box to the field tie-in terminal blocks on the back of the panel.

Final Element Hook-Up

For pneumatic systems, system calculates the material and manpower cost to fabricate and assemble the piping, valves, and fittings required for the air supply and control signal from the junction box.

Aspen Icarus systems make the same calculations for electronic systems, with the exception that the control signal is wired from the junction box to an electopneumatic transducer mounted on the valve positioner valve.

Analog Control Center

The cost of the control panel is developed from:

- The list of instruments, either electronic, pneumatic, or a combination of these control systems.
- The type of display: conventional, semi-graphic, or full graphic type.

Aspen Icarus systems assume straight type panels and conventional miniature instruments with an instrument density of 4.75 per linear foot [15.6 per meter] for conventional displays, 3.75 per linear foot [12.3 per meter] for semi-graphic displays, and 2.5 per linear foot [8.2 per meter] for full graphic displays. The total number and cost of panel-mounted instruments is reported apart from the size and cost of the control panel. The cost of the control panel includes the hardware cost of all switches, relays, alarms, power supplies, etc., required for all designated Areas in the facility, It also includes the cost of sheet metal fabrication, piping and/or wiring, and the cost of shipping and installation at the job site.

Local Equipment Panels

Aspen Icarus systems calculate the cost of material and manpower for the fabrication and installation of each local equipment panel and any wiring or pneumatic piping connections for alarms, switches, indicators, etc., to the main control panel.

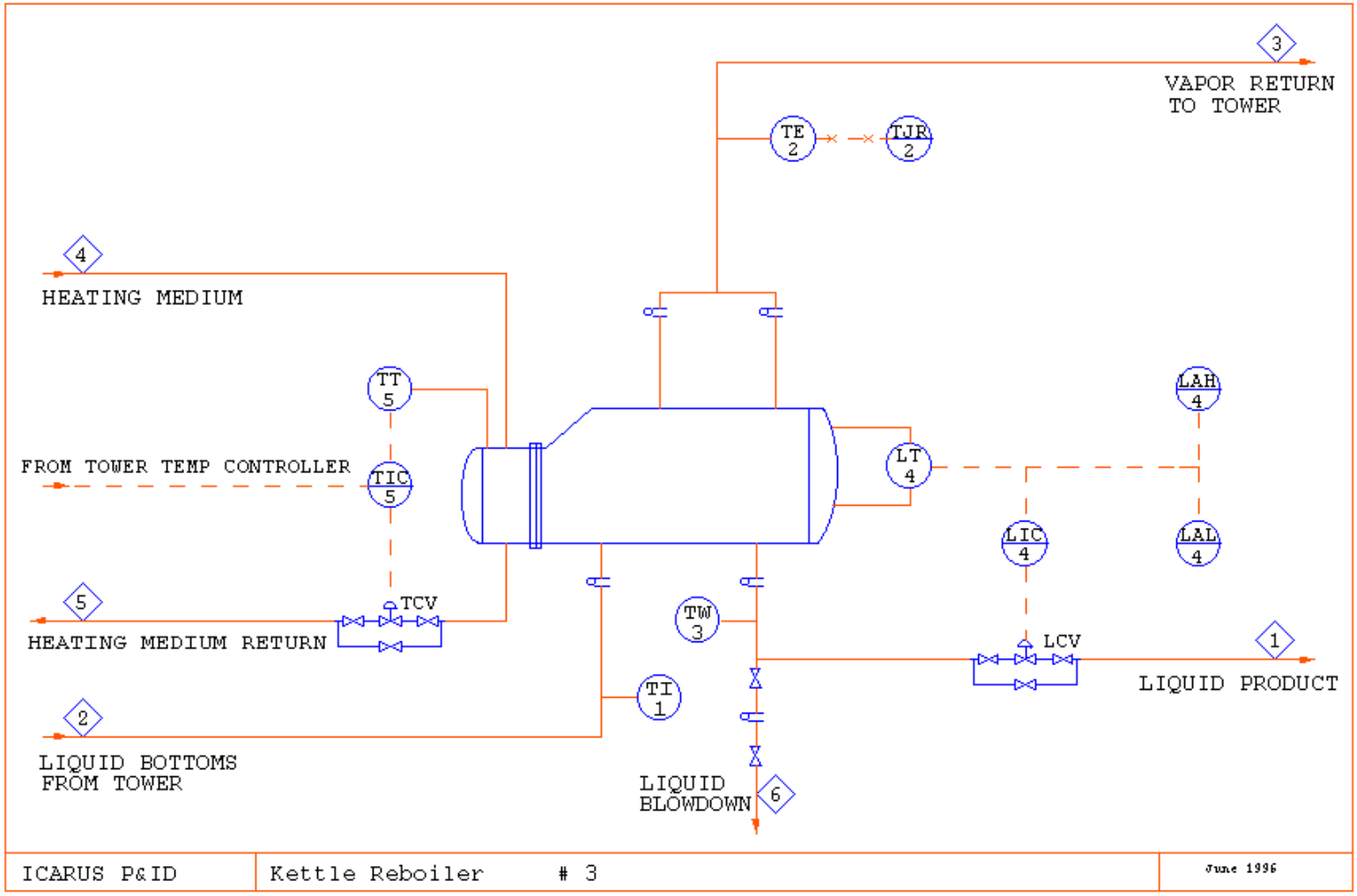
Thermocouple Wiring

On temperature control loops where thermocouples are used as sensing devices, the transmitter is assumed to be mounted on the thermocouple head.

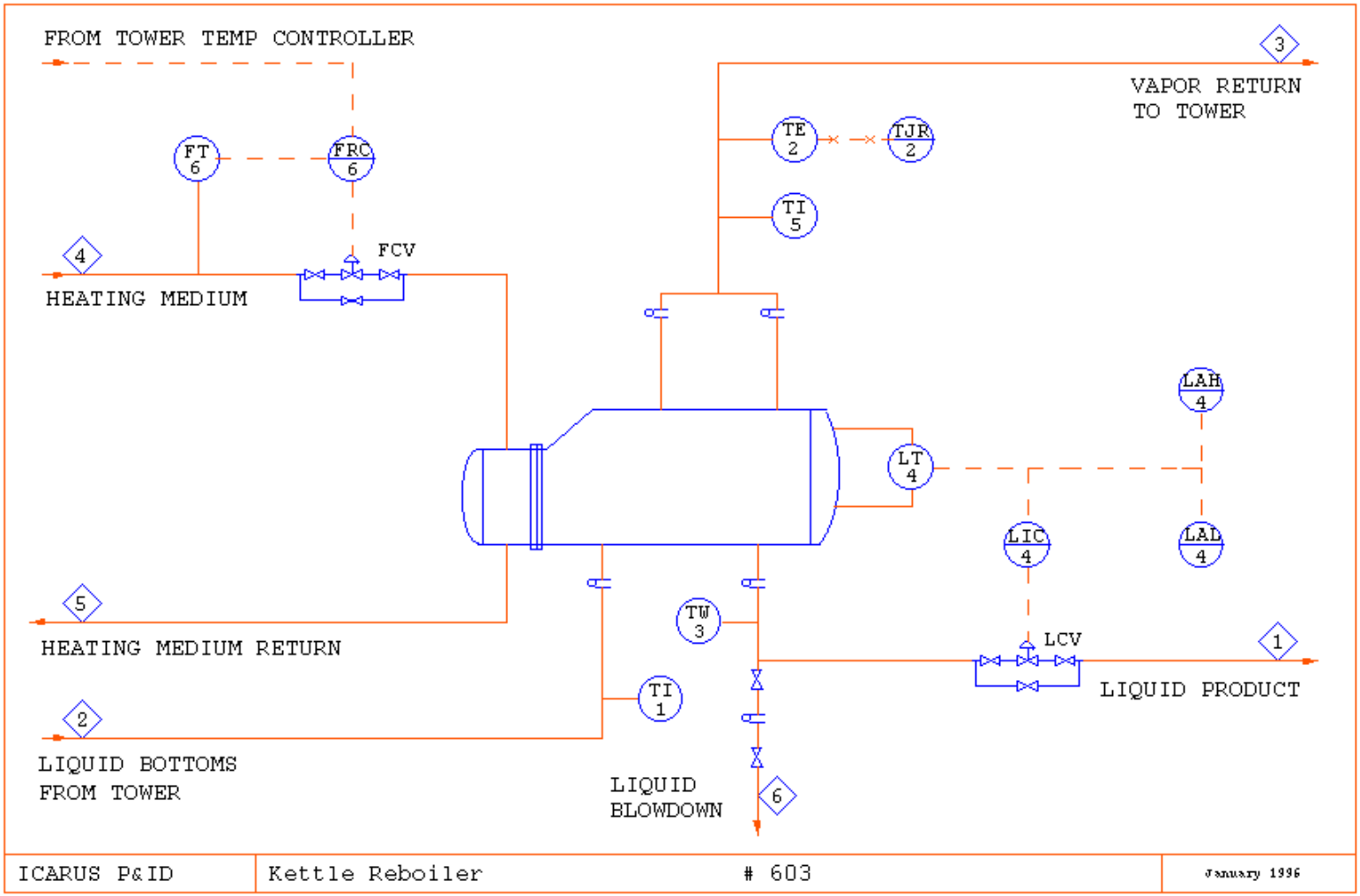
Drawings

The piping and instrumentation drawings that follow are arranged in numeric order. For easy reference, the 600 series drawings, representing fully instrumented models, immediately follow the corresponding standard models. For example, Drawing 603 immediately follows Drawing 3.

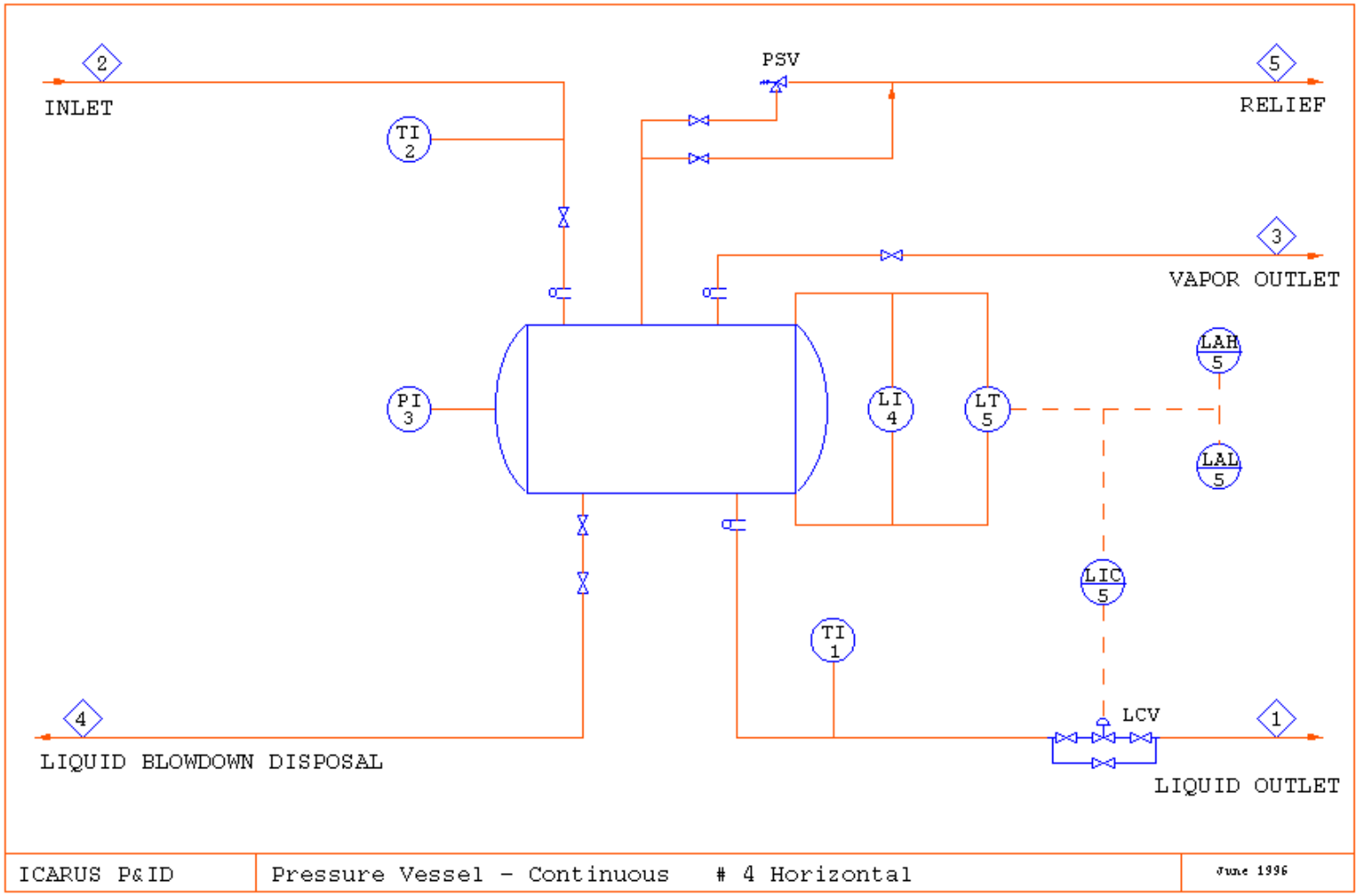
3 Kettle Reboiler



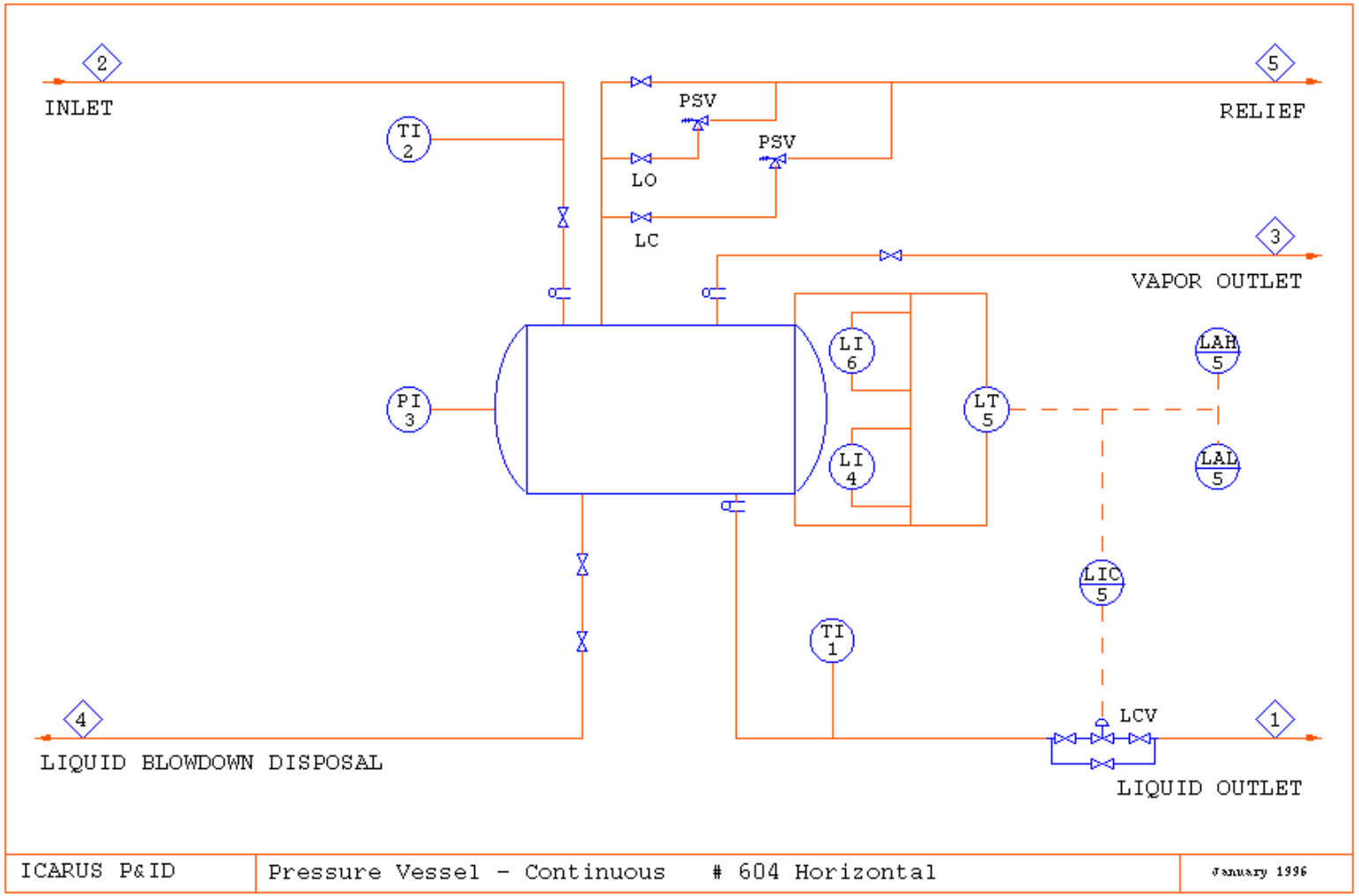
603 Kettle Reboiler



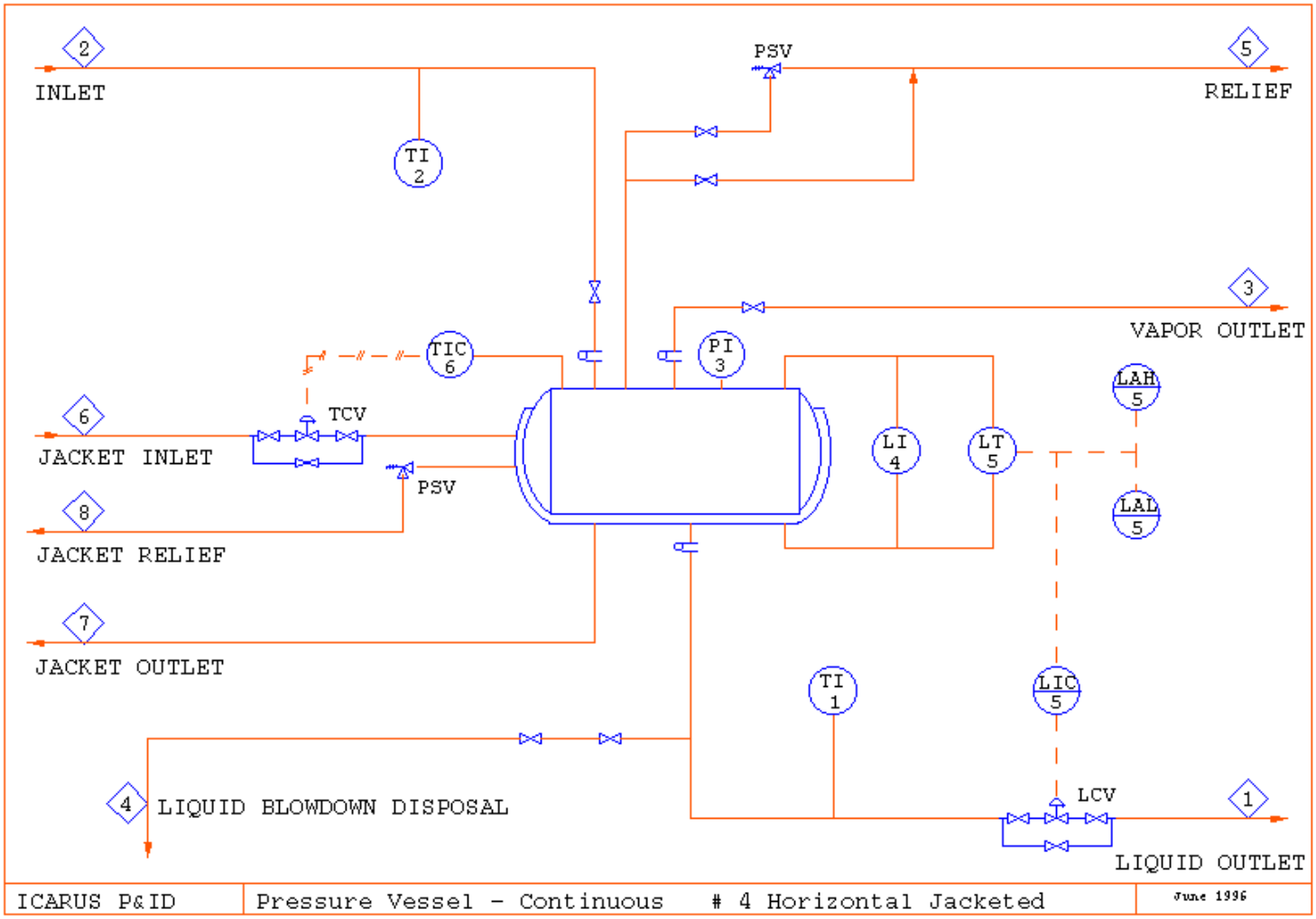
4 Horizontal Pressure Vessel – Continuous



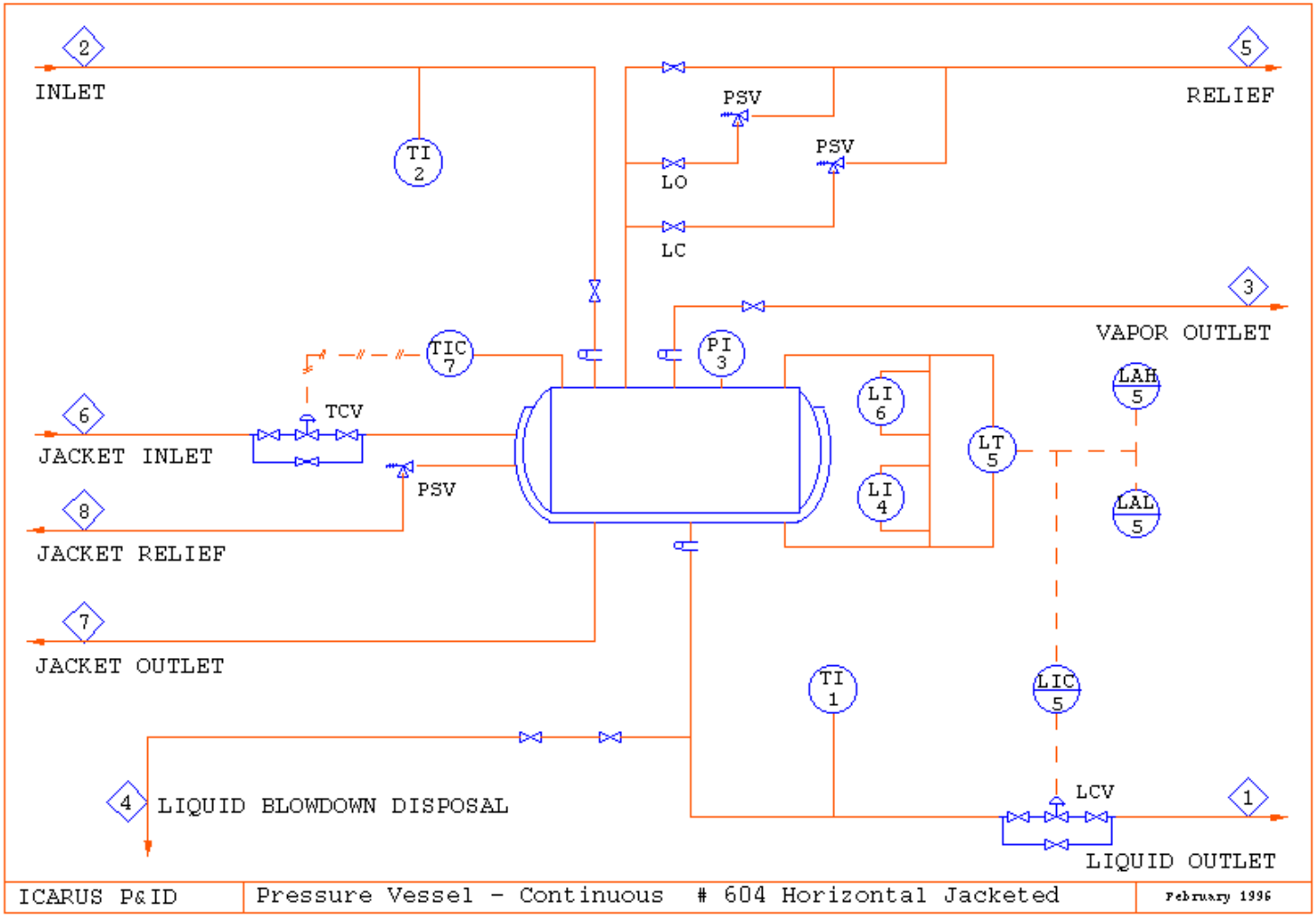
604 Horizontal Pressure Vessel – Continuous



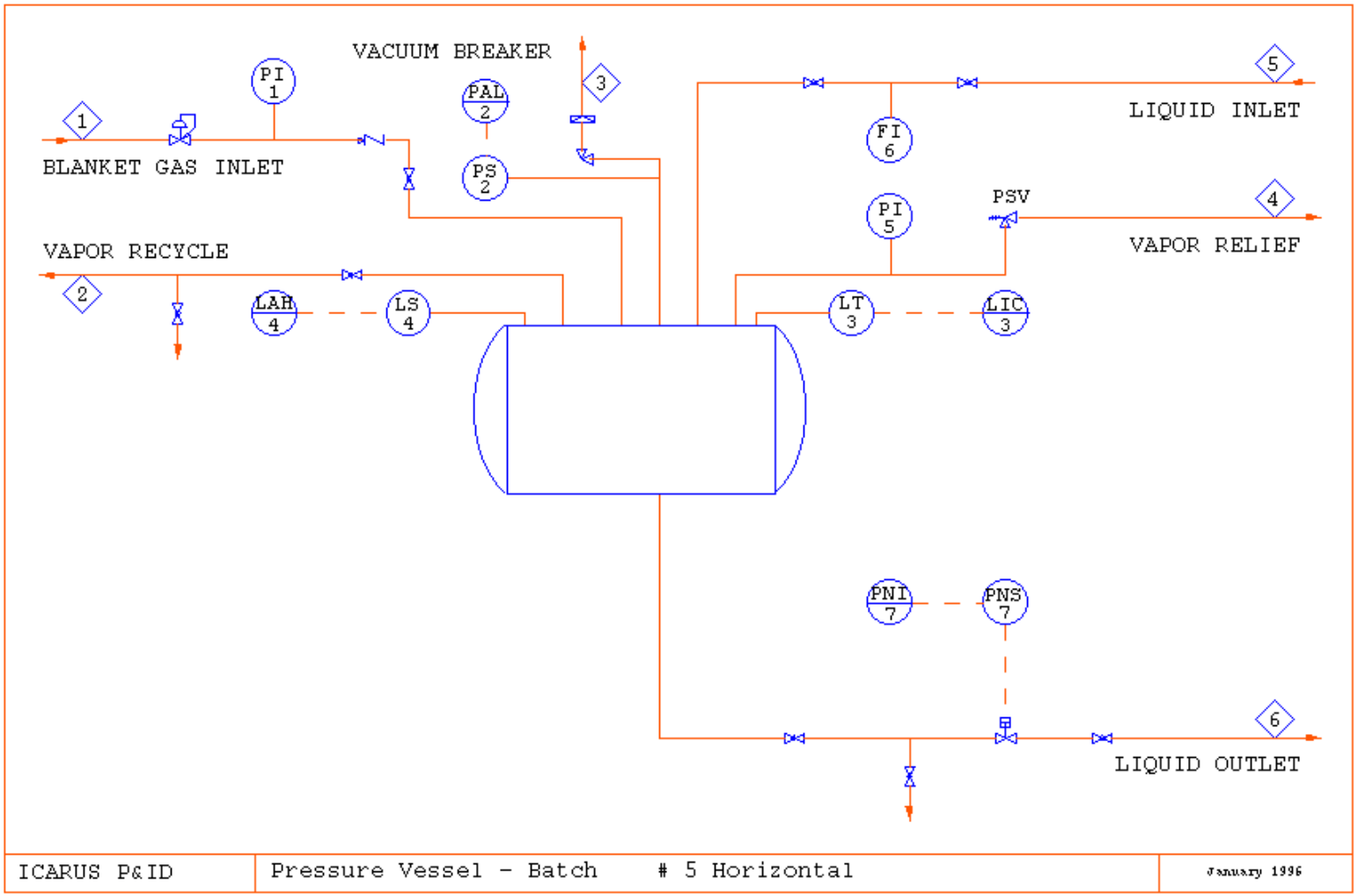
4 Horizontal Jacketed Pressure Vessel - Continuous


2
INLET
TI
2
PSV
5
RELIEF
3
VAPOR OUTLET
TIC
6
PI
3
LAH
5
6
JACKET INLET
TCV
PSV
LI
4
LT
5
LAL
5
8
JACKET RELIEF
7
JACKET OUTLET
TI
1
LIC
5
4
LIQUID BLOWDOWN DISPOSAL
LCV
1
LIQUID OUTLET
ICARUS P&ID
Pressure Vessel - Continuous # 4 Horizontal Jacketed
June 1996

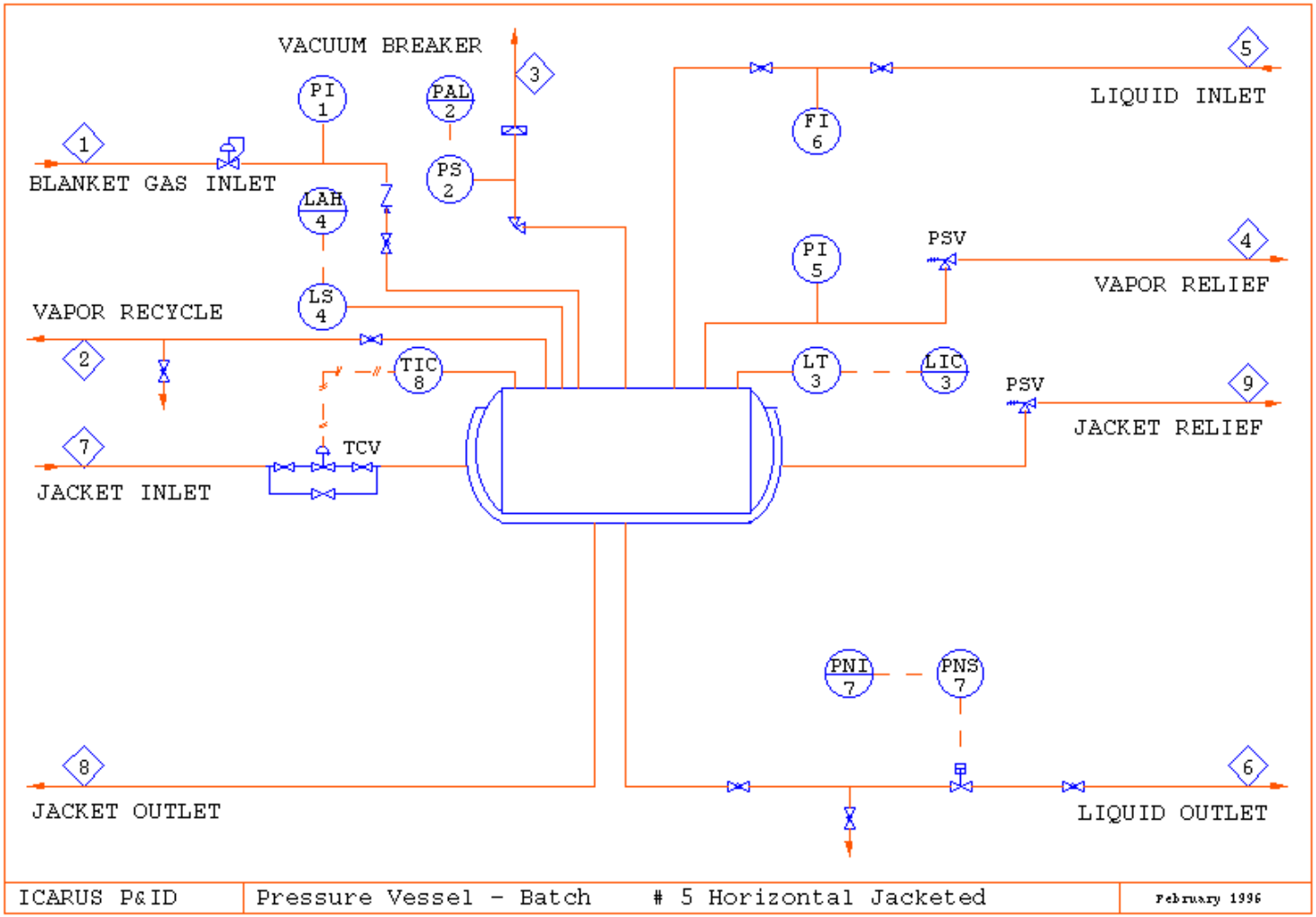
604 Horizontal Jacketed Pressure Vessel – Continuous



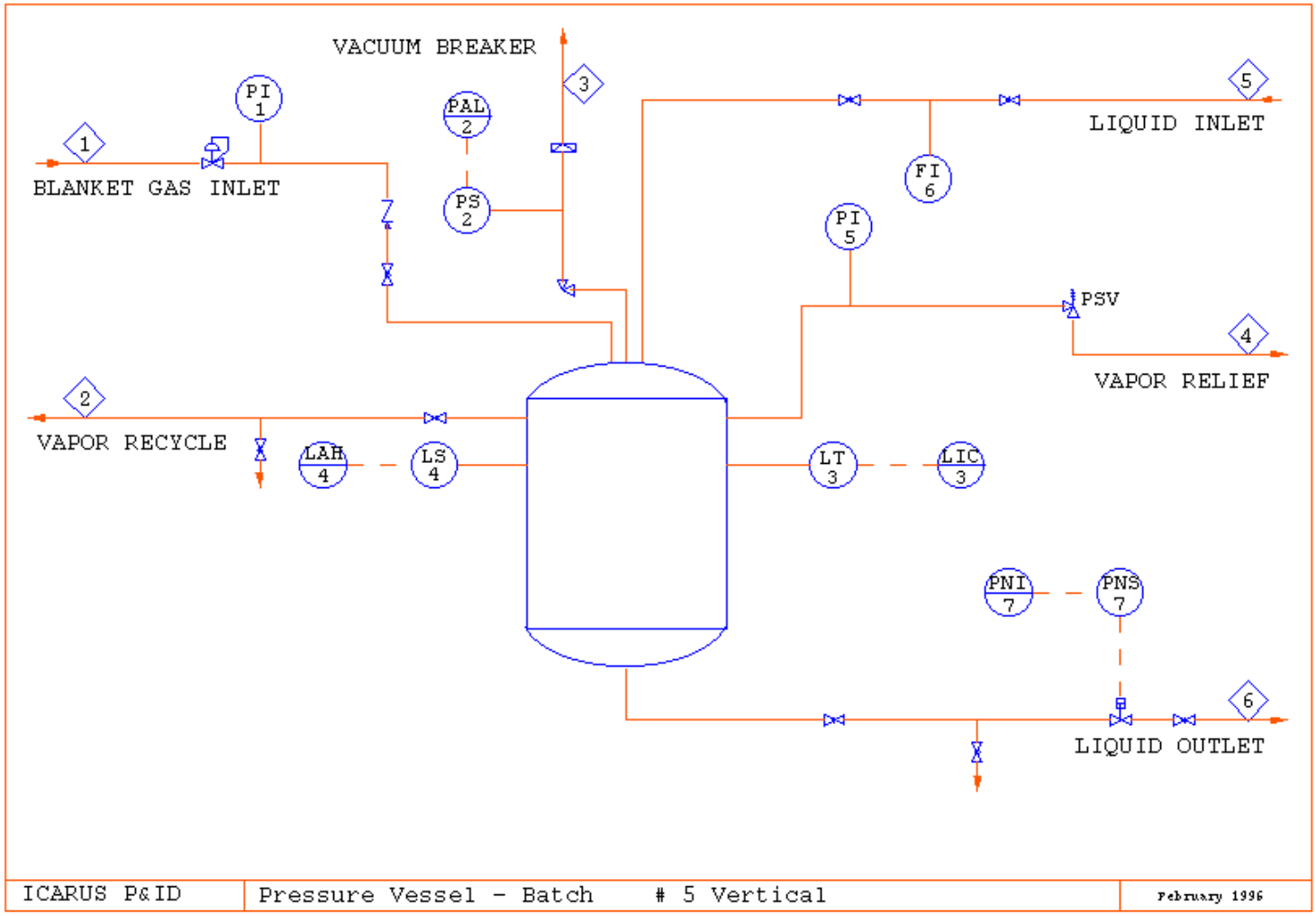
5 Horizontal Pressure Vessel – Batch



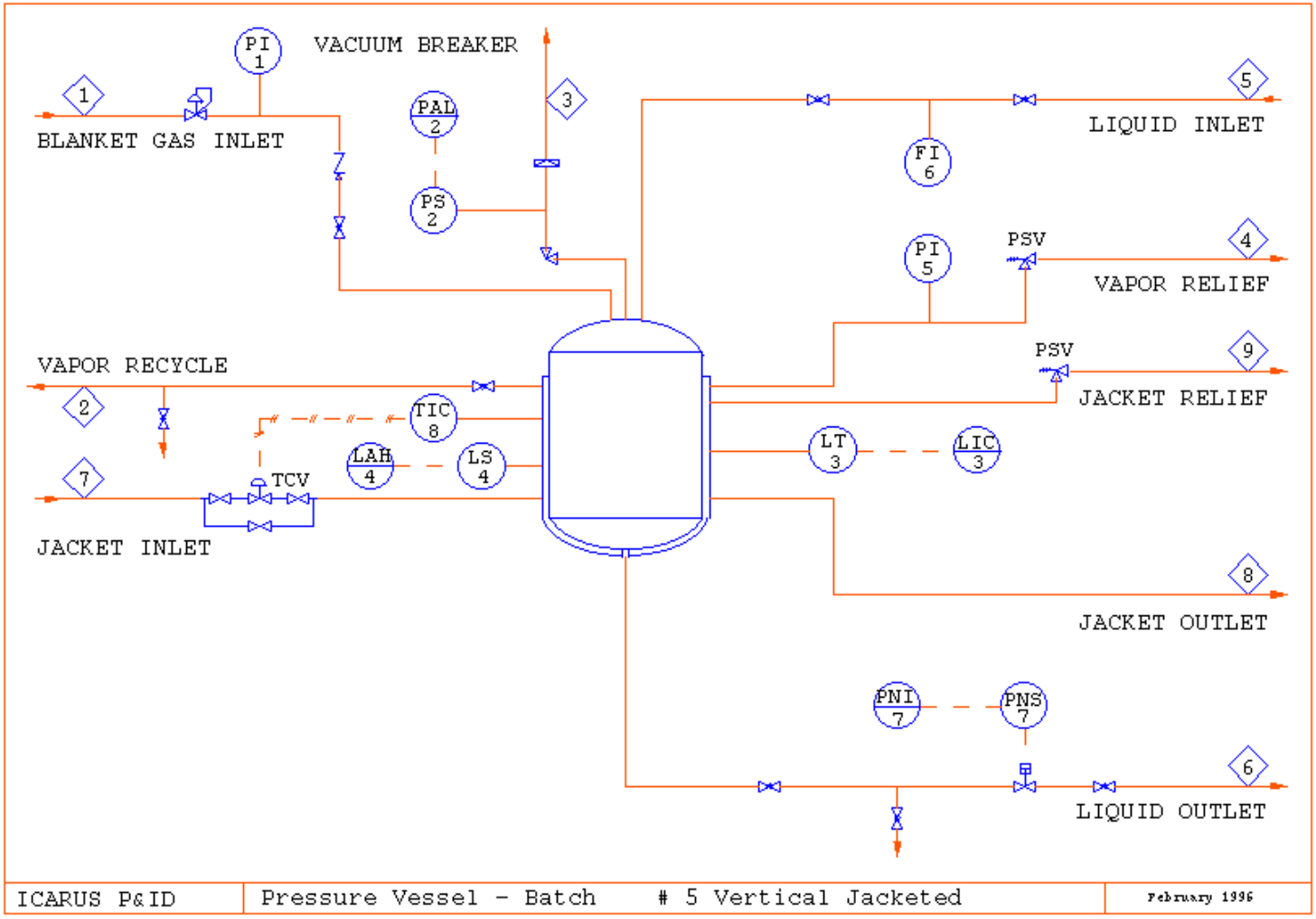
5 Horizontal Jacketed Pressure Vessel – Batch



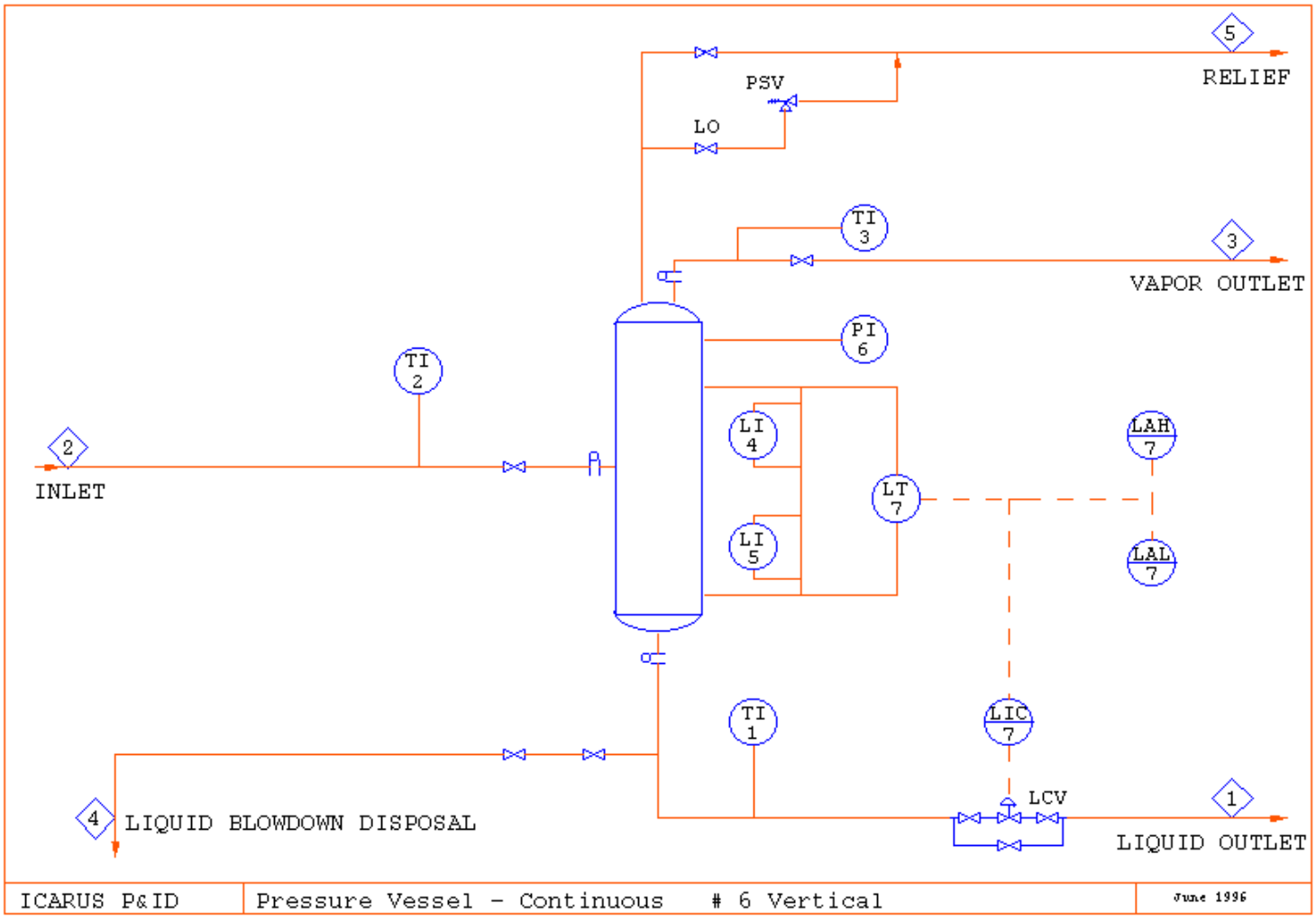
5 Vertical Pressure Vessel – Batch



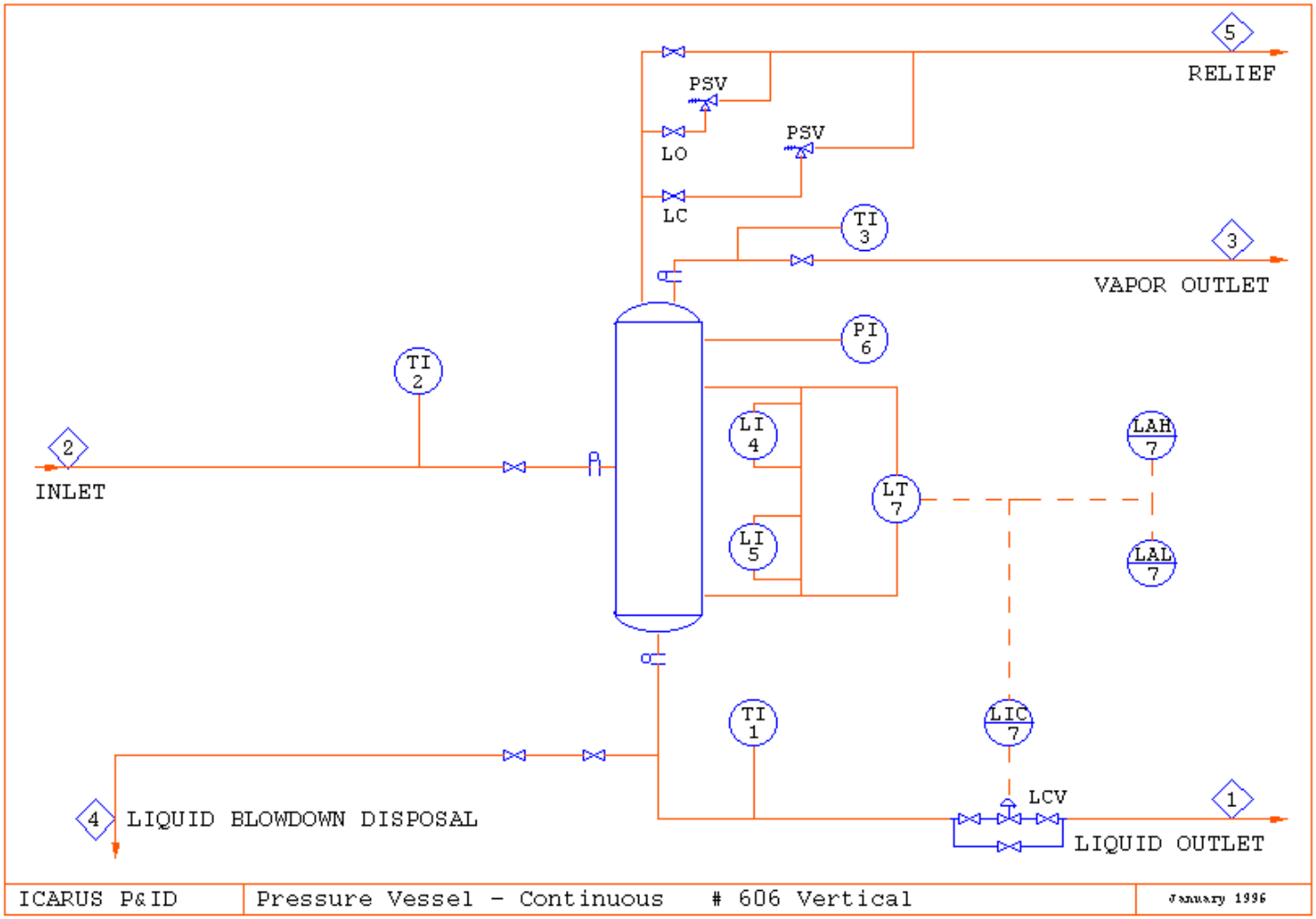
5 Vertical Jacketed Pressure Vessel – Batch



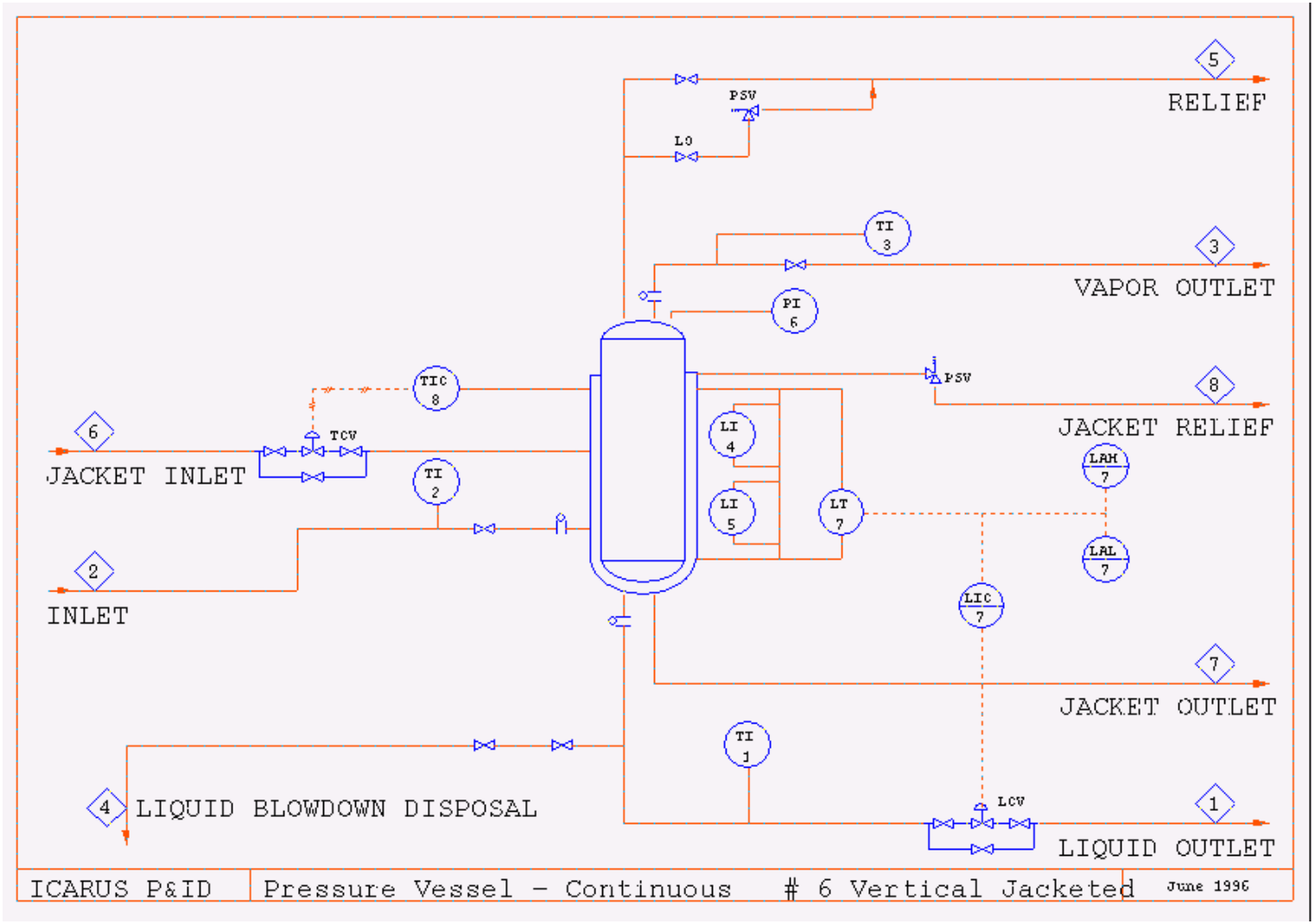
6 Vertical Pressure Vessel – Continuous


5
RELIEF
PSV
LO
TI
3
3
VAPOR OUTLET
PI
6
TI
2
LI
4
LAH
7
2
INLET
LT
7
LI
5
LAL
7
TI
1
LIC
7
LCV
1
4
LIQUID BLOWDOWN DISPOSAL
LIQUID OUTLET
ICARUS P&ID
Pressure Vessel - Continuous # 6 Vertical
June 1996

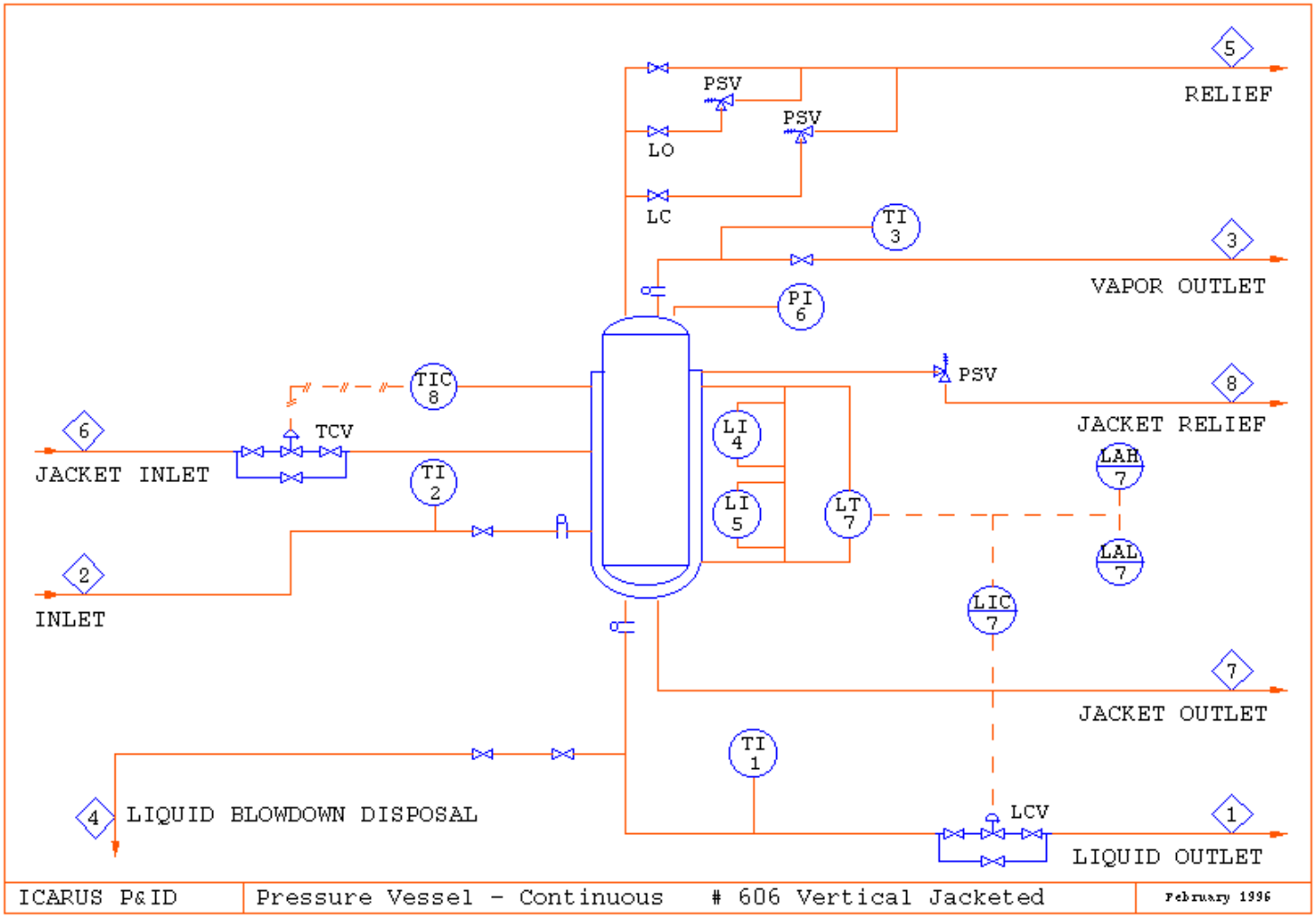
606 Vertical Pressure Vessel – Continuous



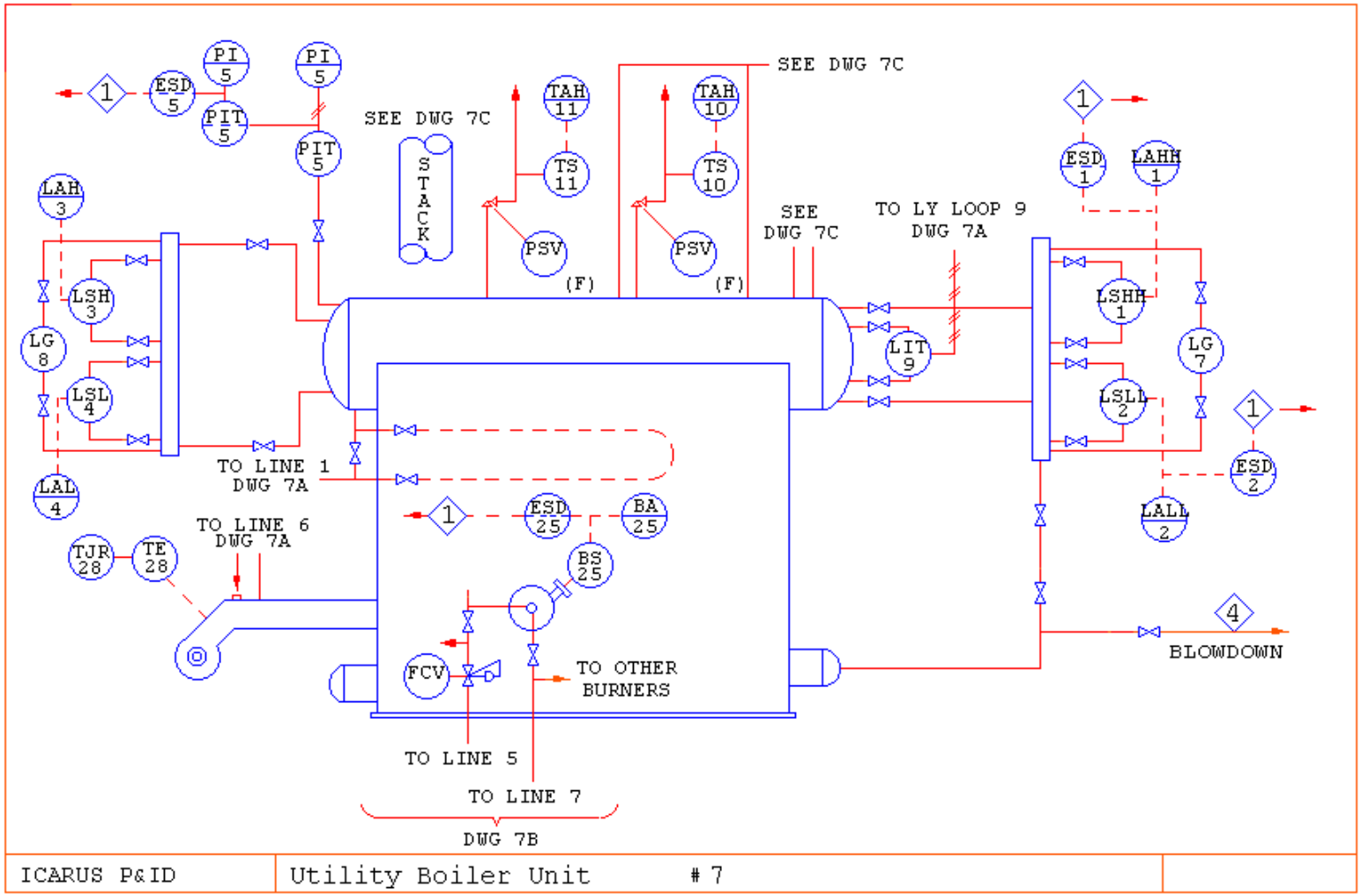
6 Vertical Jacketed Pressure Vessel – Continuous



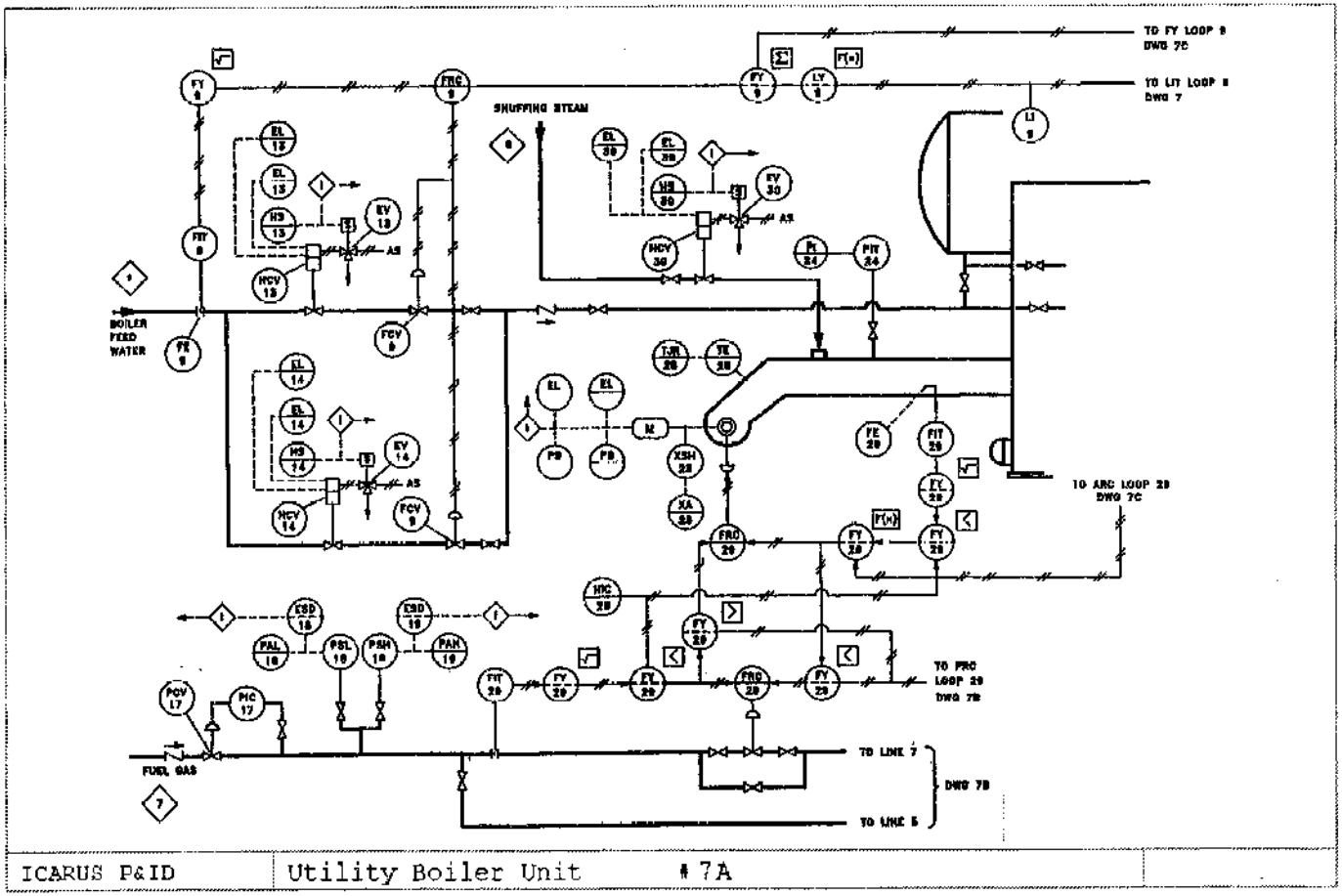
606 Vertical Jacketed Pressure Vessel – Continuous



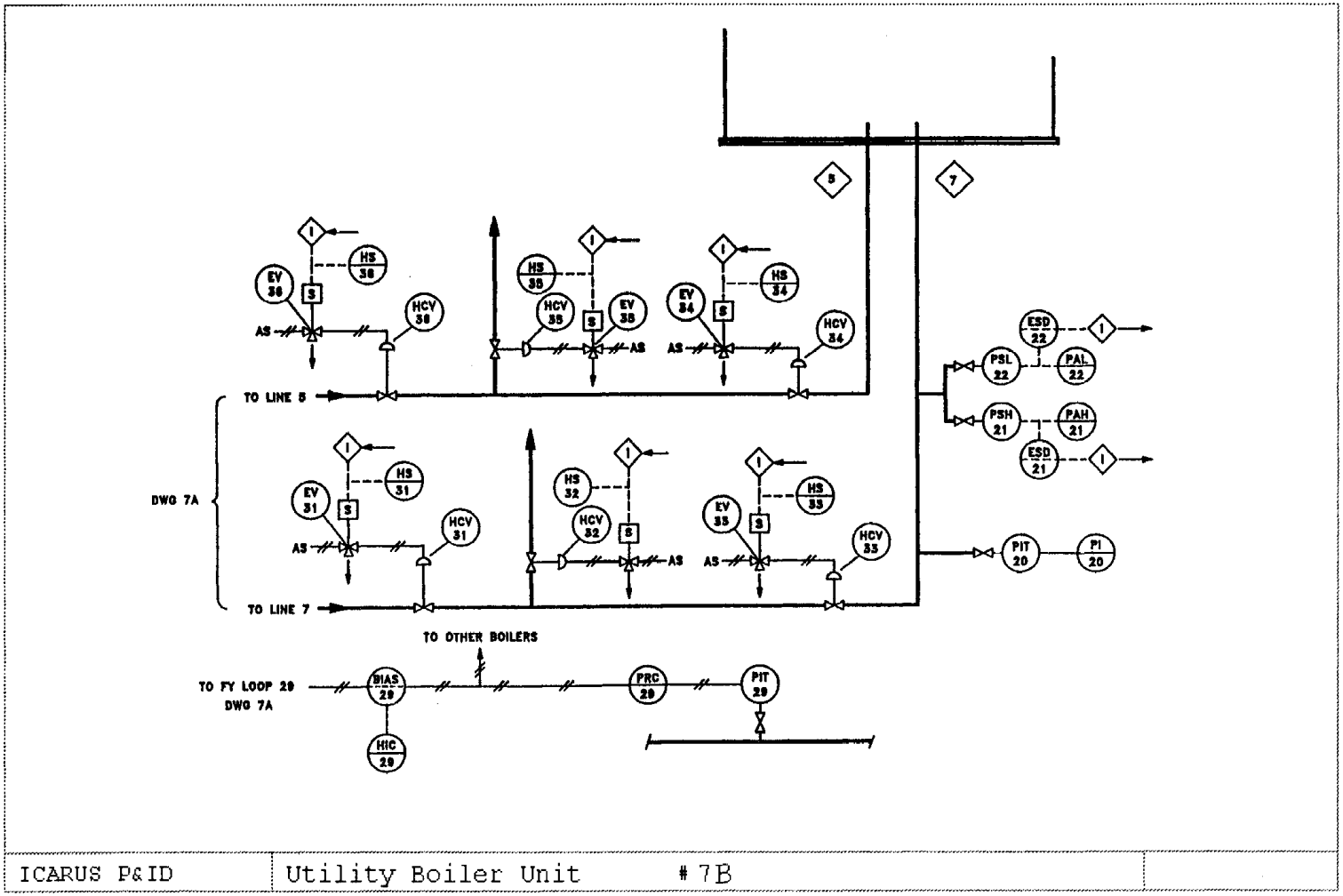
7 Utility Boiler Unit



7A Utility Boiler Unit

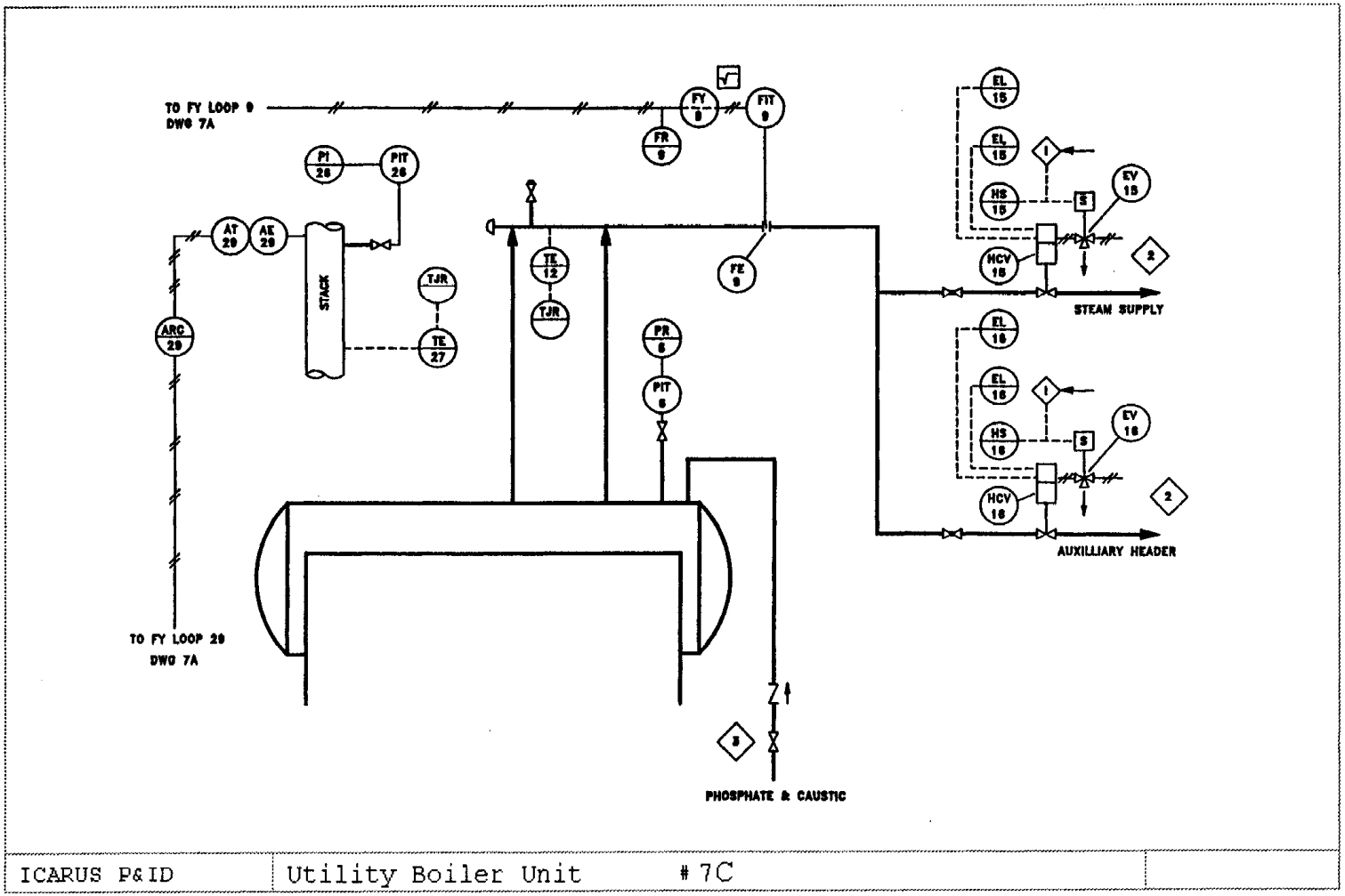


7B Utility Boiler Unit



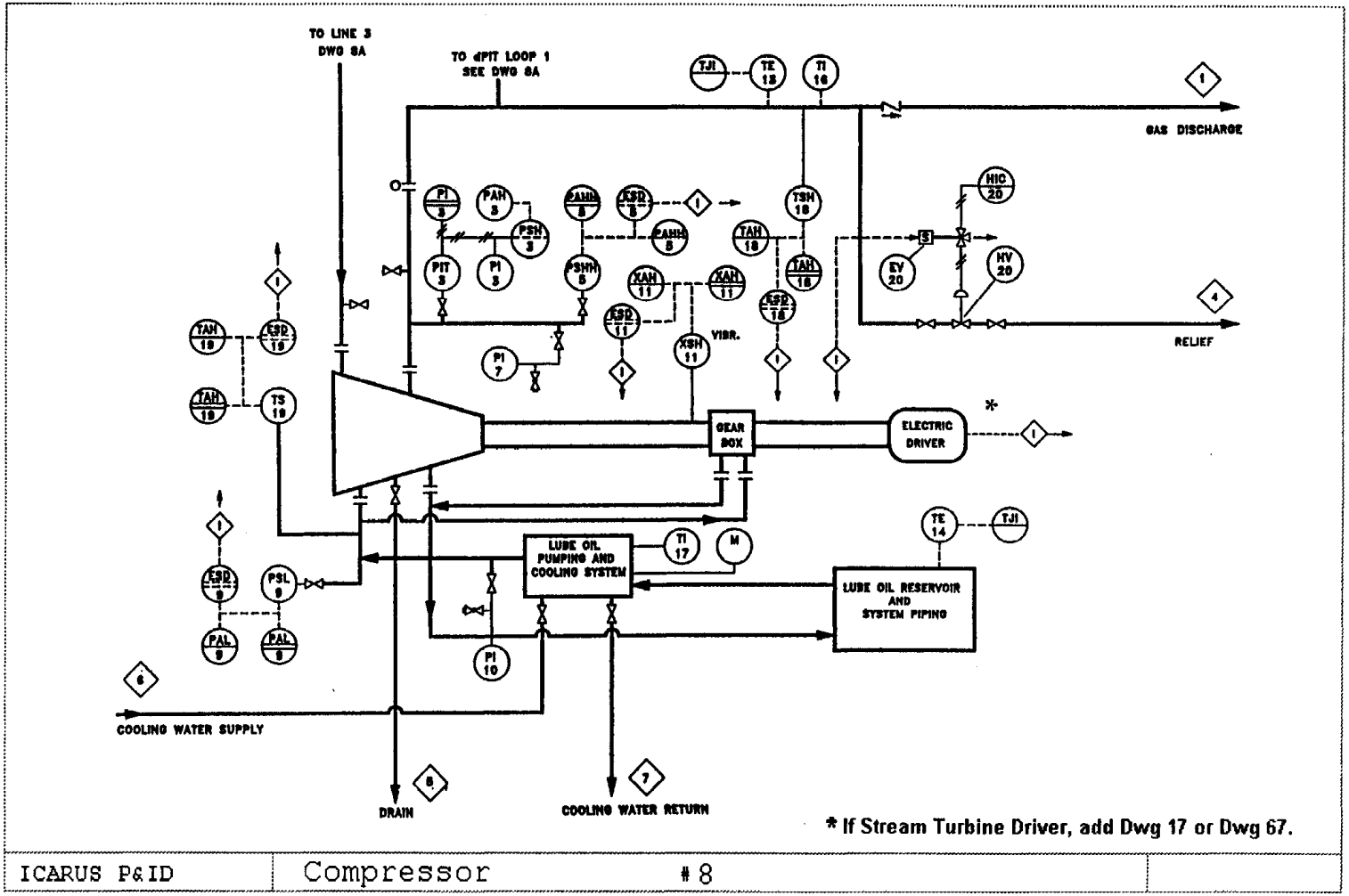
ICARUS P&ID	Utility Boiler Unit # 7B	

7C Utility Boiler Unit

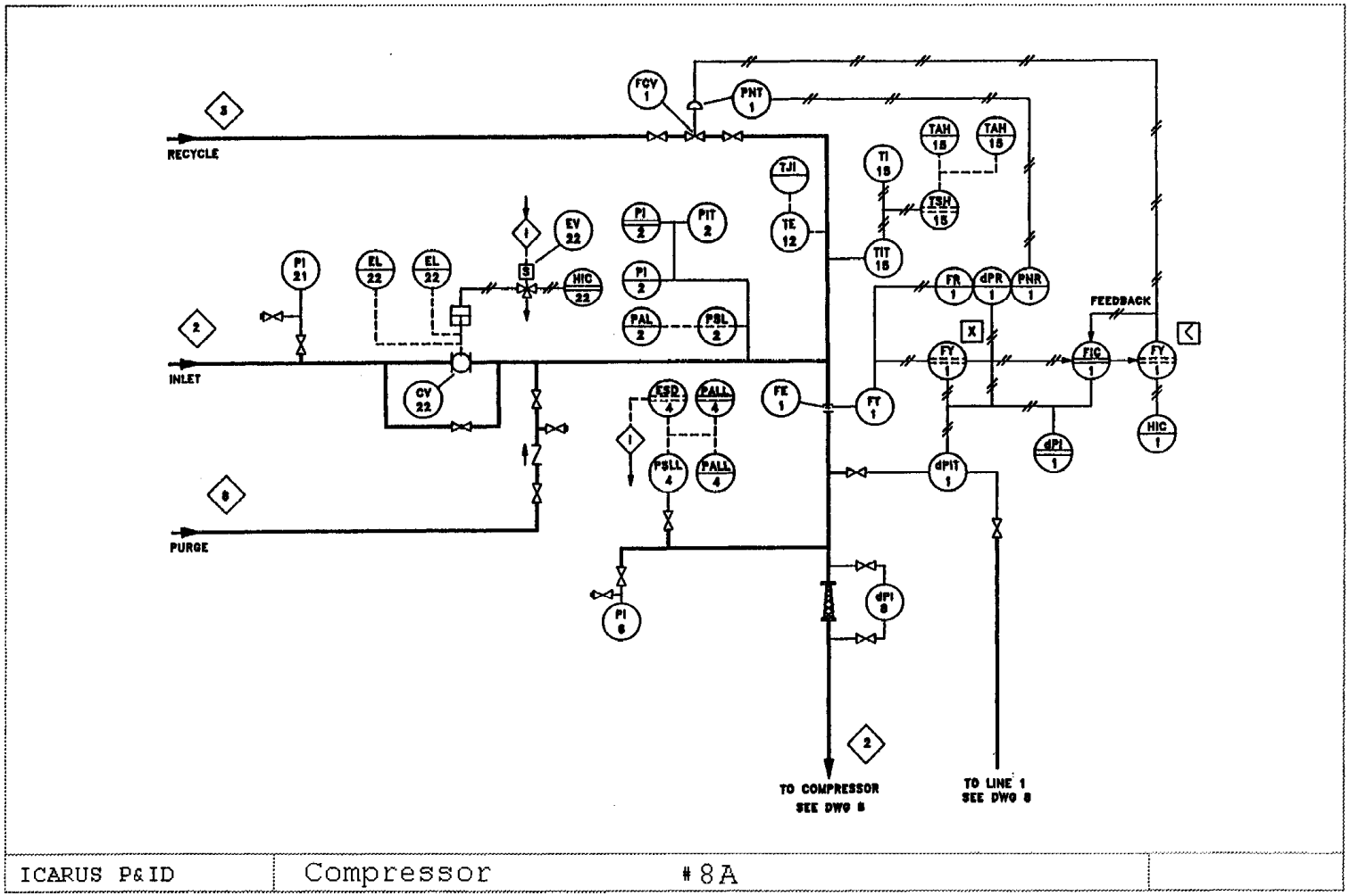


ICARUS P&ID	Utility Boiler Unit # 7C	

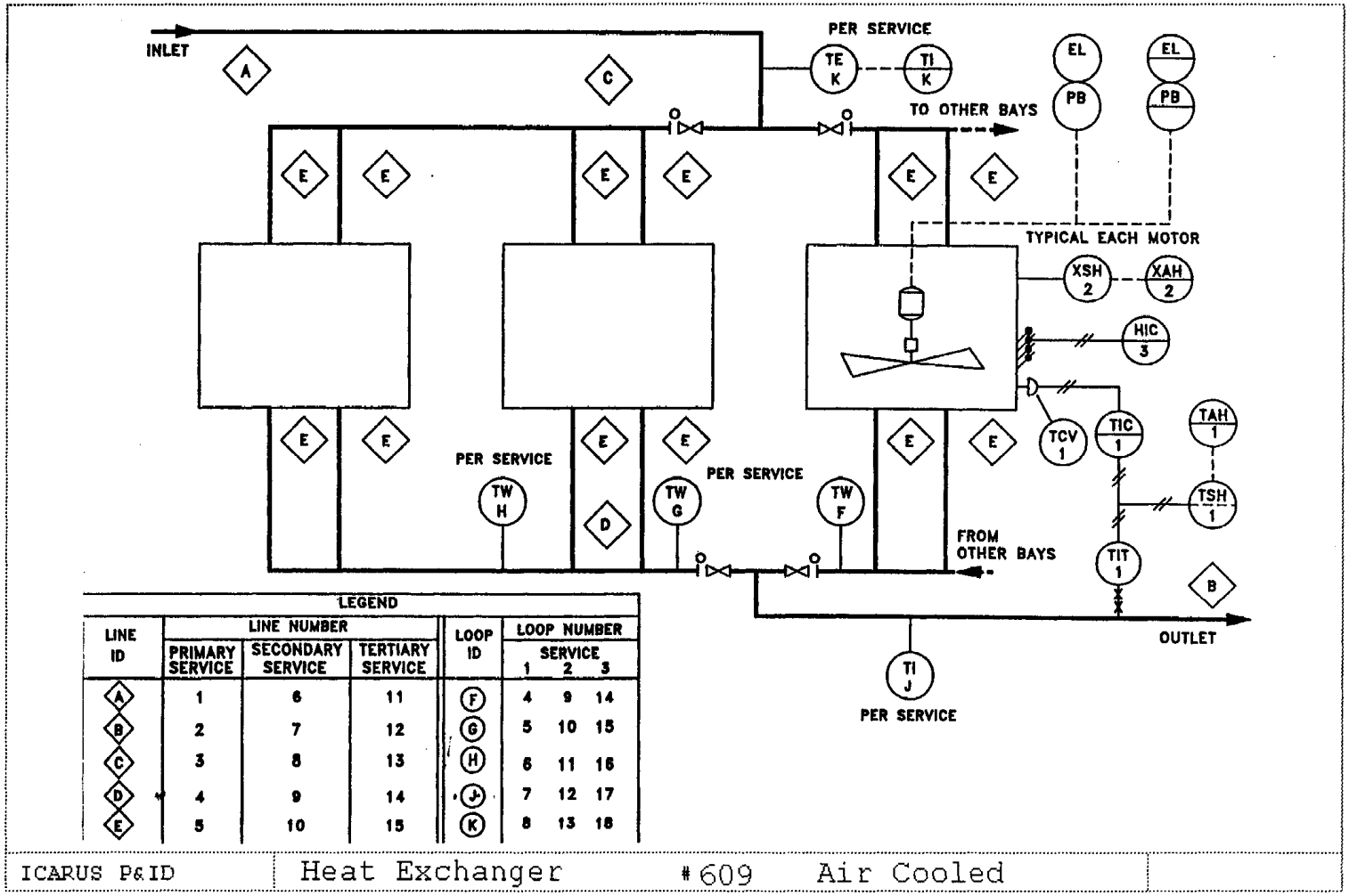
8 Compressor



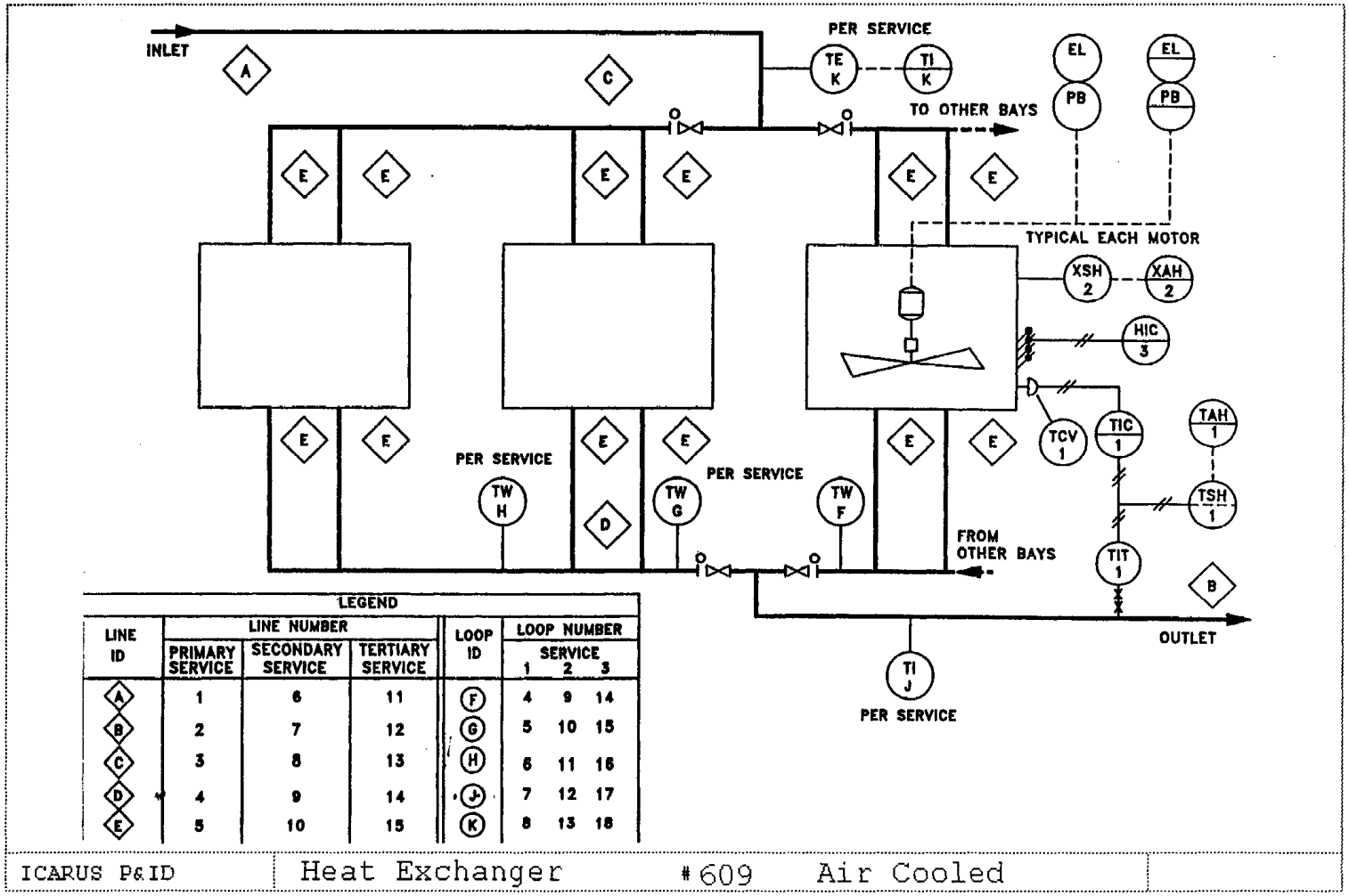
8A Compressor



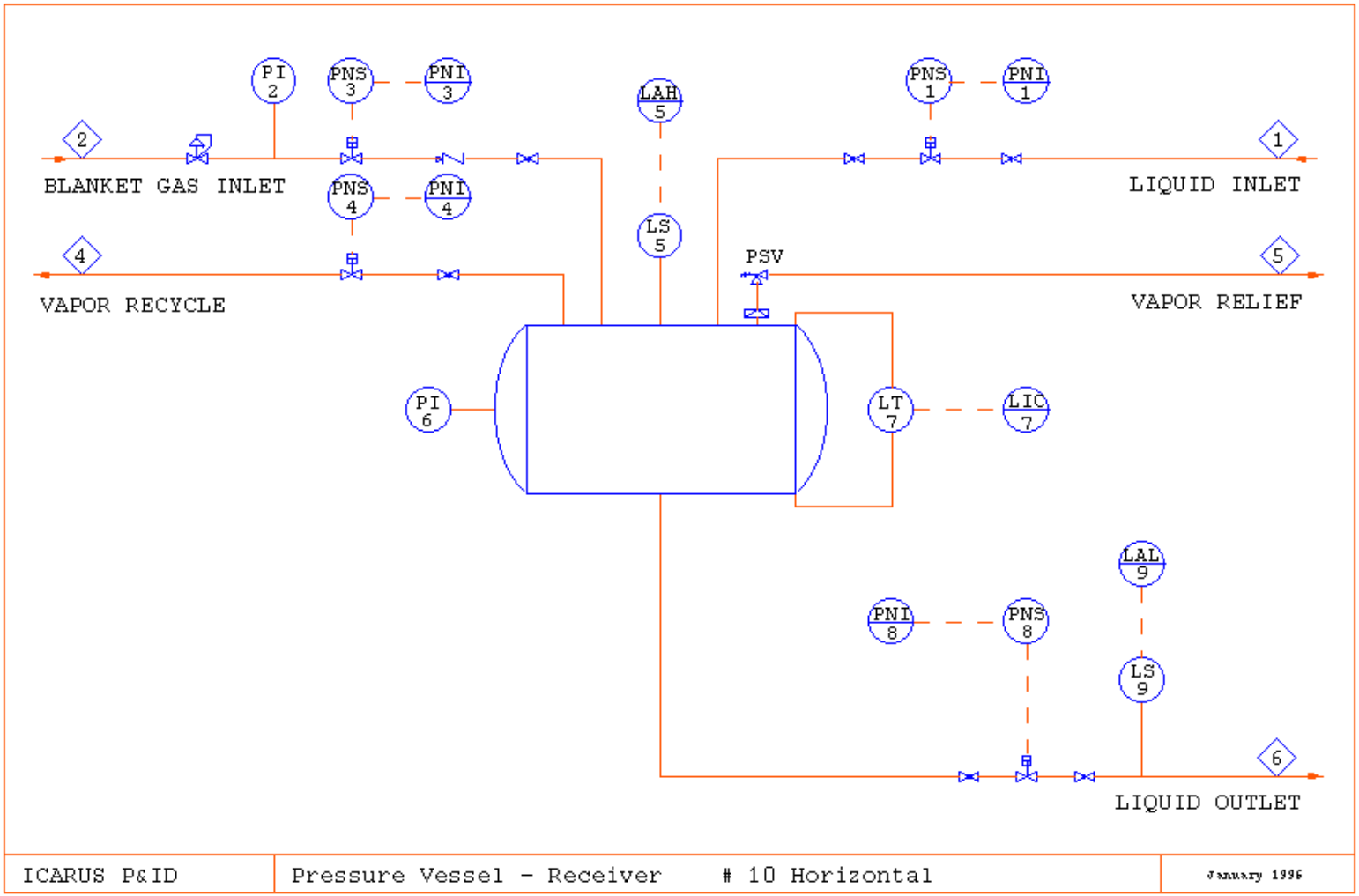
9 Air Cooled Heat Exchanger



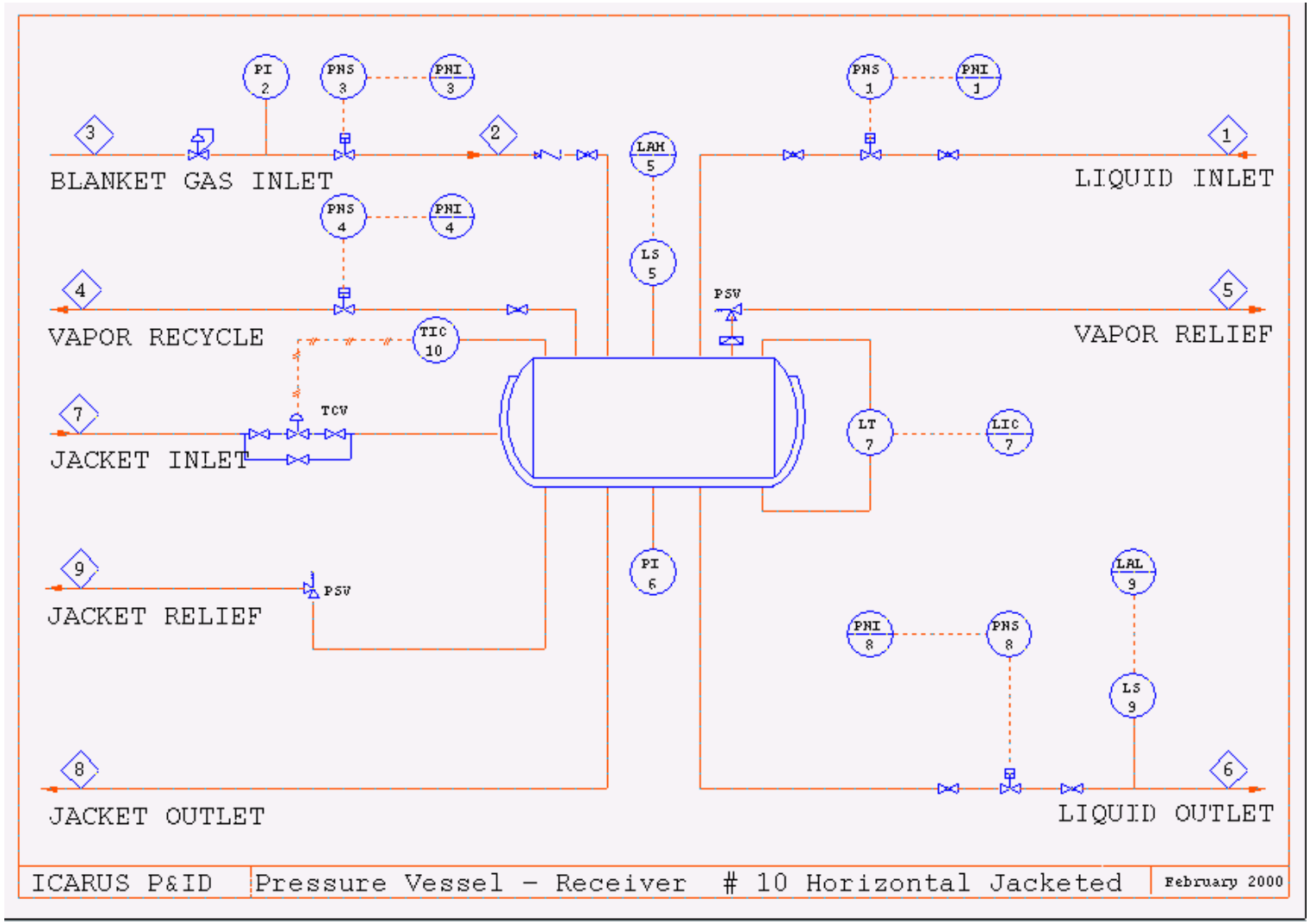
609 Air Cooled Heat Exchanger



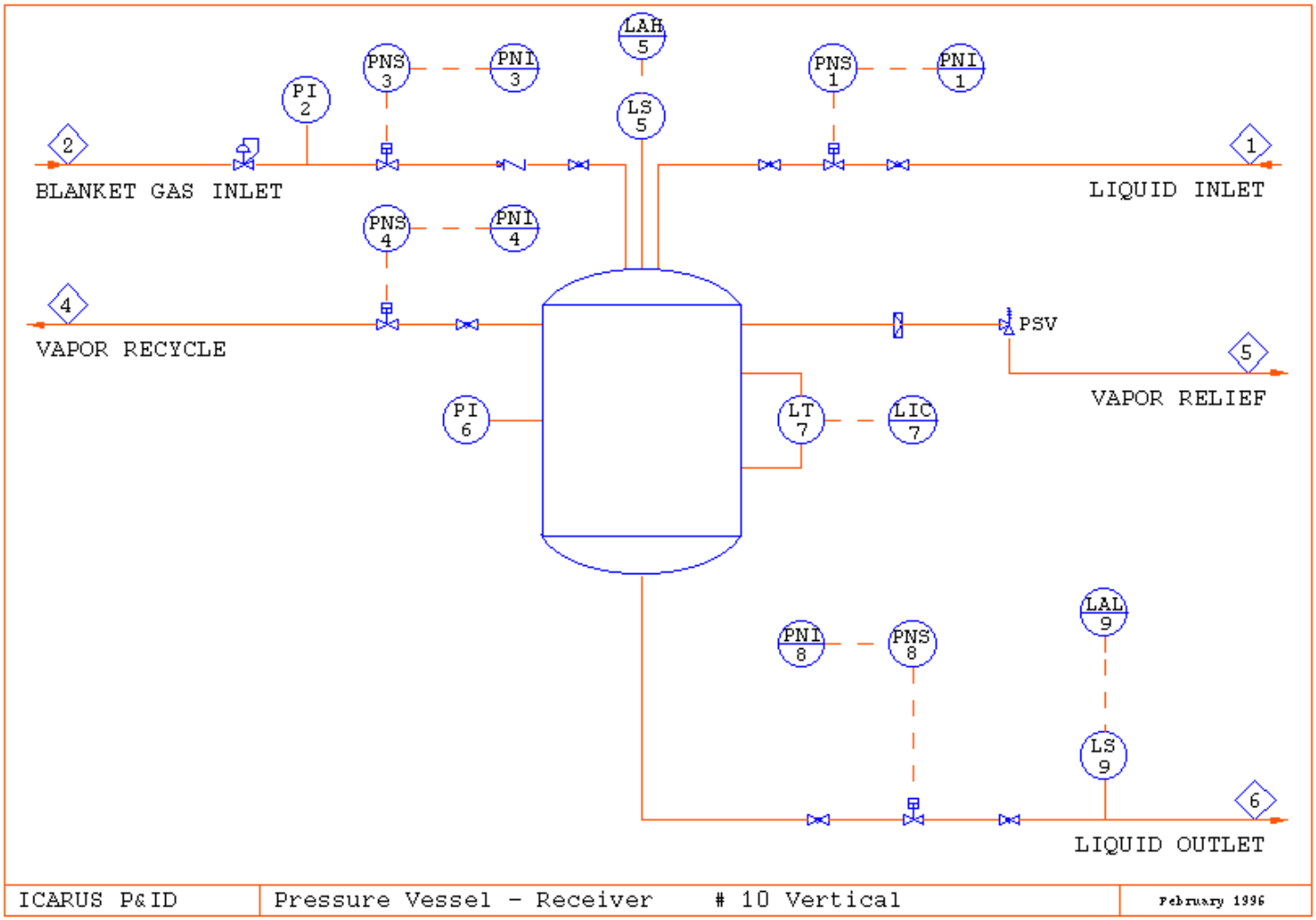
10 Horizontal Pressure Vessel – Receiver



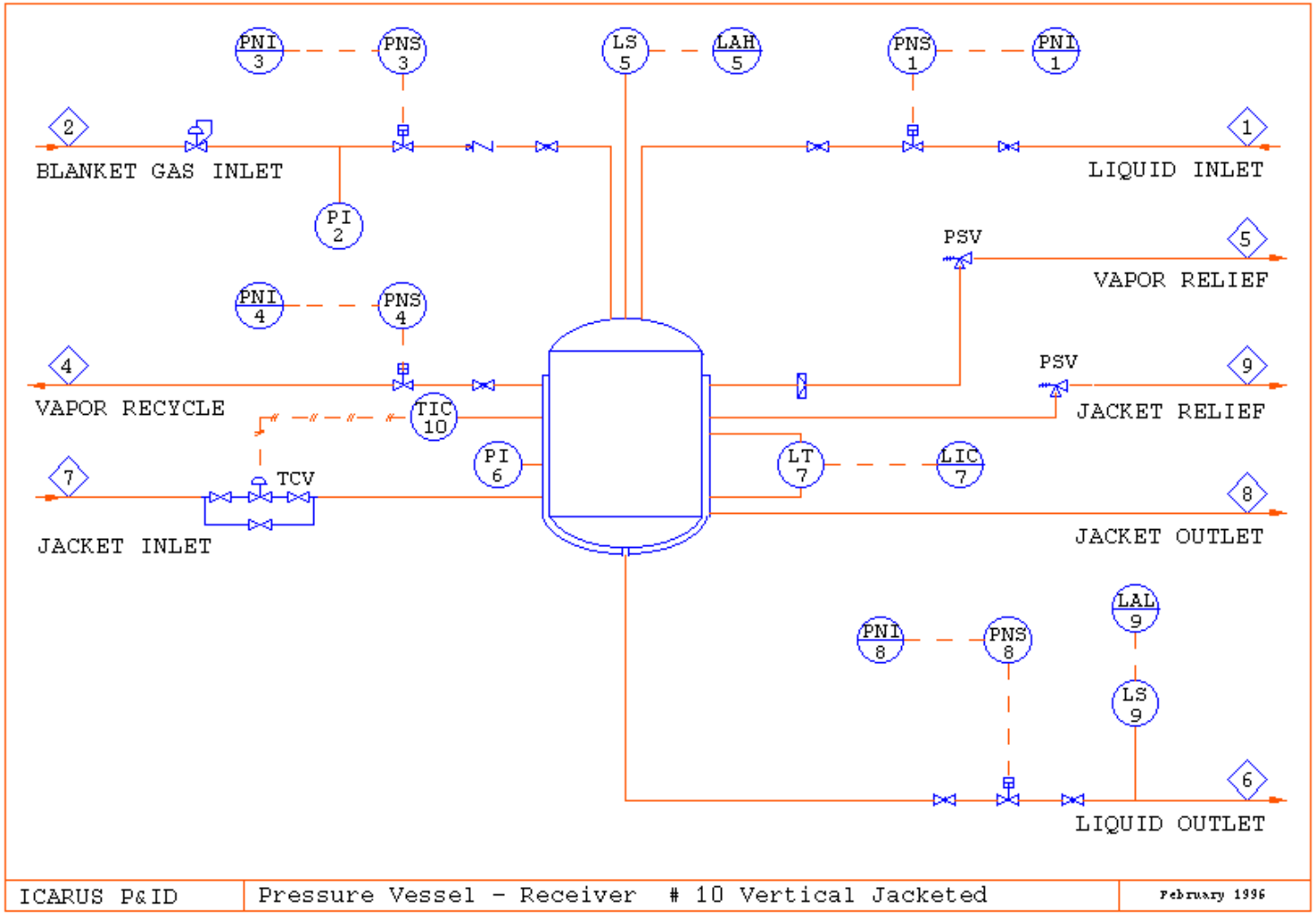
10 Horizontal Jacketed Pressure Vessel – Receiver


PI 2
PNS 3
PNI 3
PNS 1
PNI 1
3
2
1
LAH 5
BLANKET GAS INLET
LIQUID INLET
PNS 4
PNI 4
LS 5
4
PSV
5
VAPOR RECYCLE
VAPOR RELIEF
TIC 10
TCV
7
LT 7
LIC 7
JACKET INLET
PI 6
LAL 9
9
PSV
JACKET RELIEF
PNI 8
PNS 8
LS 9
8
6
JACKET OUTLET
LIQUID OUTLET
ICARUS P&ID
Pressure Vessel - Receiver # 10 Horizontal Jacketed
February 2000

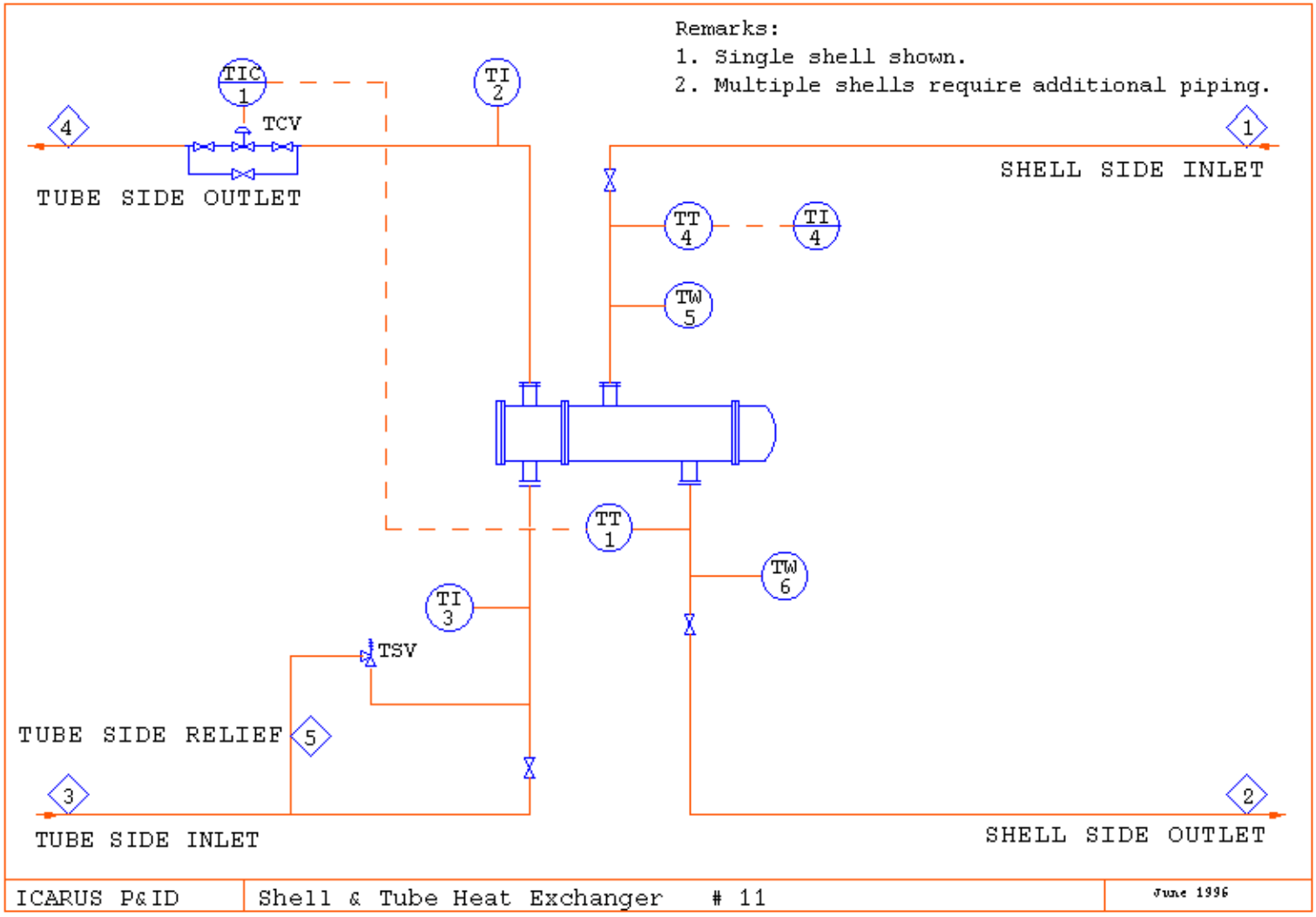
10 Vertical Pressure Vessel – Receiver



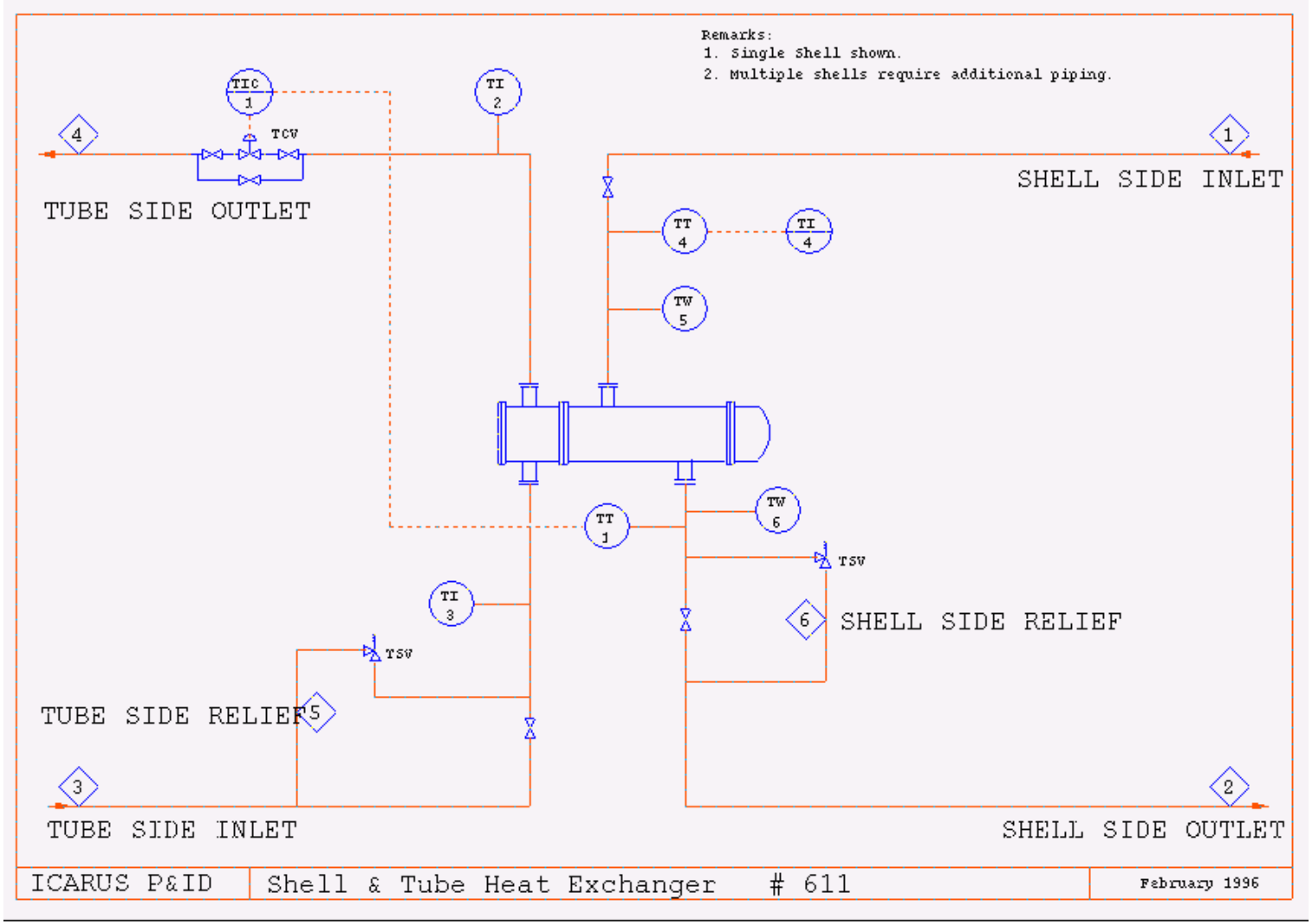
10 Vertical Jacketed Pressure Vessel – Receiver



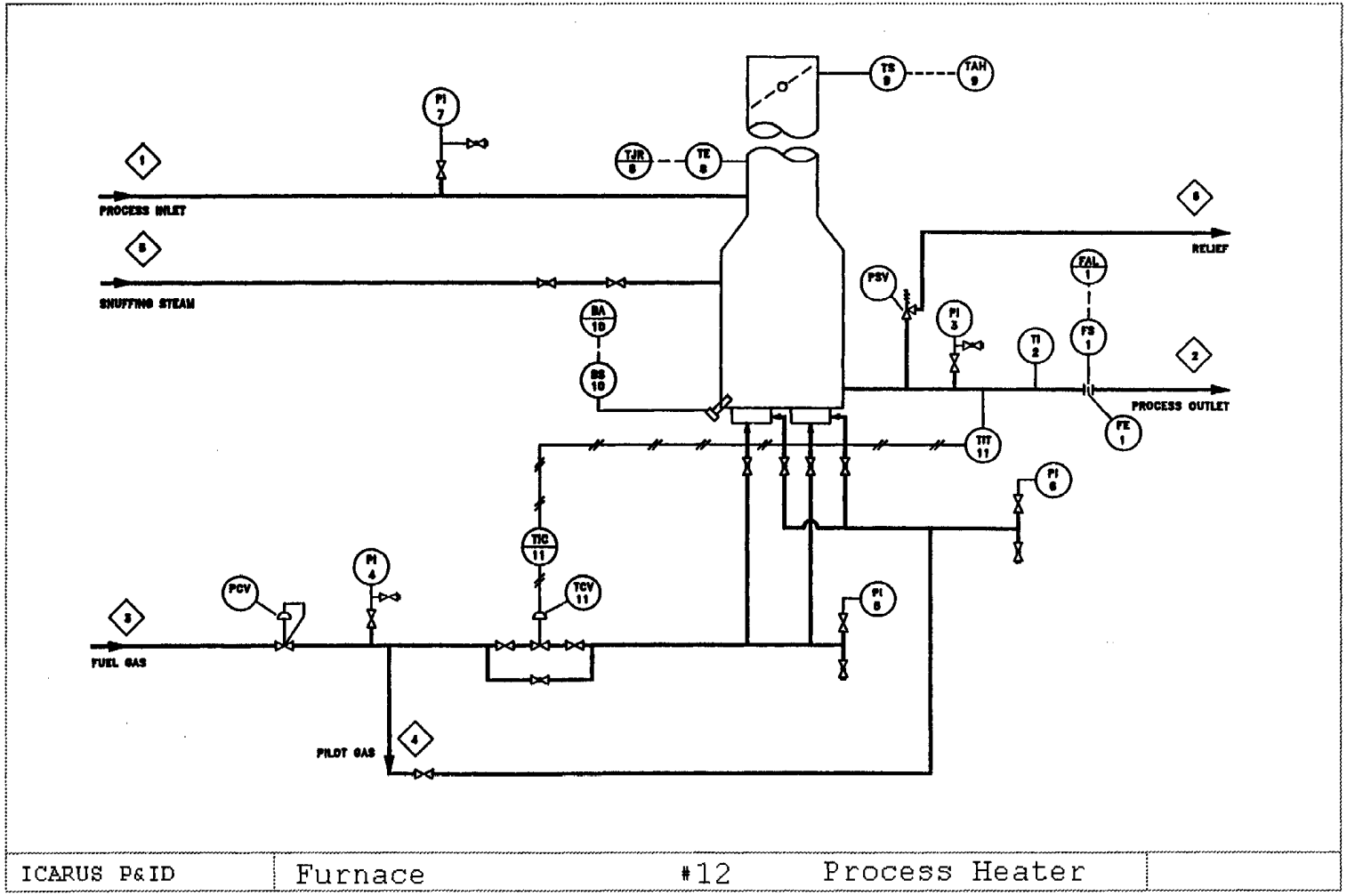
11 Shell & Tube Heat Exchanger



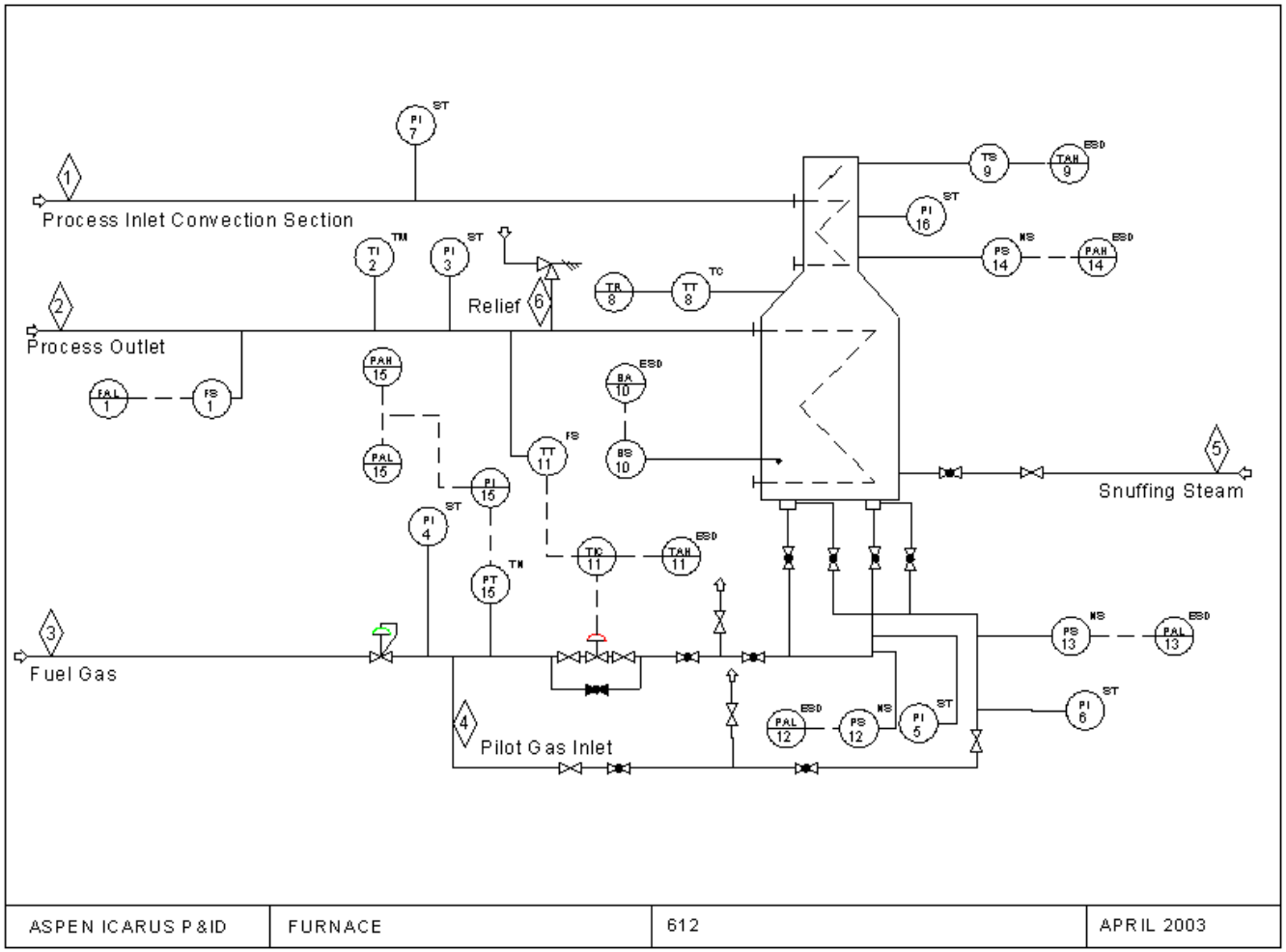
611 Shell & Tube Heat Exchanger


Remarks:
1. Single Shell shown.
2. Multiple shells require additional piping.
TIC 1
TI 2
TCV
4
TUBE SIDE OUTLET
1
SHELL SIDE INLET
TT 4
TI 4
TW 5
TW 6
TT 1
TSV
TI 3
6
SHELL SIDE RELIEF
TSV
TUBE SIDE RELIEF
5
3
TUBE SIDE INLET
2
SHELL SIDE OUTLET
ICARUS P&ID
Shell & Tube Heat Exchanger # 611
February 1996

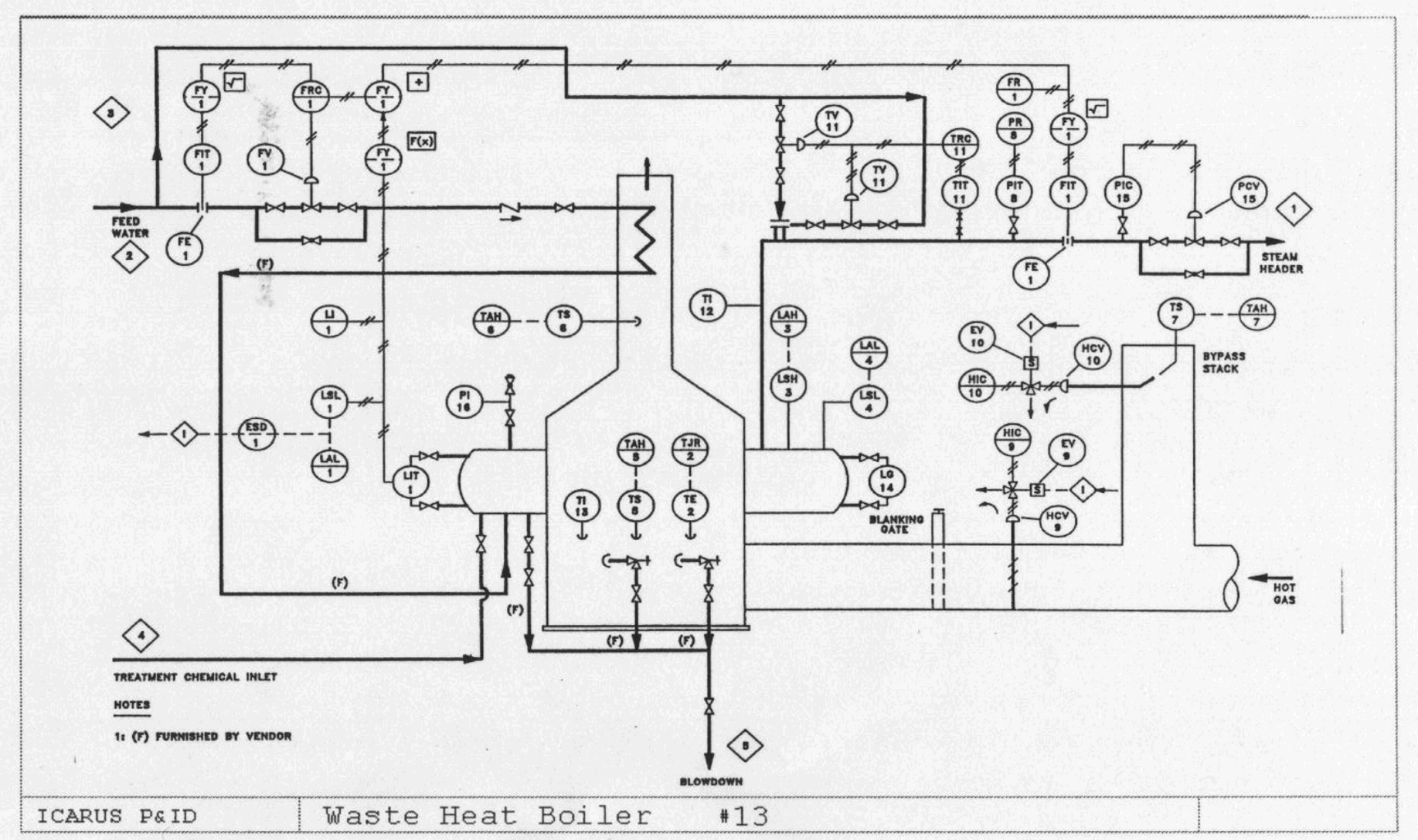
12 Process Heater Furnace



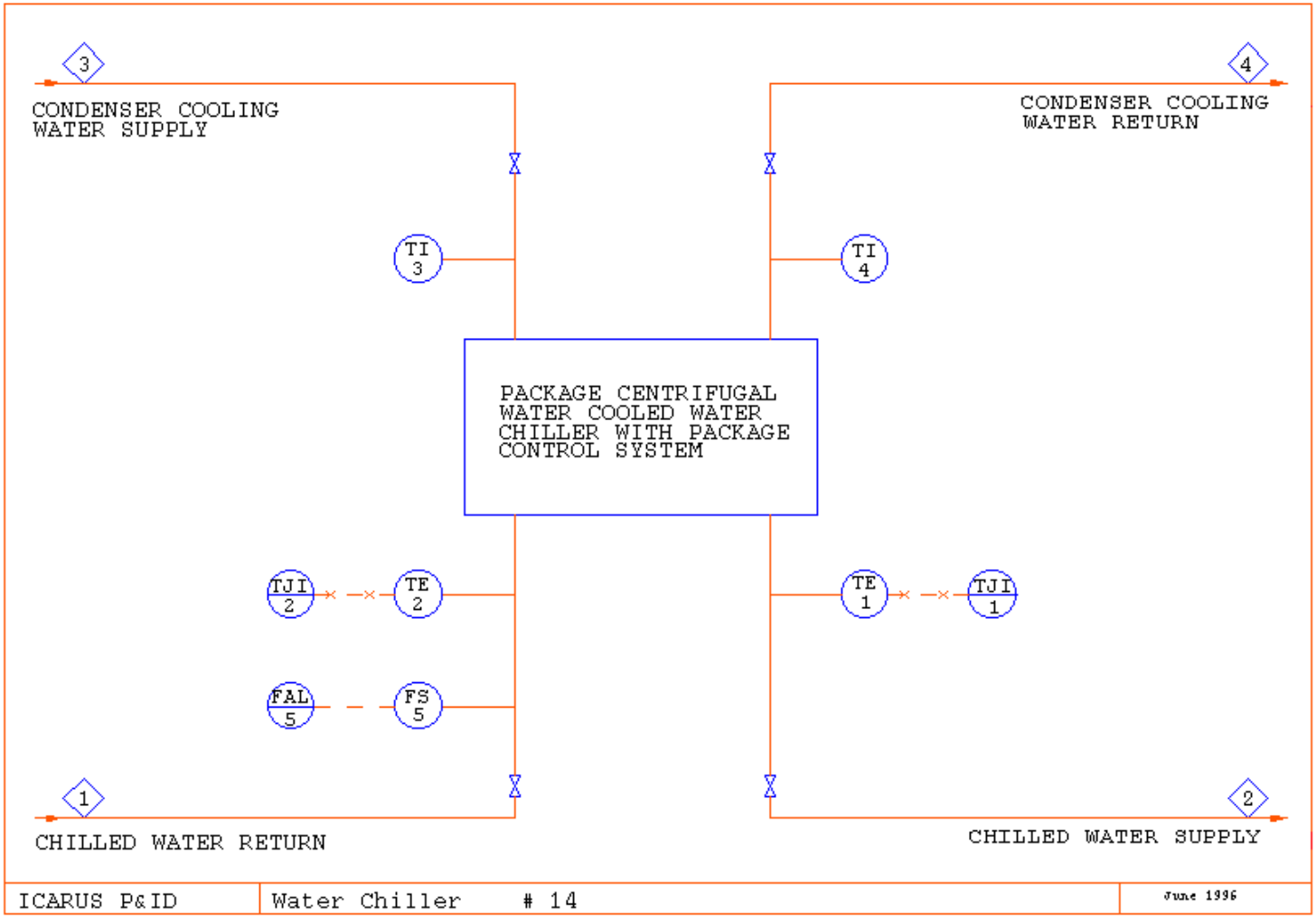
612 Process Heater Furnace



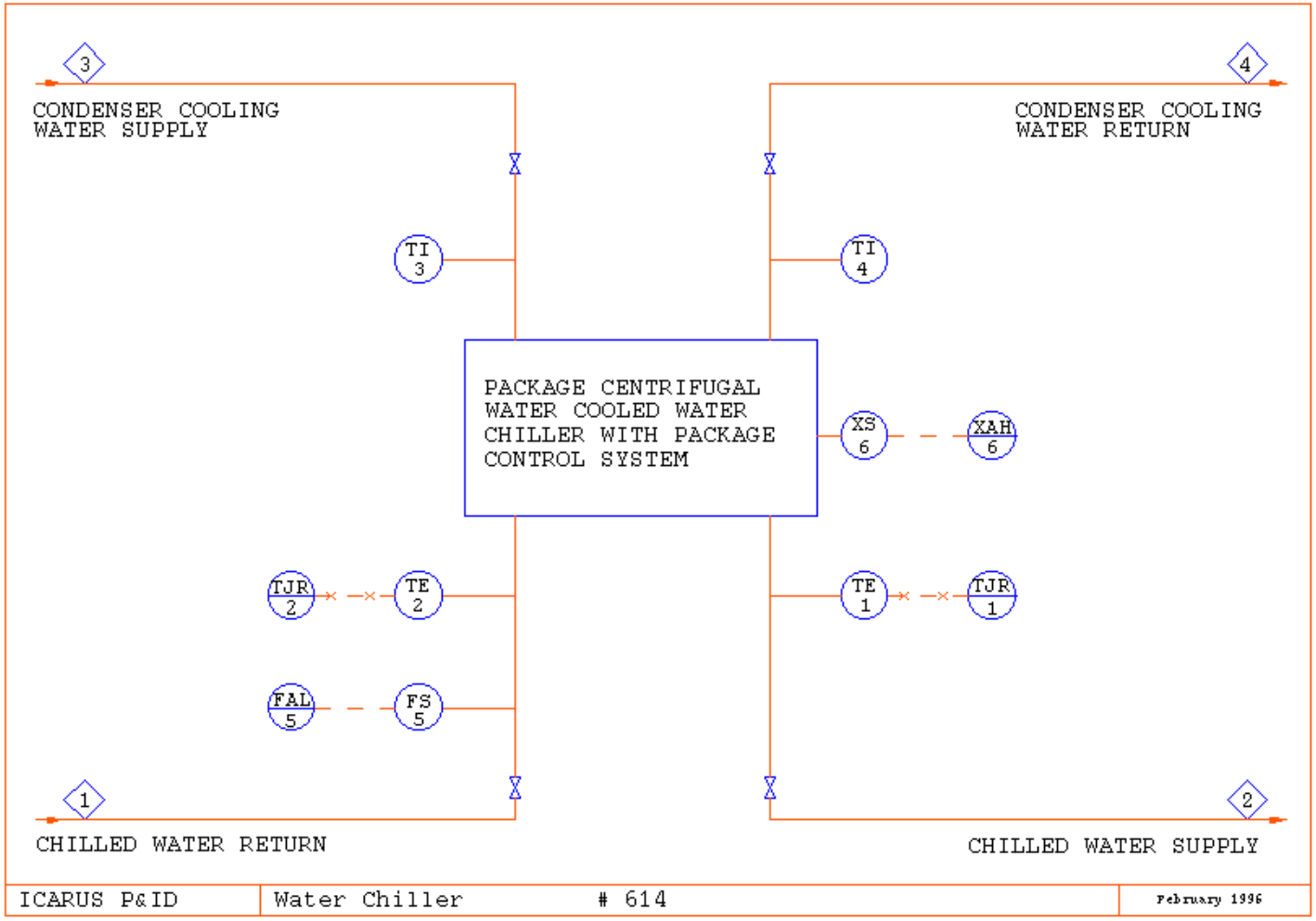
13 Waste Heat Boiler


FEED WATER
STEAM HEADER
BYPASS STACK
HOT GAS
BLANKING GATE
BLOWDOWN
TREATMENT CHEMICAL INLET
NOTES
1: (F) FURNISHED BY VENDOR
ICARUS P&ID
Waste Heat Boiler #13

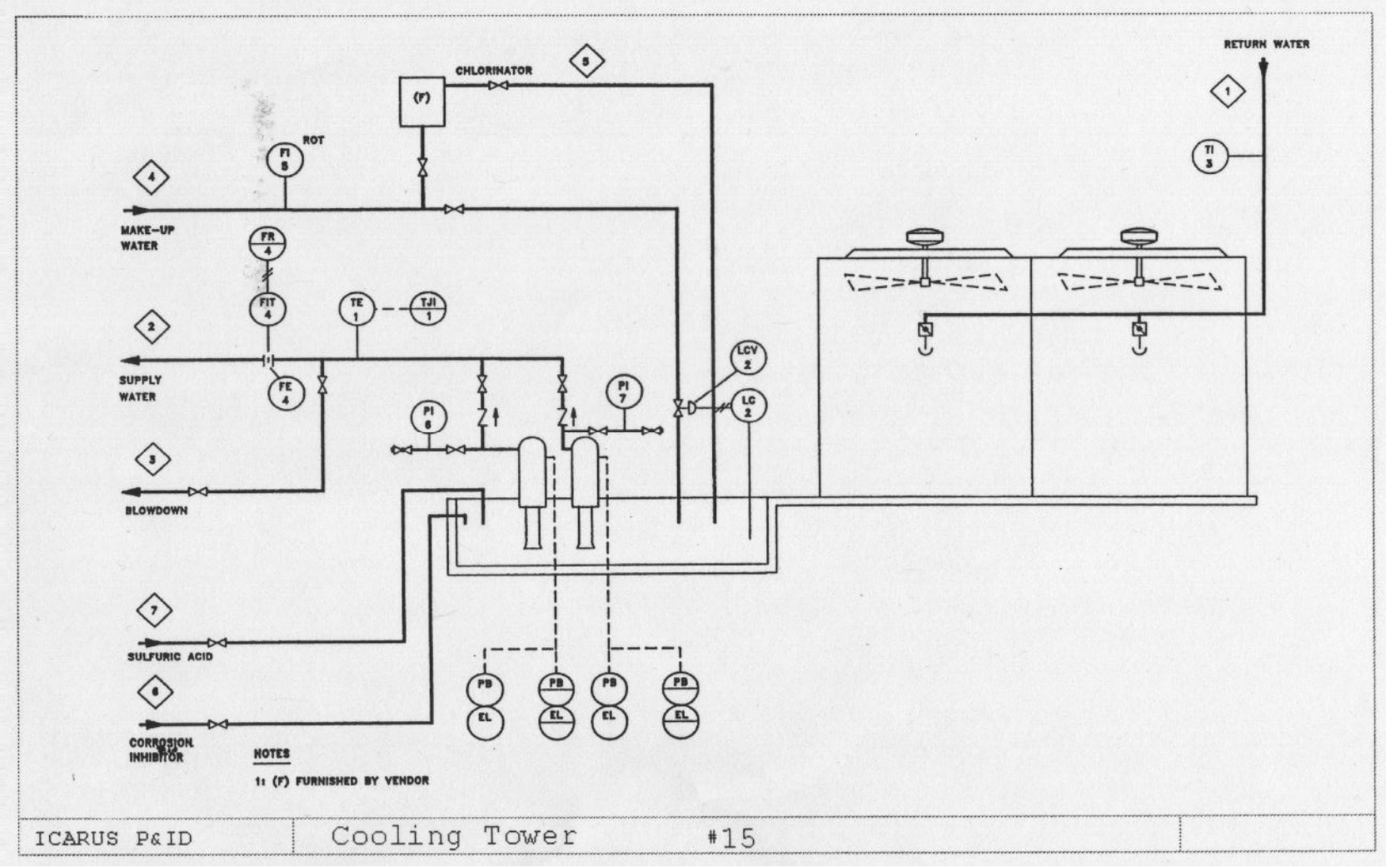
14 Water Chiller



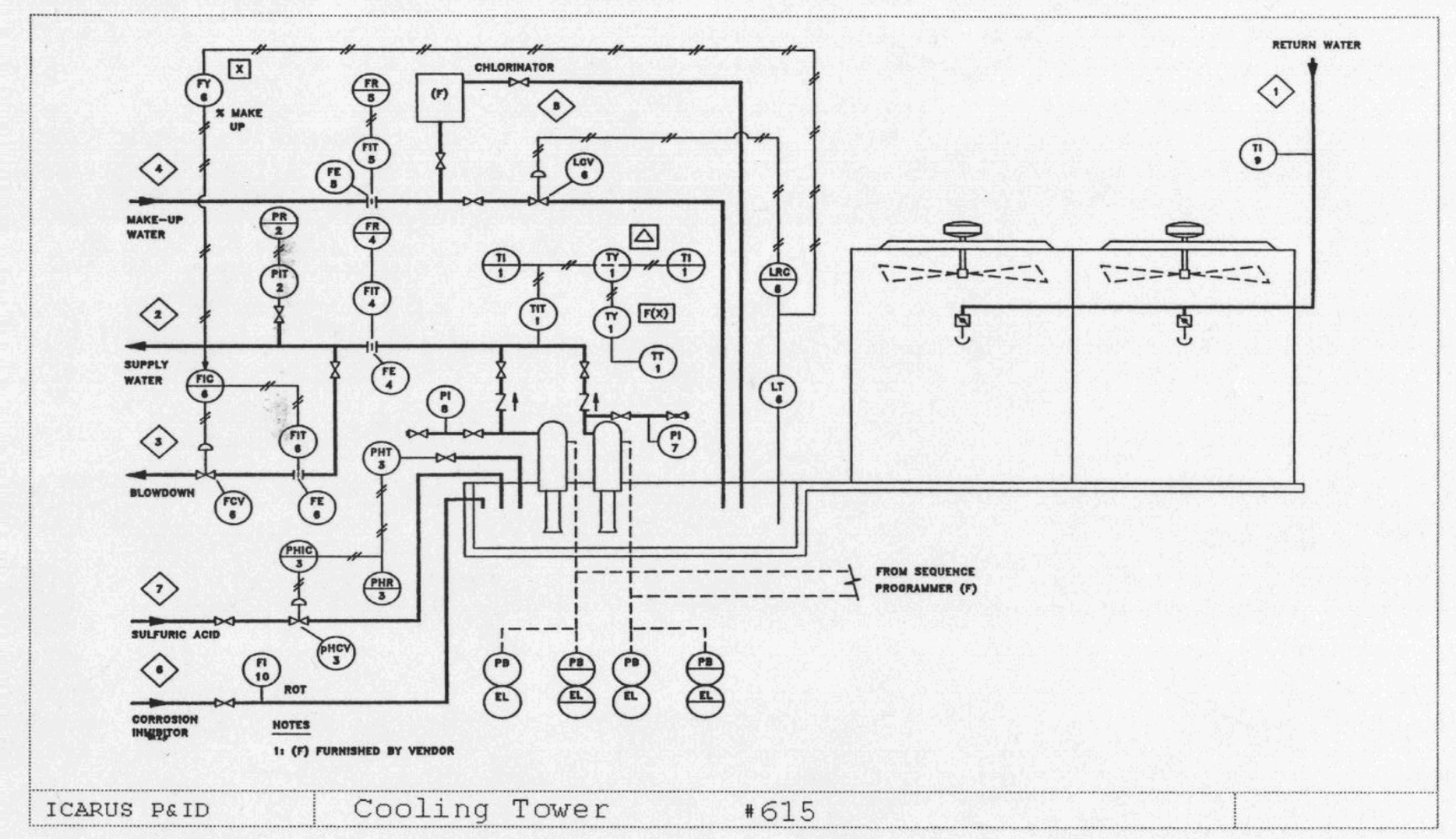
614 Water Chiller



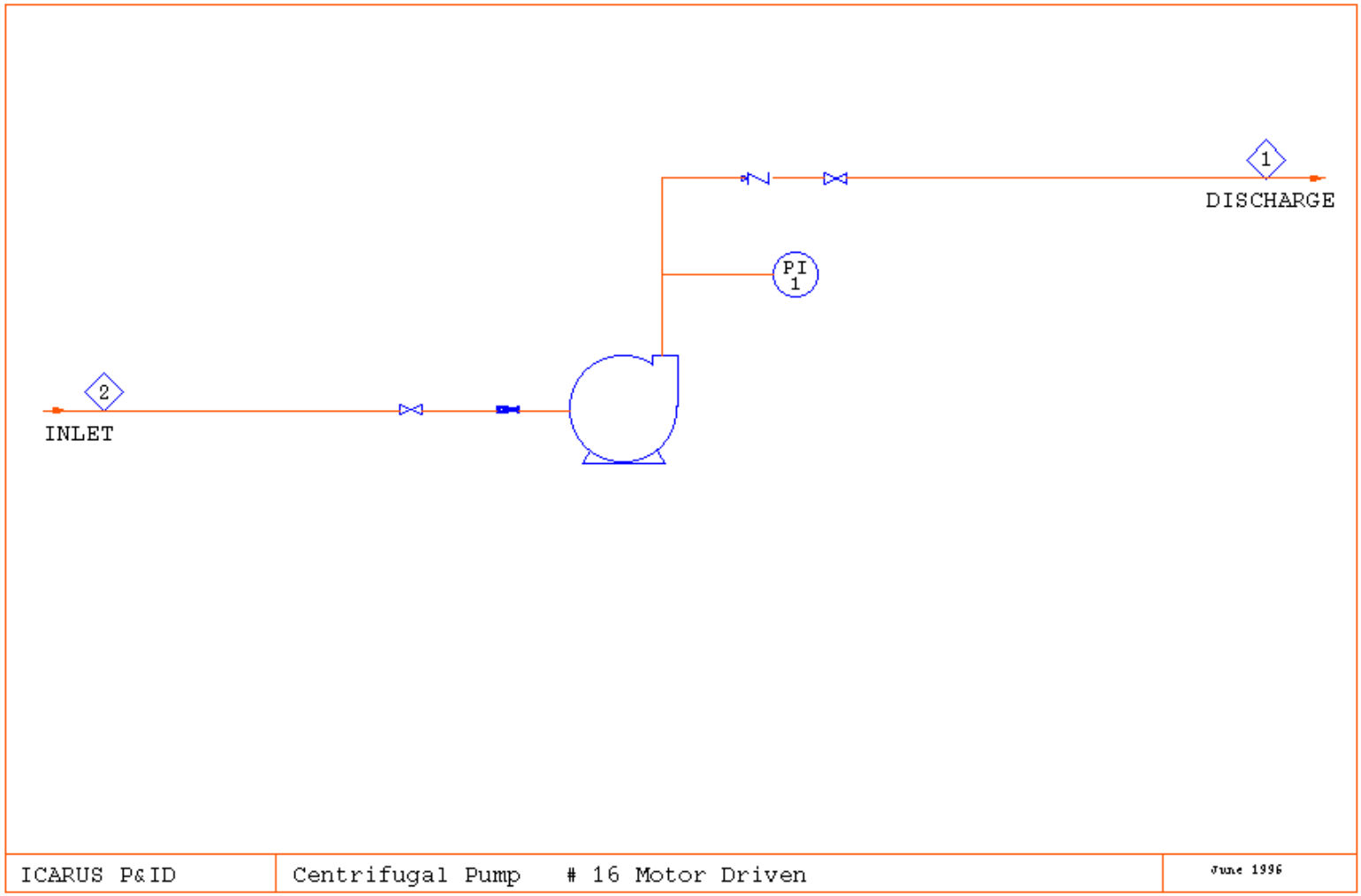
15 Cooling Tower


RETURN WATER
CHLORINATOR
(F)
5
1
TI 3
ROT
FI 5
4
MAKE-UP WATER
FR 4
FIT 4
TE 1
TJI 1
2
SUPPLY WATER
FE 4
PI 6
PI 7
LCV 2
LC 2
3
BLOWDOWN
7
SULFURIC ACID
6
CORROSION INHIBITOR
PB
EL
NOTES
1: (F) FURNISHED BY VENDOR
ICARUS P&ID
Cooling Tower
#15

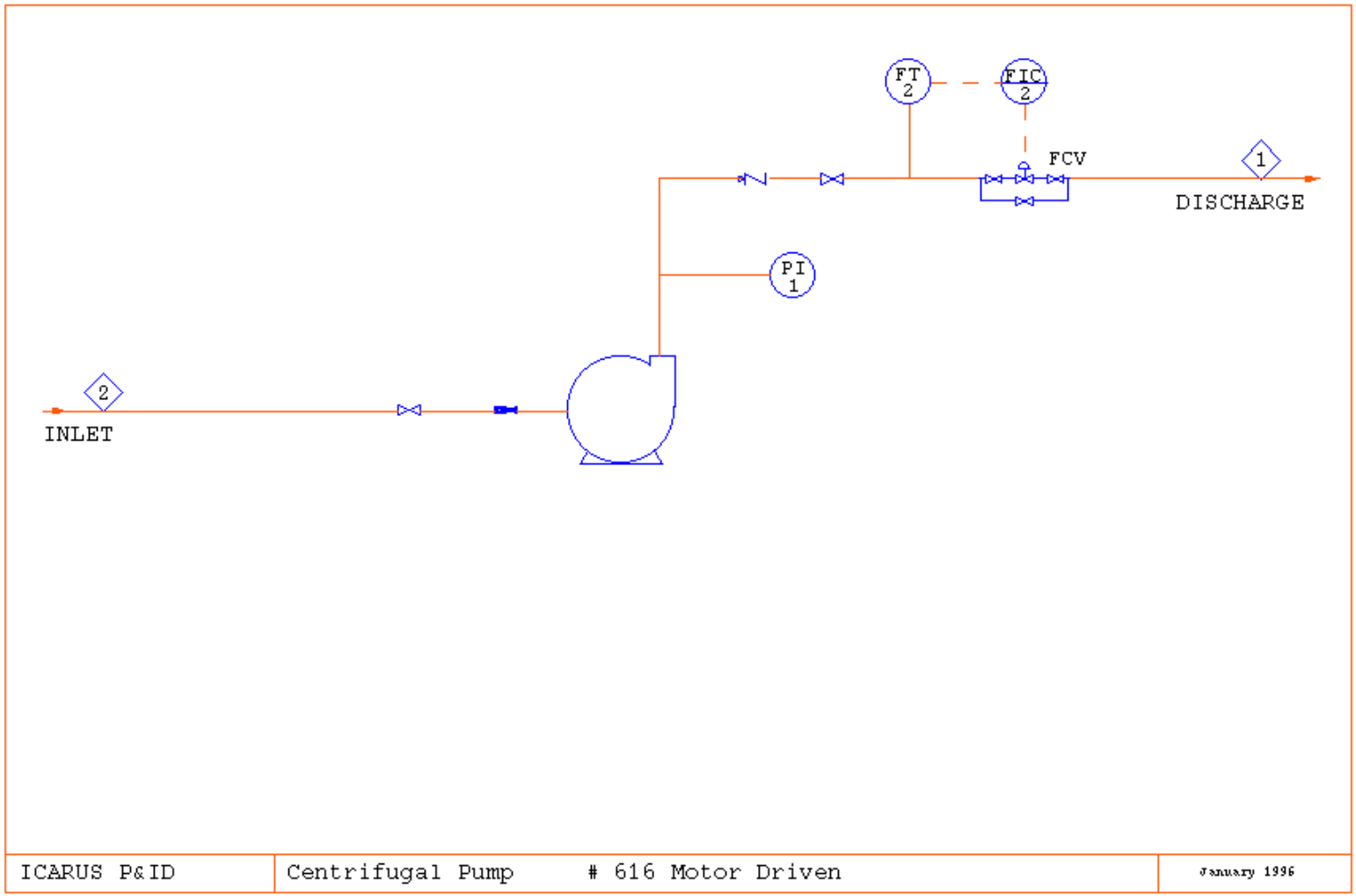
615 Cooling Tower



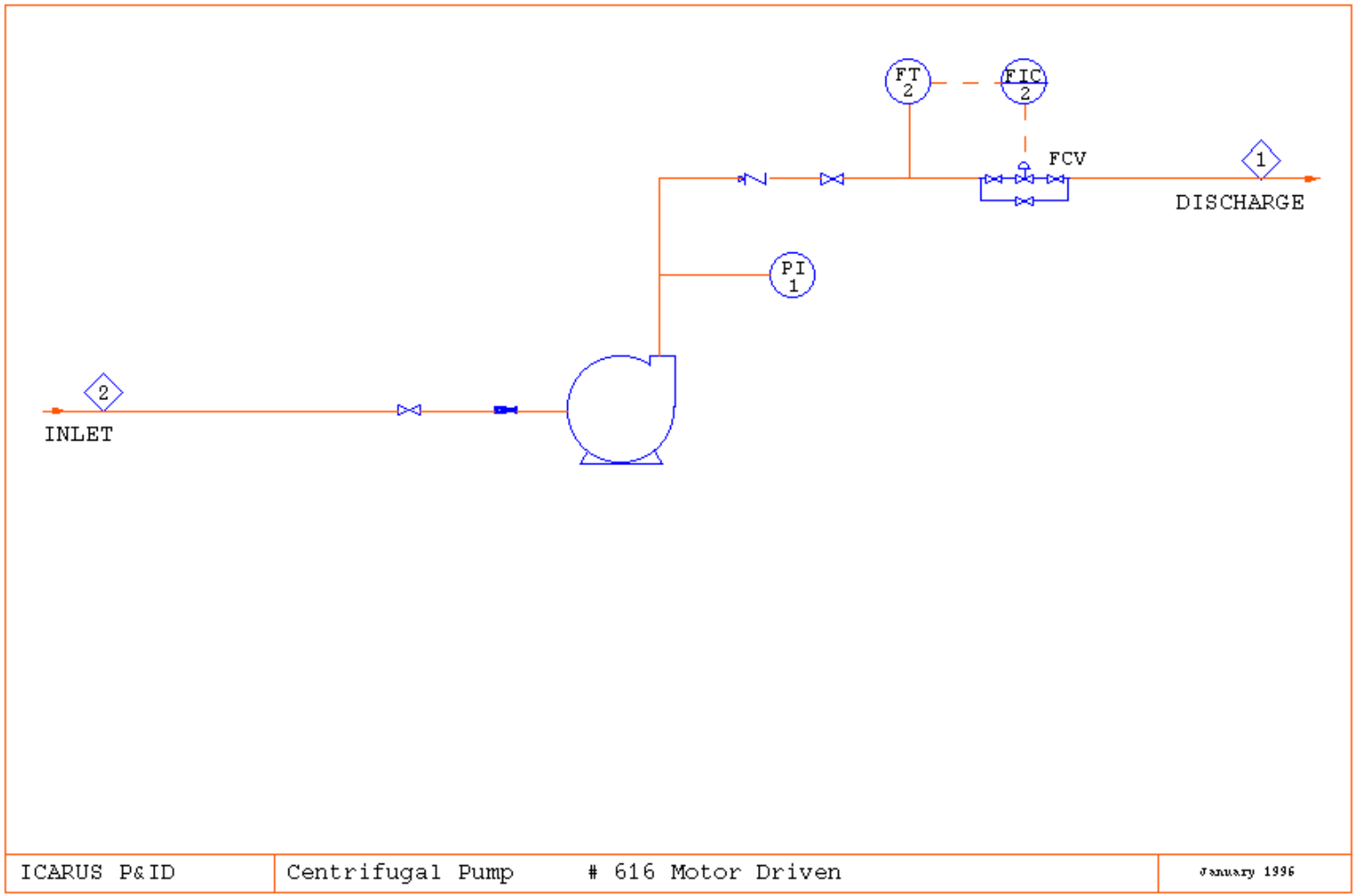
16 Motor Driven Centrifugal Pump



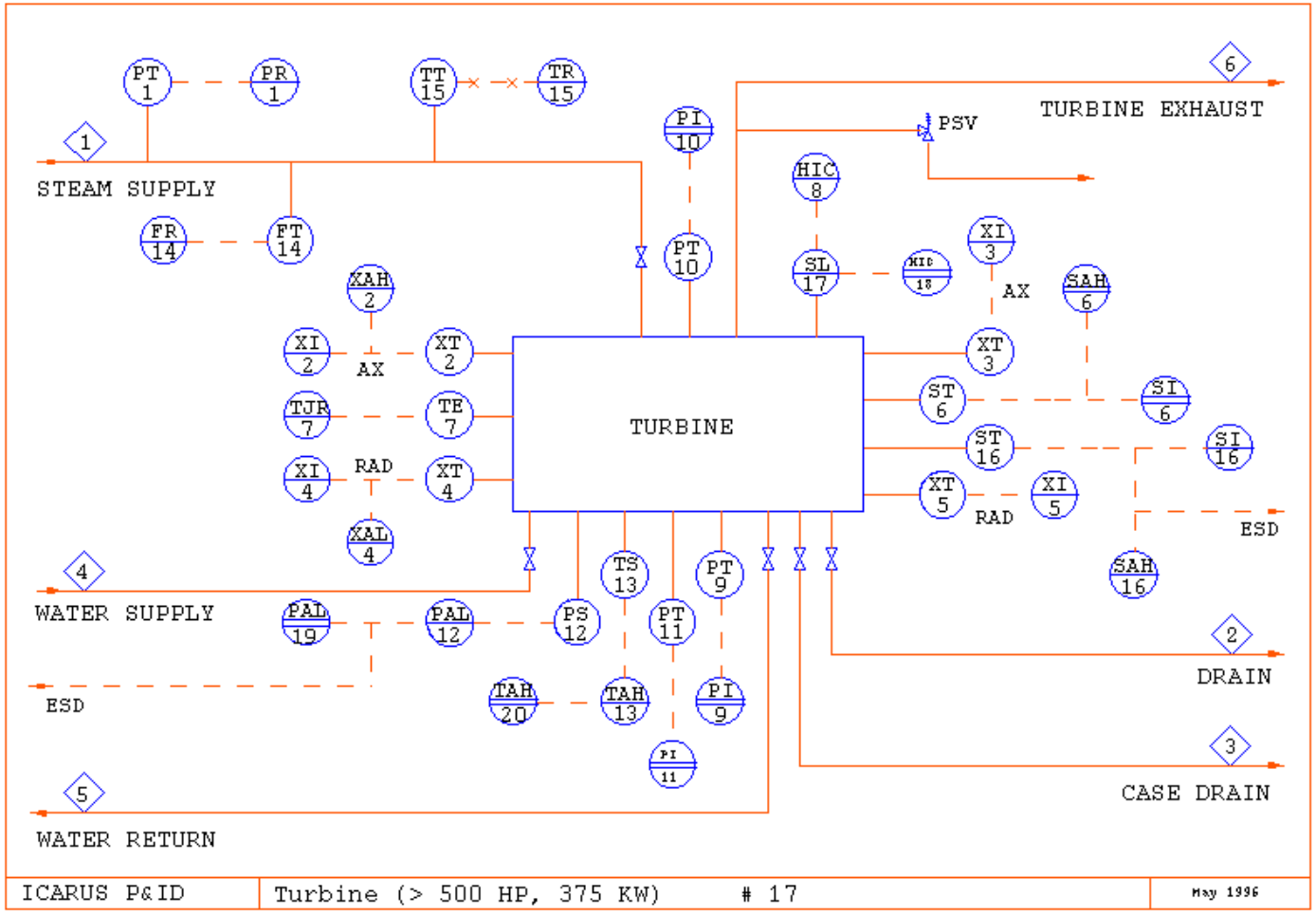
616 Motor Driven Centrifugal Pump


FT
2
FIC
2
FCV
1
DISCHARGE
PI
1
2
INLET
ICARUS P&ID
Centrifugal Pump # 616 Motor Driven
January 1996

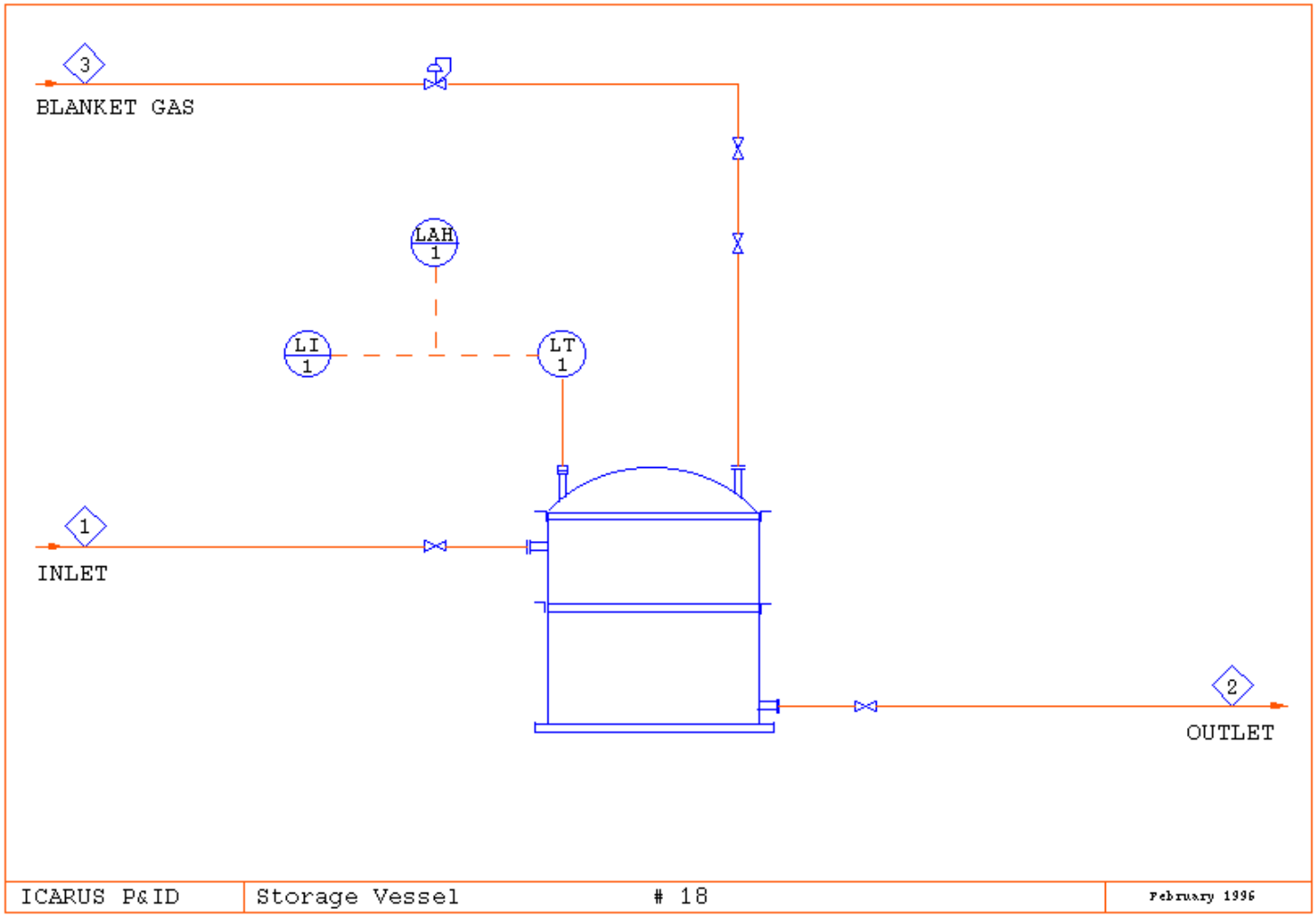
616 Motor Driven Spare Centrifugal Pump


FT
2
FIC
2
FCV
1
DISCHARGE
PI
1
2
INLET
ICARUS P&ID
Centrifugal Pump # 616 Motor Driven
January 1996

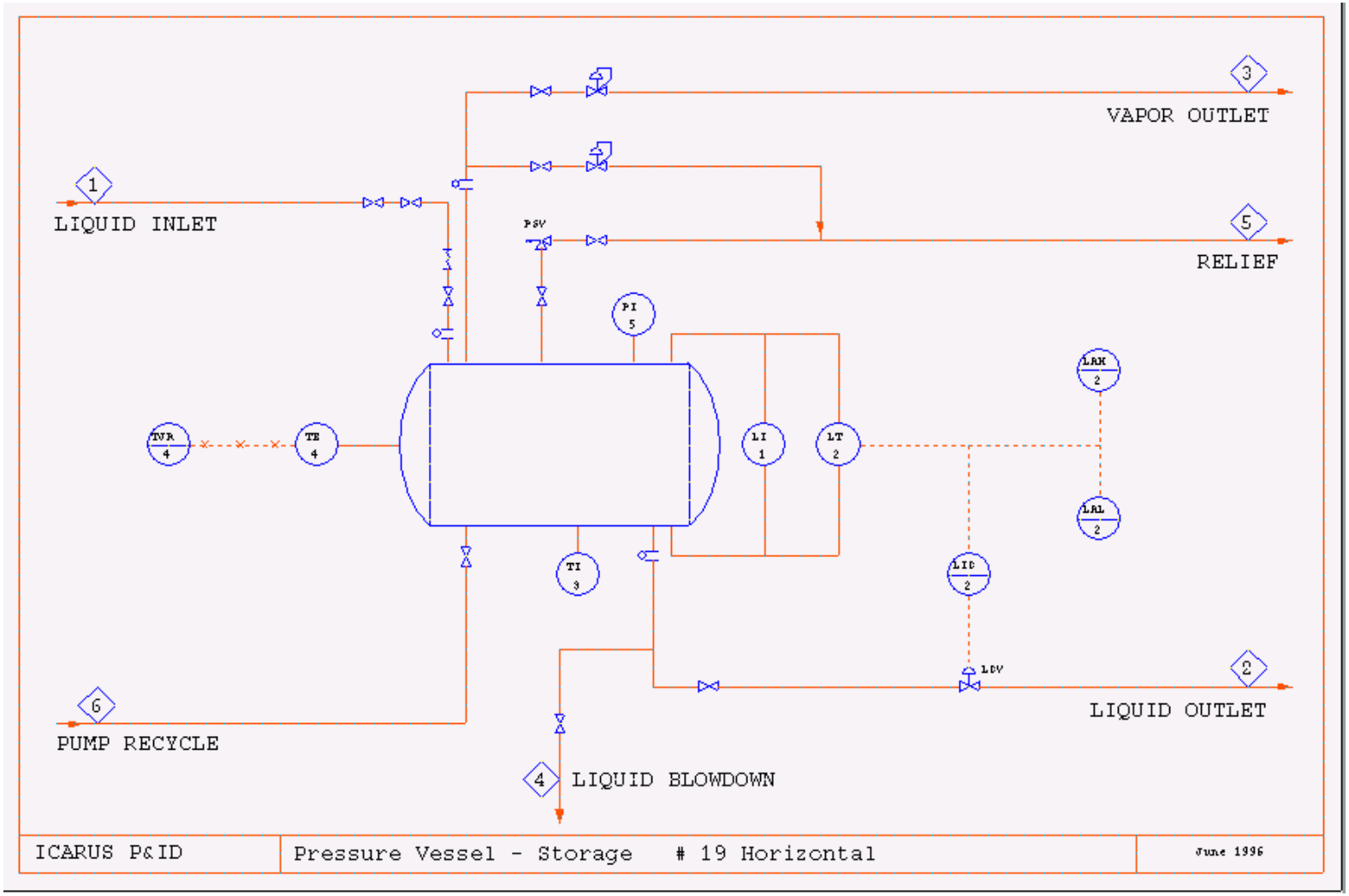
17 Turbine (>500 HP, 375 KW)



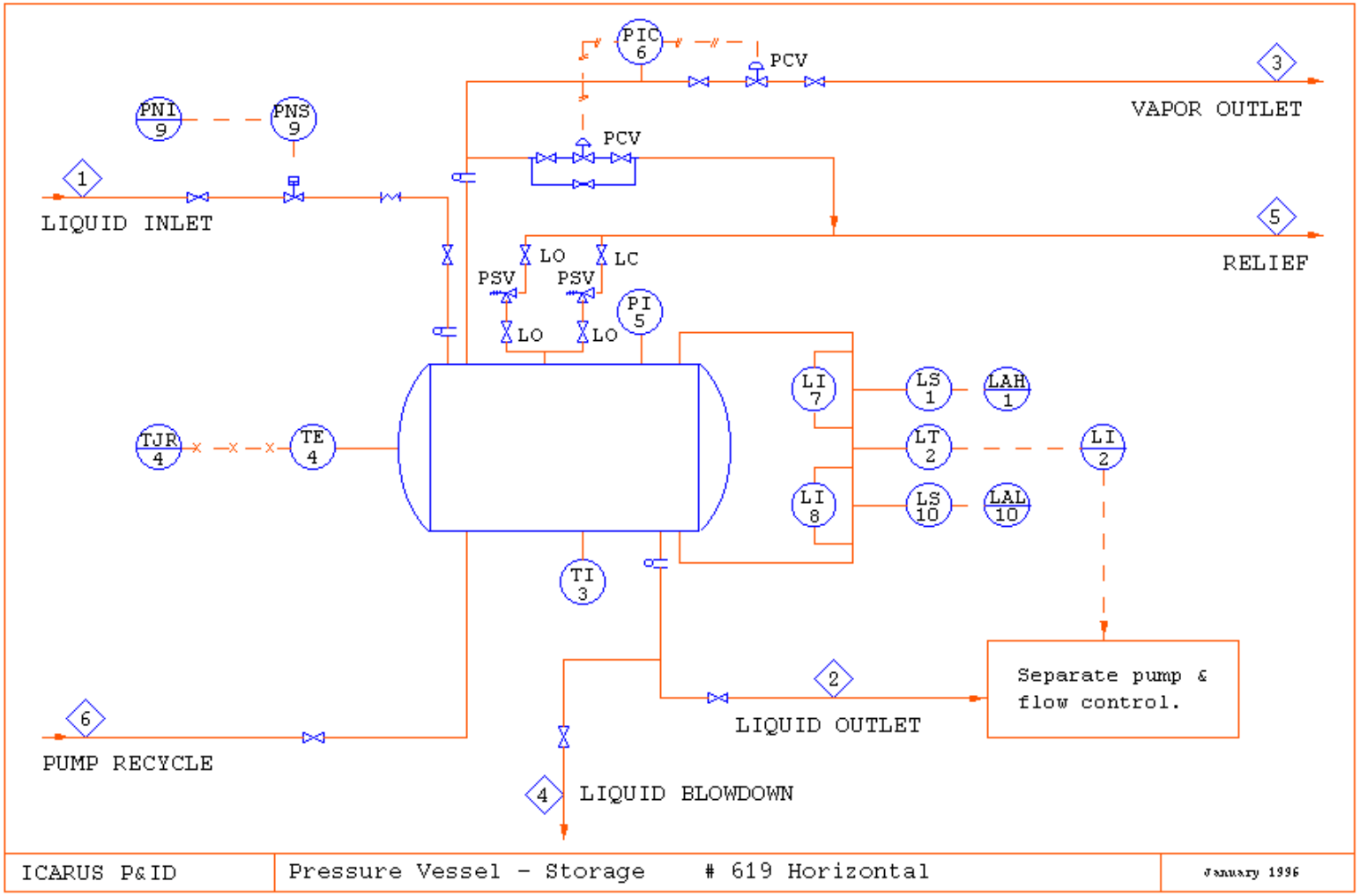
18 Storage Vessel



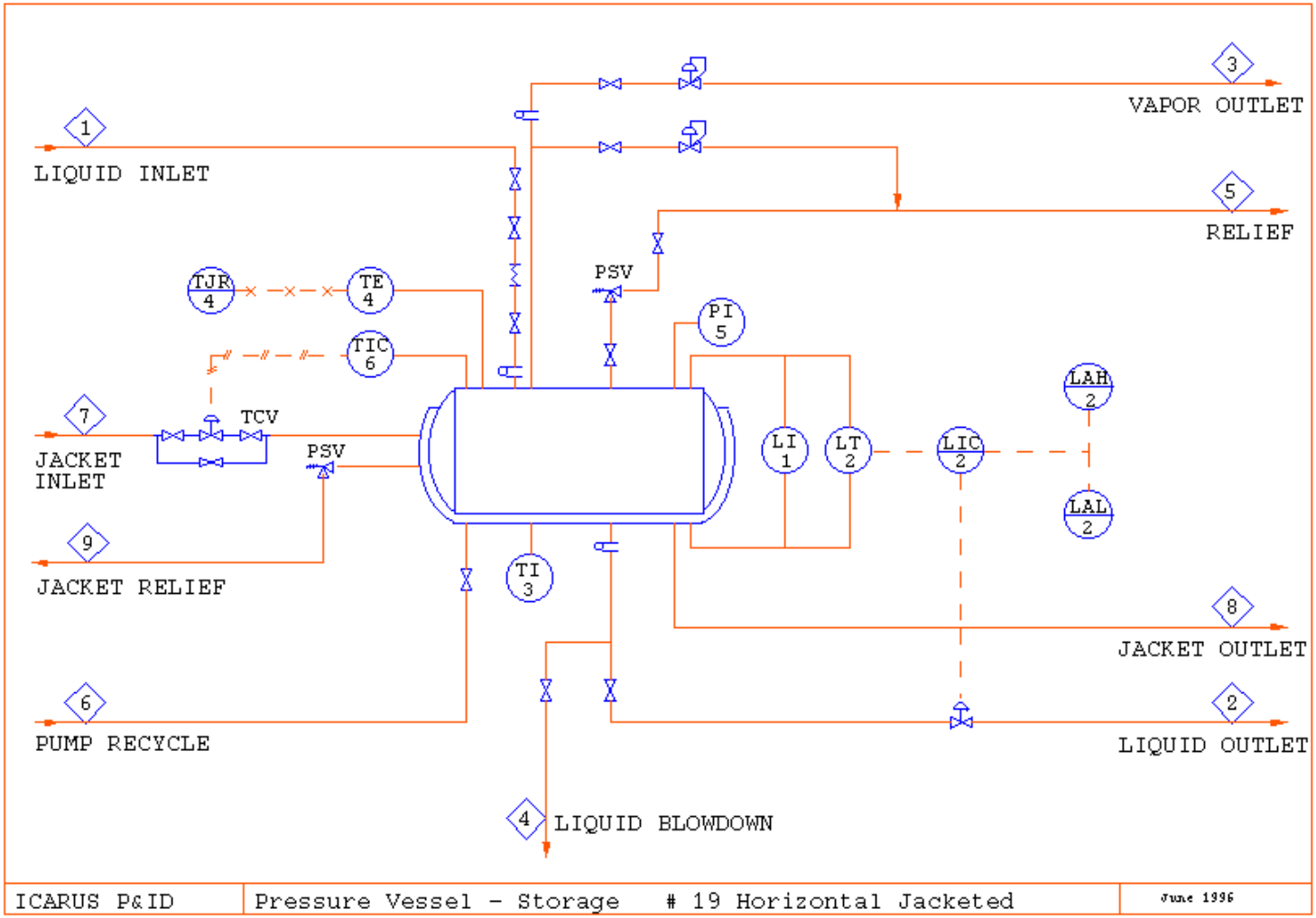
19 Horizontal Pressure Vessel – Storage


3
VAPOR OUTLET
1
LIQUID INLET
PSV
5
RELIEF
PI
5
LAH
2
TE
4
LI
1
LT
2
LAL
2
TI
3
LIC
2
LCV
2
LIQUID OUTLET
6
PUMP RECYCLE
4
LIQUID BLOWDOWN
ICARUS P&ID
Pressure Vessel - Storage # 19 Horizontal
June 1996

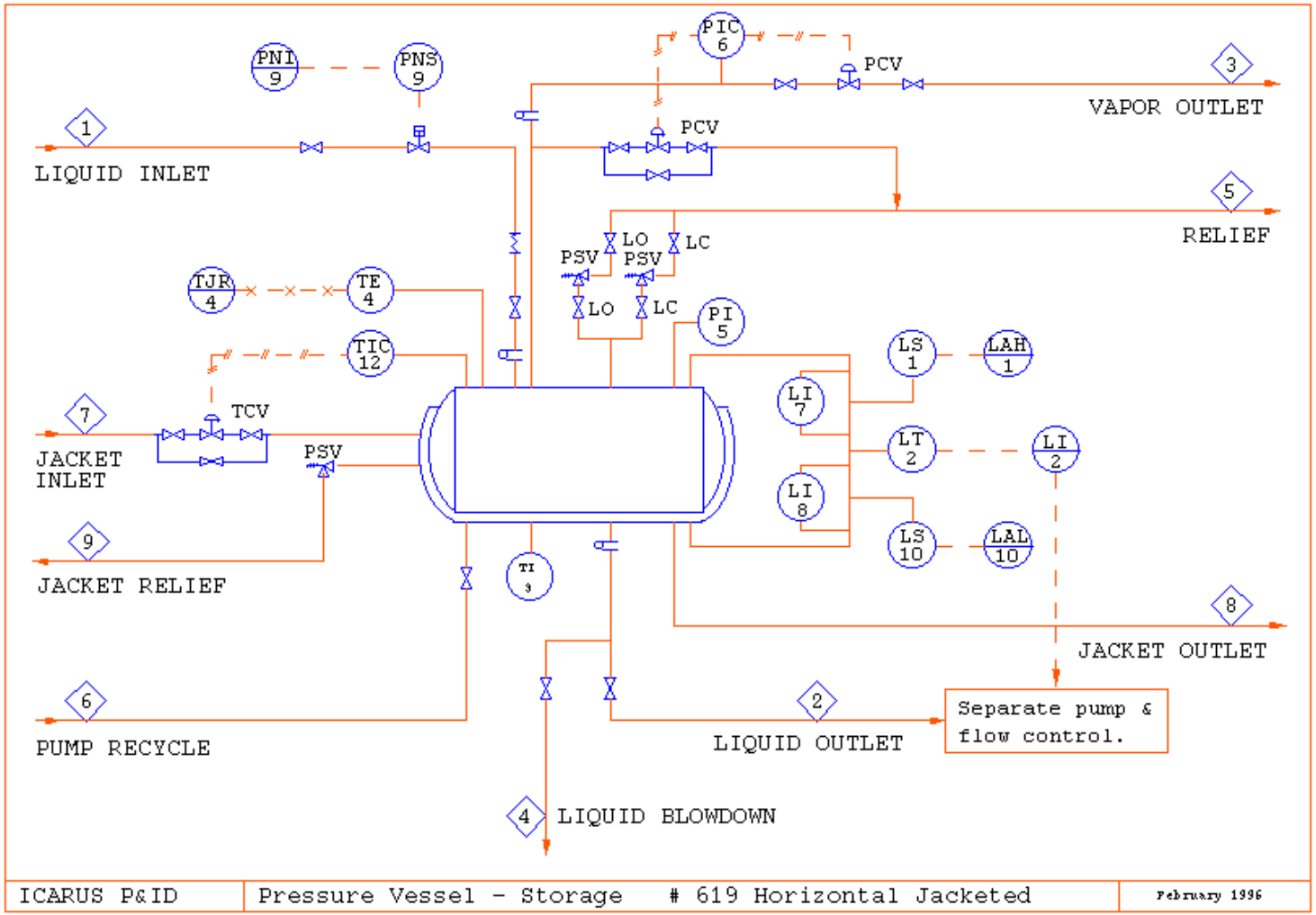
619 Horizontal Pressure Vessel – Storage



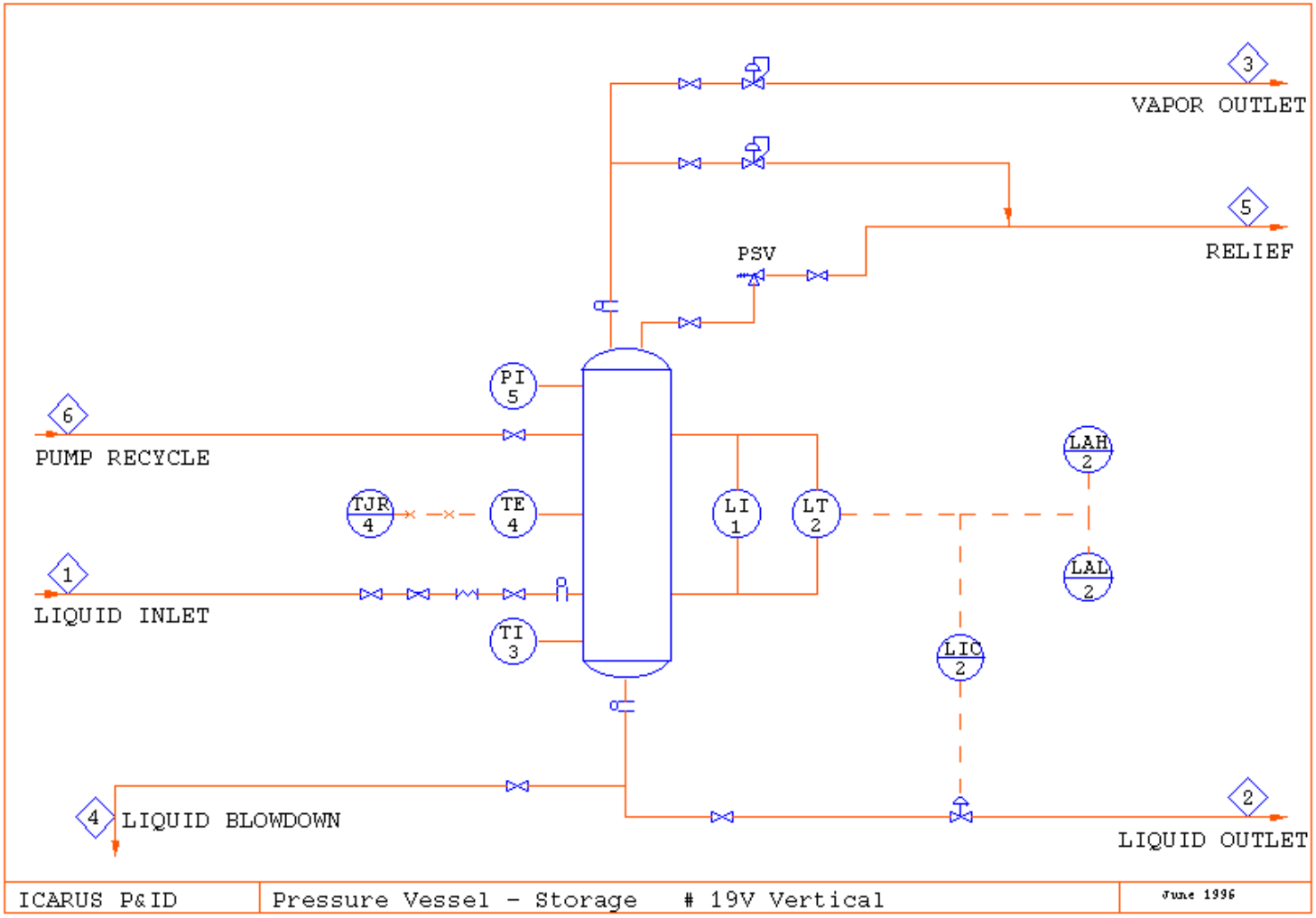
19 Horizontal Jacketed Pressure Vessel – Storage



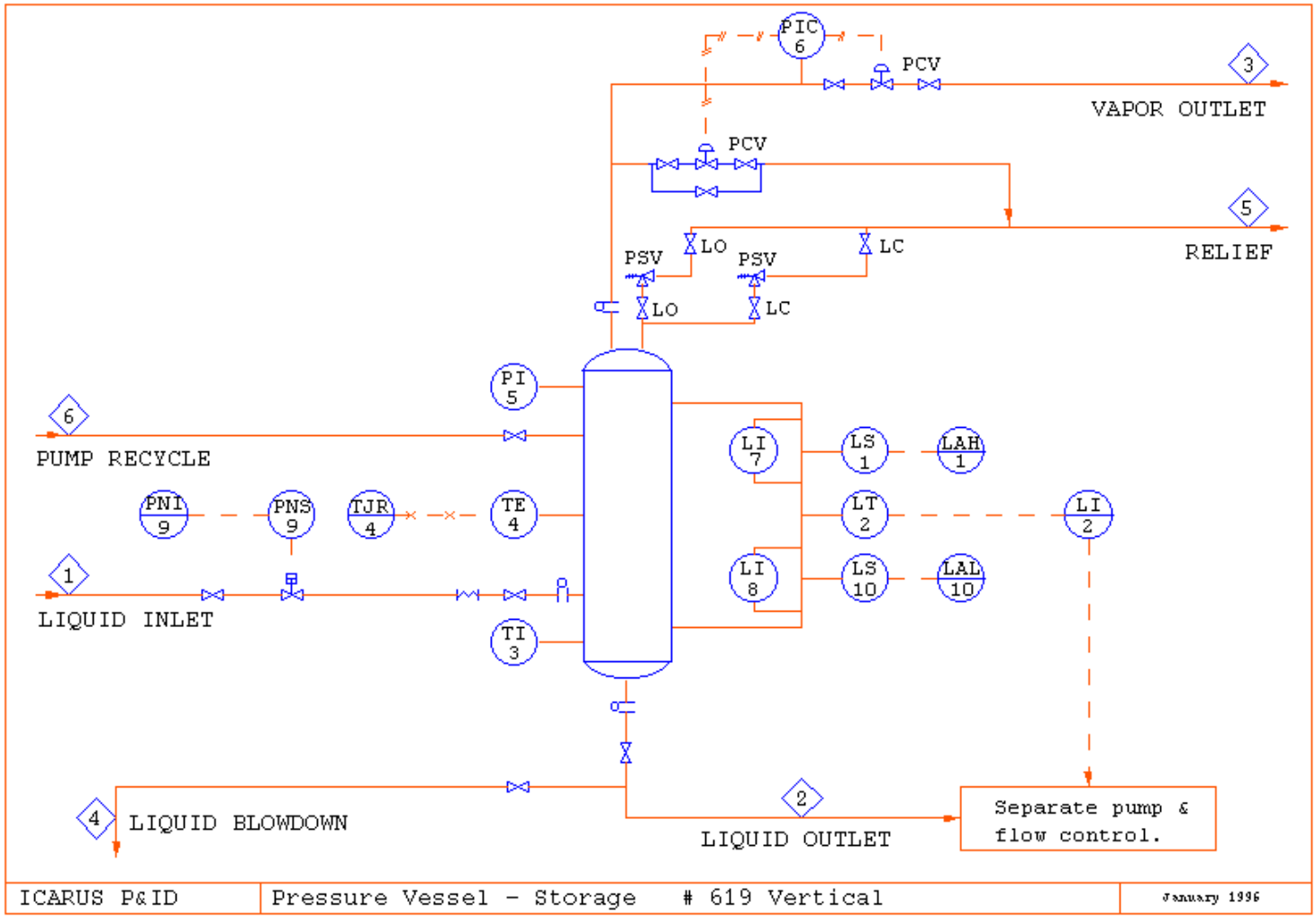
619 Horizontal Jacketed Pressure Vessel – Storage



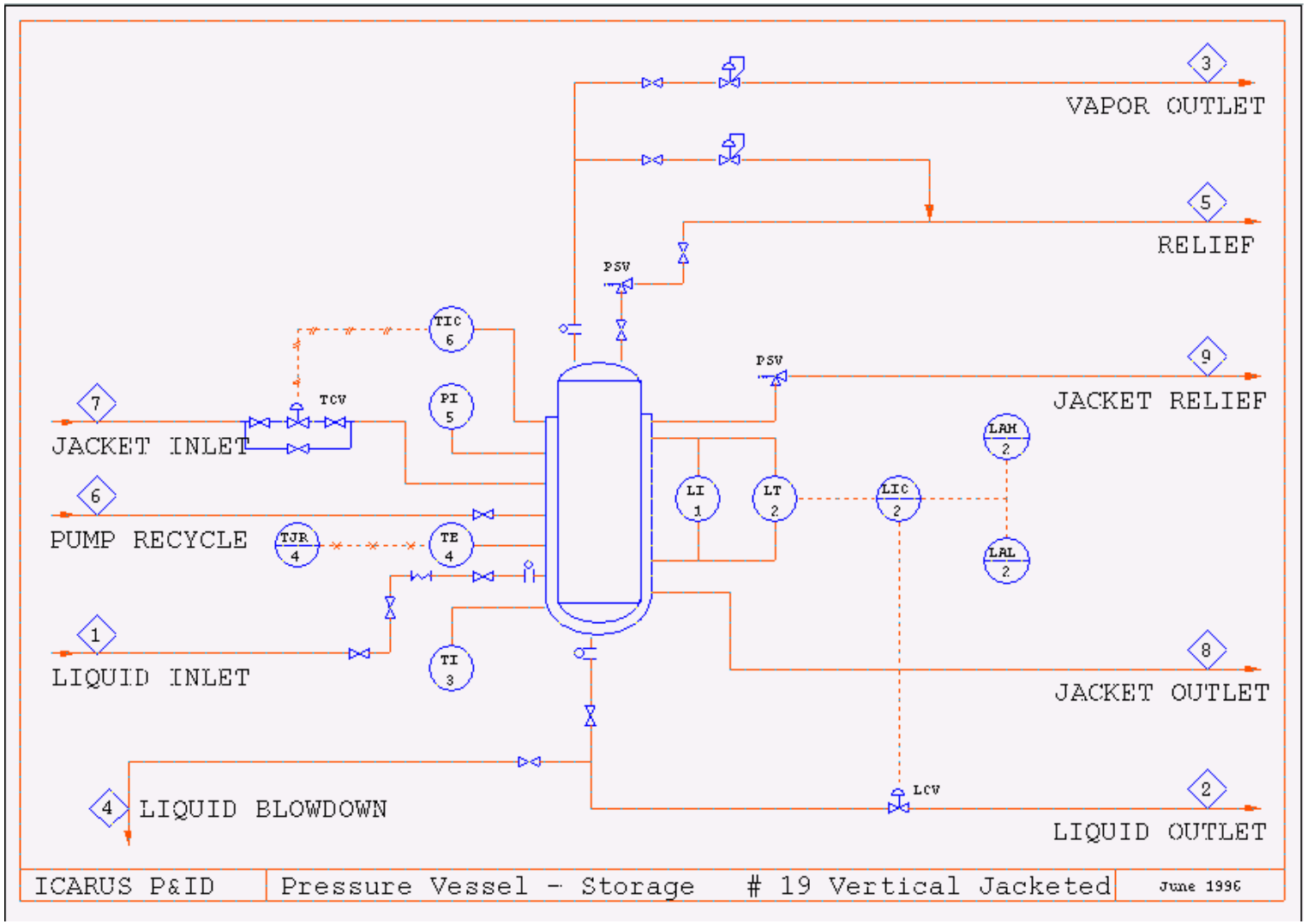
19 Vertical Pressure Vessel – Storage



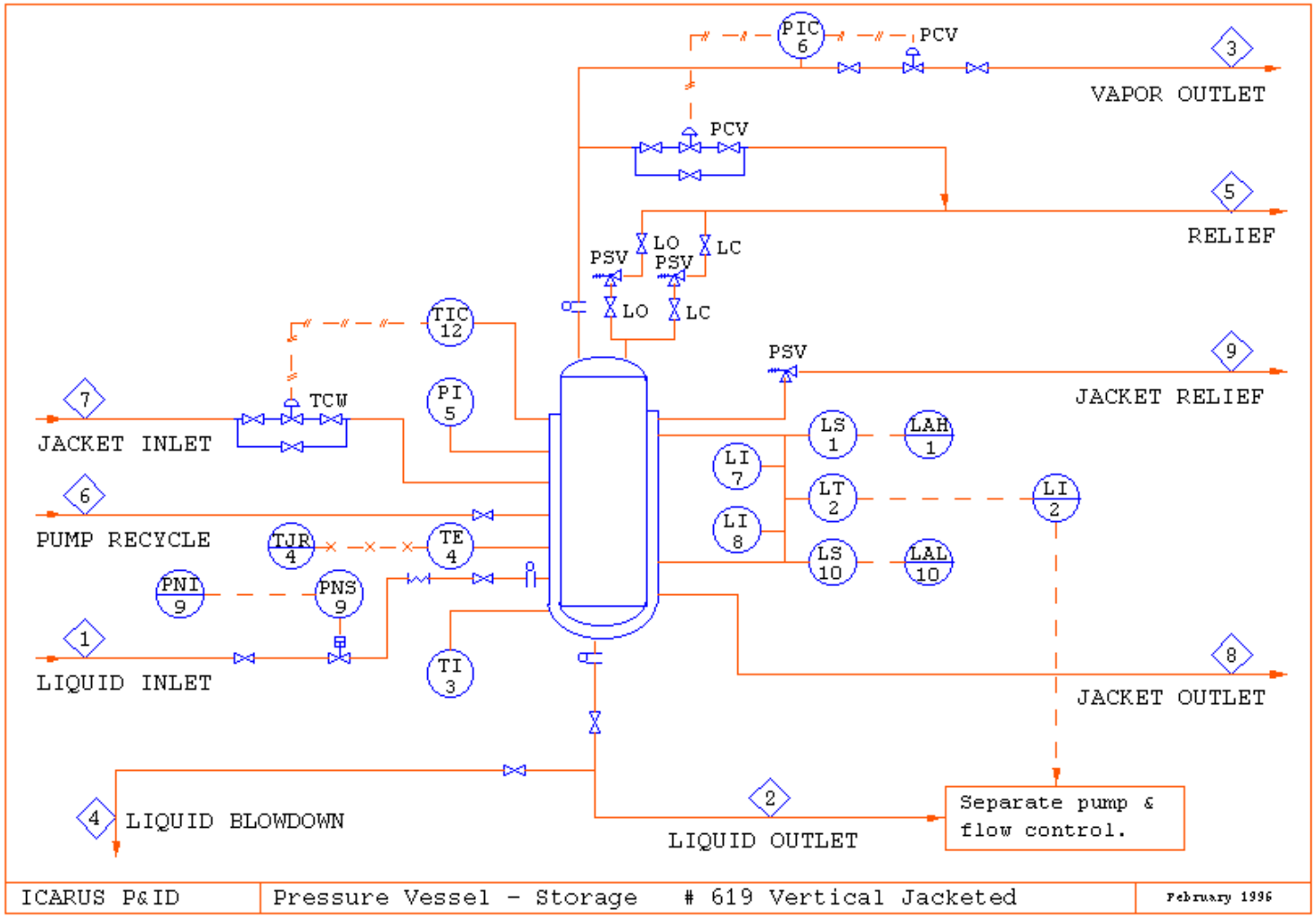
619 Vertical Pressure Vessel – Storage


PIC 6
PCV
3
VAPOR OUTLET
PCV
5
RELIEF
PSV
LO
PSV
LC
LO
LC
PI 5
6
PUMP RECYCLE
LI 7
LS 1
LAH 1
PNI 9
PNS 9
TJR 4
TE 4
LT 2
LI 2
1
LIQUID INLET
LI 8
LS 10
LAL 10
TI 3
4
LIQUID BLOWDOWN
2
LIQUID OUTLET
Separate pump & flow control.
ICARUS P&ID
Pressure Vessel - Storage # 619 Vertical
January 1996

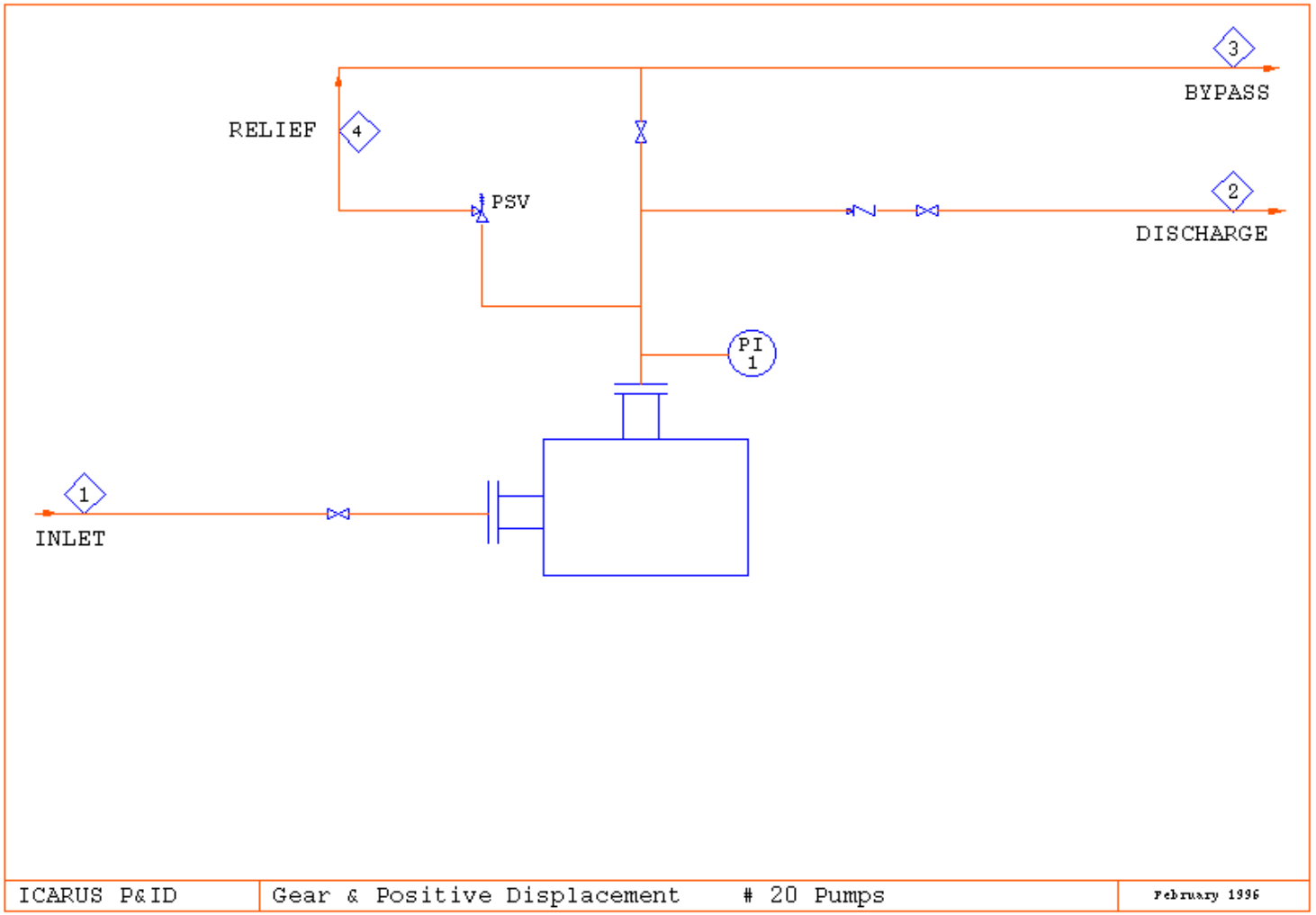
19 Vertical Jacketed Pressure Vessel – Storage


3
VAPOR OUTLET
5
RELIEF
PSV
TIC
6
PSV
9
JACKET RELIEF
7
JACKET INLET
TCV
PI
5
LAH
2
LI
1
LT
2
LIC
2
6
PUMP RECYCLE
TJR
4
TE
4
LAL
2
1
LIQUID INLET
TI
3
8
JACKET OUTLET
LCV
4
LIQUID BLOWDOWN
2
LIQUID OUTLET
ICARUS P&ID
Pressure Vessel - Storage # 19 Vertical Jacketed
June 1996

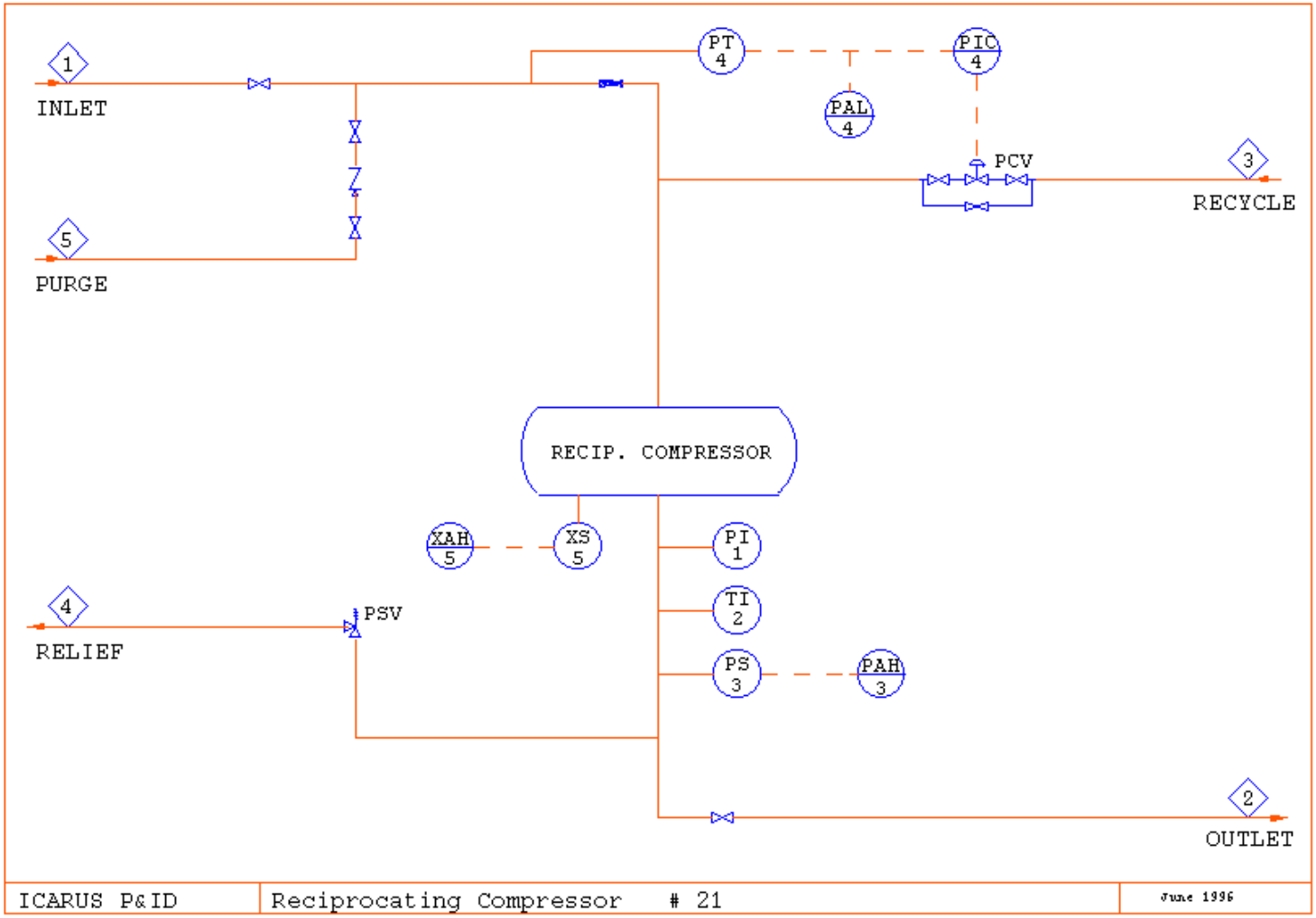
619 Vertical Jacketed Pressure Vessel – Storage



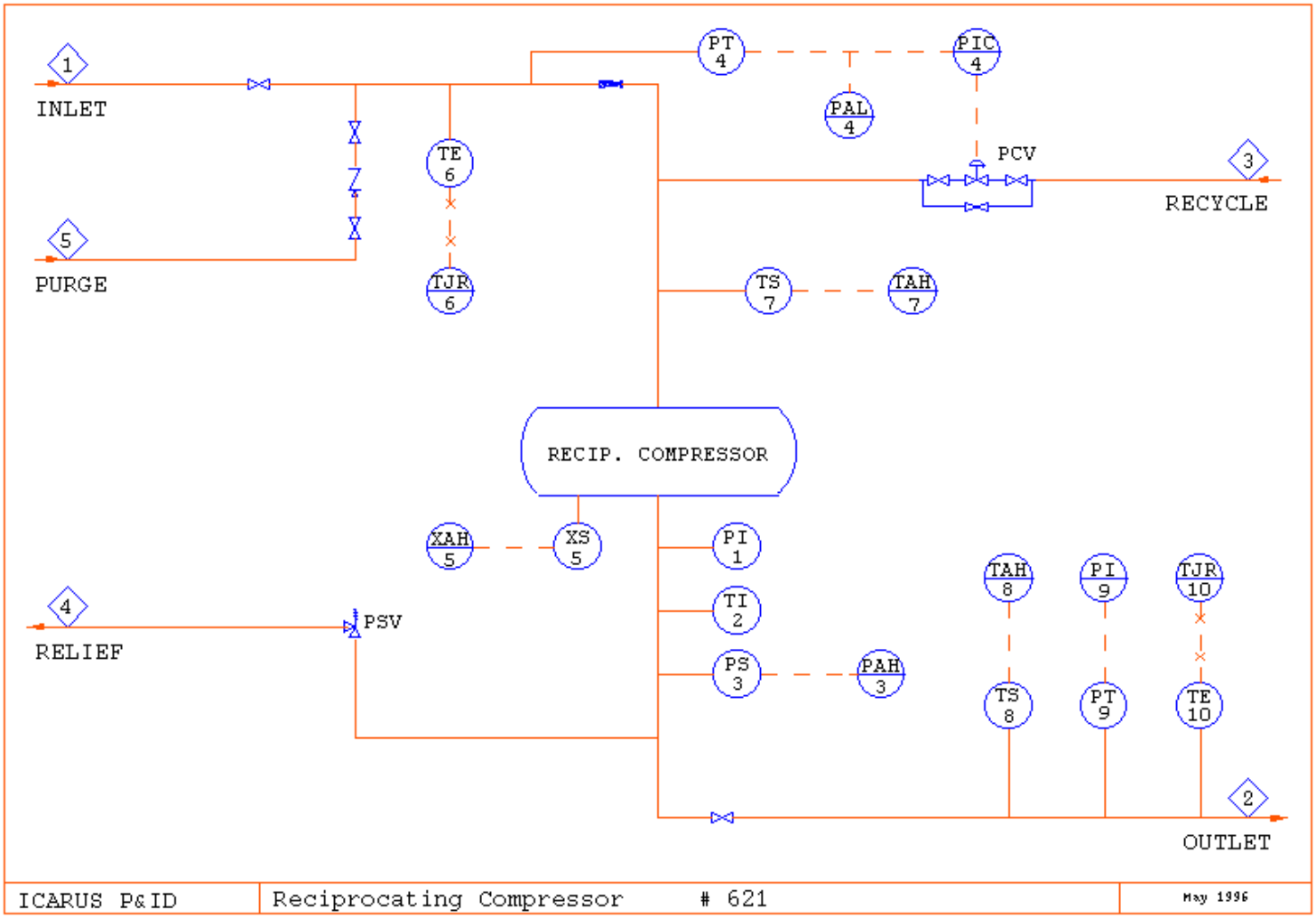
20 Pumps – Gear & Positive Displacement



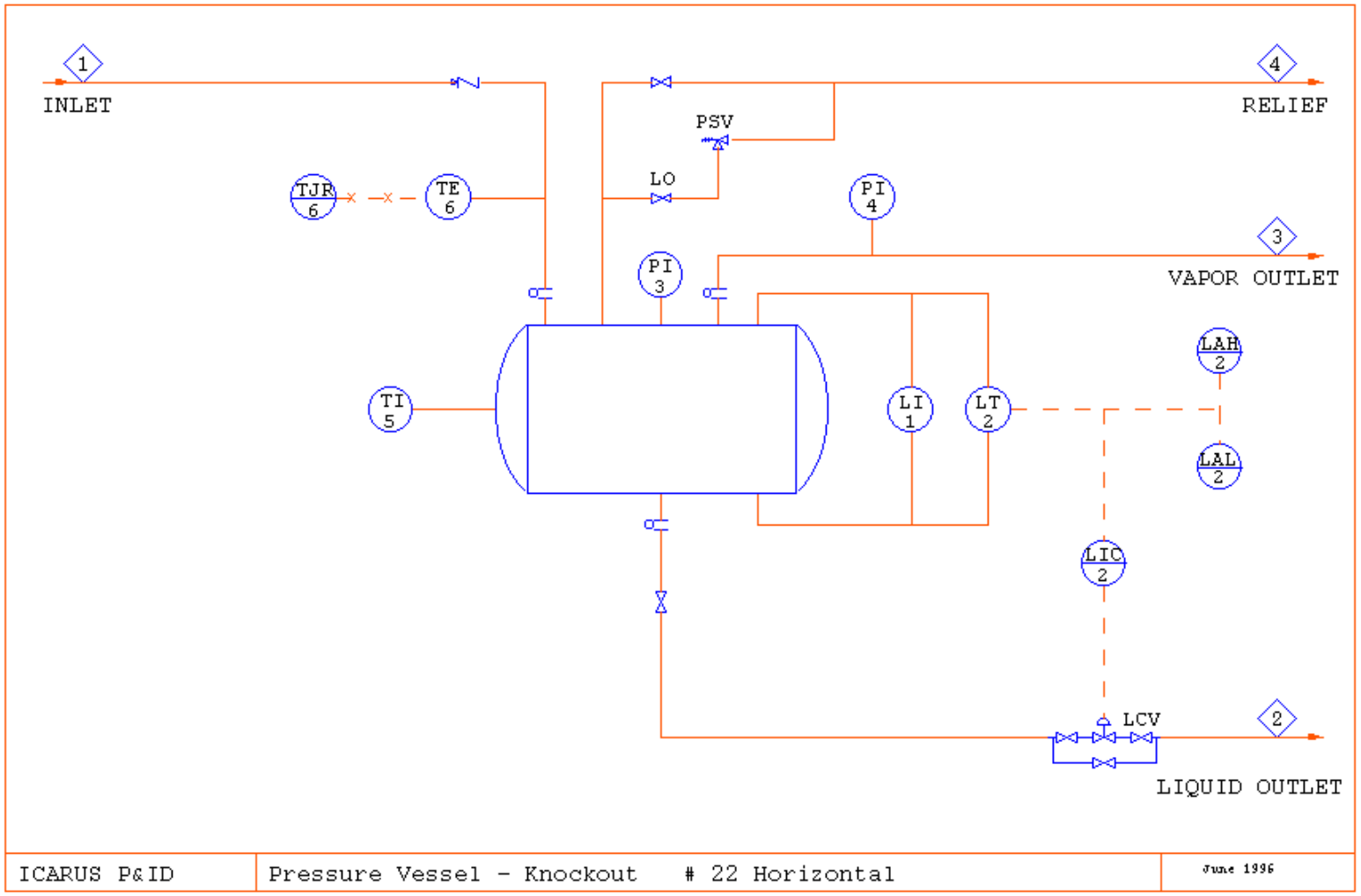
21 Reciprocating Compressor



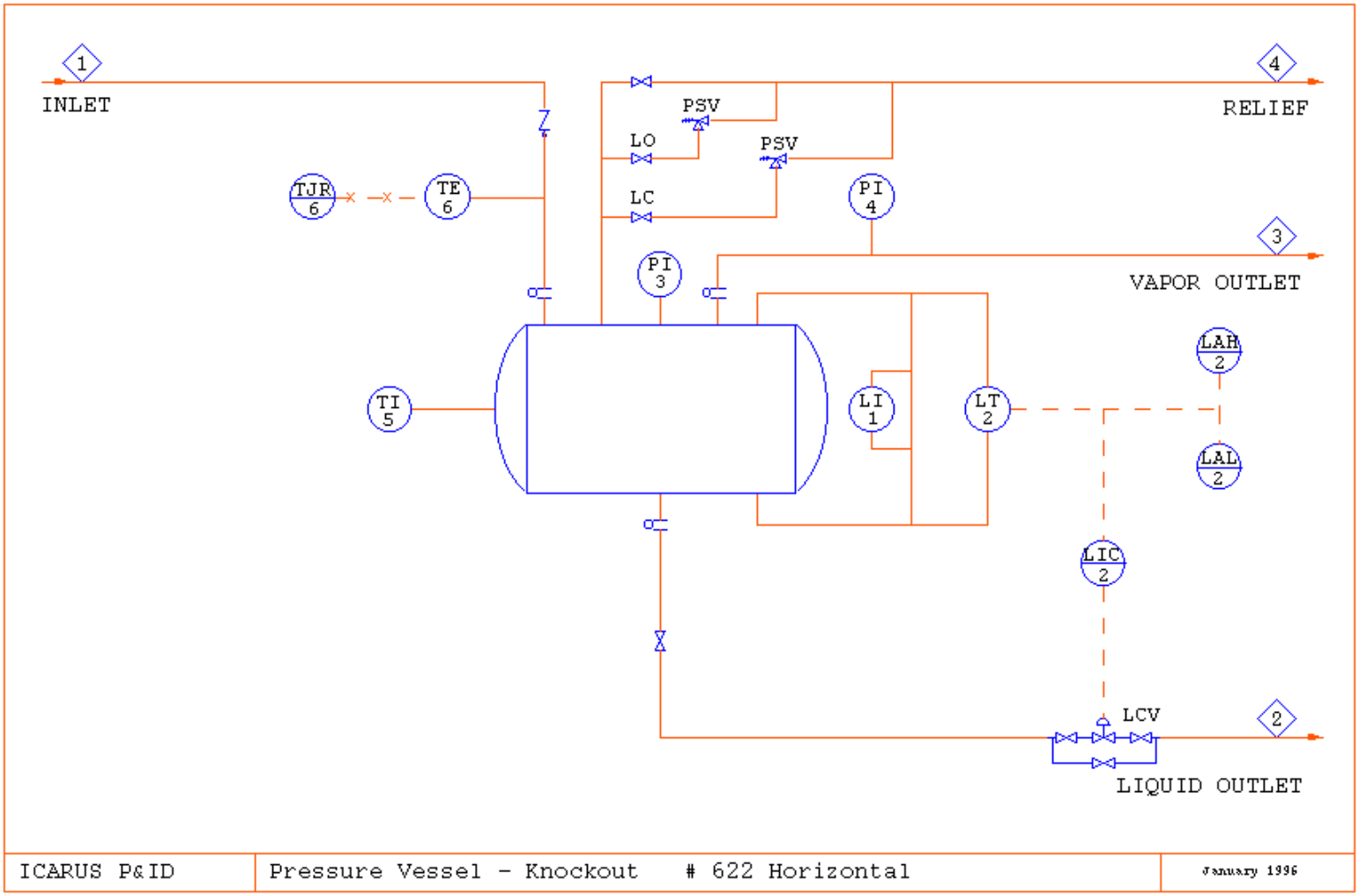
621 Reciprocating Compressor



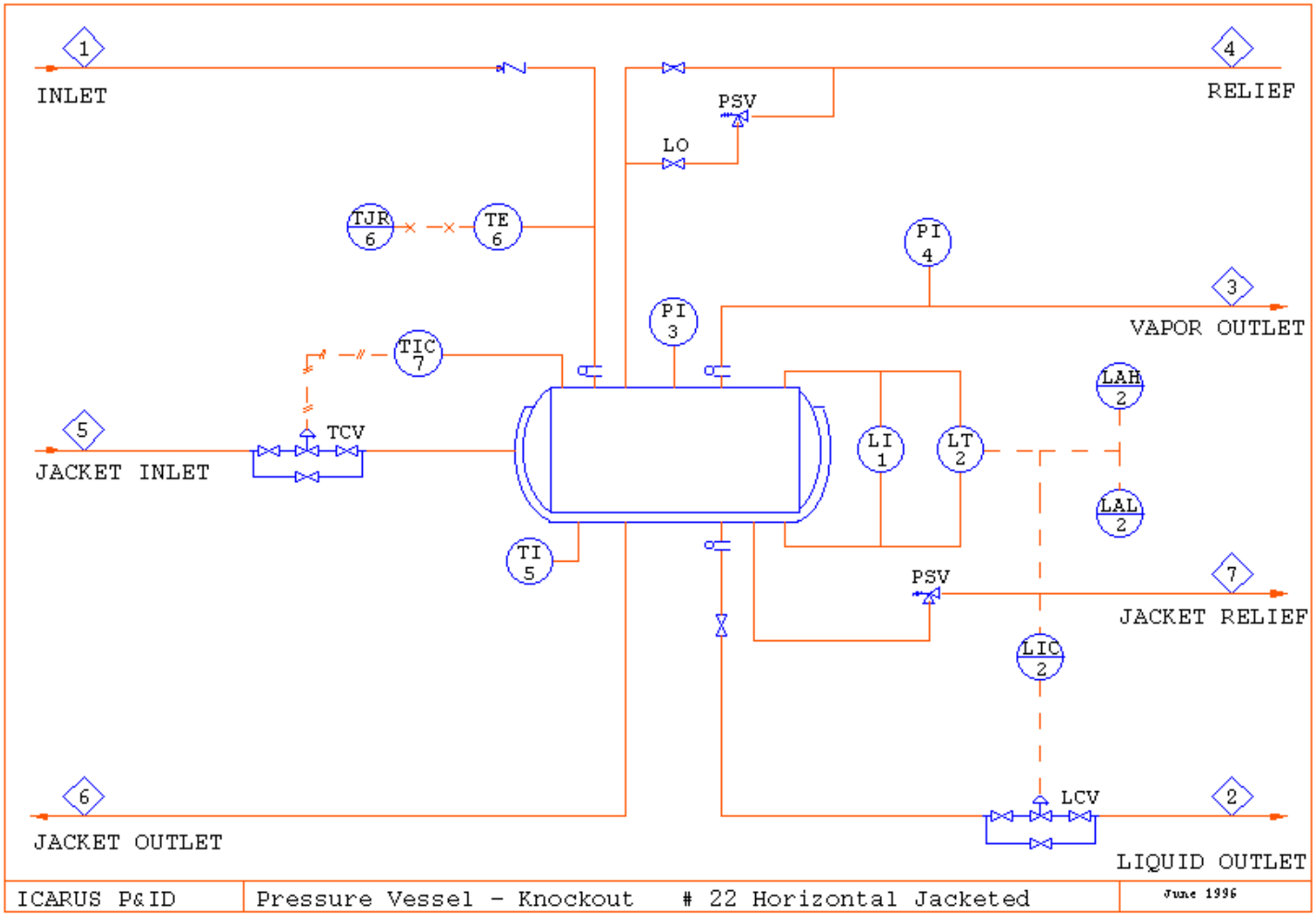
22 Horizontal Pressure Vessel – Knockout



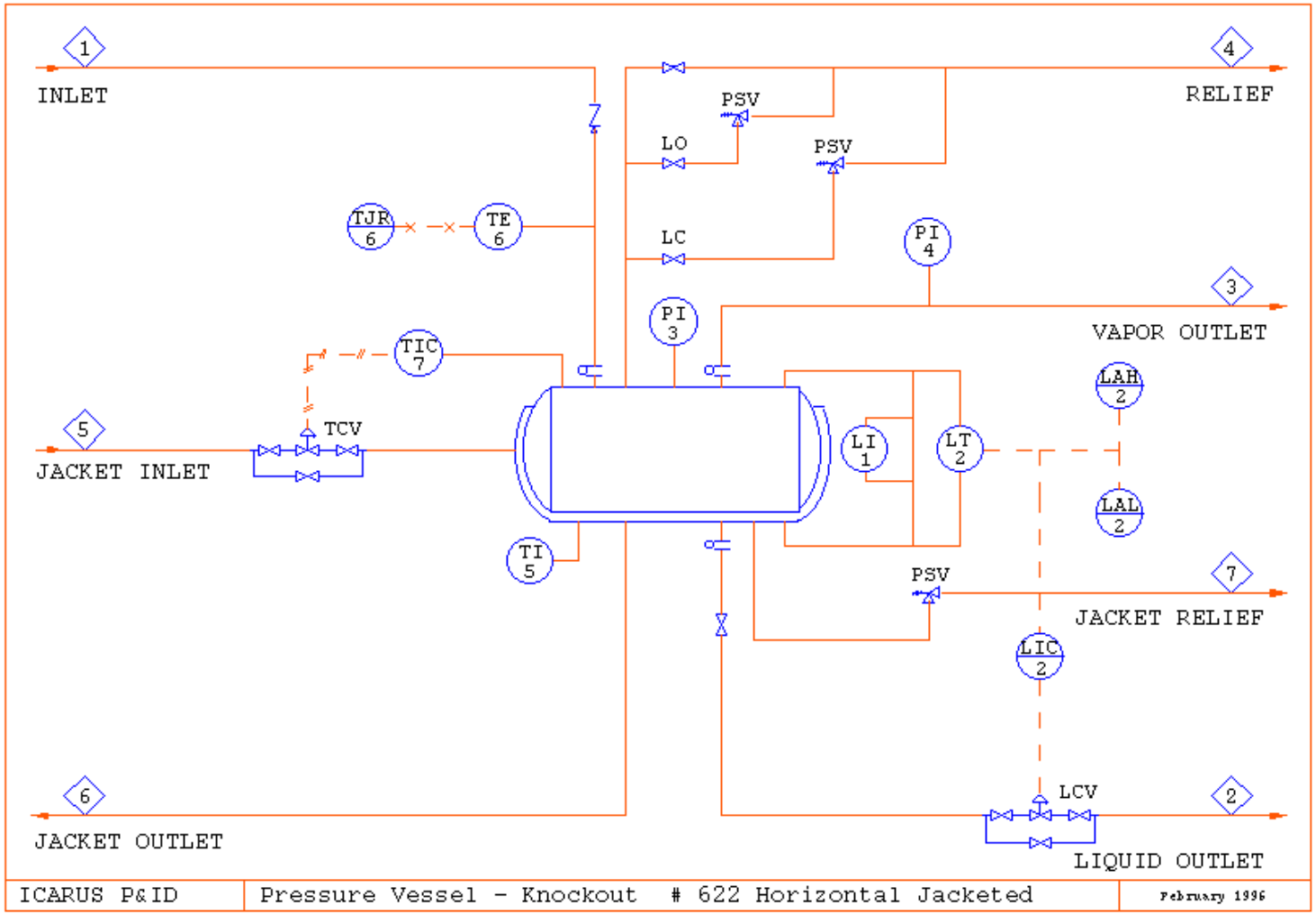
622 Horizontal Pressure Vessel – Knockout



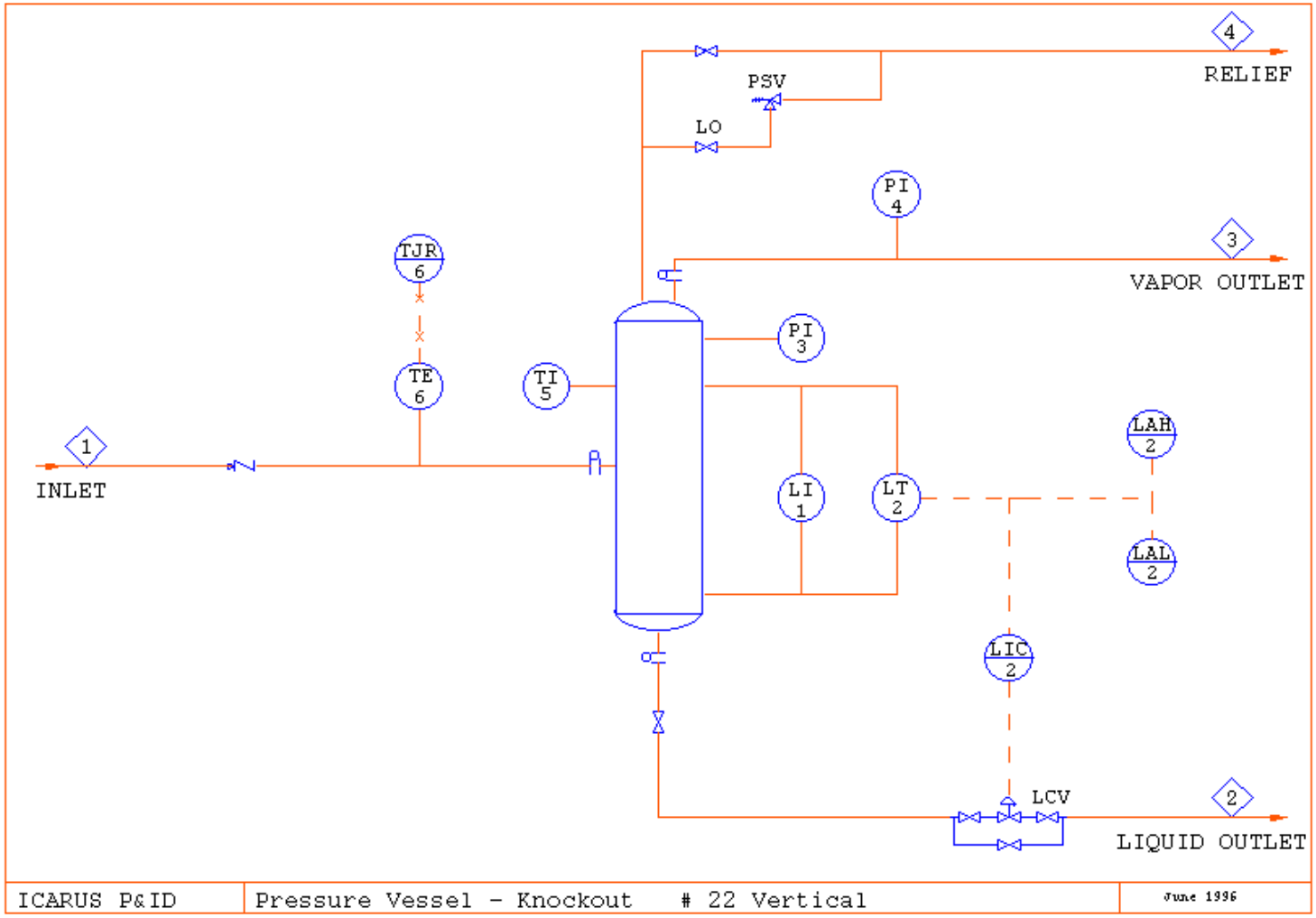
22 Horizontal Jacketed Pressure Vessel – Knockout



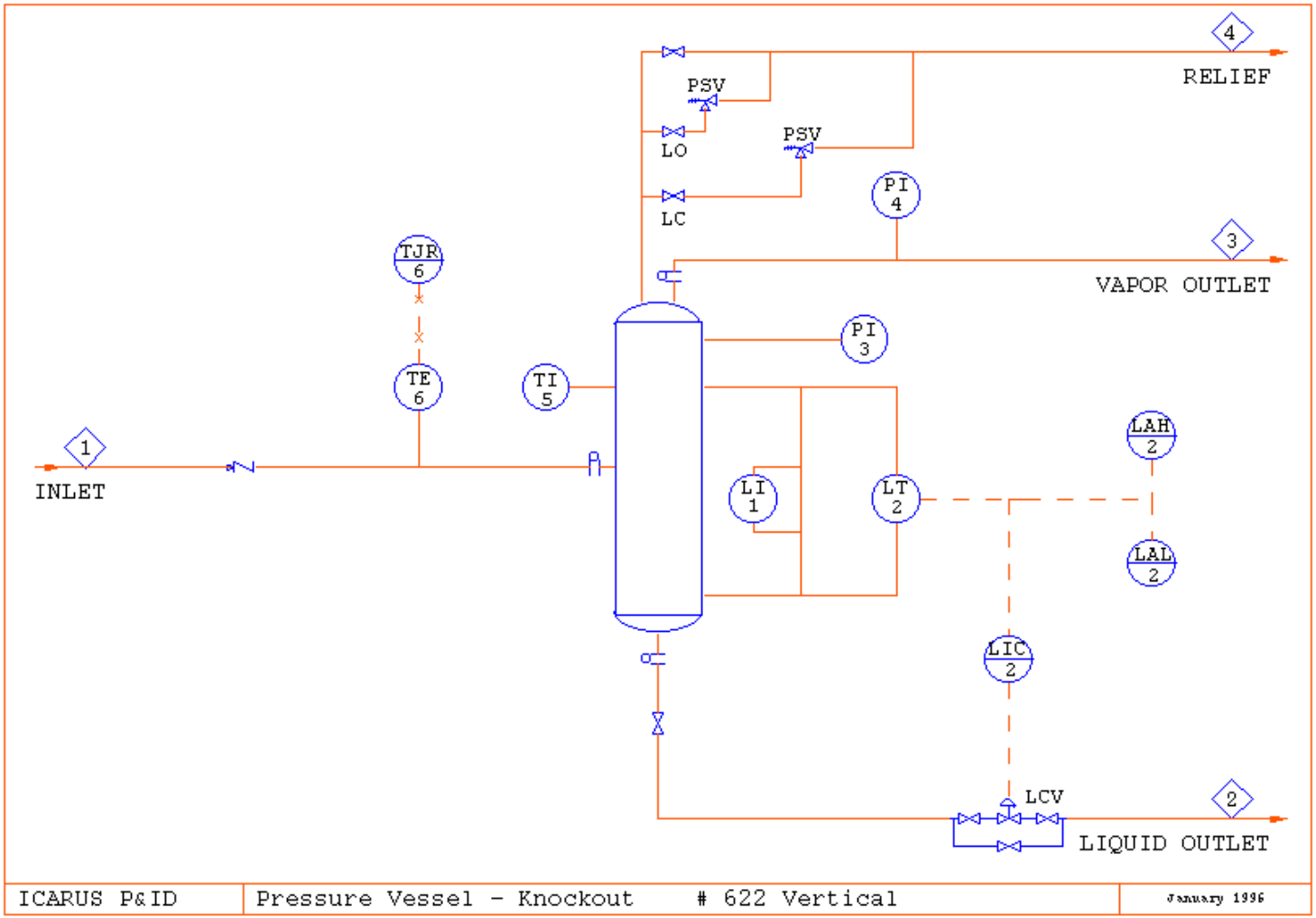
622 Horizontal Jacketed Pressure Vessel – Knockout



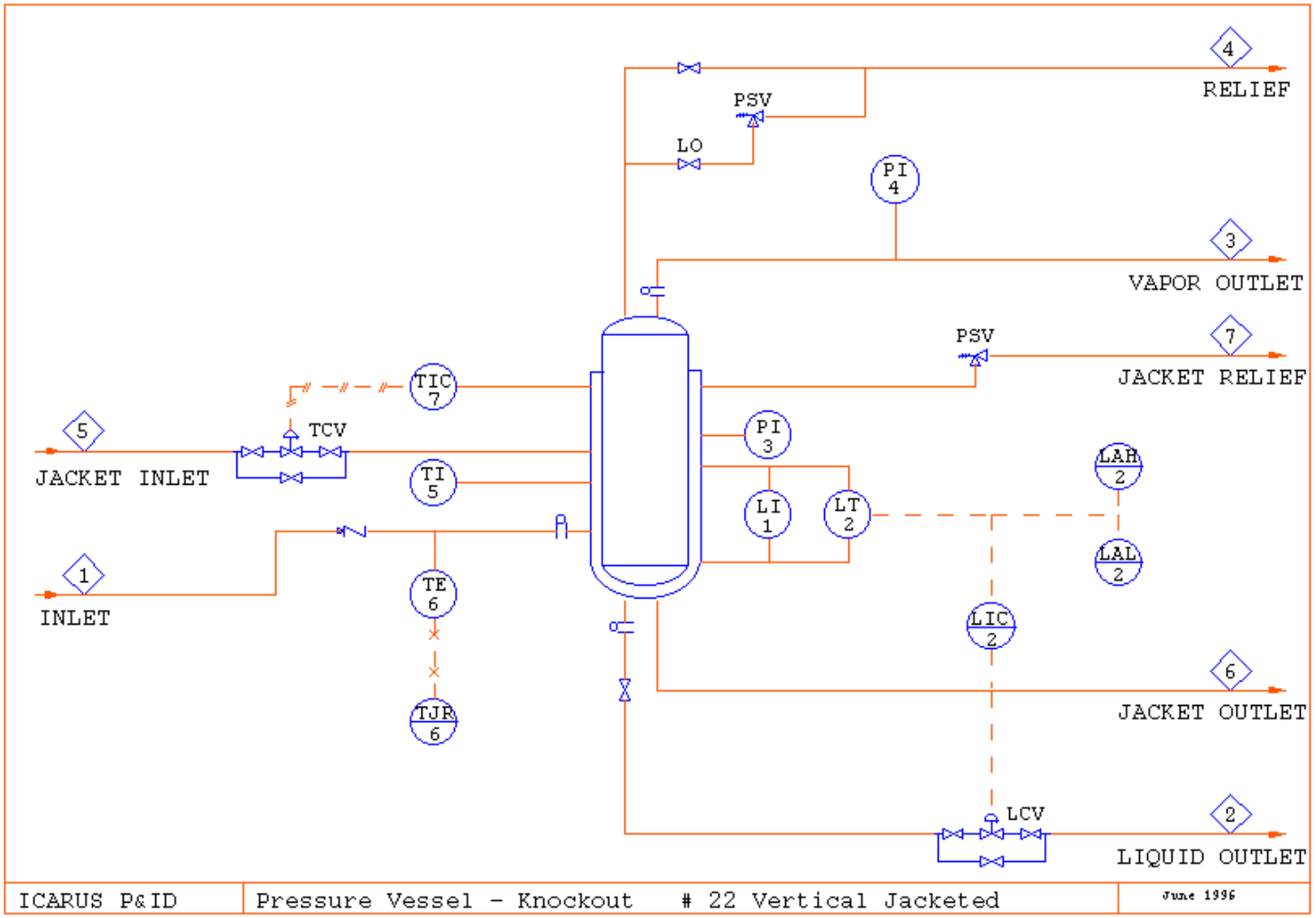
22 Vertical Pressure – Knockout



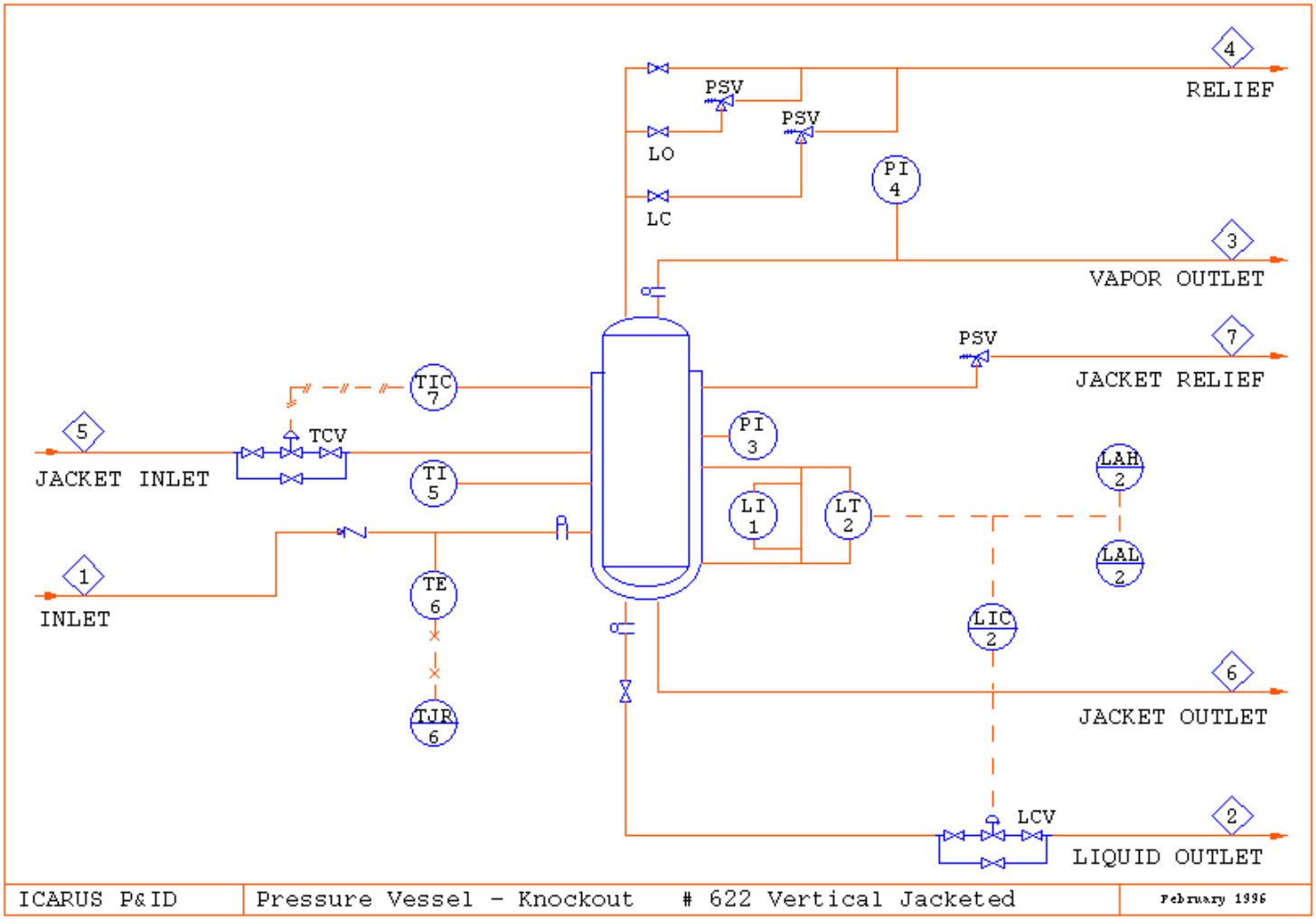
622 Vertical Pressure Vessel – Knockout



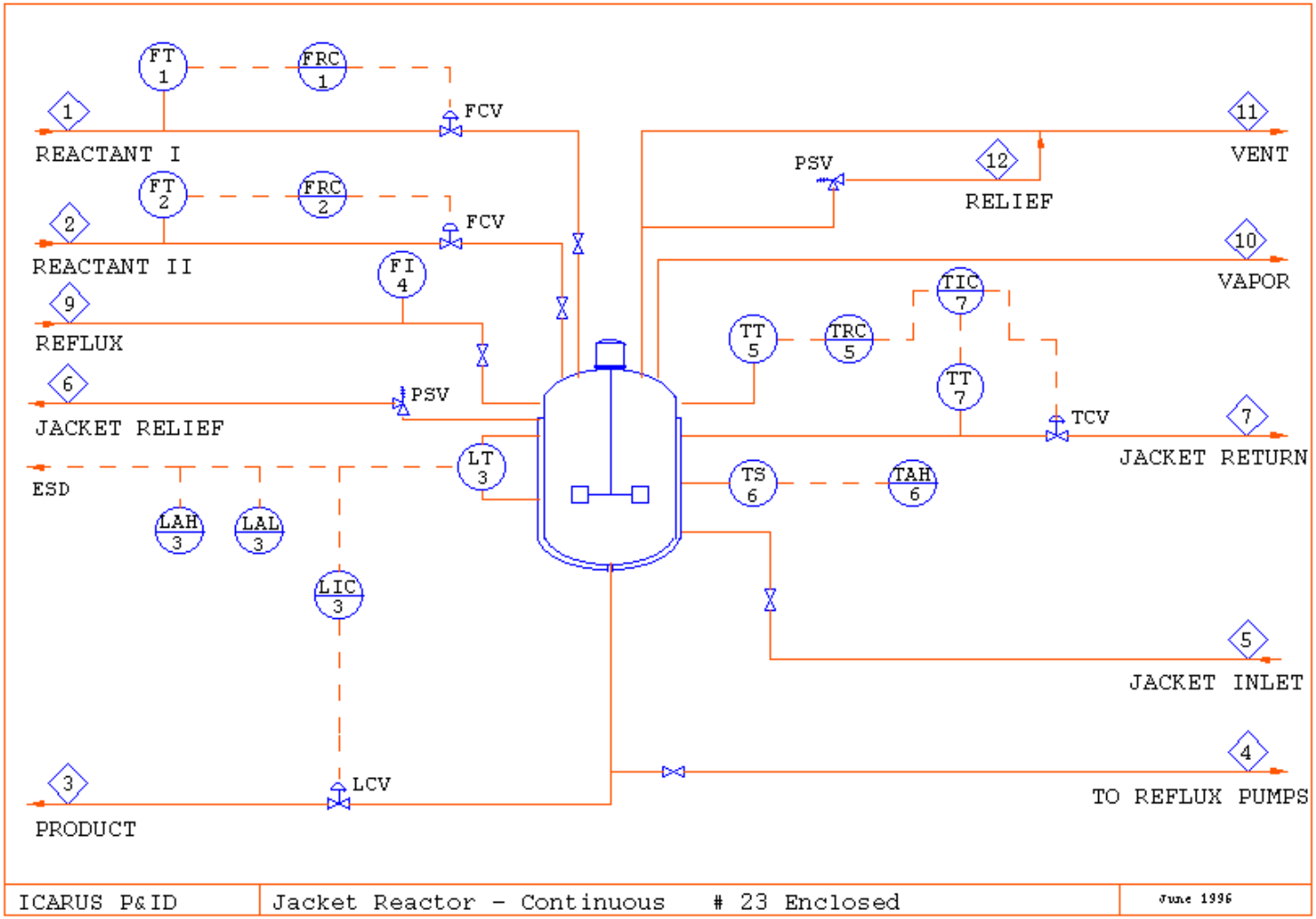
22 Vertical Jacketed Pressure Vessel – Knockout



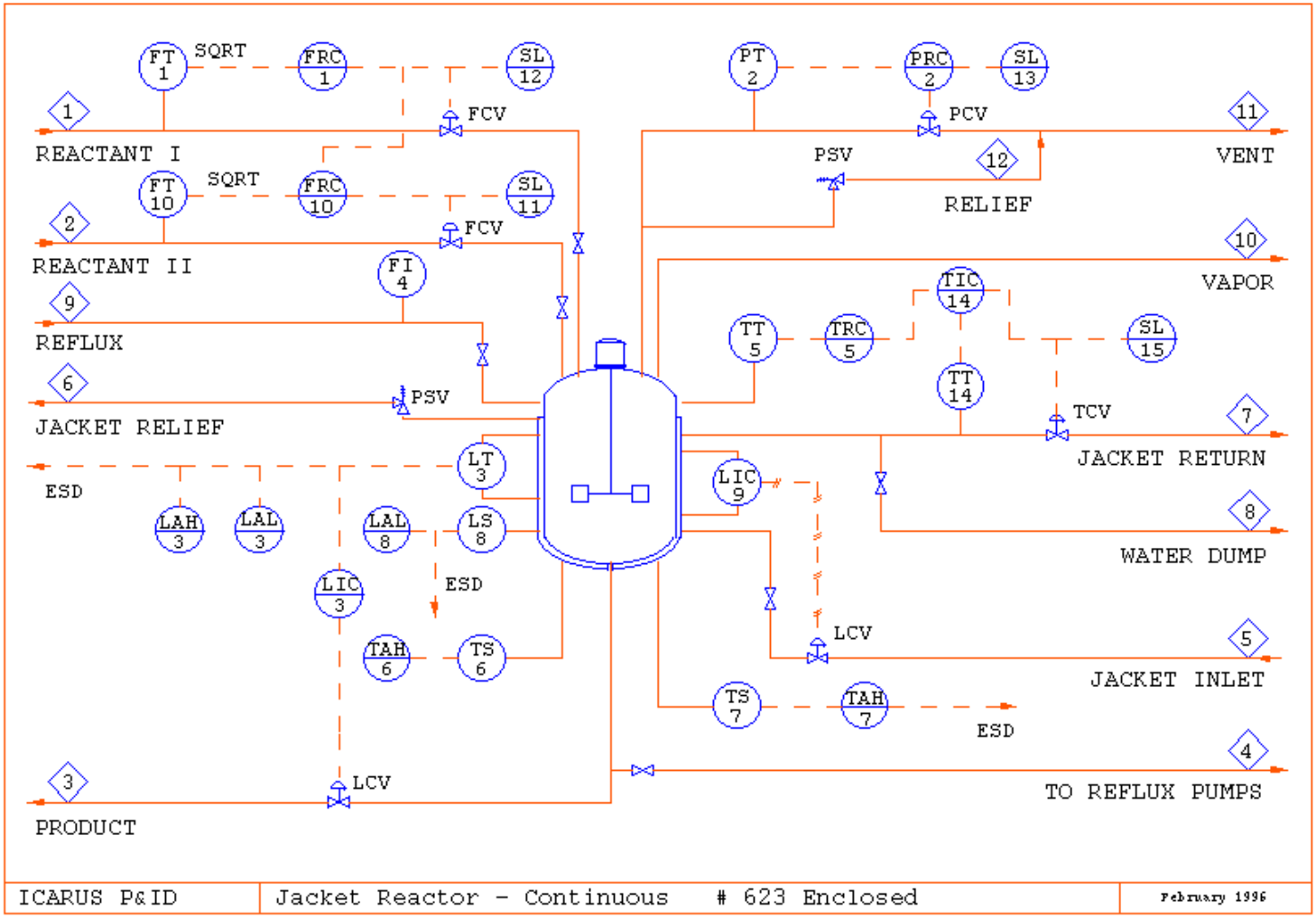
622 Vertical Jacketed Pressure Vessel – Knockout



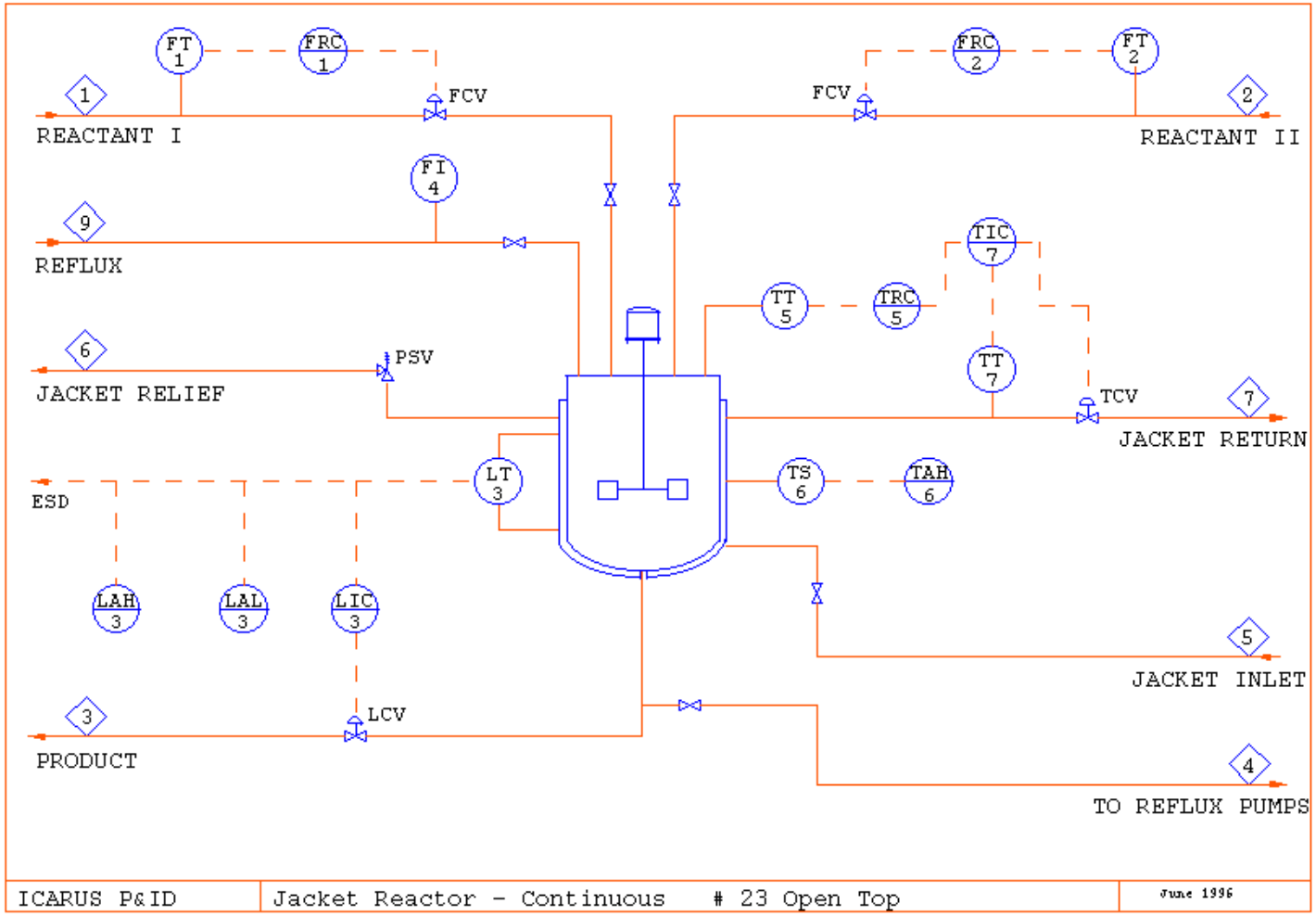
23 Enclosed Jacket Reactor – Continuous



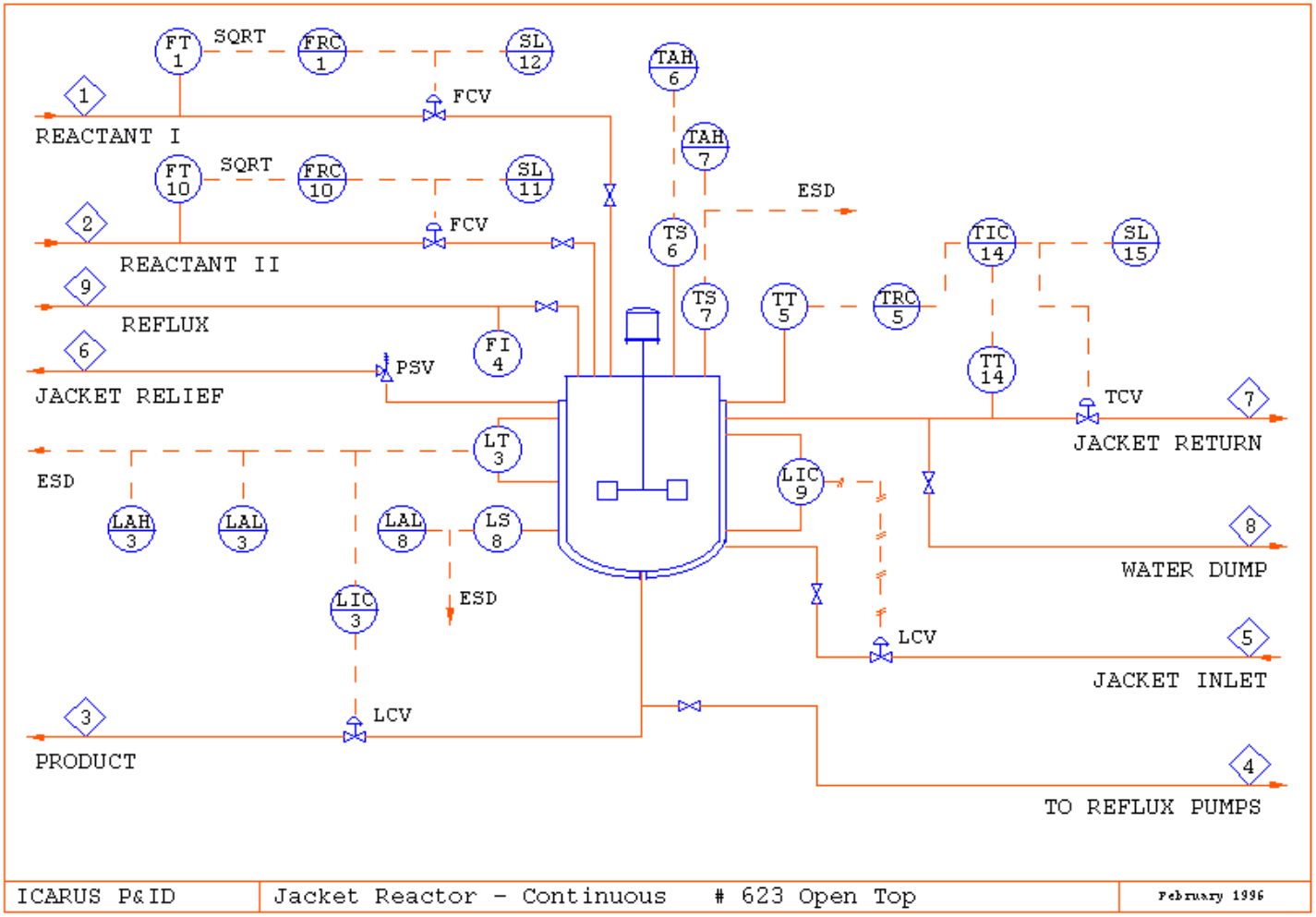
623 Enclosed Jacket Reactor – Continuous



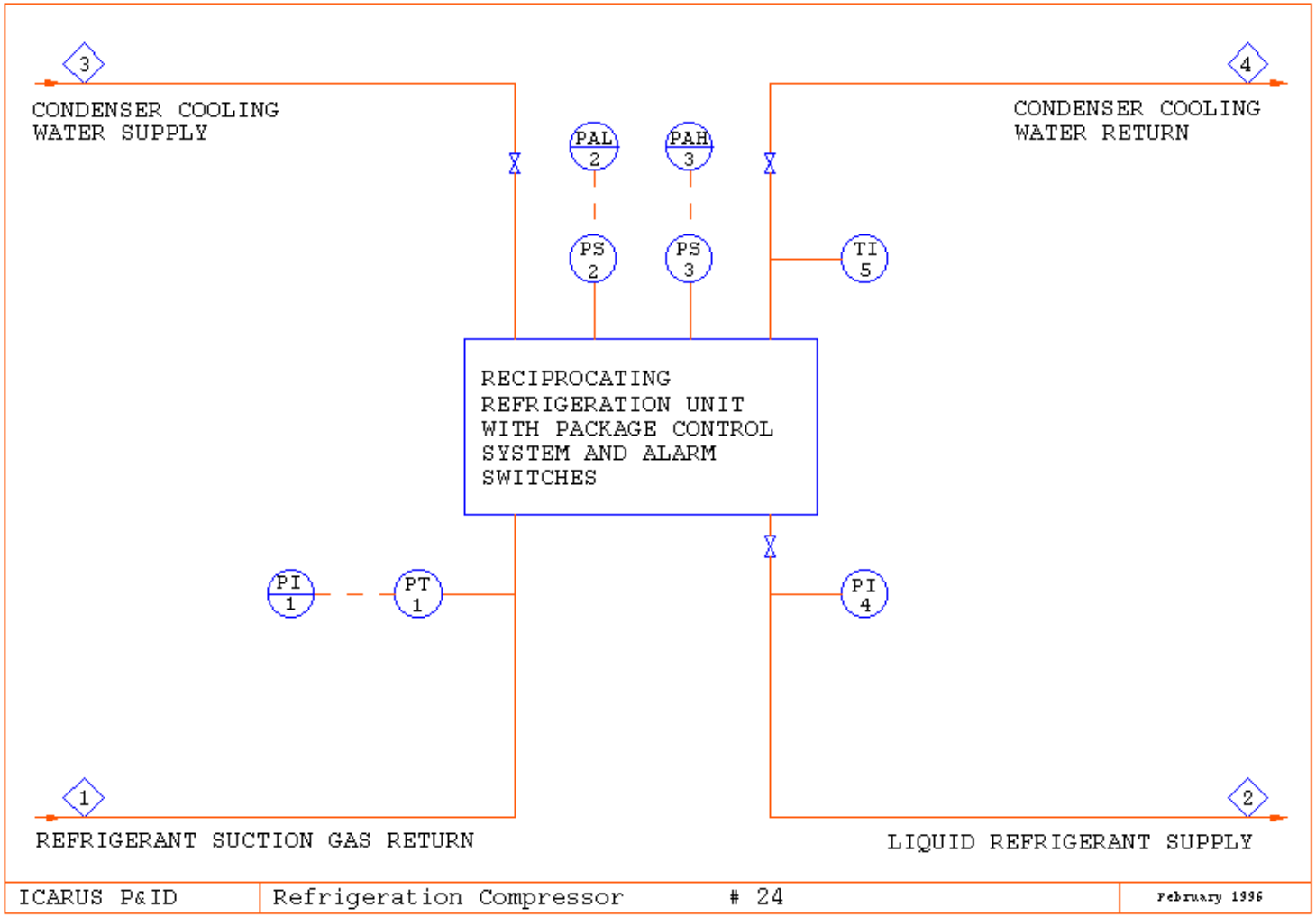
23 Open Top Jacket Reactor – Continuous



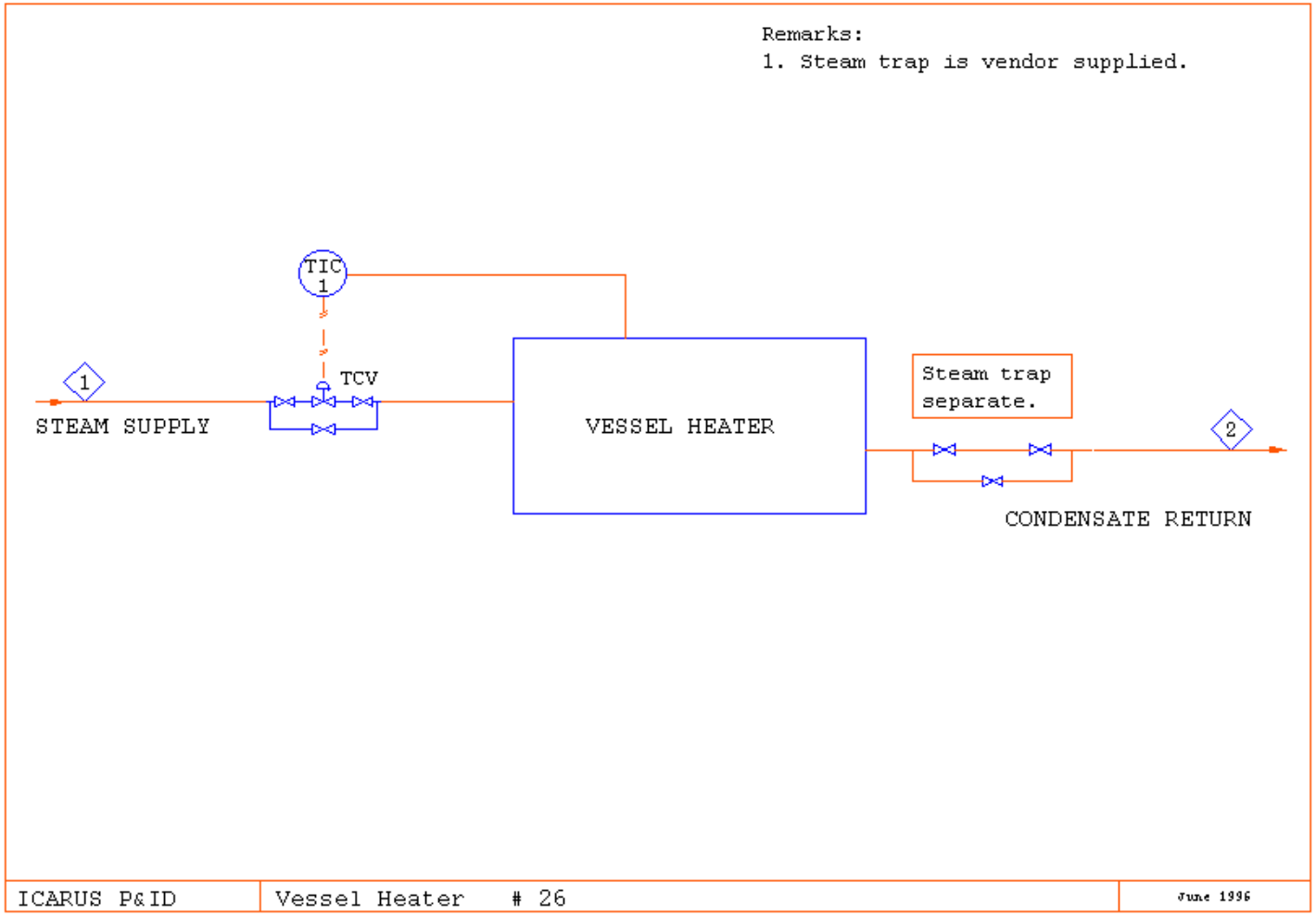
23 Open Top Jacket Reactor – Continuous



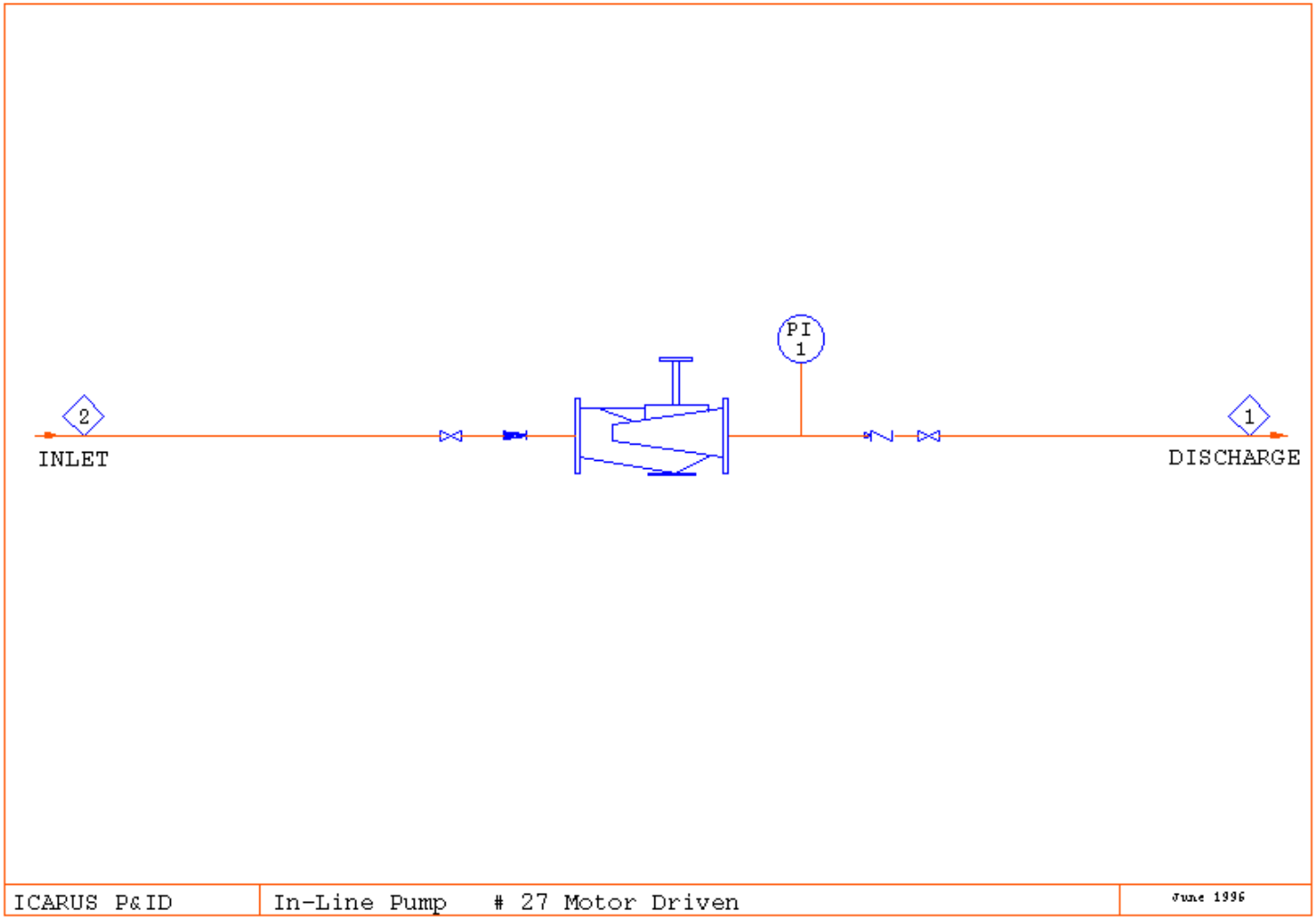
24 Refrigeration Compressor



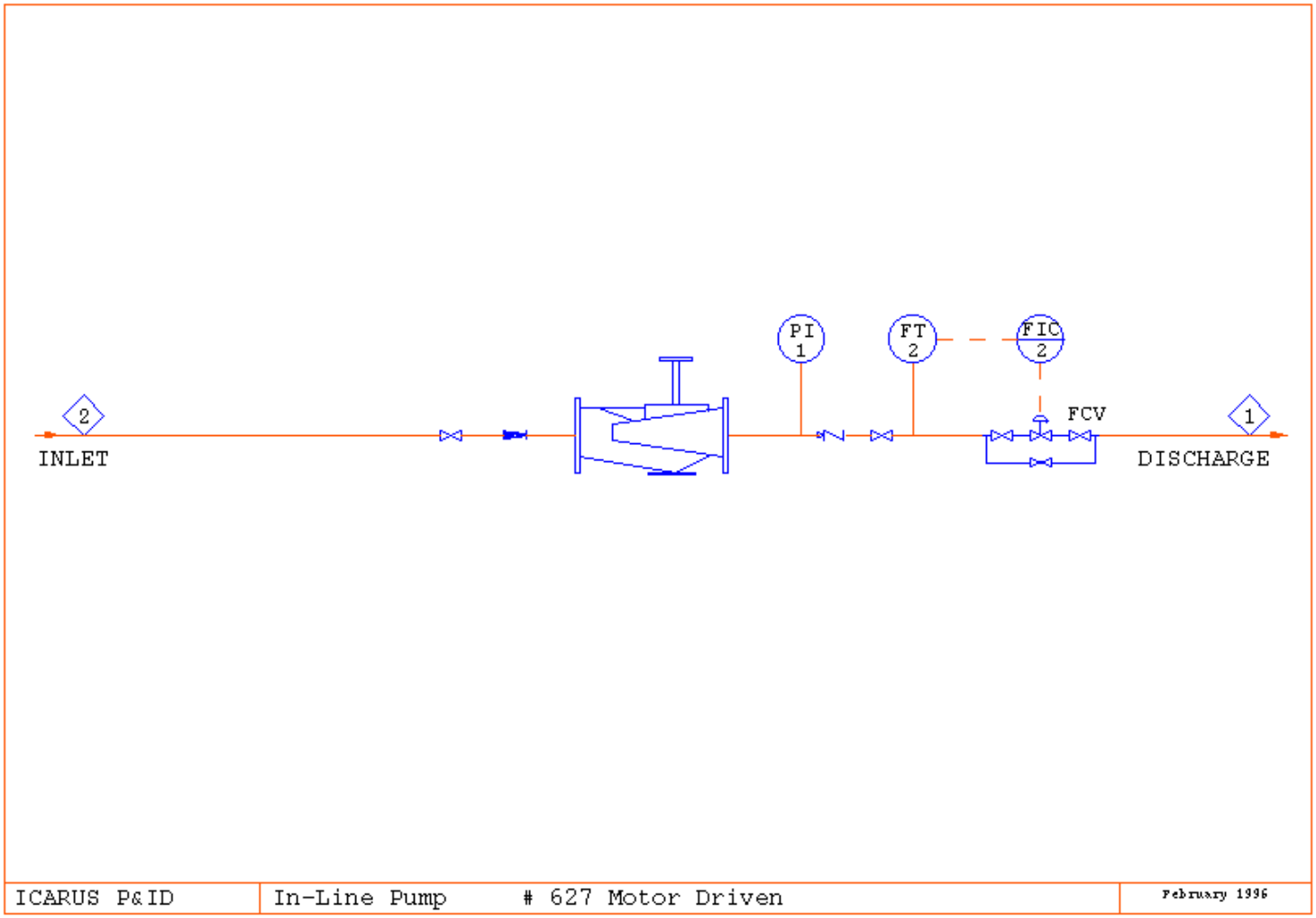
26 Vessel Heater



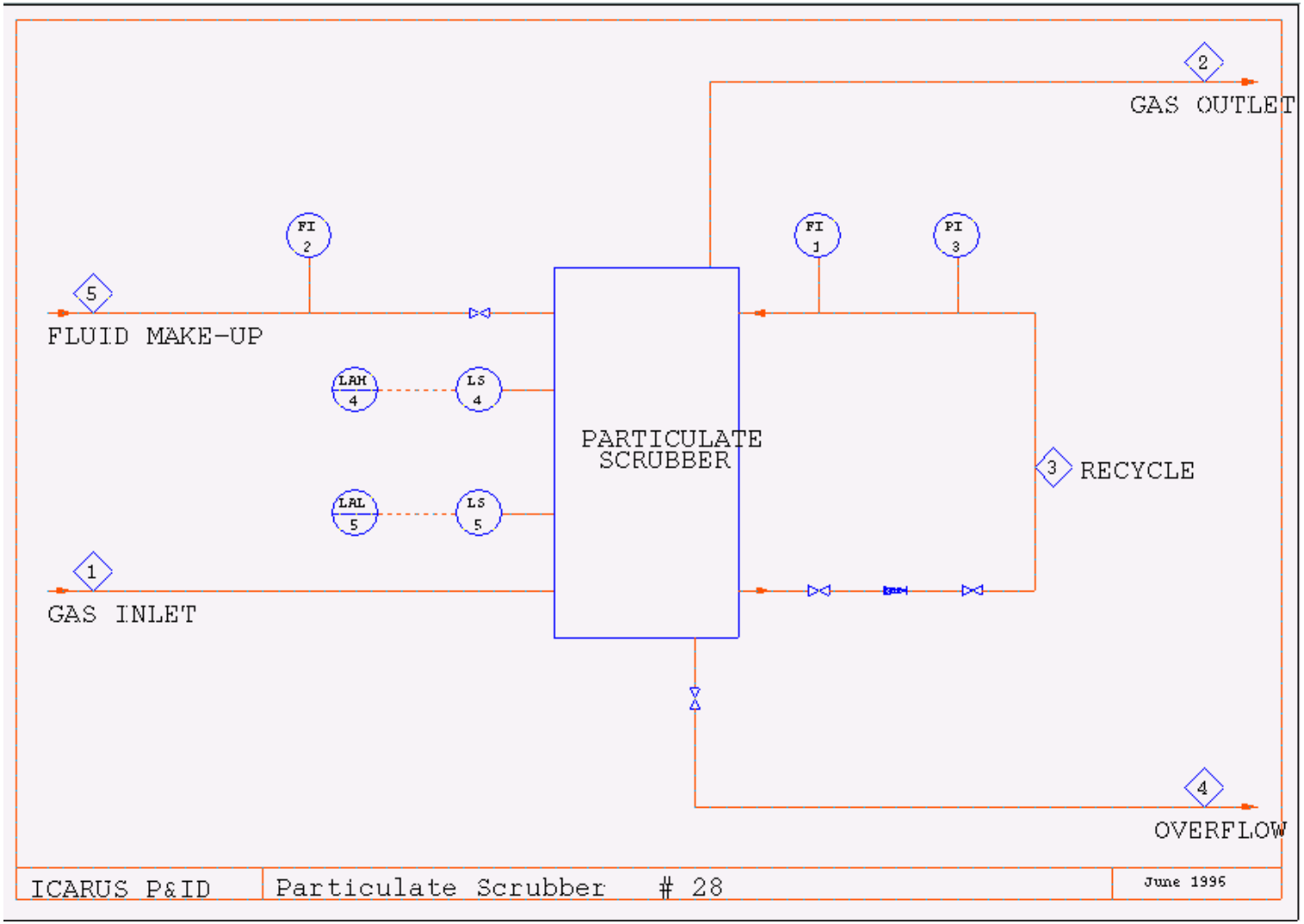
27 Motor Driven In-Line Pump



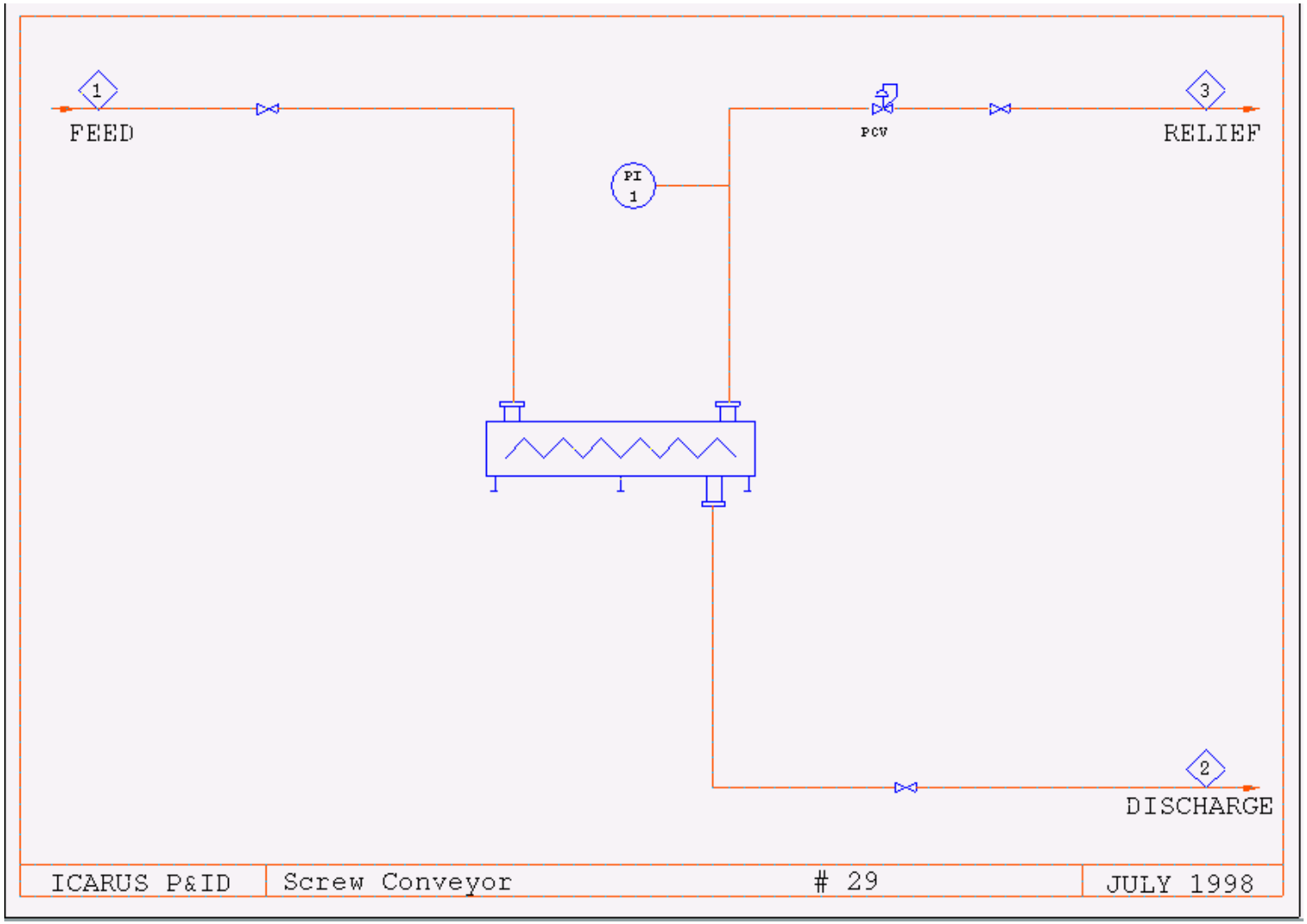
627 Motor Driven In-Line Pump


PI
1
FT
2
FIC
2
FCV
2
INLET
1
DISCHARGE
ICARUS P&ID
In-Line Pump # 627 Motor Driven
February 1996

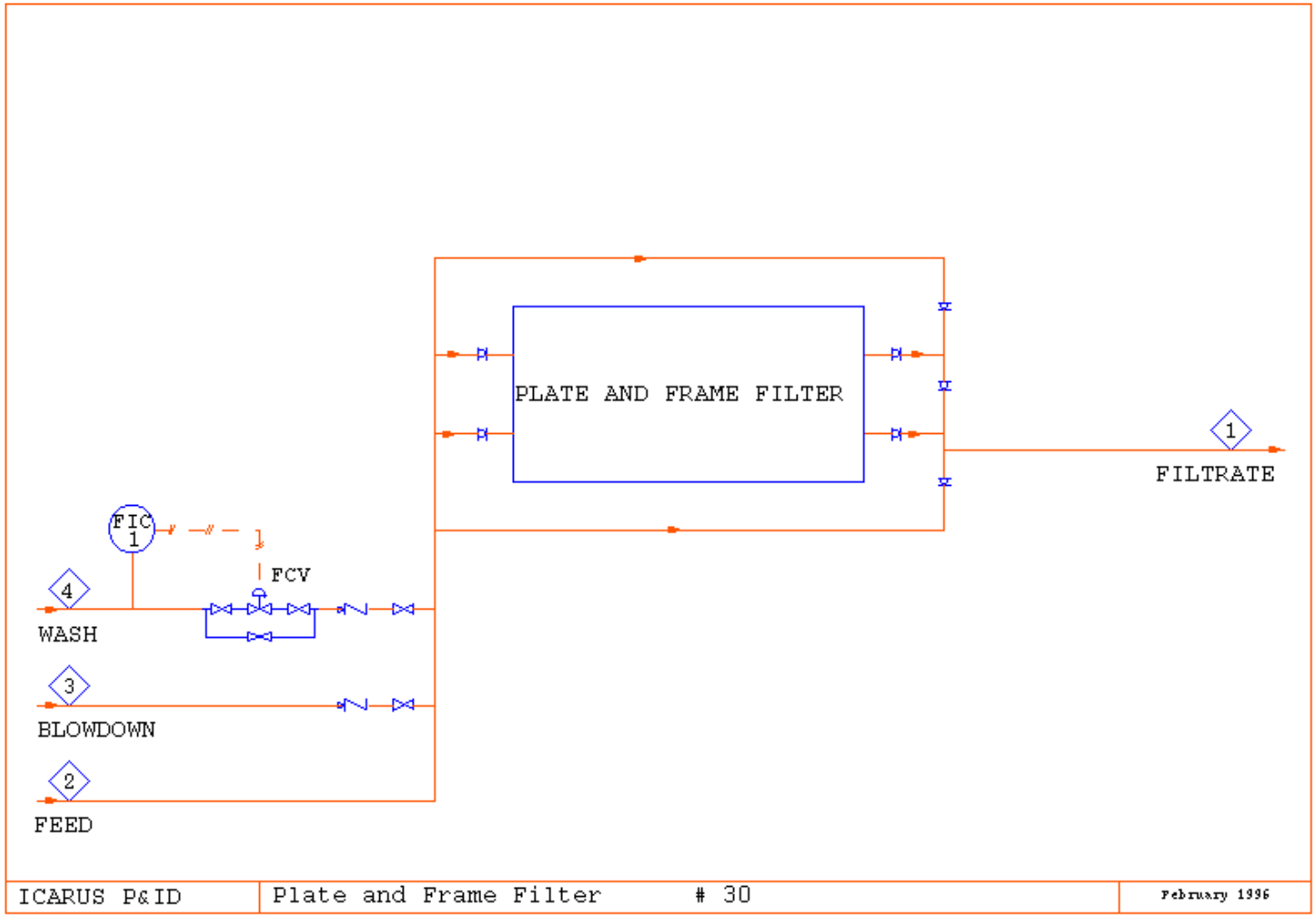
28 Particulate Scrubber


2
GAS OUTLET
FI
2
FI
1
PI
3
5
FLUID MAKE-UP
LAH
4
LS
4
PARTICULATE
SCRUBBER
3
RECYCLE
LAL
5
LS
5
1
GAS INLET
4
OVERFLOW
ICARUS P&ID
Particulate Scrubber # 28
June 1995

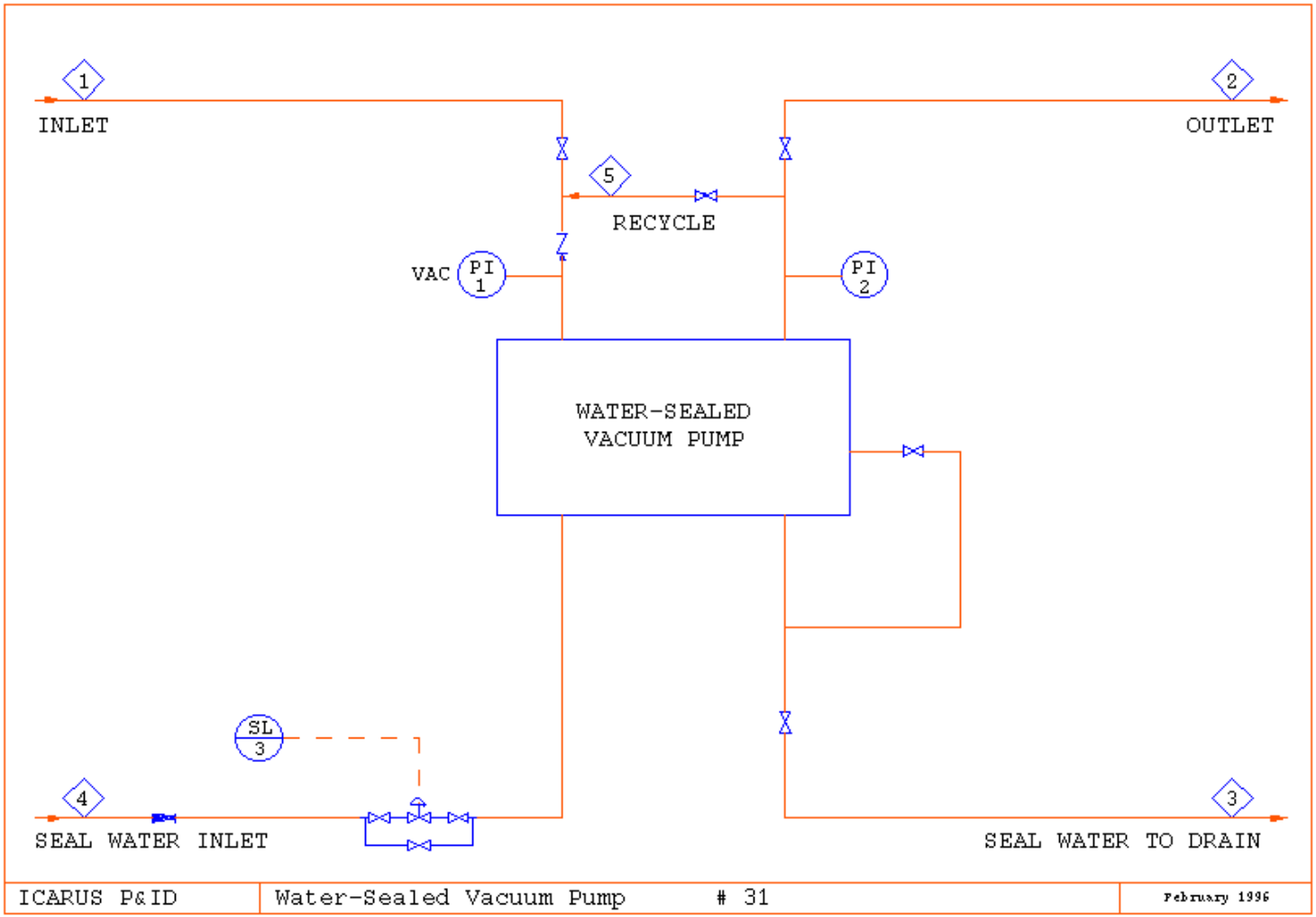
29 Screw Conveyor


1
FEED
PCV
3
RELIEF
PI
1
2
DISCHARGE
ICARUS P&ID
Screw Conveyor
29
JULY 1998

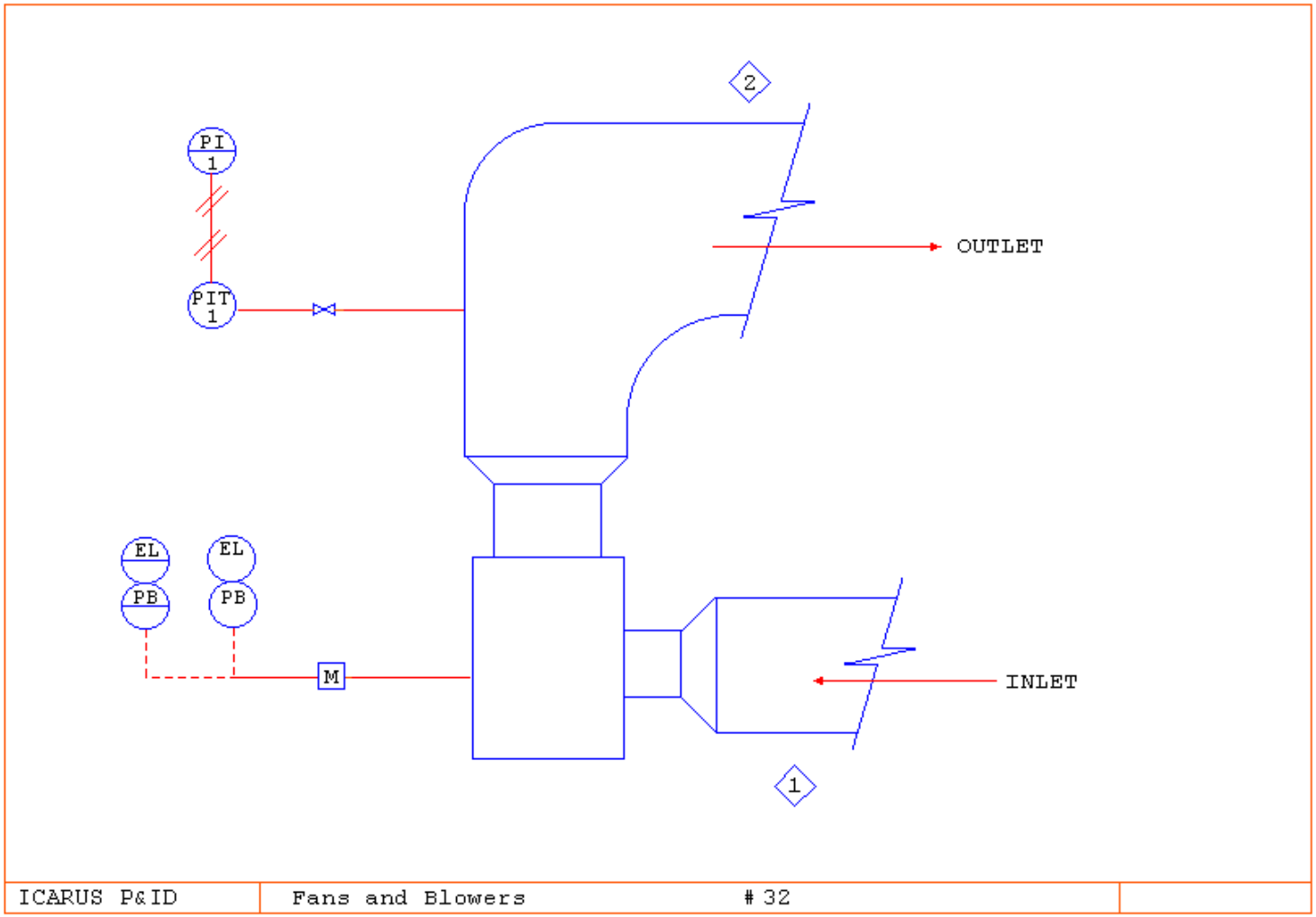
30 Plate and Frame Filter



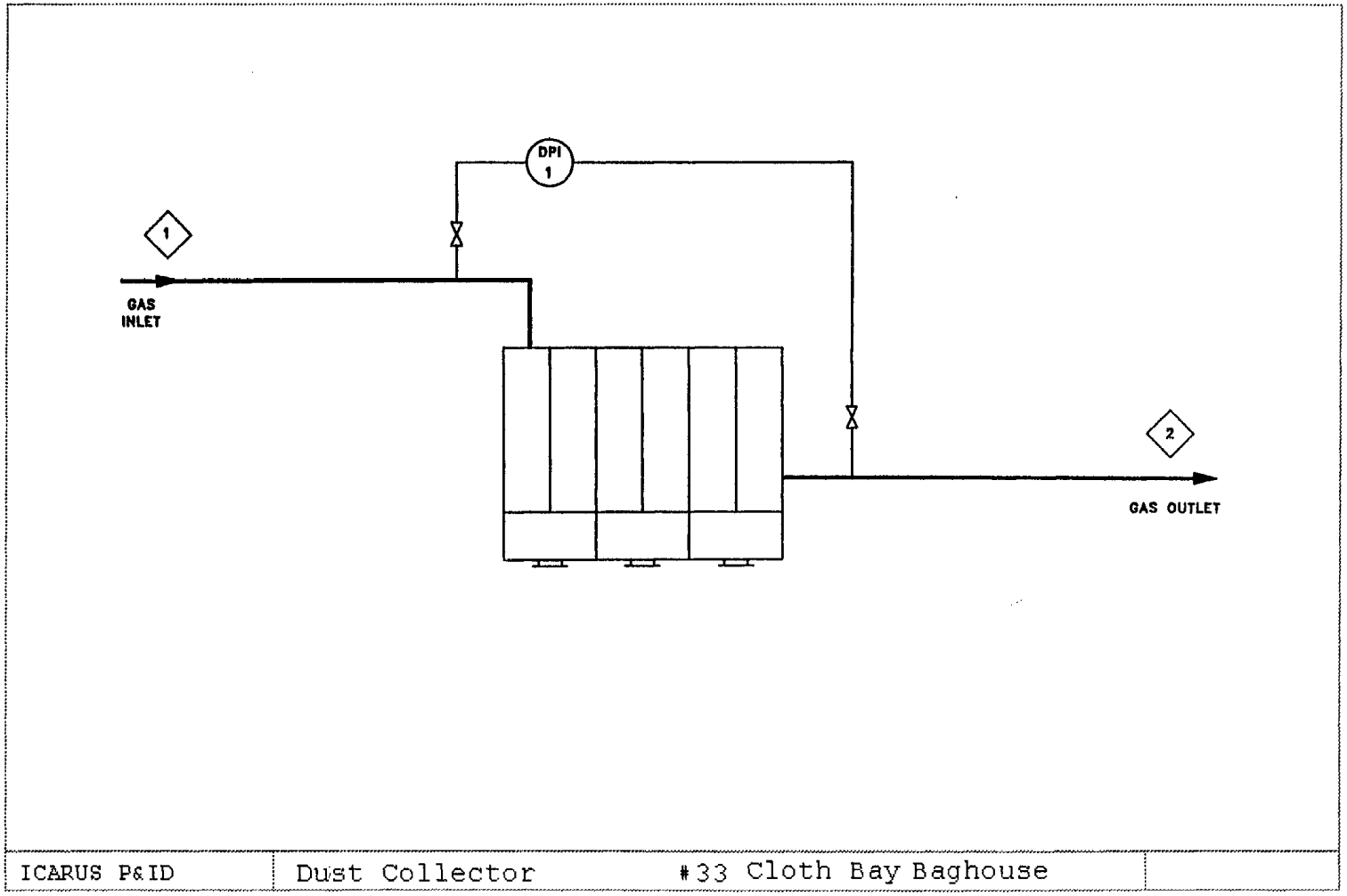
31 Water-Sealed Vacuum Pump



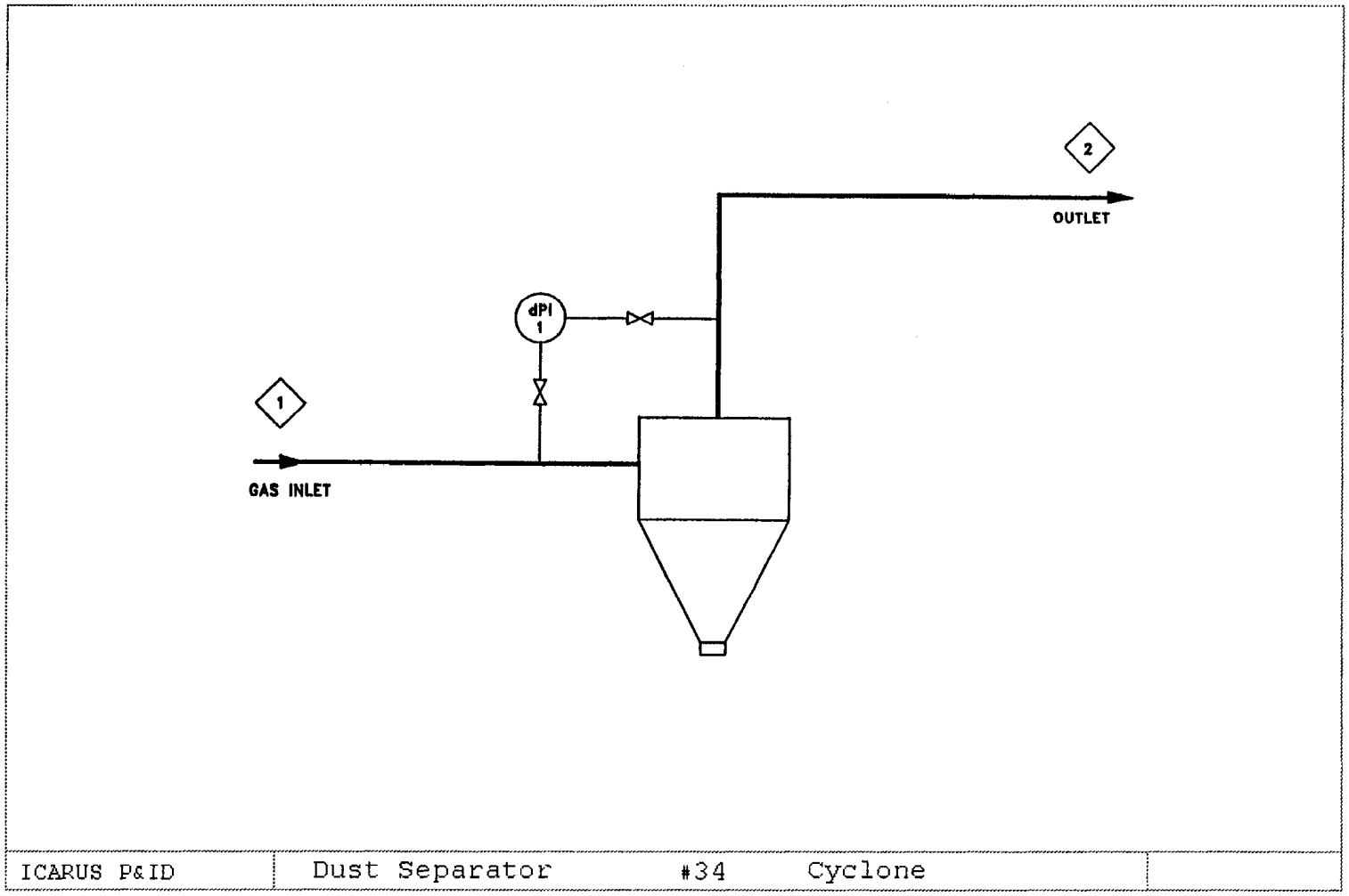
32 Fans and Blowers



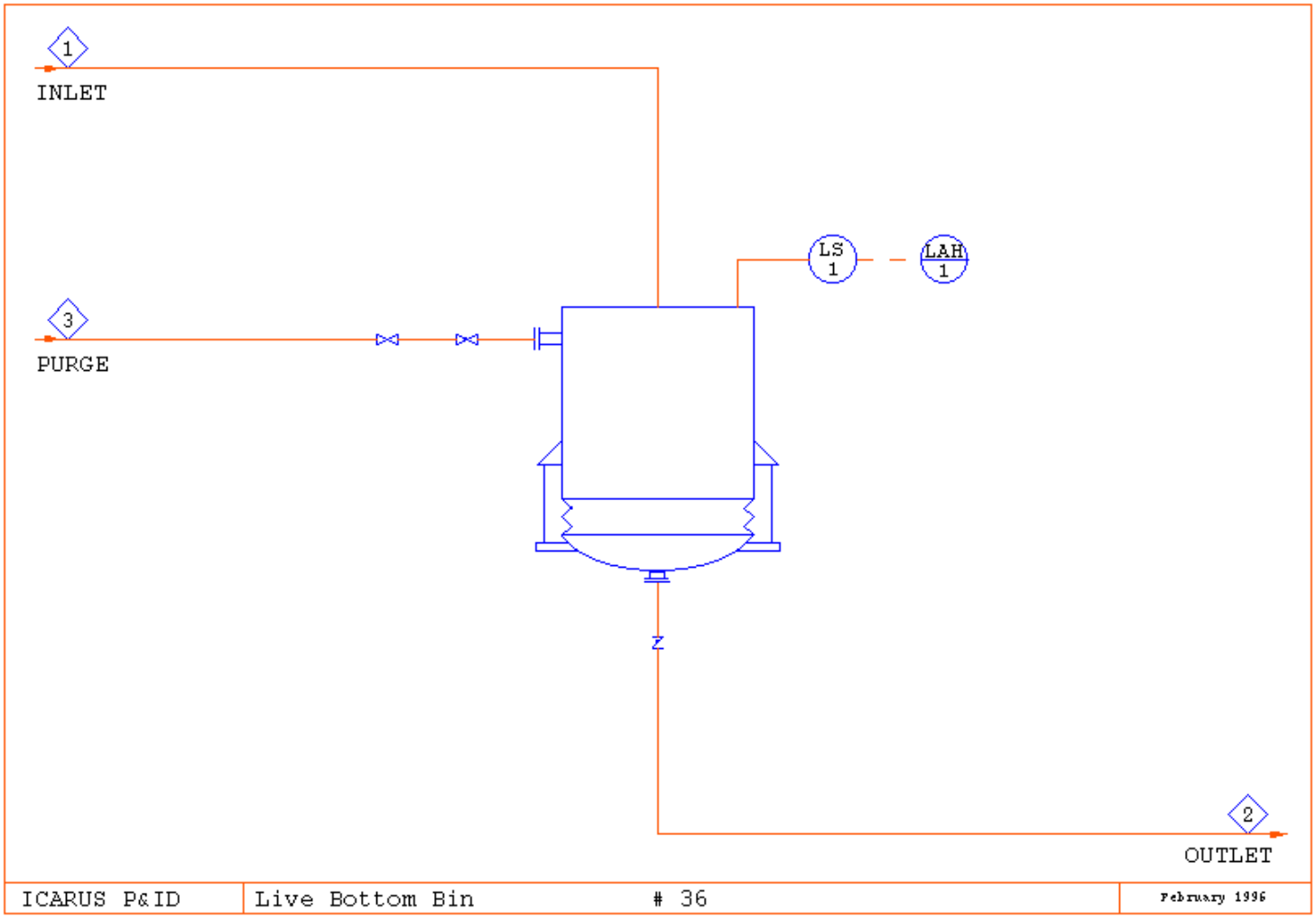
33 Cloth Bay Baghouse Dust Collector



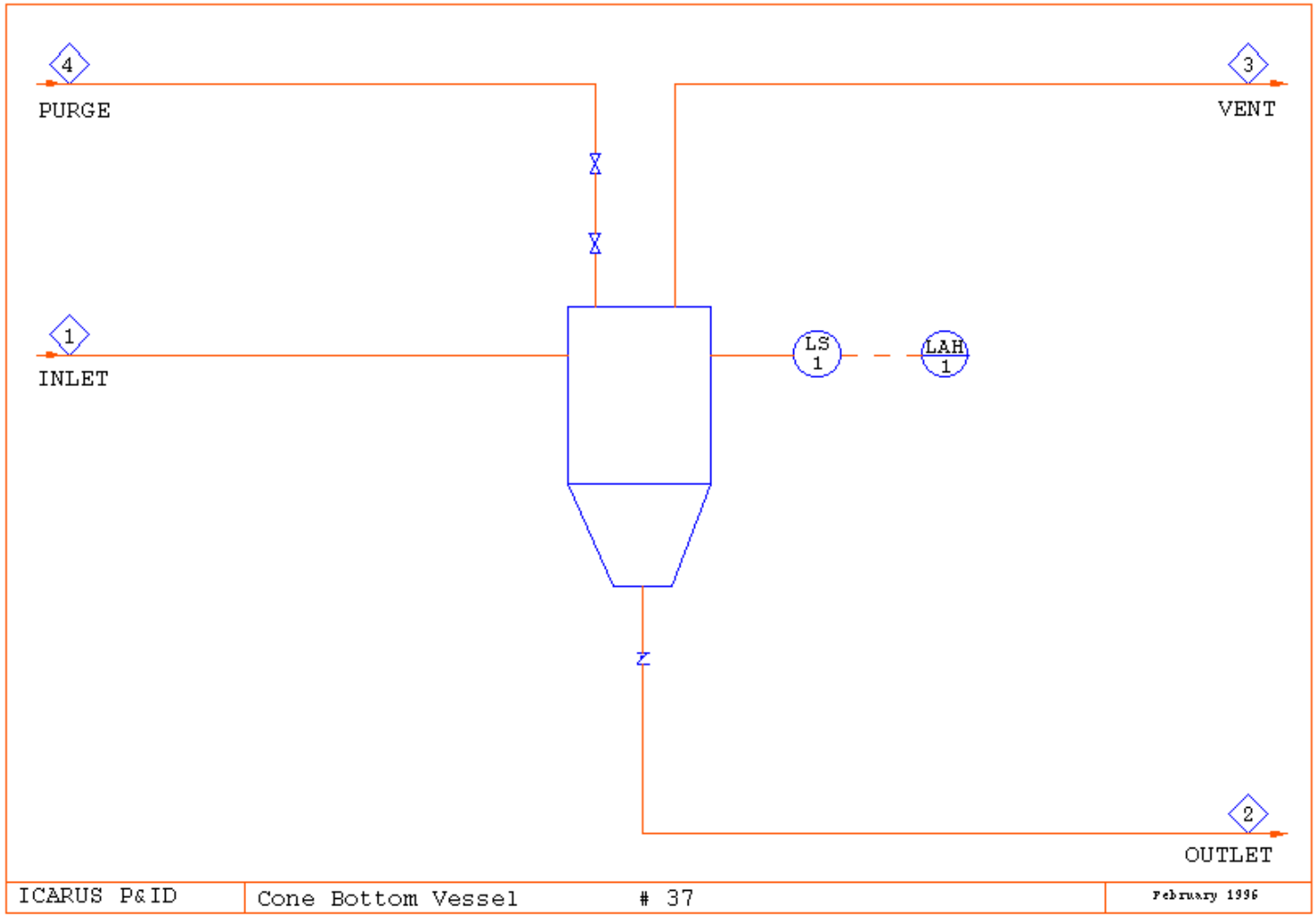
34 Cyclone Dust Collector



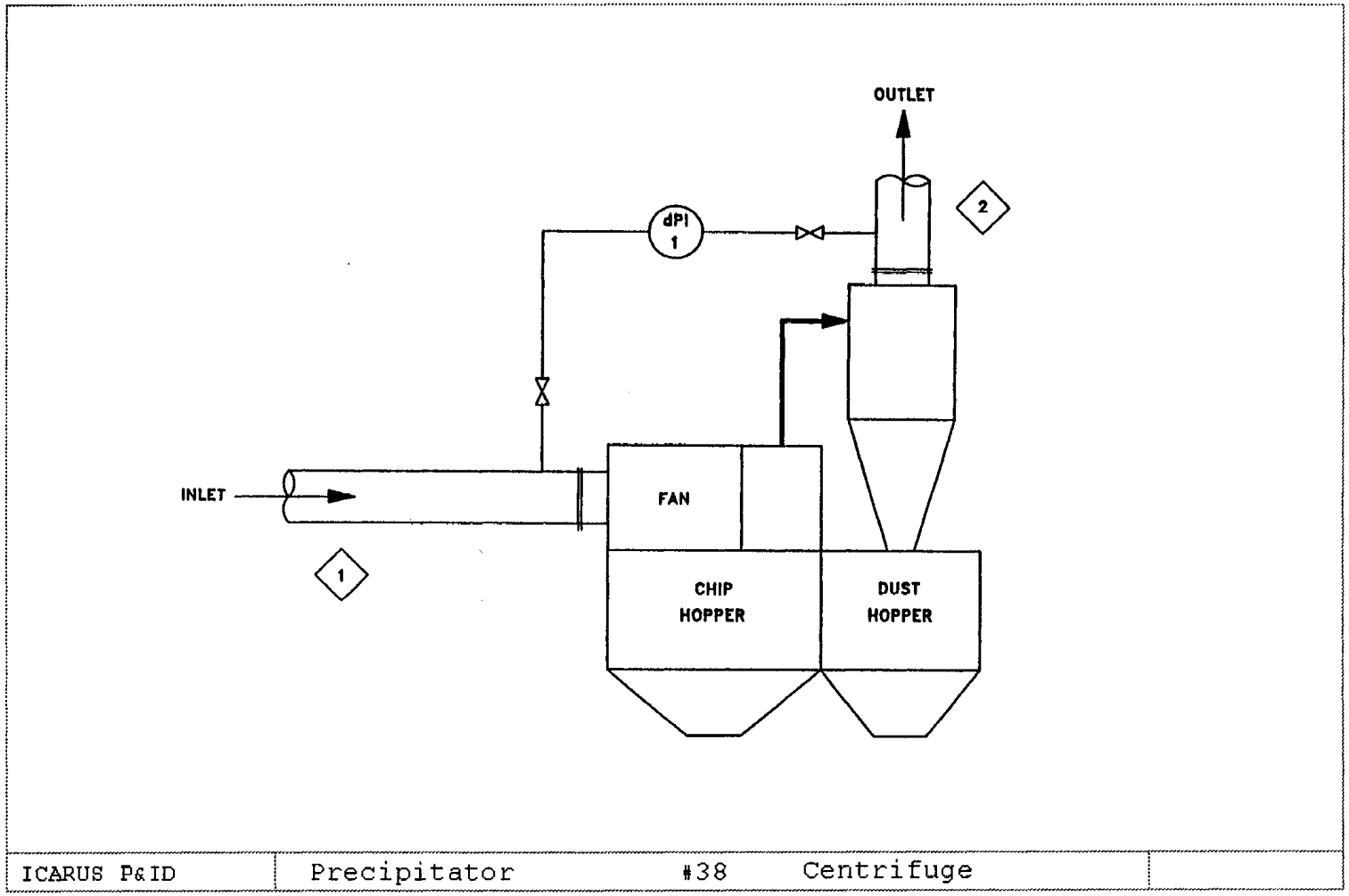
36 Live Bottom Bin



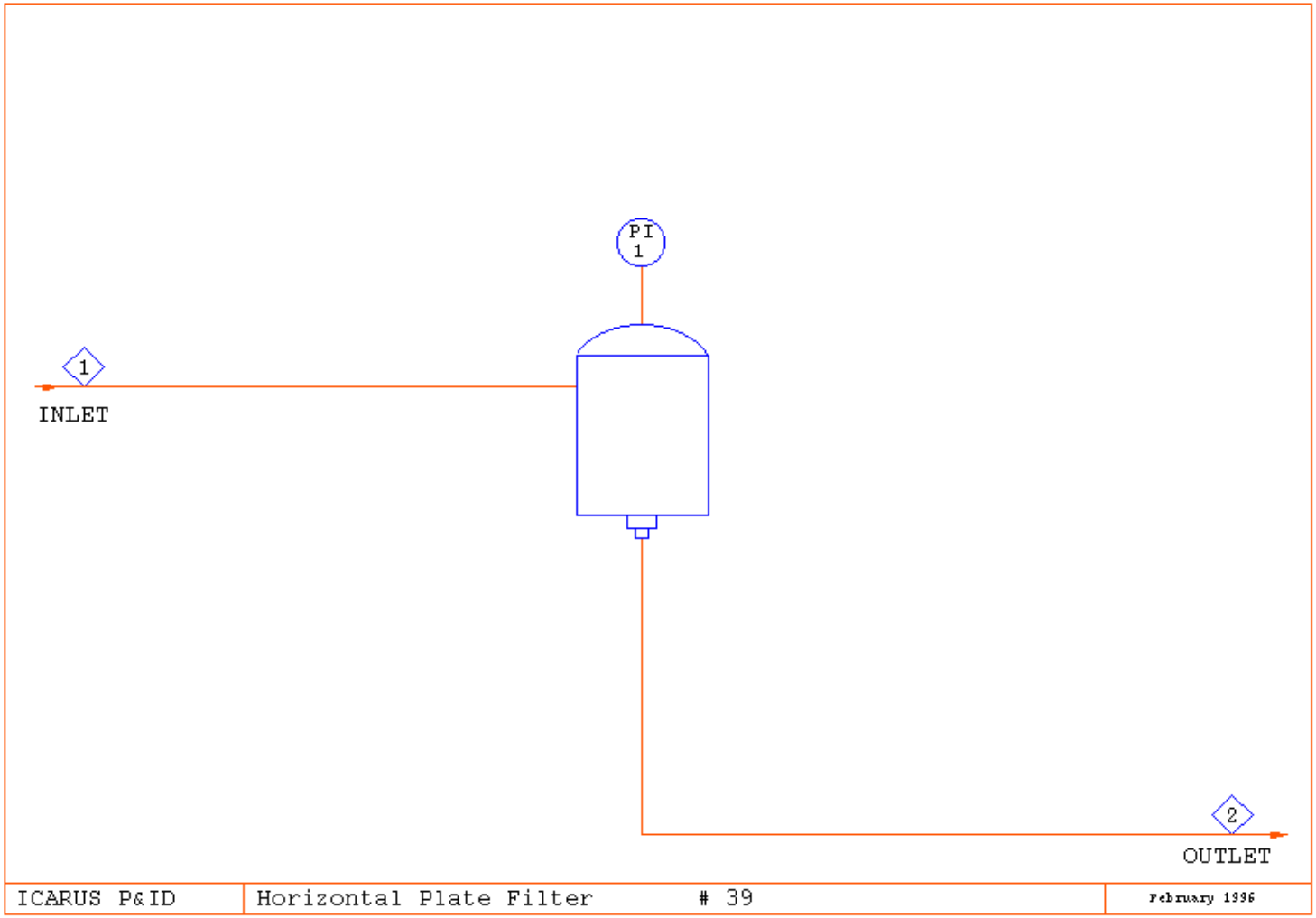
37 Cone Bottom Vessel



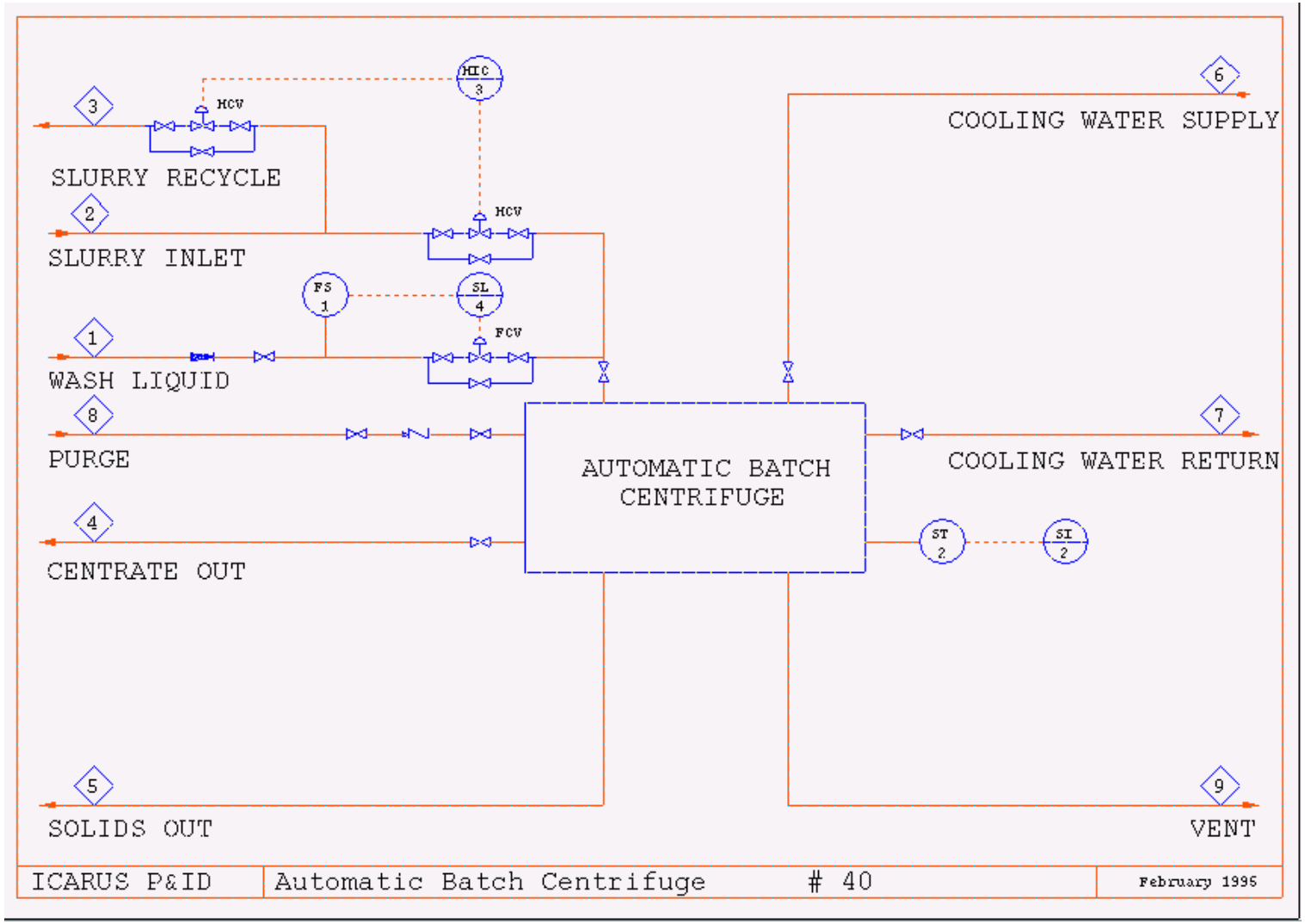
38 Centrifuge Precipitator



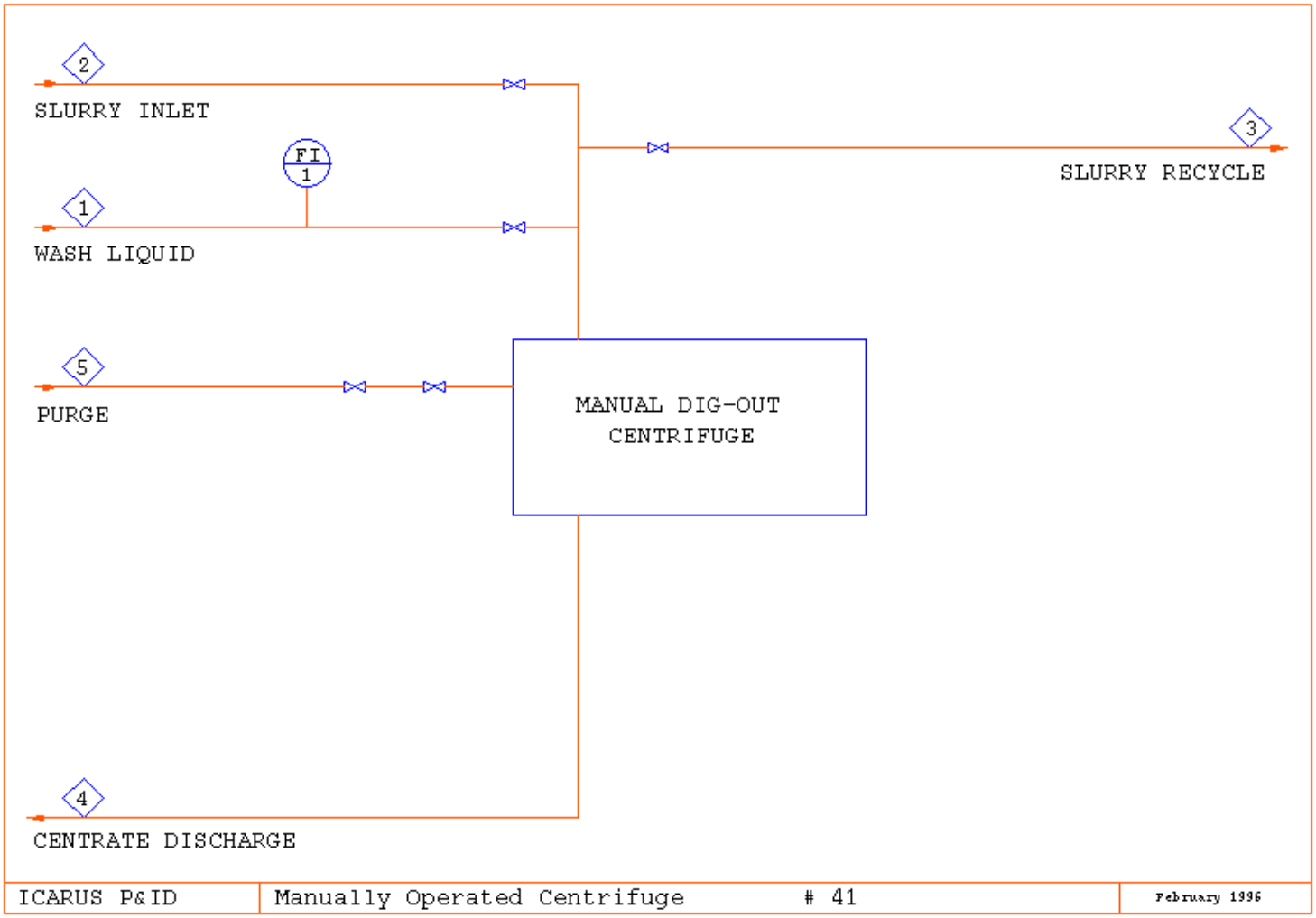
39 Horizontal Plate Filter



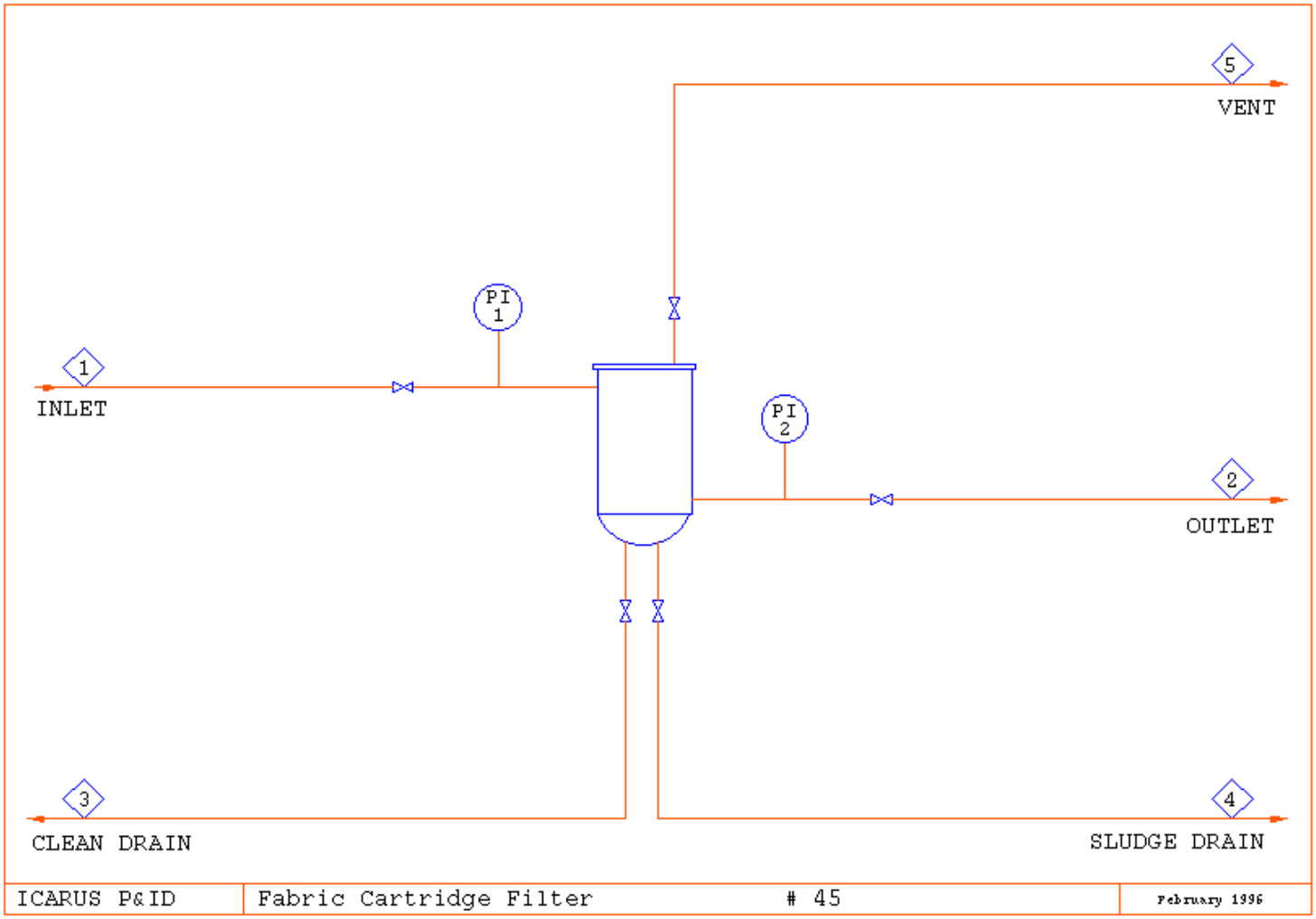
40 Automatic Batch Centrifuge


HIC
3
HCV
3
SLURRY RECYCLE
2
SLURRY INLET
HCV
FS
1
SL
4
FCV
1
WASH LIQUID
8
PURGE
4
CENTRATE OUT
AUTOMATIC BATCH
CENTRIFUGE
6
COOLING WATER SUPPLY
7
COOLING WATER RETURN
ST
2
SI
2
5
SOLIDS OUT
9
VENT
ICARUS P&ID
Automatic Batch Centrifuge
40
February 1995

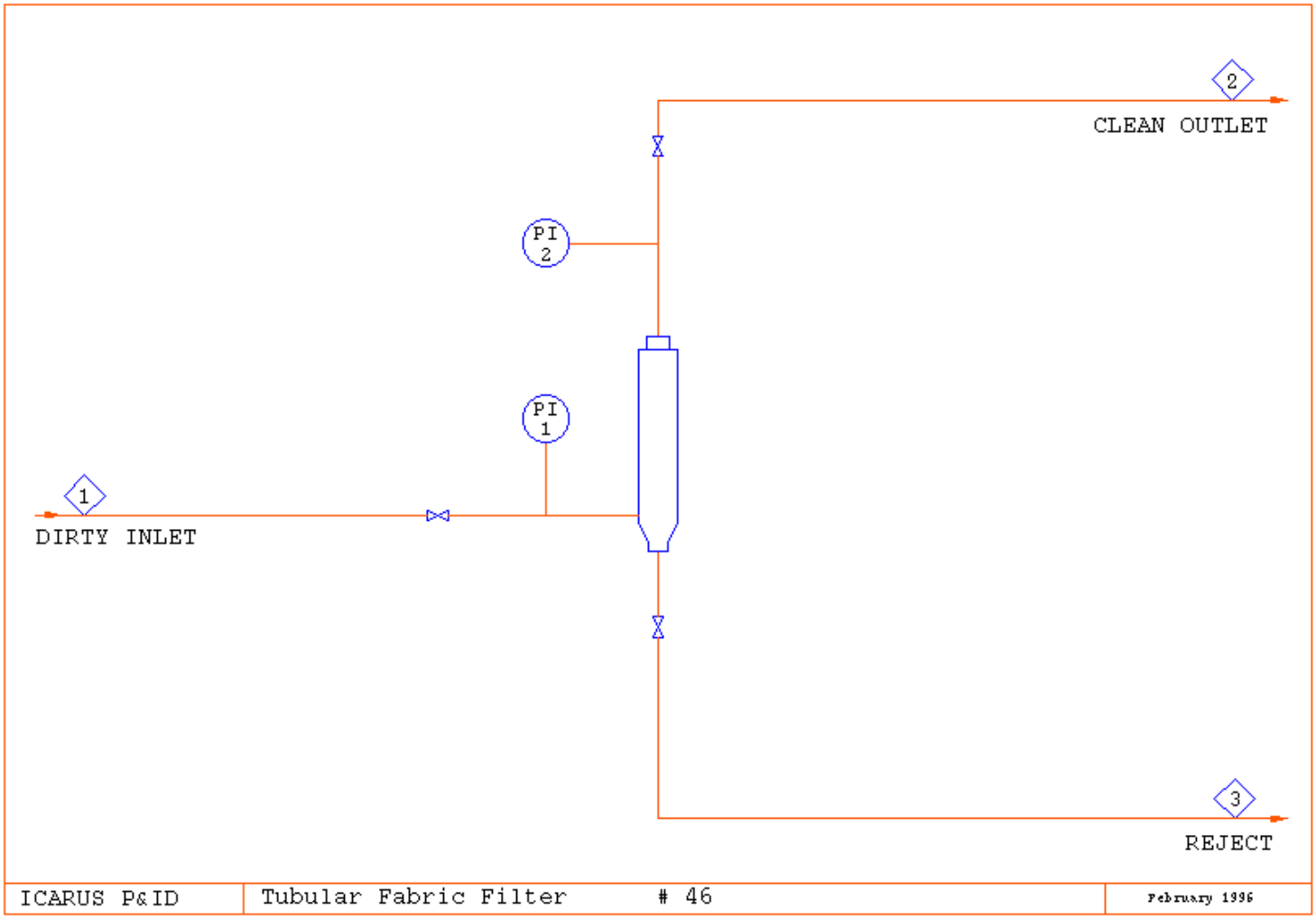
41 Manually Operated Centrifuge



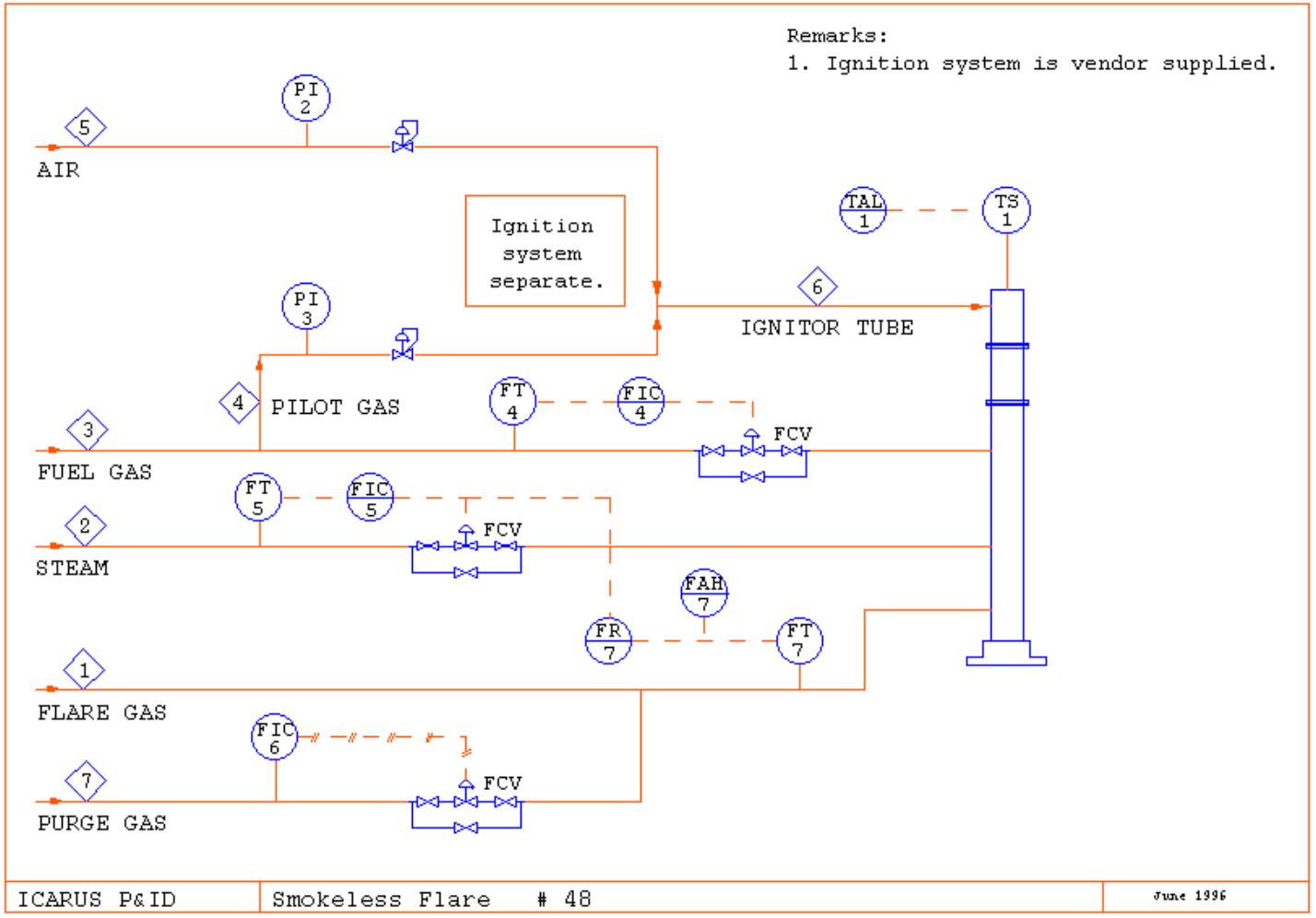
45 Fabric Cartridge Filter



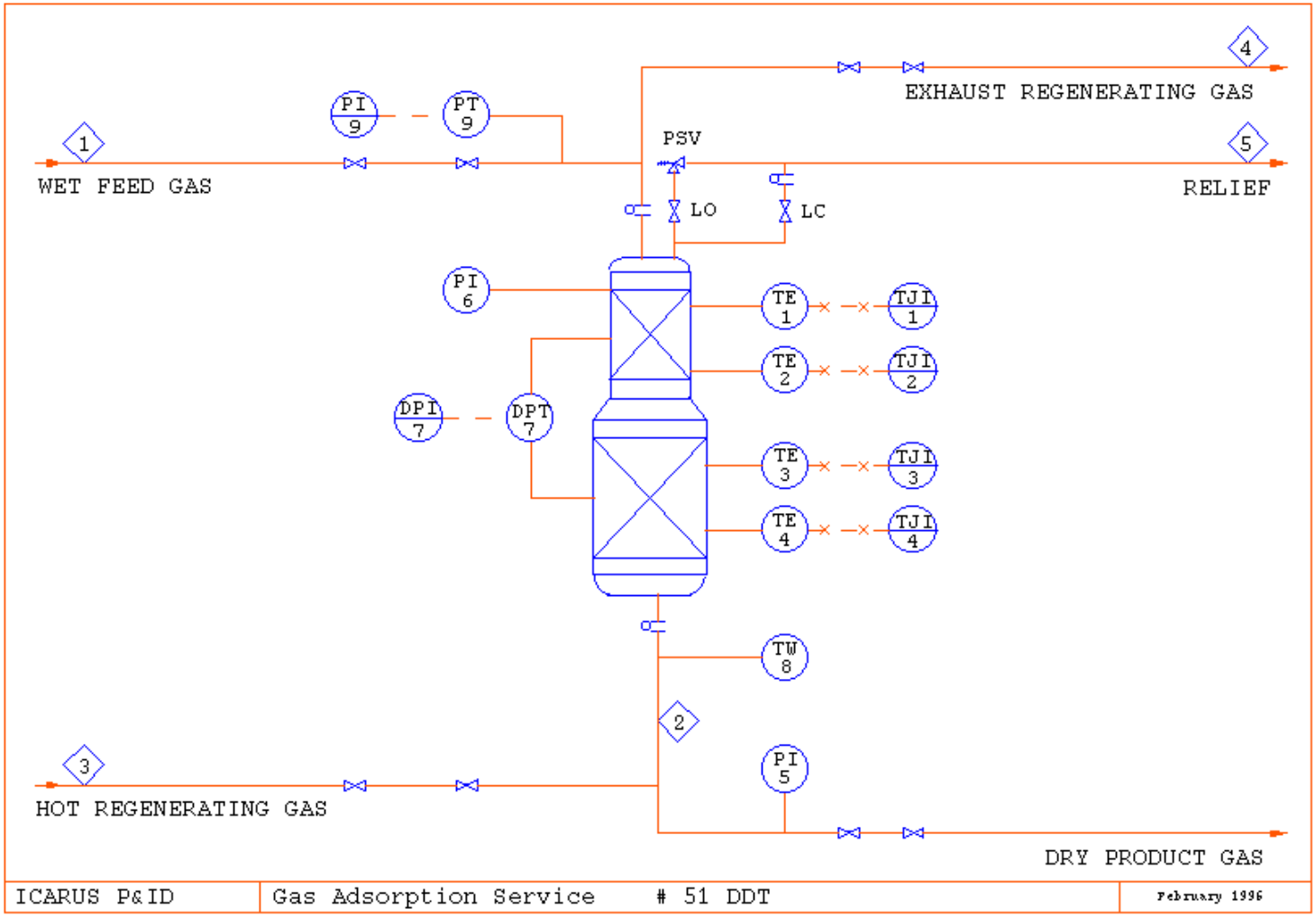
46 Tubular Fabric Filter



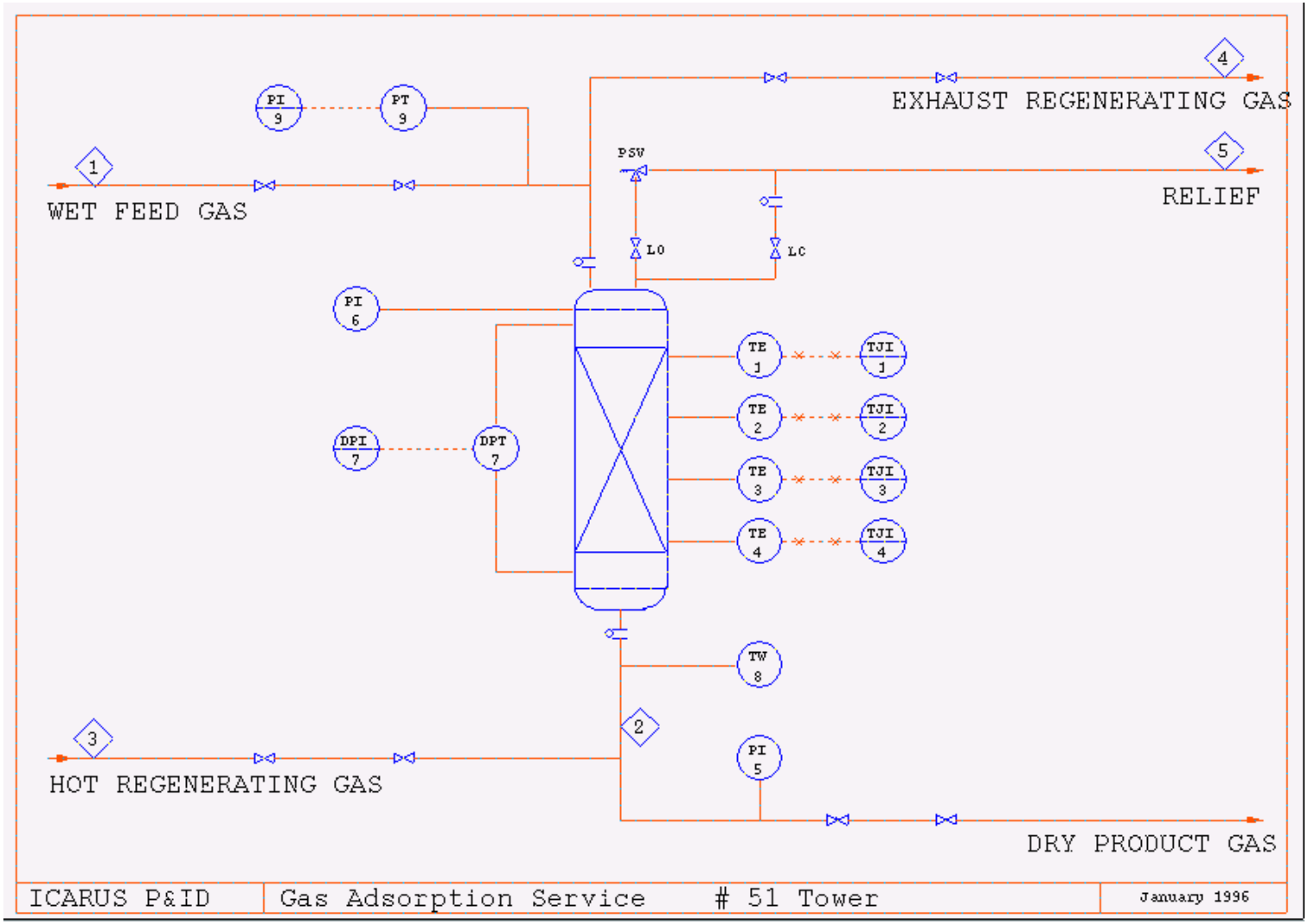
48 Smokeless Flare



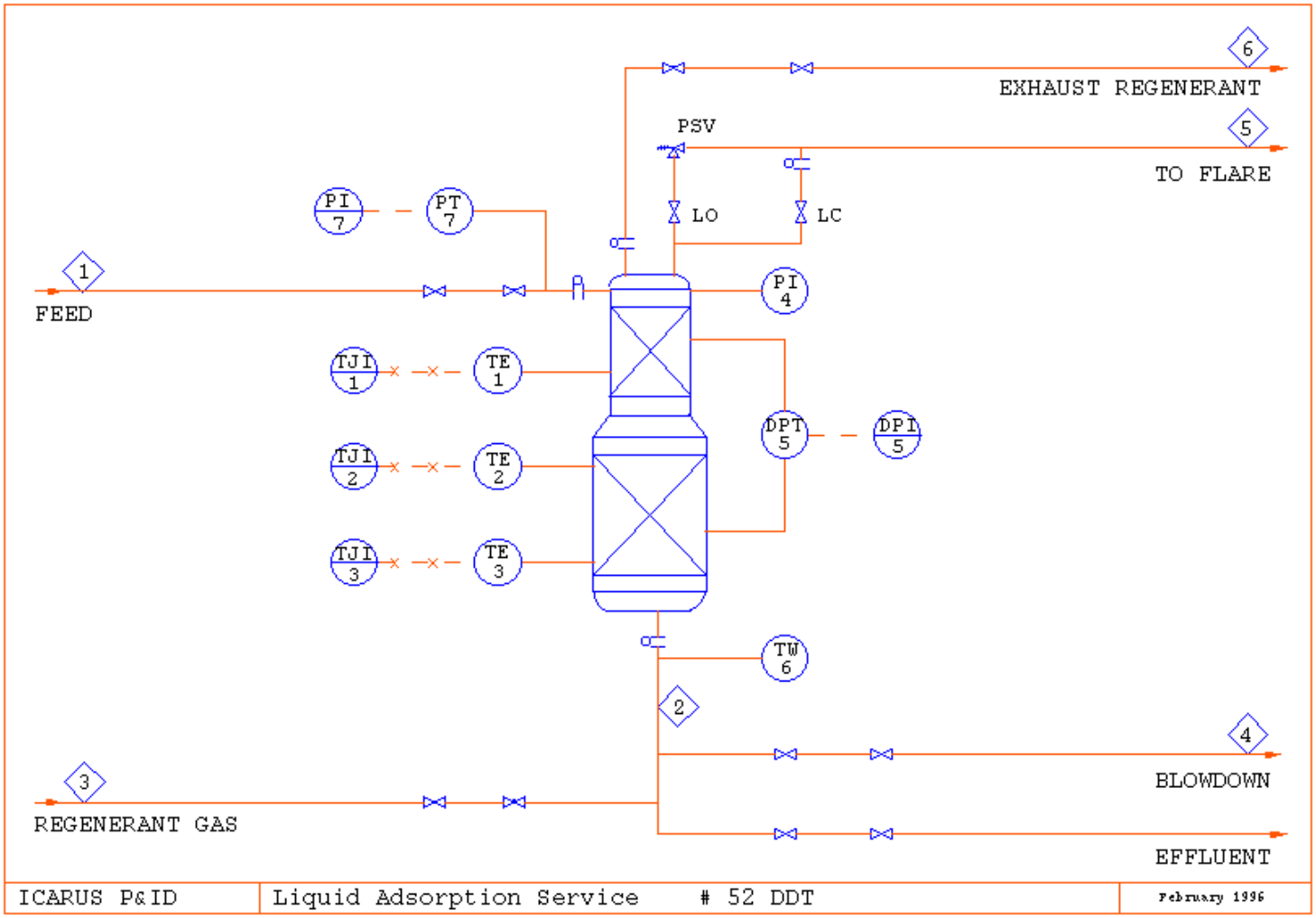
51 DDT – Gas Adsorption Service



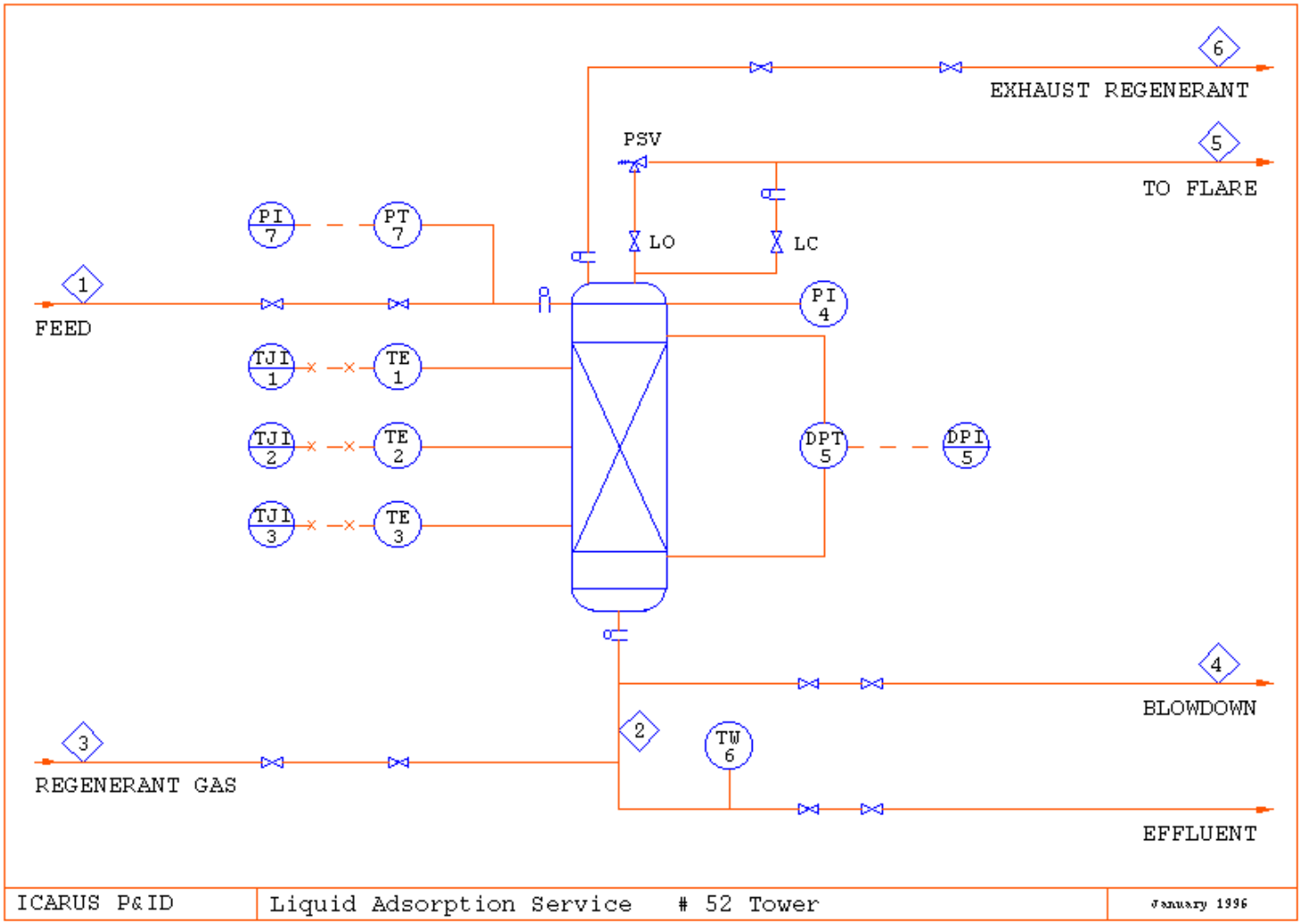
51 Tower – Gas Adsorption Service


4
EXHAUST REGENERATING GAS
PI 9
PT 9
PSV
5
RELIEF
1
WET FEED GAS
LO
LC
PI 6
TE 1
TJI 1
TE 2
TJI 2
DPI 7
DPT 7
TE 3
TJI 3
TE 4
TJI 4
TW 8
2
3
PI 5
HOT REGENERATING GAS
DRY PRODUCT GAS
ICARUS P&ID
Gas Adsorption Service
51 Tower
January 1996

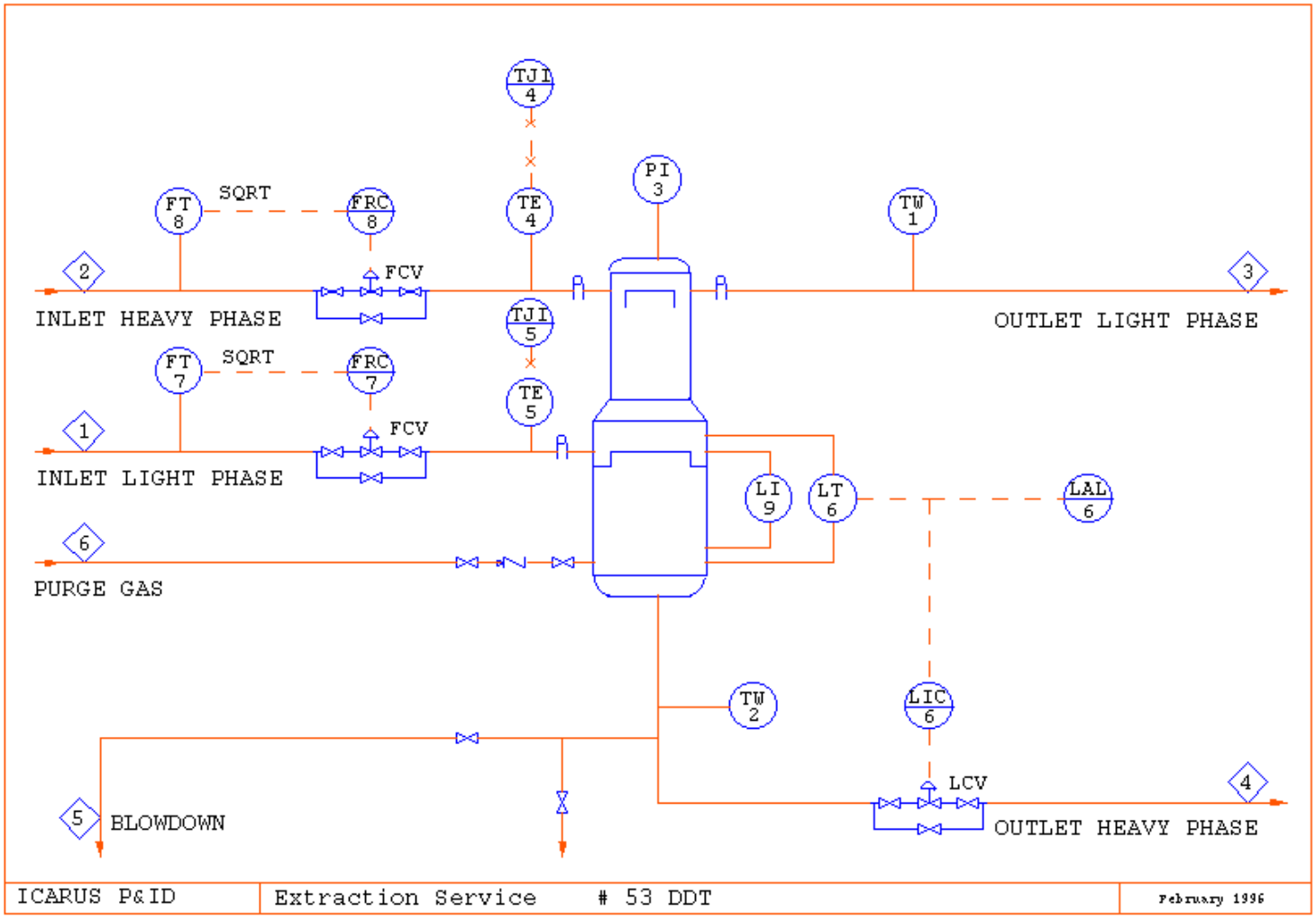
52 DDT – Liquid Adsorption Service



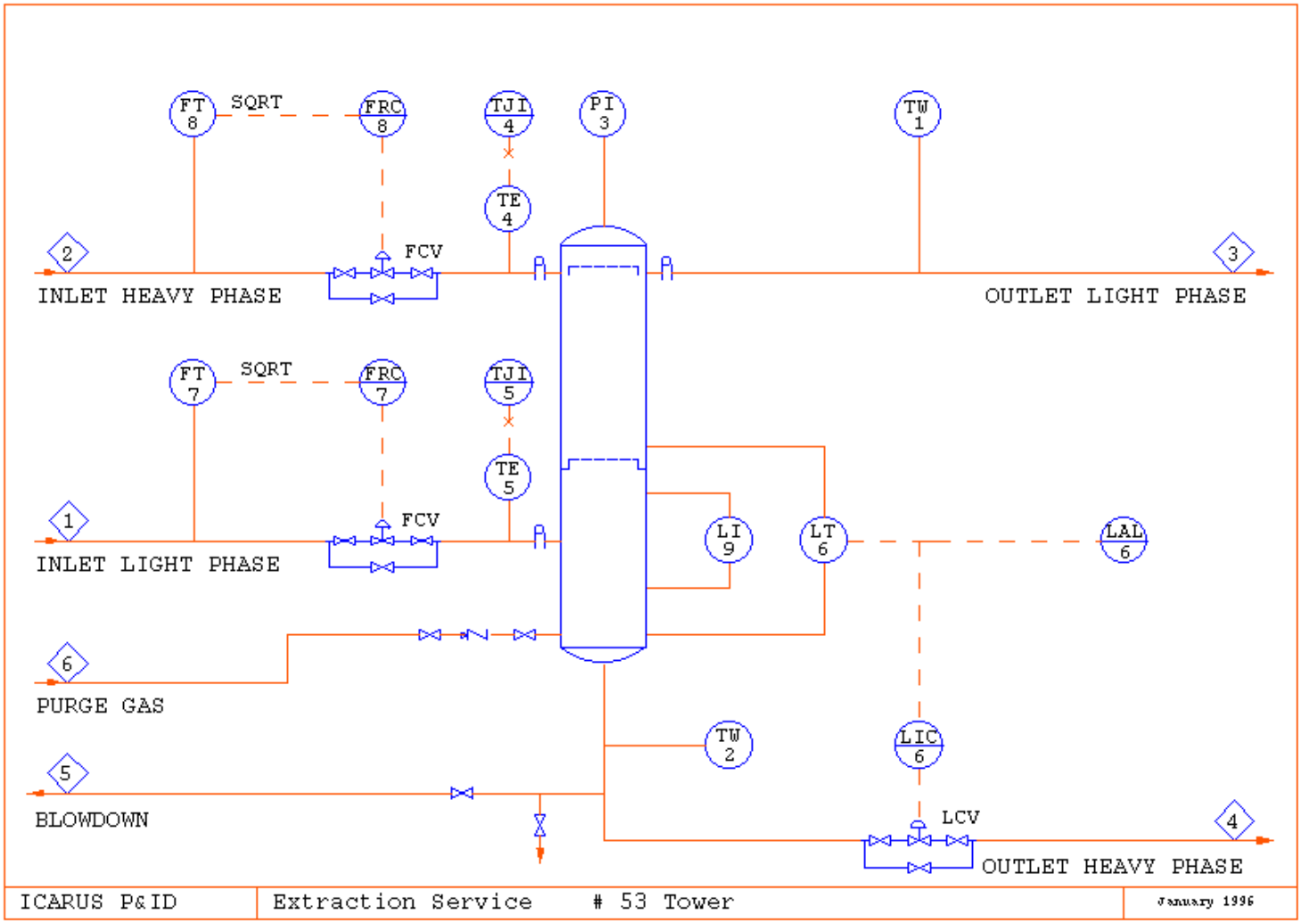
52 Tower – Liquid Adsorption Service



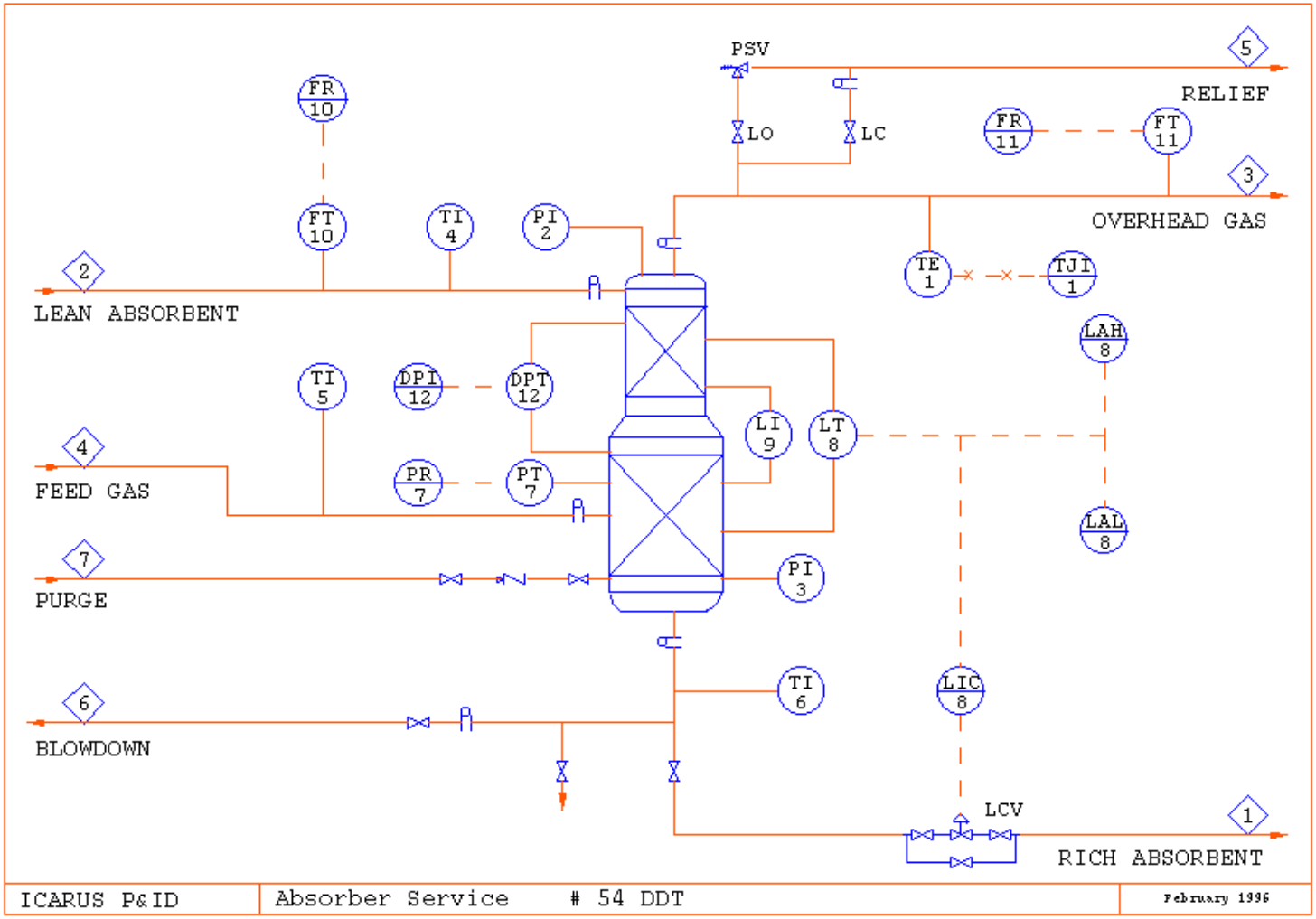
53 DDT – Extraction Service


TJI 4
PI 3
FT 8
SQRT
FRC 8
TE 4
TW 1
2
FCV
3
INLET HEAVY PHASE
TJI 5
OUTLET LIGHT PHASE
FT 7
SQRT
FRC 7
TE 5
1
FCV
INLET LIGHT PHASE
LI 9
LT 6
LAL 6
6
PURGE GAS
TW 2
LIC 6
LCV
4
5
BLOWDOWN
OUTLET HEAVY PHASE
ICARUS P&ID
Extraction Service # 53 DDT
February 1996

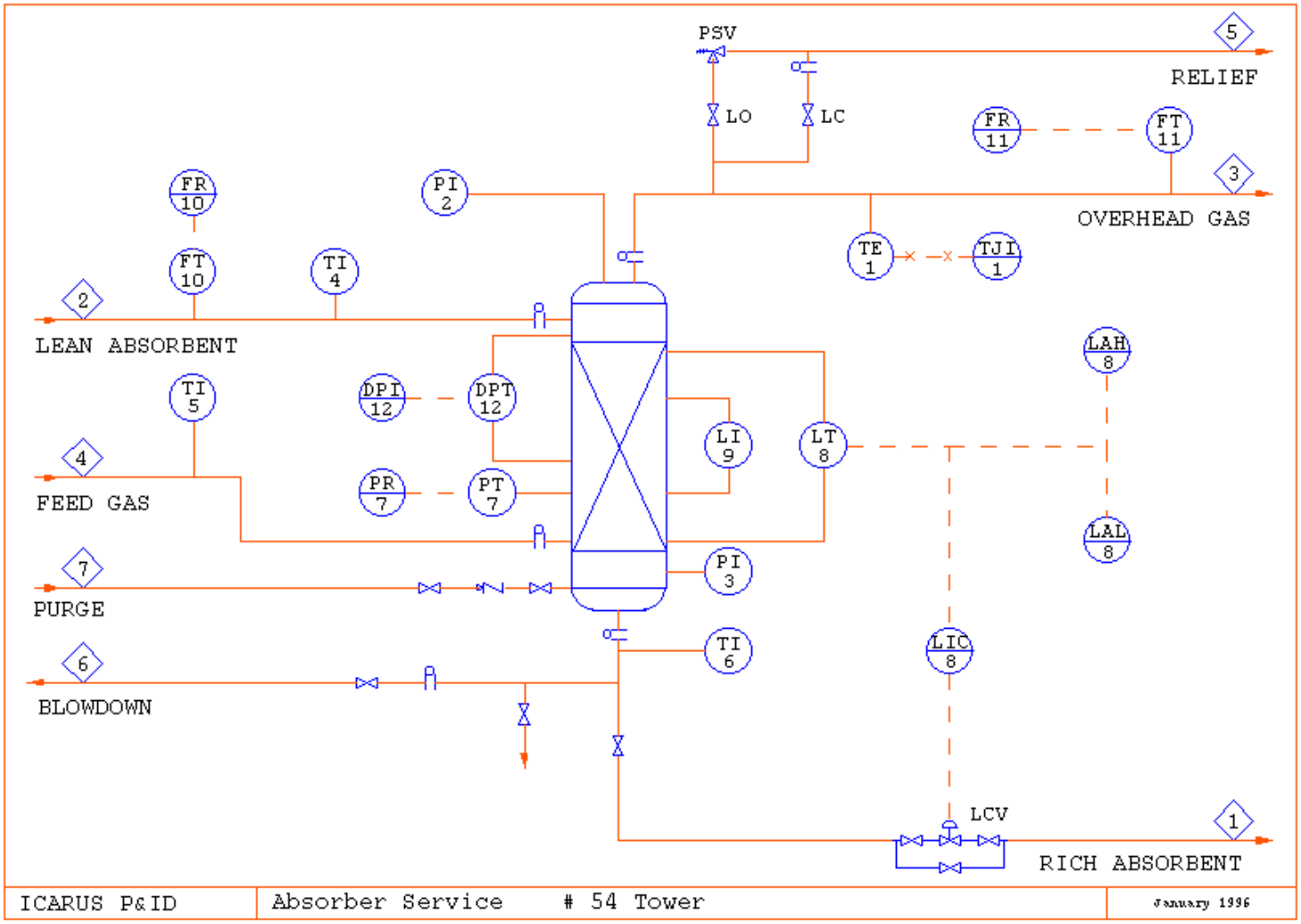
53 Tower – Extraction Service


FT 8
SQRT
FRC 8
TJI 4
PI 3
TW 1
TE 4
2
FCV
3
INLET HEAVY PHASE
OUTLET LIGHT PHASE
FT 7
SQRT
FRC 7
TJI 5
TE 5
1
FCV
LI 9
LT 6
LAL 6
INLET LIGHT PHASE
6
PURGE GAS
TW 2
LIC 6
5
LCV
4
BLOWDOWN
OUTLET HEAVY PHASE
ICARUS P&ID
Extraction Service # 53 Tower
January 1996

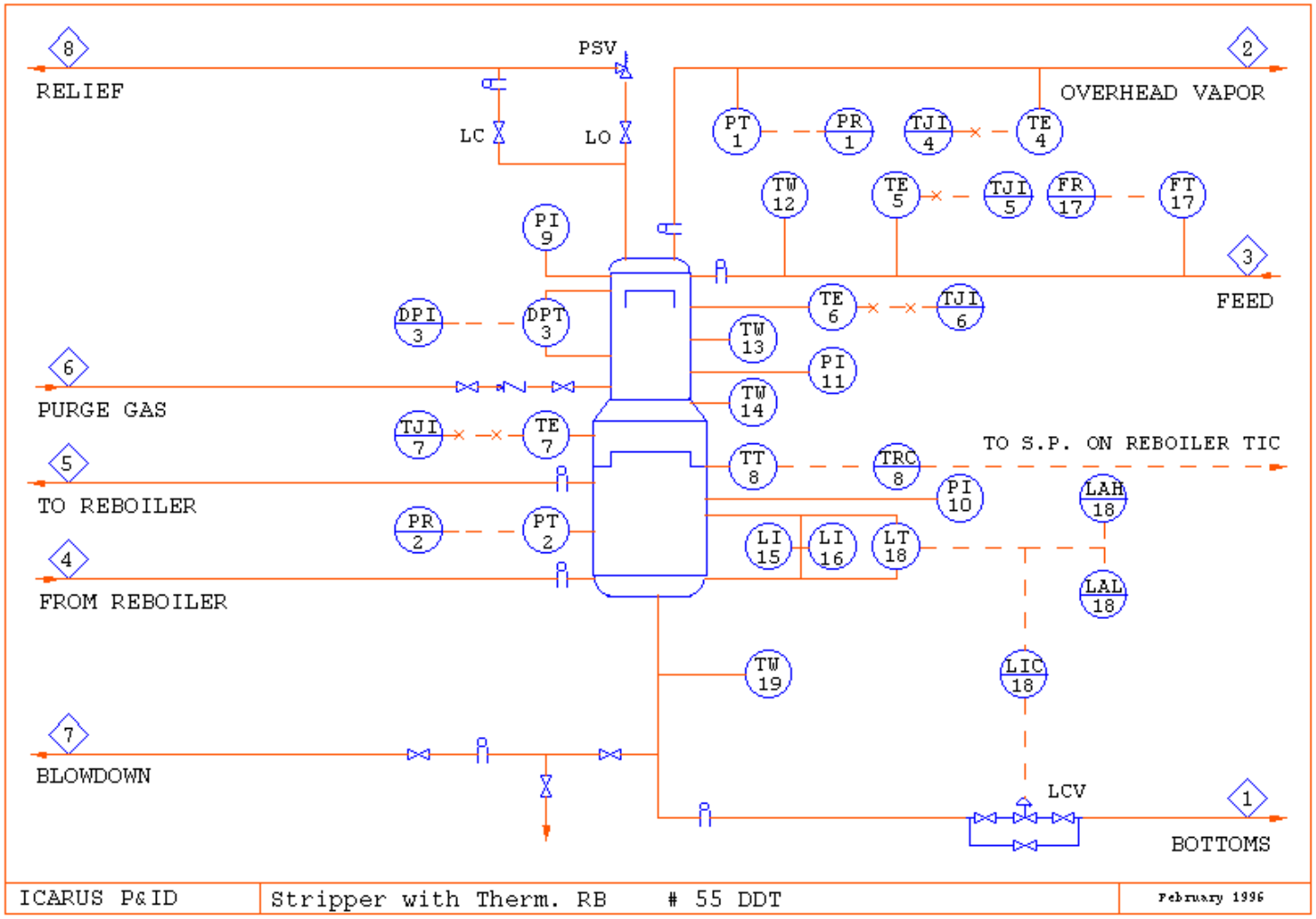
54 DDT – Absorber Service


PSV
5
RELIEF
FR 10
LO
LC
FR 11
FT 11
3
OVERHEAD GAS
FT 10
TI 4
PI 2
2
LEAN ABSORBENT
TE 1
TJI 1
LAH 8
TI 5
DPI 12
DPT 12
LI 9
LT 8
4
FEED GAS
PR 7
PT 7
LAL 8
7
PURGE
PI 3
TI 6
LIC 8
6
BLOWDOWN
LCV
1
RICH ABSORBENT
ICARUS P&ID
Absorber Service
54 DDT
February 1996

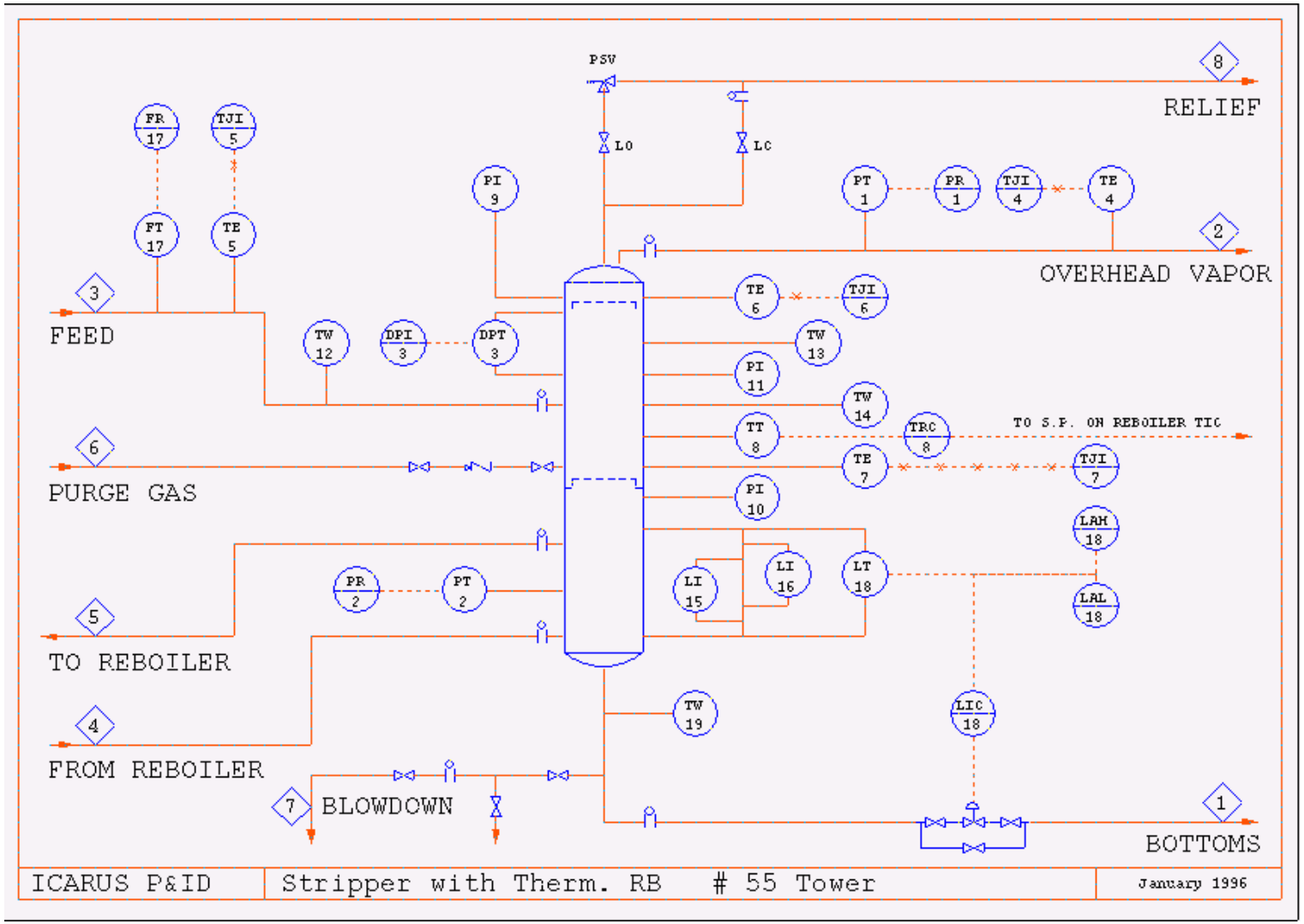
54 Tower – Absorber Service


PSV
5
RELIEF
LO
LC
FR 11
FT 11
3
OVERHEAD GAS
FR 10
PI 2
TE 1
TJI 1
FT 10
TI 4
2
LEAN ABSORBENT
LAH 8
TI 5
DPI 12
DPT 12
LI 9
LT 8
4
FEED GAS
PR 7
PT 7
LAL 8
7
PURGE
PI 3
6
BLOWDOWN
TI 6
LIC 8
LCV
1
RICH ABSORBENT
ICARUS P&ID
Absorber Service
54 Tower
January 1996

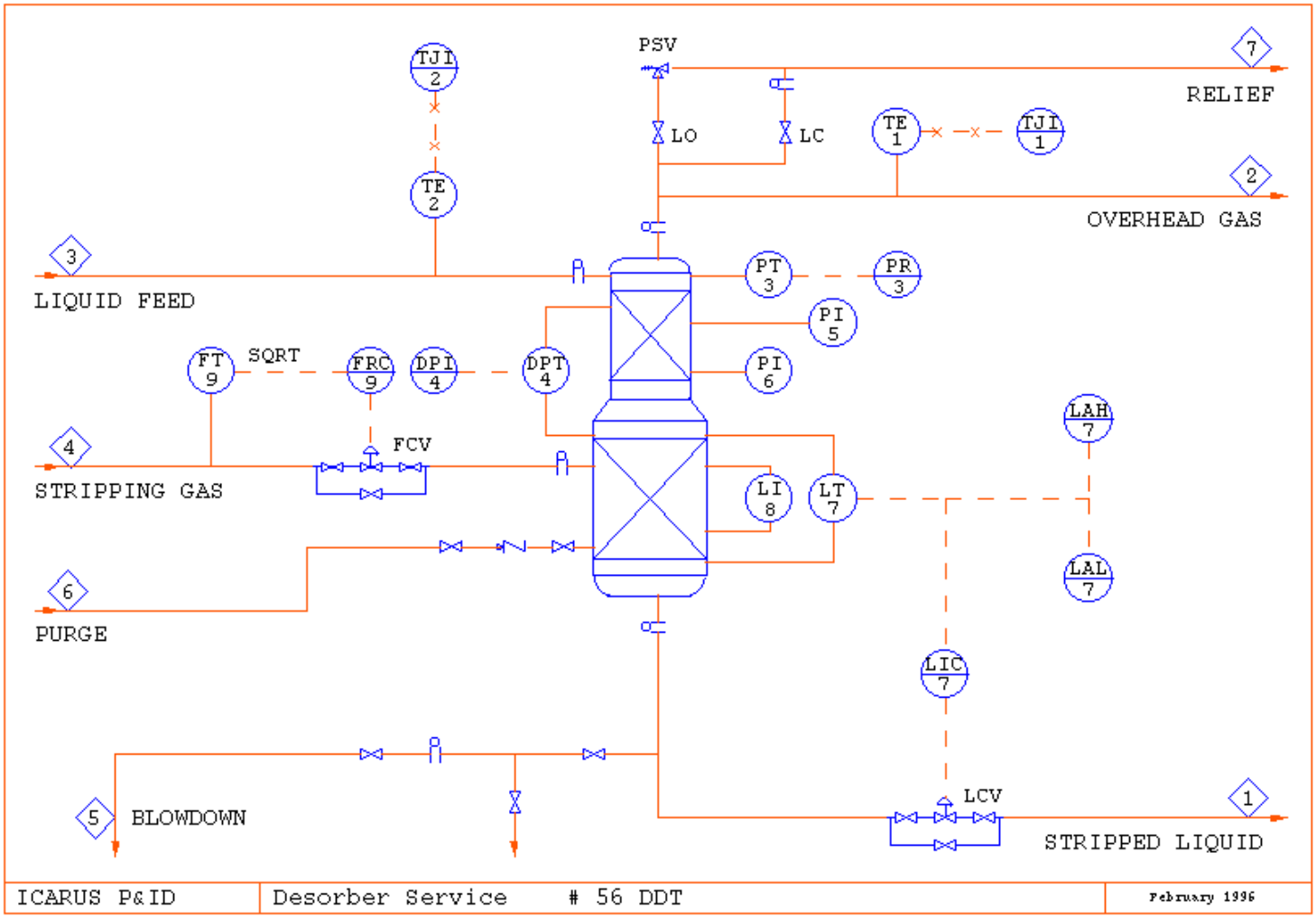
55 DDT – Stripper with Therm. RB


8
RELIEF
PSV
LC
LO
2
OVERHEAD VAPOR
PT 1
PR 1
TJI 4
TE 4
TW 12
TE 5
TJI 5
FR 17
FT 17
PI 9
3
FEED
DPI 3
DPT 3
TE 6
TJI 6
TW 13
PI 11
6
PURGE GAS
TW 14
TJI 7
TE 7
TO S.P. ON REBOILER TIC
TT 8
TRC 8
5
TO REBOILER
PI 10
LAH 18
PR 2
PT 2
LI 15
LI 16
LT 18
4
FROM REBOILER
LAL 18
TW 19
LIC 18
7
BLOWDOWN
LCV
1
BOTTOMS
ICARUS P&ID
Stripper with Therm. RB # 55 DDT
February 1996

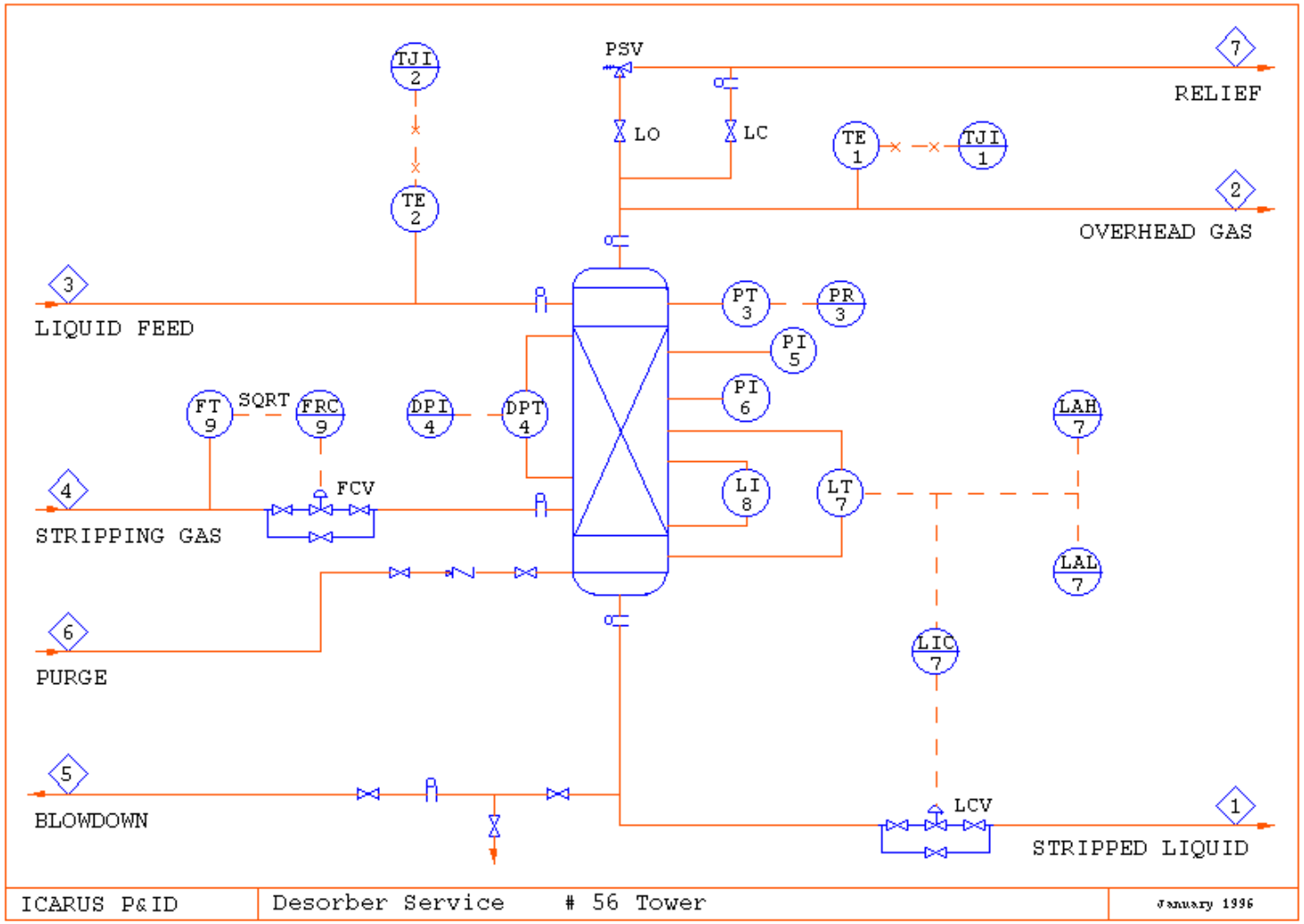
55 Tower – Stripper with Therm. RB


PSV
8
RELIEF
FR 17
TJI 5
LO
LC
PI 9
PT 1
PR 1
TJI 4
TE 4
FT 17
TE 5
2
OVERHEAD VAPOR
3
FEED
TE 6
TJI 6
TW 12
DPI 3
DPT 3
TW 13
PI 11
TW 14
TT 8
TRC 8
TO S.P. ON REBOILER TIC
6
PURGE GAS
TE 7
TJI 7
PI 10
LAH 18
PR 2
PT 2
LI 15
LI 16
LT 18
LAL 18
5
TO REBOILER
4
FROM REBOILER
TW 19
LIC 18
7
BLOWDOWN
1
BOTTOMS
ICARUS P&ID
Stripper with Therm. RB # 55 Tower
January 1996

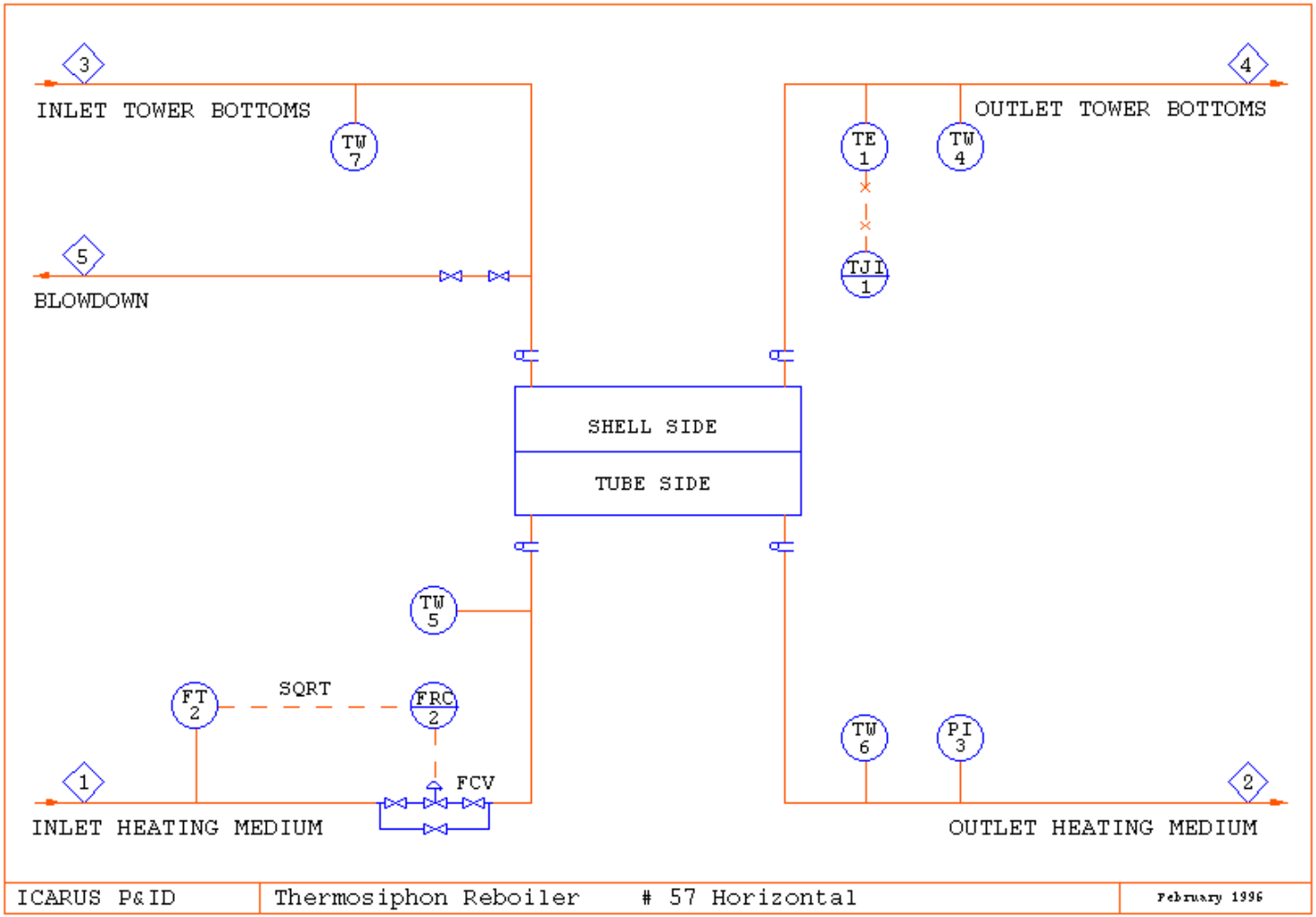
56 DDT – Desorber Service



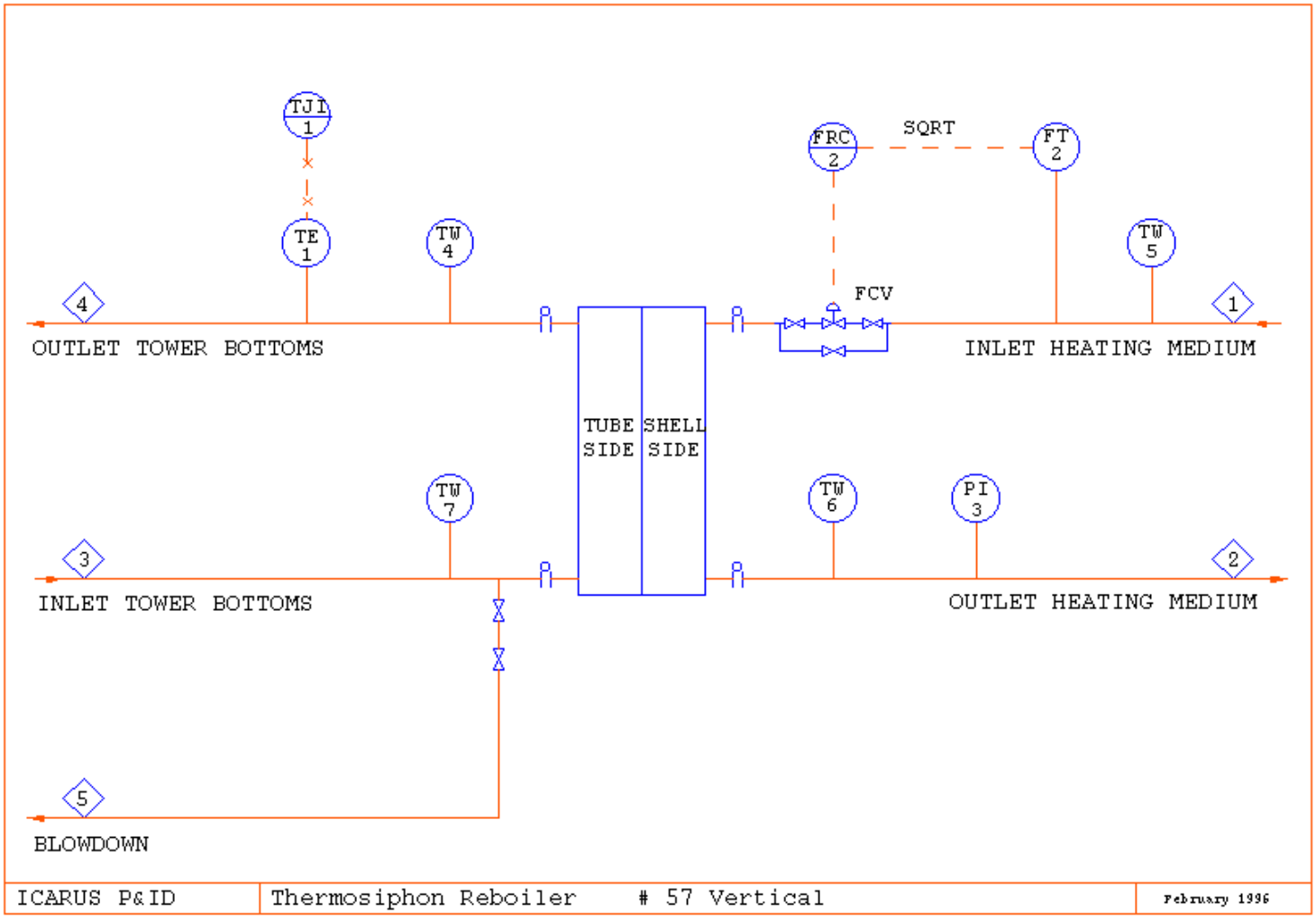
56 Tower – Desorber Service



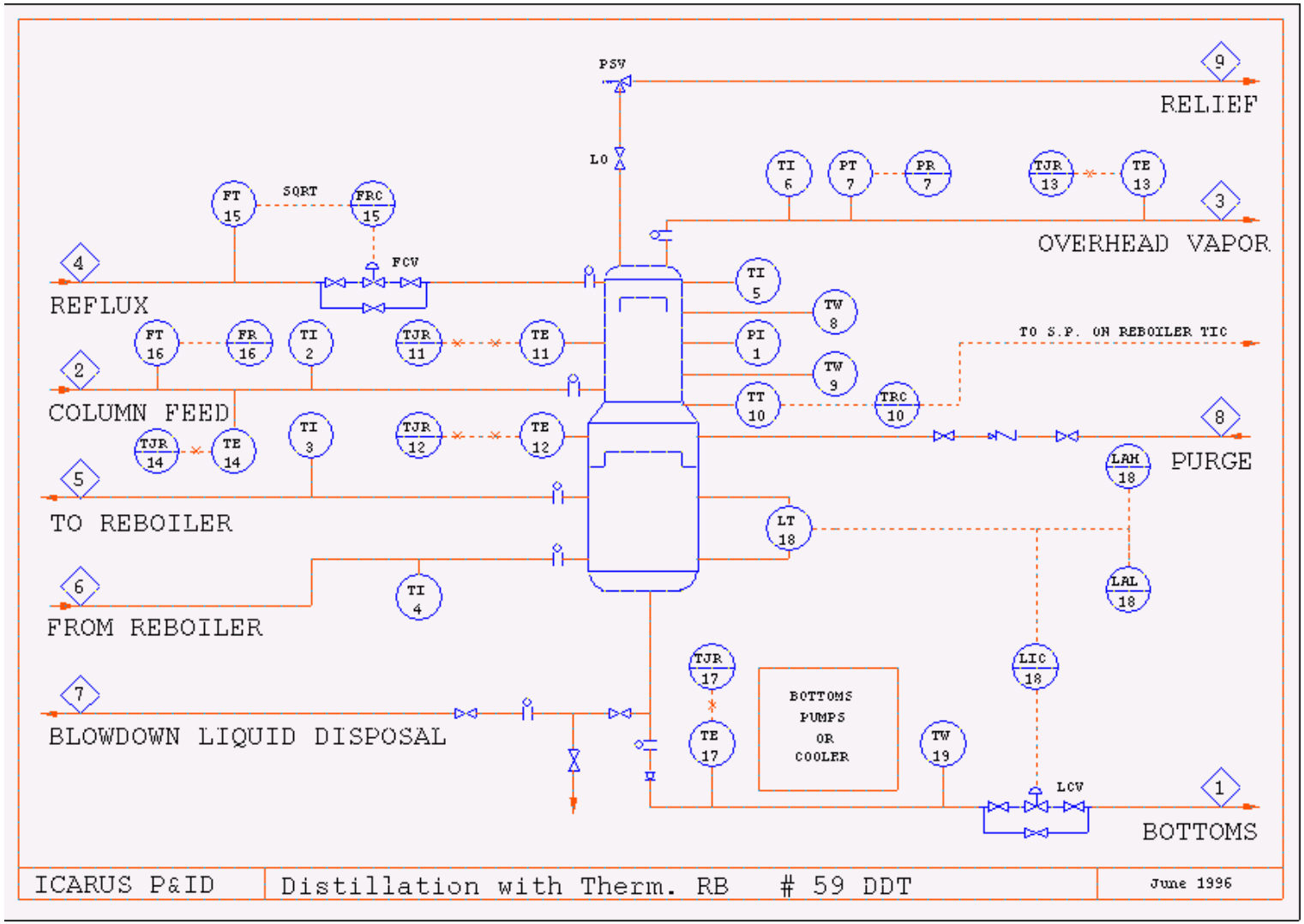
57 Horizontal Thermosiphon Reboiler



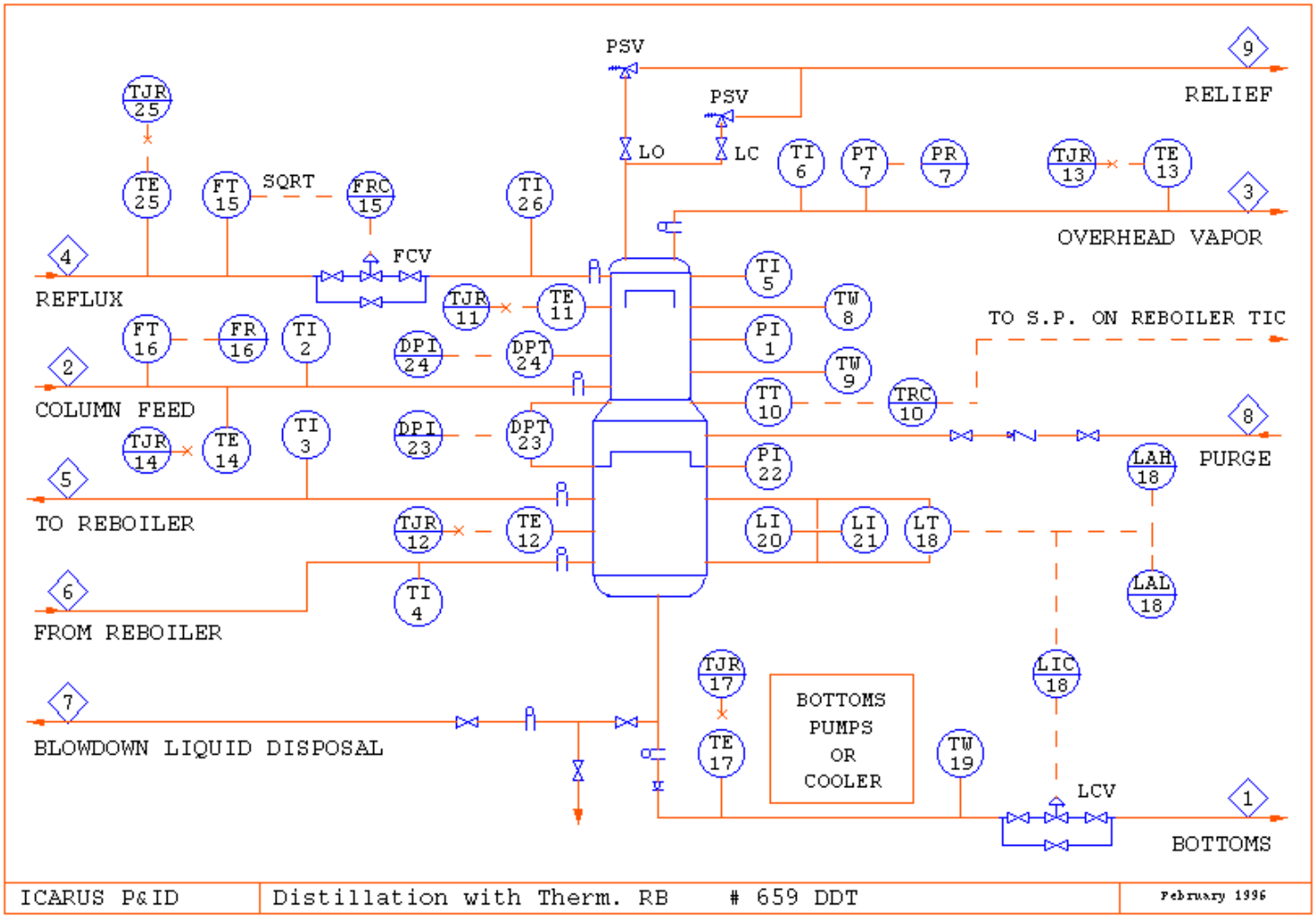
57 Vertical Thermosiphon Reboiler


TJI 1
TE 1
TW 4
FRC 2
SQRT
FT 2
TW 5
FCV
4
OUTLET TOWER BOTTOMS
1
INLET HEATING MEDIUM
TUBE SIDE
SHELL SIDE
TW 7
TW 6
PI 3
3
INLET TOWER BOTTOMS
2
OUTLET HEATING MEDIUM
5
BLOWDOWN
ICARUS P&ID
Thermosiphon Reboiler # 57 Vertical
February 1996

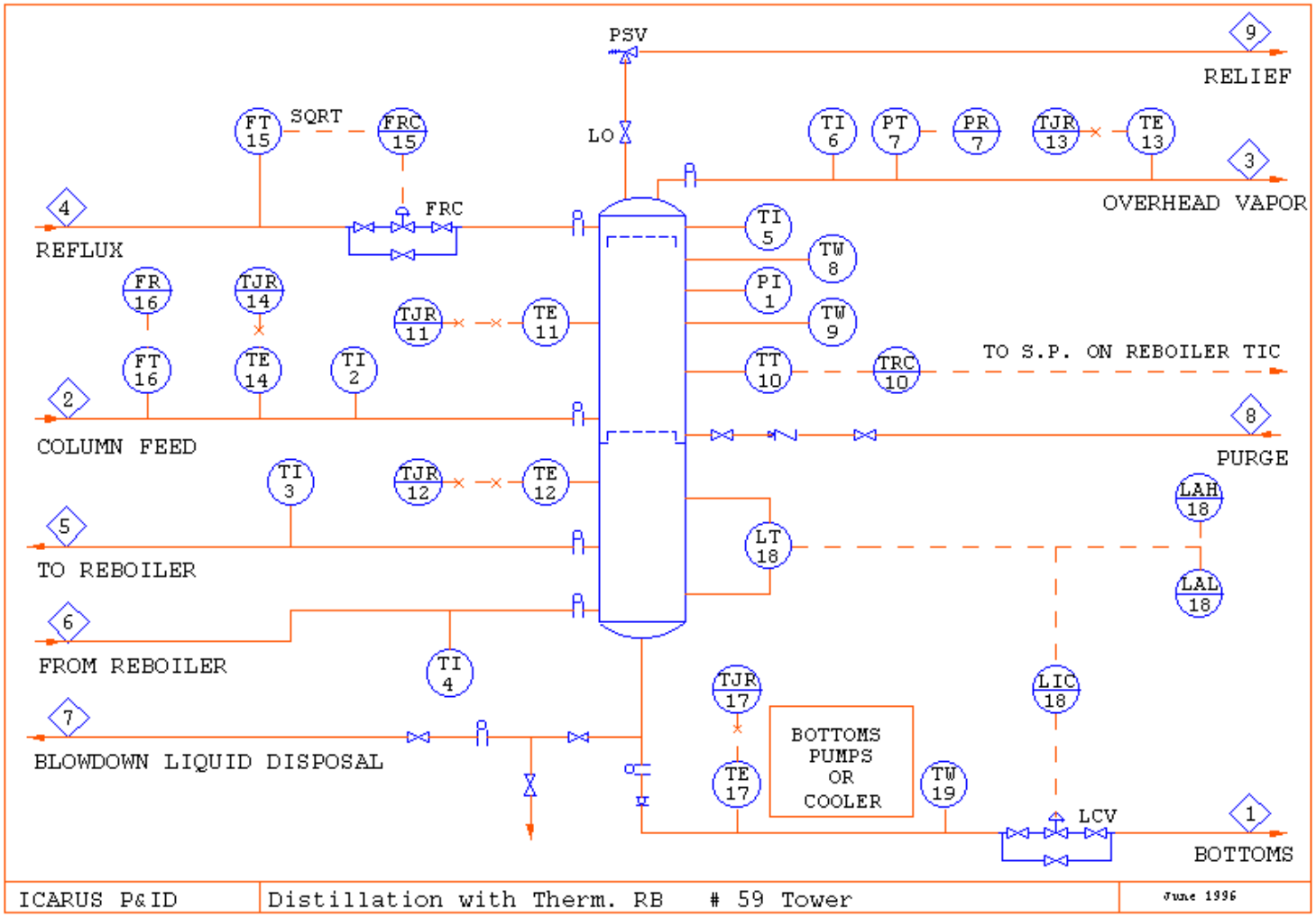
59 DDT – Distillation with Therm. RB


PSV
9
RELIEF
LO
TI 6
PT 7
PR 7
TJR 13
TE 13
3
OVERHEAD VAPOR
FT 15
SQRT
FRC 15
FCV
4
REFLUX
TI 5
TW 8
PI 1
TW 9
TT 10
TRC 10
TO S.P. ON REBOILER TIC
FT 16
FR 16
TI 2
TJR 11
TE 11
2
COLUMN FEED
TJR 14
TE 14
TI 3
TJR 12
TE 12
8
LAH 18
PURGE
5
TO REBOILER
LT 18
LAL 18
6
FROM REBOILER
TI 4
TJR 17
LIC 18
BOTTOMS PUMPS OR COOLER
7
BLOWDOWN LIQUID DISPOSAL
TE 17
TW 19
LCV
1
BOTTOMS
ICARUS P&ID
Distillation with Therm. RB # 59 DDT
June 1996

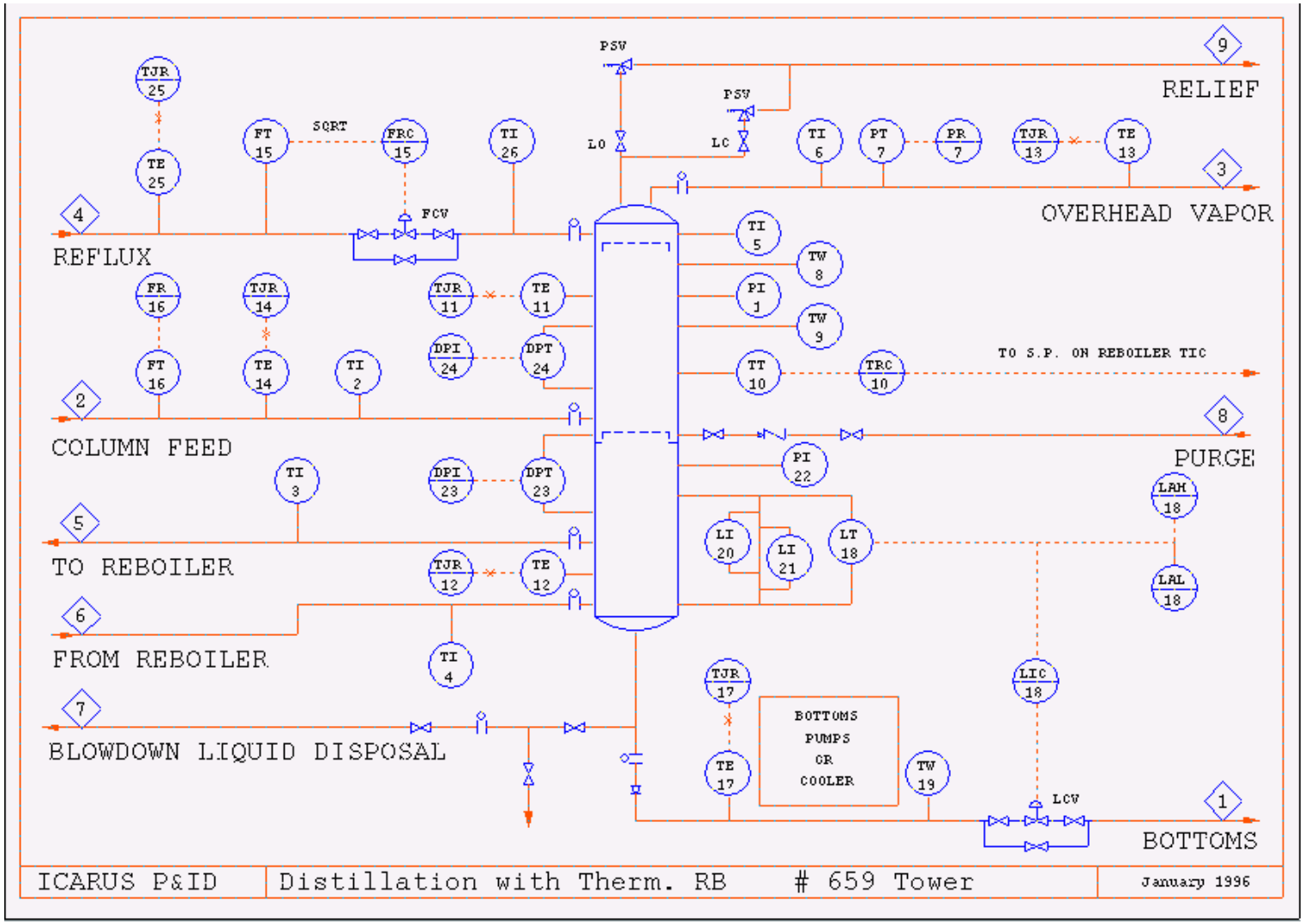
659 DDT – Distillation with Therm. RB



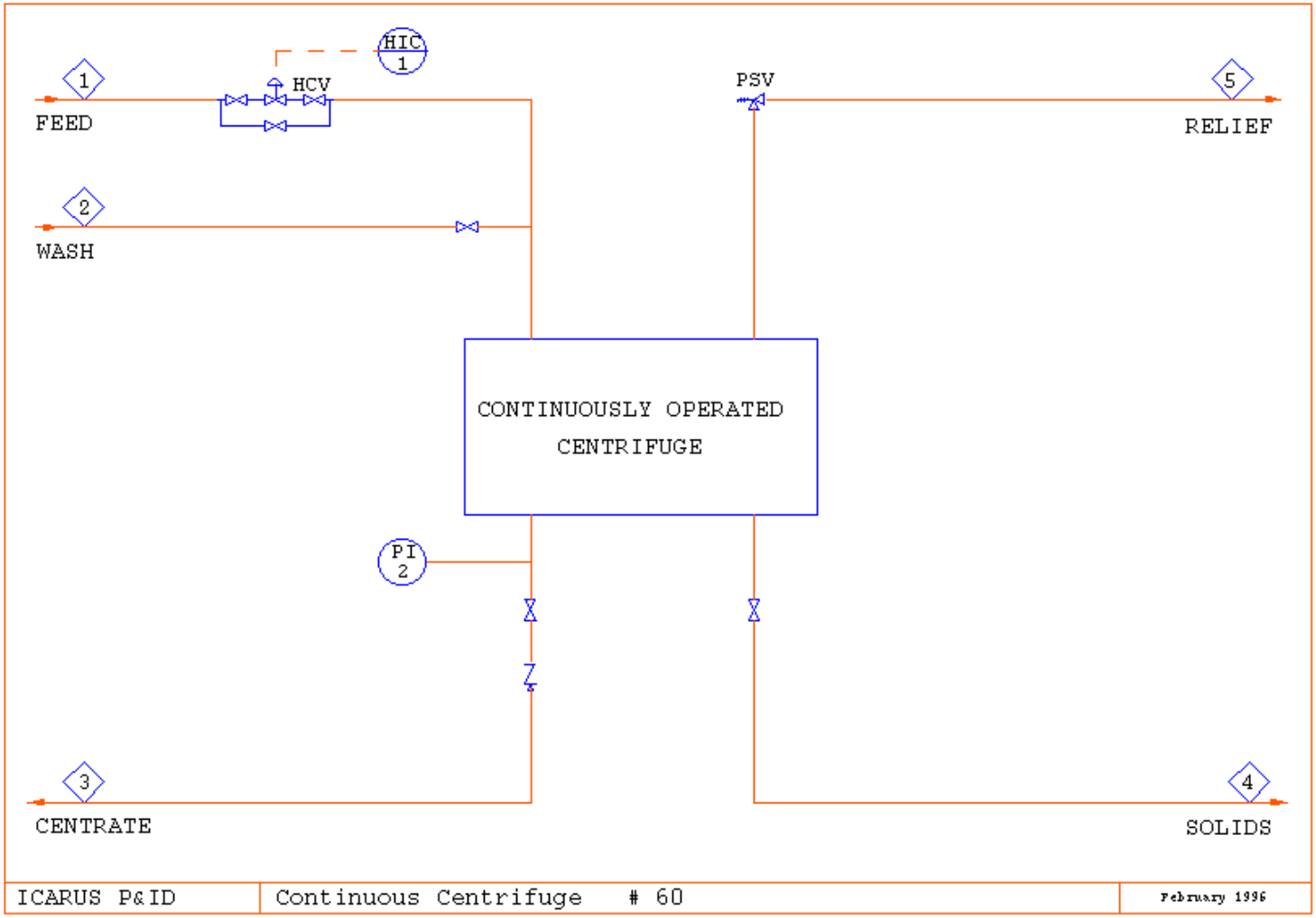
59 Tower – Distillation with Therm. RB



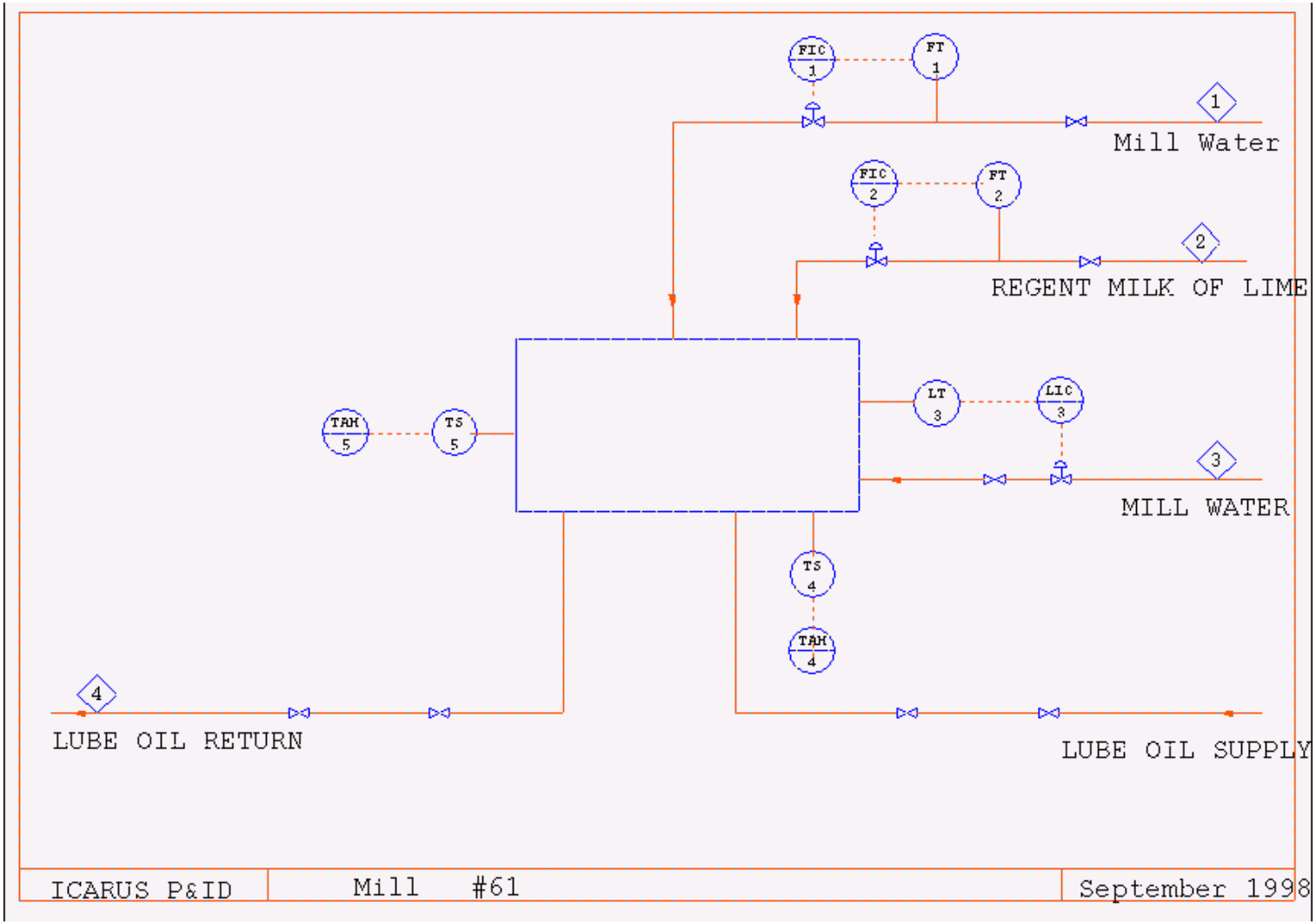
659 Tower – Distillation with Therm. RB


PSV
9
RELIEF
TJR 25
TE 25
FT 15
SQRT
FRC 15
TI 26
LO
PSV
LC
TI 6
PT 7
PR 7
TJR 13
TE 13
3
OVERHEAD VAPOR
4
REFLUX
FCV
TI 5
TW 8
PI 1
TW 9
FR 16
TJR 14
TJR 11
TE 11
DPI 24
DPT 24
FT 16
TE 14
TI 2
TT 10
TRC 10
TO S.P. ON REBOILER TIC
2
COLUMN FEED
8
PURGE
PI 22
TI 3
DPI 23
DPT 23
LAH 18
5
TO REBOILER
LI 20
LI 21
LT 18
LAL 18
TJR 12
TE 12
6
FROM REBOILER
TI 4
TJR 17
LIC 18
7
BLOWDOWN LIQUID DISPOSAL
BOTTOMS PUMPS OR COOLER
TE 17
TW 19
LCV
1
BOTTOMS
ICARUS P&ID
Distillation with Therm. RB
659 Tower
January 1996

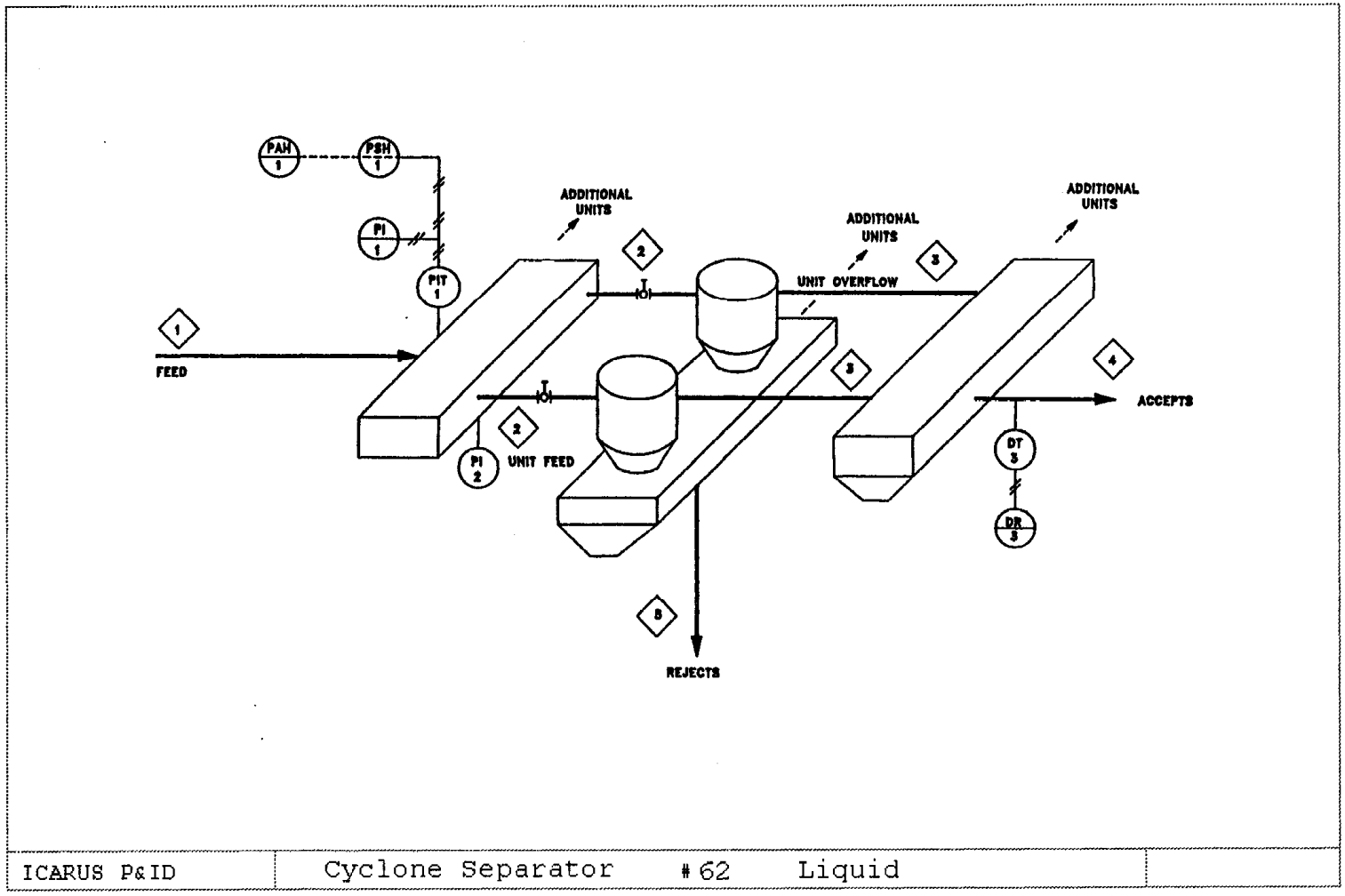
60 Continuous Centrifuge


HIC
1
HCV
1
FEED
2
WASH
PSV
5
RELIEF
CONTINUOUSLY OPERATED
CENTRIFUGE
PI
2
3
CENTRATE
4
SOLIDS
ICARUS P&ID
Continuous Centrifuge # 60
February 1996

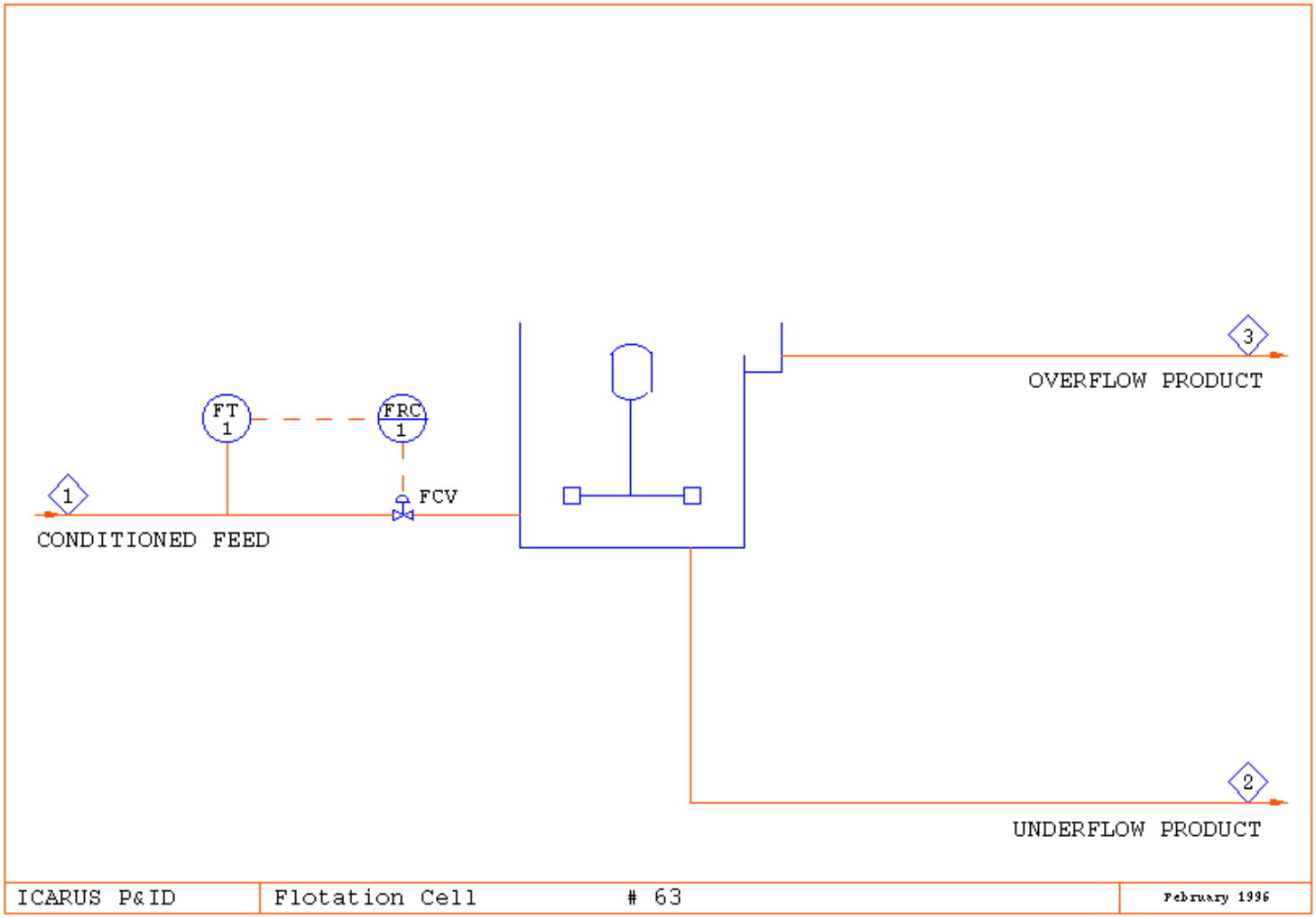
61 Mill


FIC 1
FT 1
1
Mill Water
FIC 2
FT 2
2
REGENT MILK OF LIME
TAH 5
TS 5
LT 3
LIC 3
3
MILL WATER
TS 4
TAH 4
4
LUBE OIL RETURN
LUBE OIL SUPPLY
ICARUS P&ID
Mill #61
September 1998

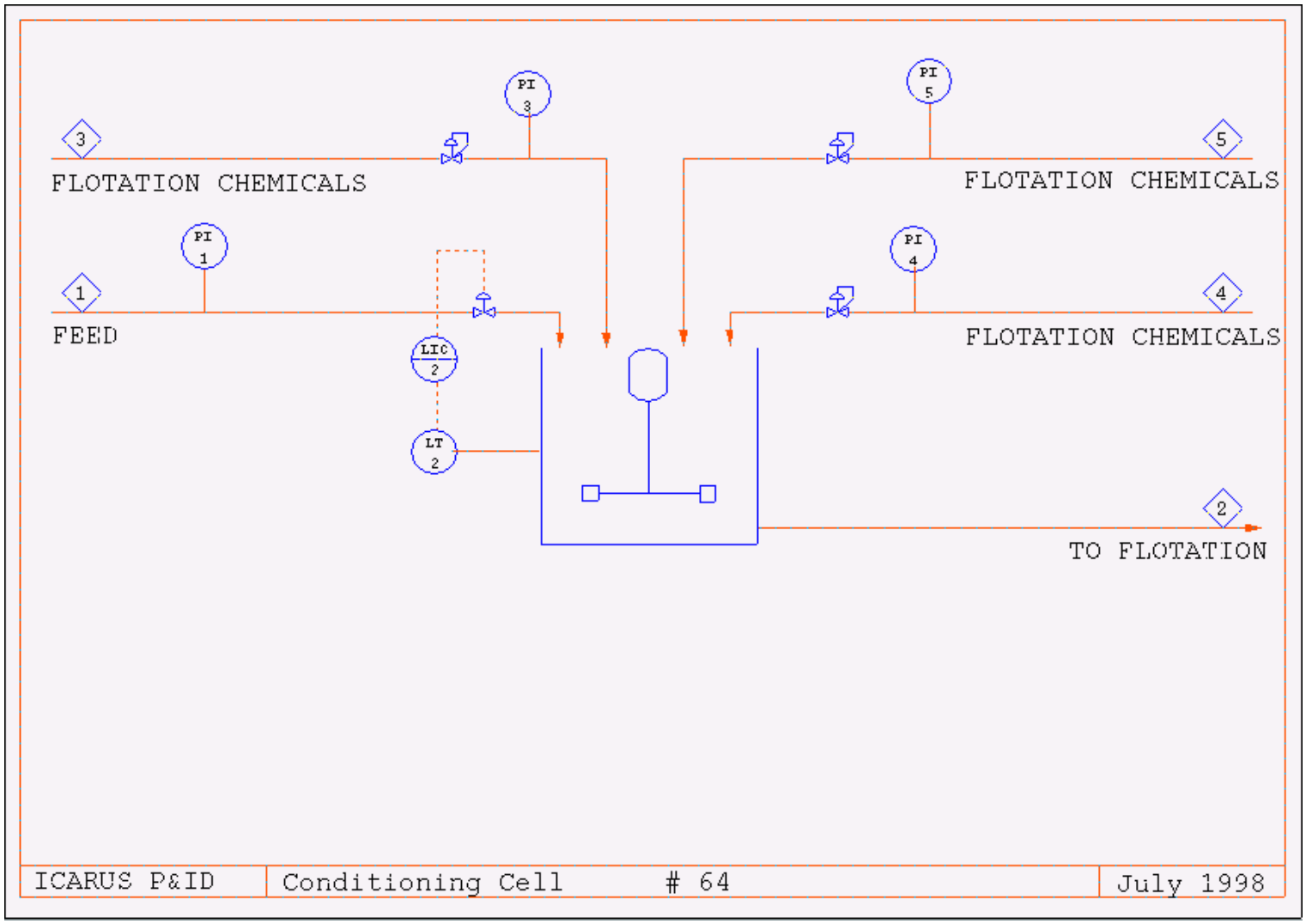
62 Liquid Cyclone Separator



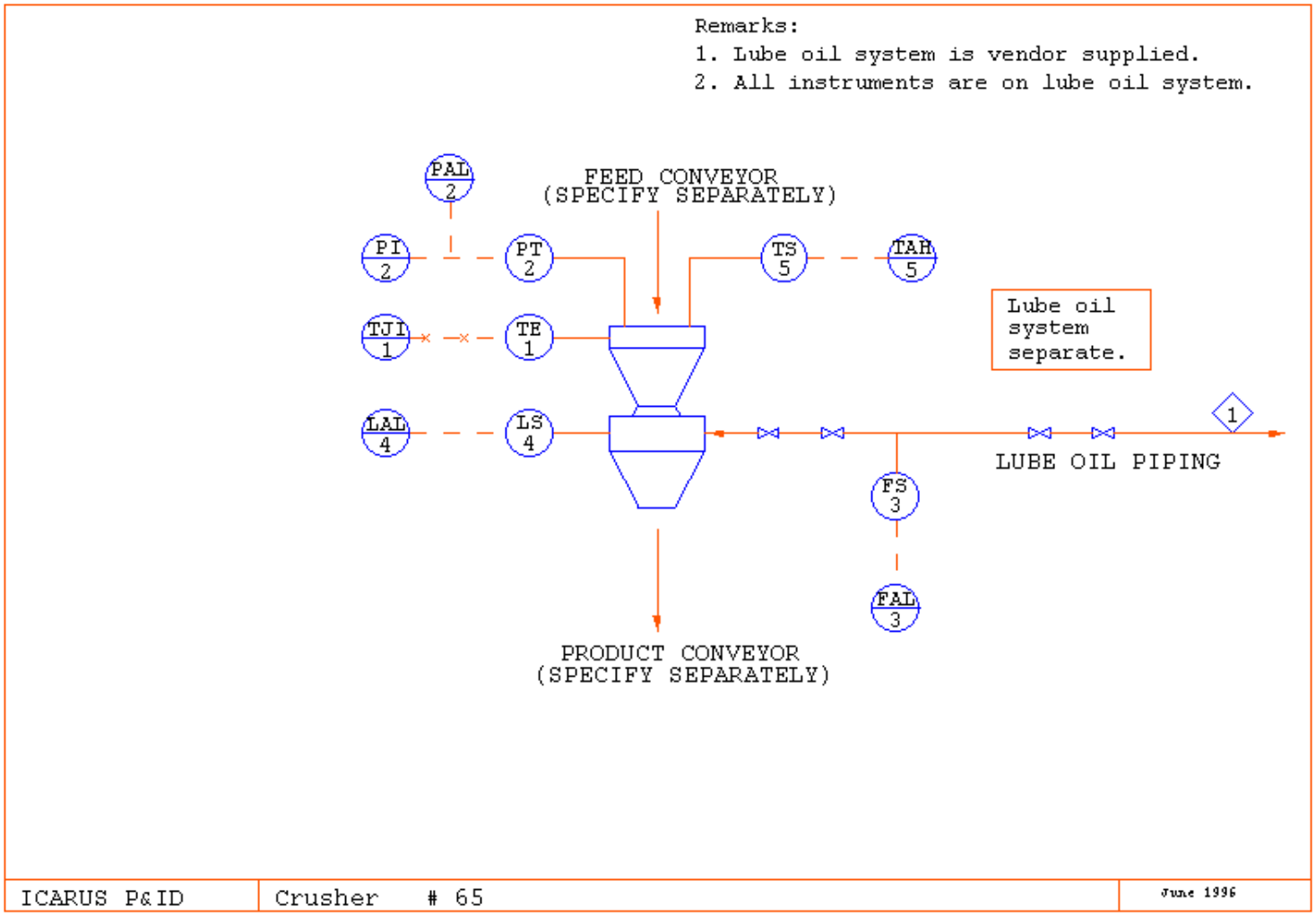
63 Flotation Cell



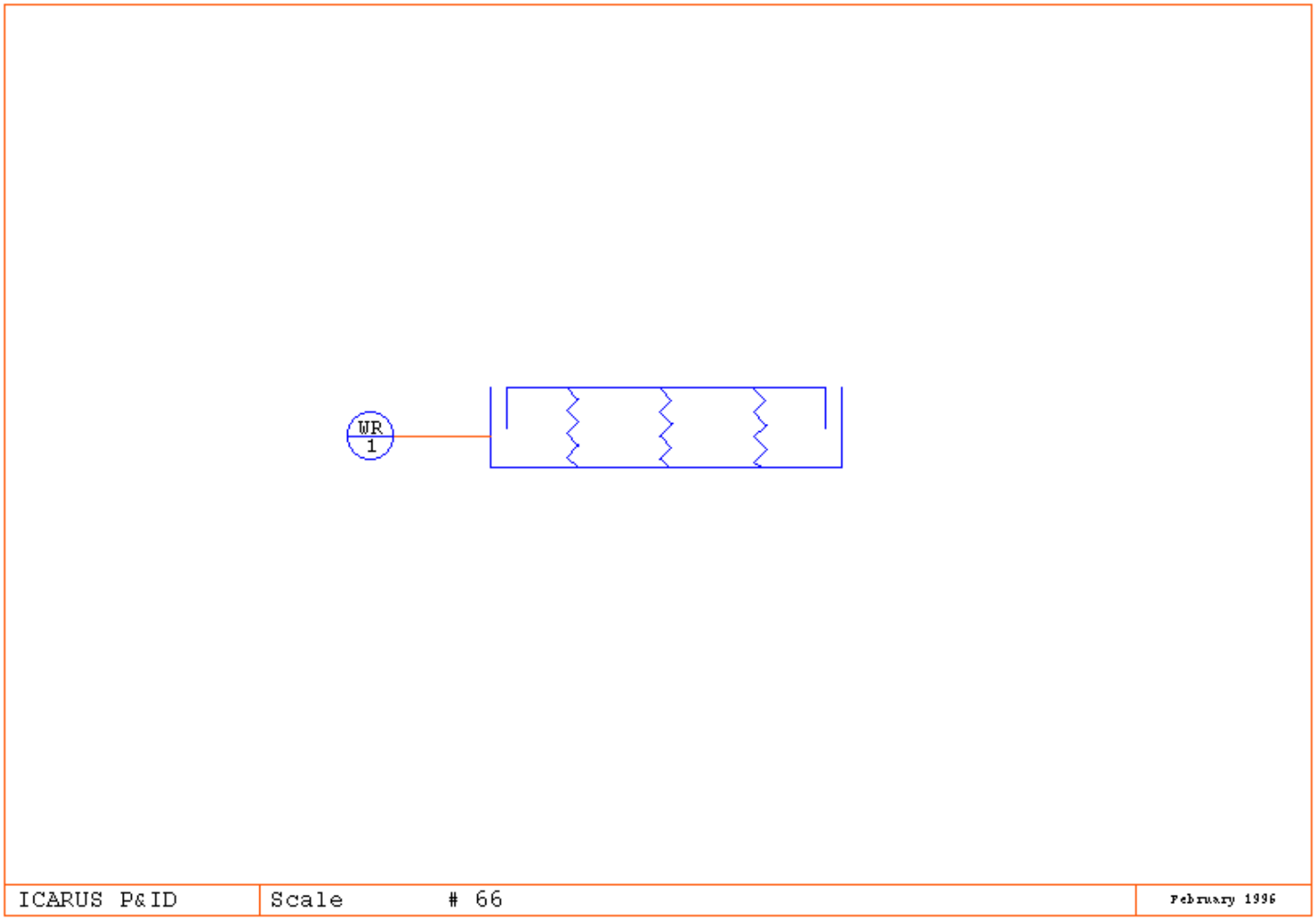
64 Conditioning Cell


PI 3
PI 5
3
5
FLOTATION CHEMICALS
FLOTATION CHEMICALS
PI 1
PI 4
1
4
FEED
FLOTATION CHEMICALS
LIC 2
LT 2
2
TO FLOTATION
ICARUS P&ID
Conditioning Cell # 64
July 1998

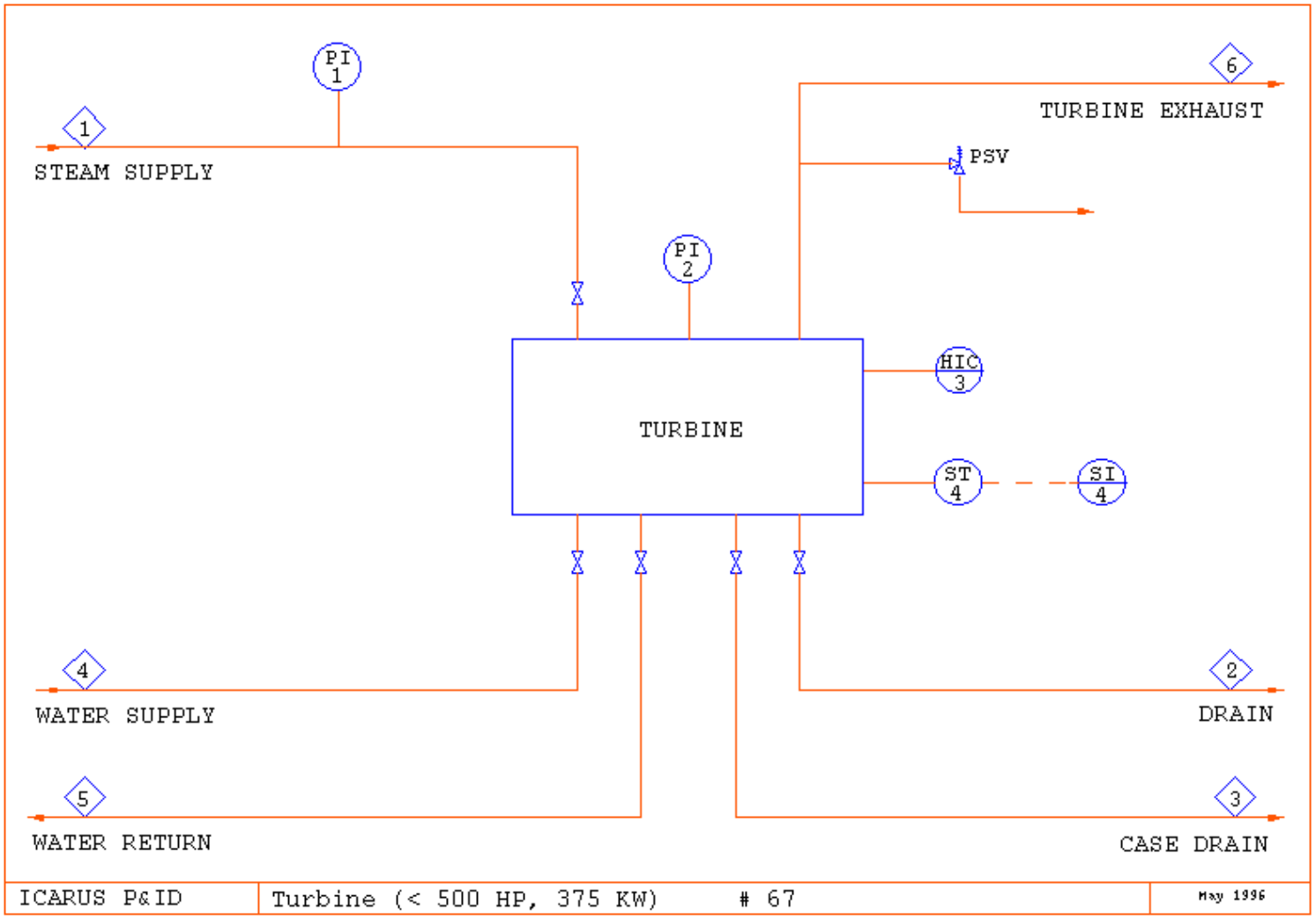
65 Crusher


Remarks:
1. Lube oil system is vendor supplied.
2. All instruments are on lube oil system.
PAL 2
FEED CONVEYOR
(SPECIFY SEPARATELY)
PI 2
PT 2
TS 5
TAH 5
TJI 1
TE 1
Lube oil system separate.
LAL 4
LS 4
1
LUBE OIL PIPING
FS 3
FAL 3
PRODUCT CONVEYOR
(SPECIFY SEPARATELY)
ICARUS P&ID
Crusher # 65
June 1996

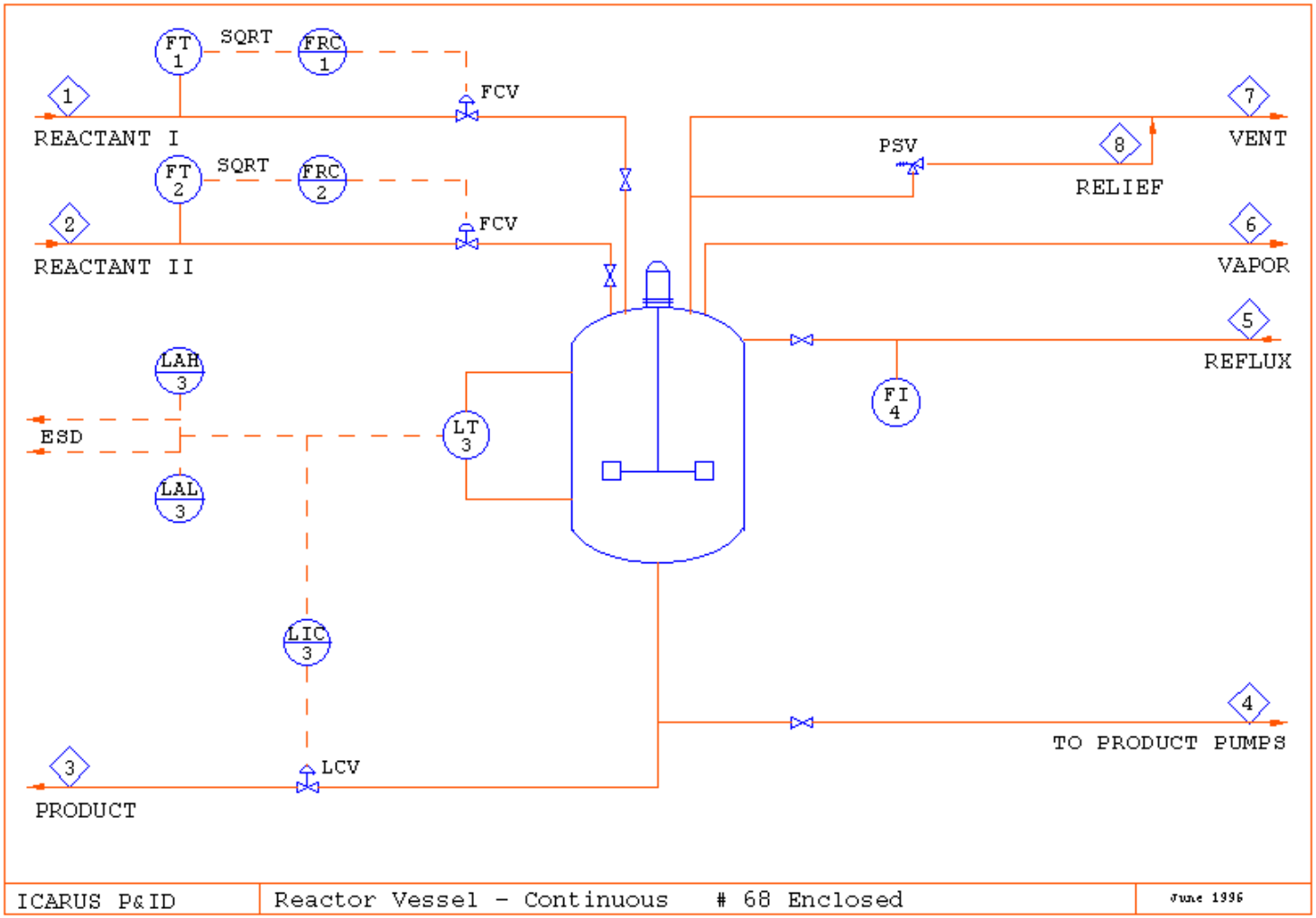
66 Scale


WR
1
ICARUS P&ID
Scale # 66
February 1996

67 Turbine (<500 HP, 375 KW)

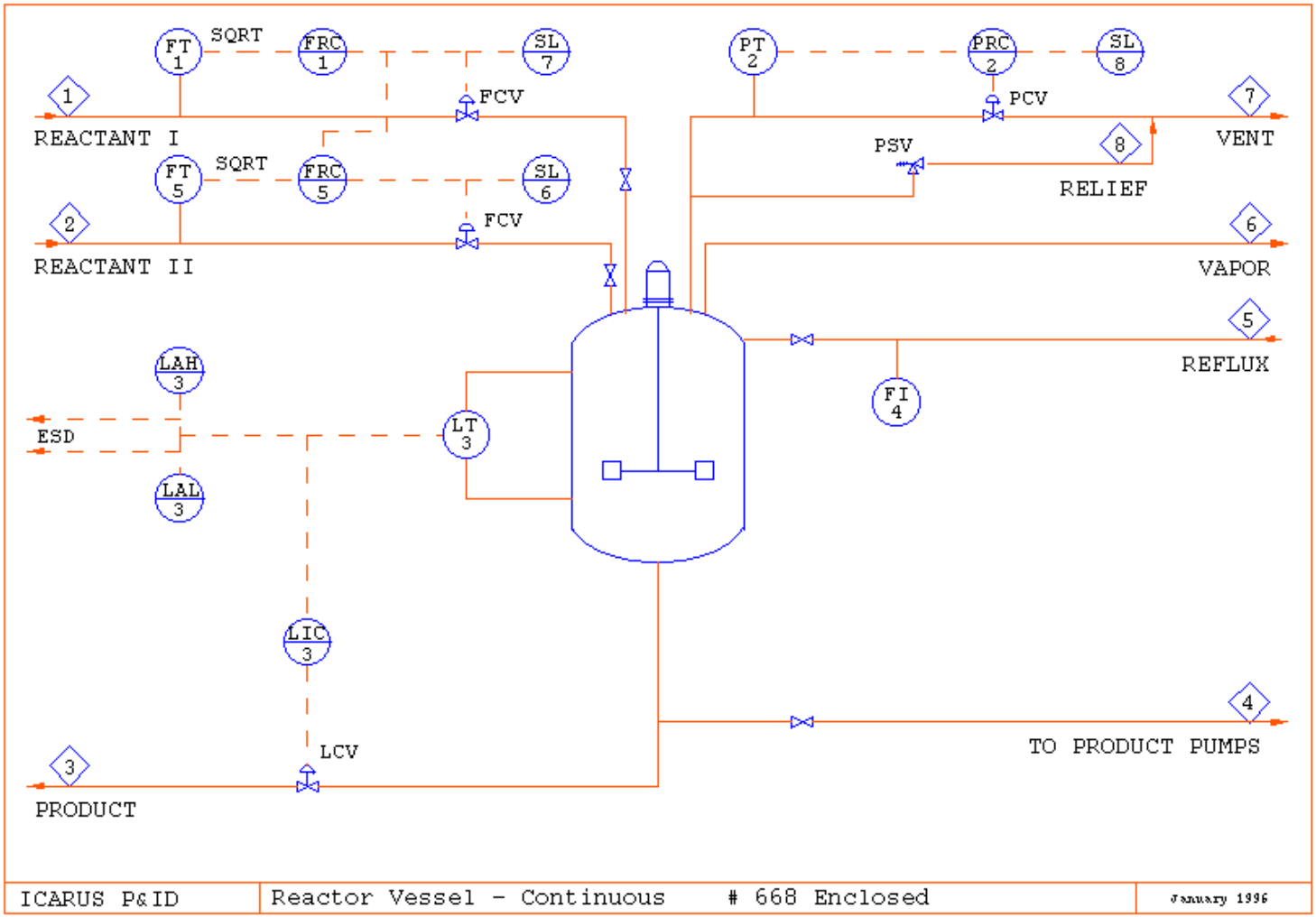


68 Enclosed Reactor Vessel – Continuous



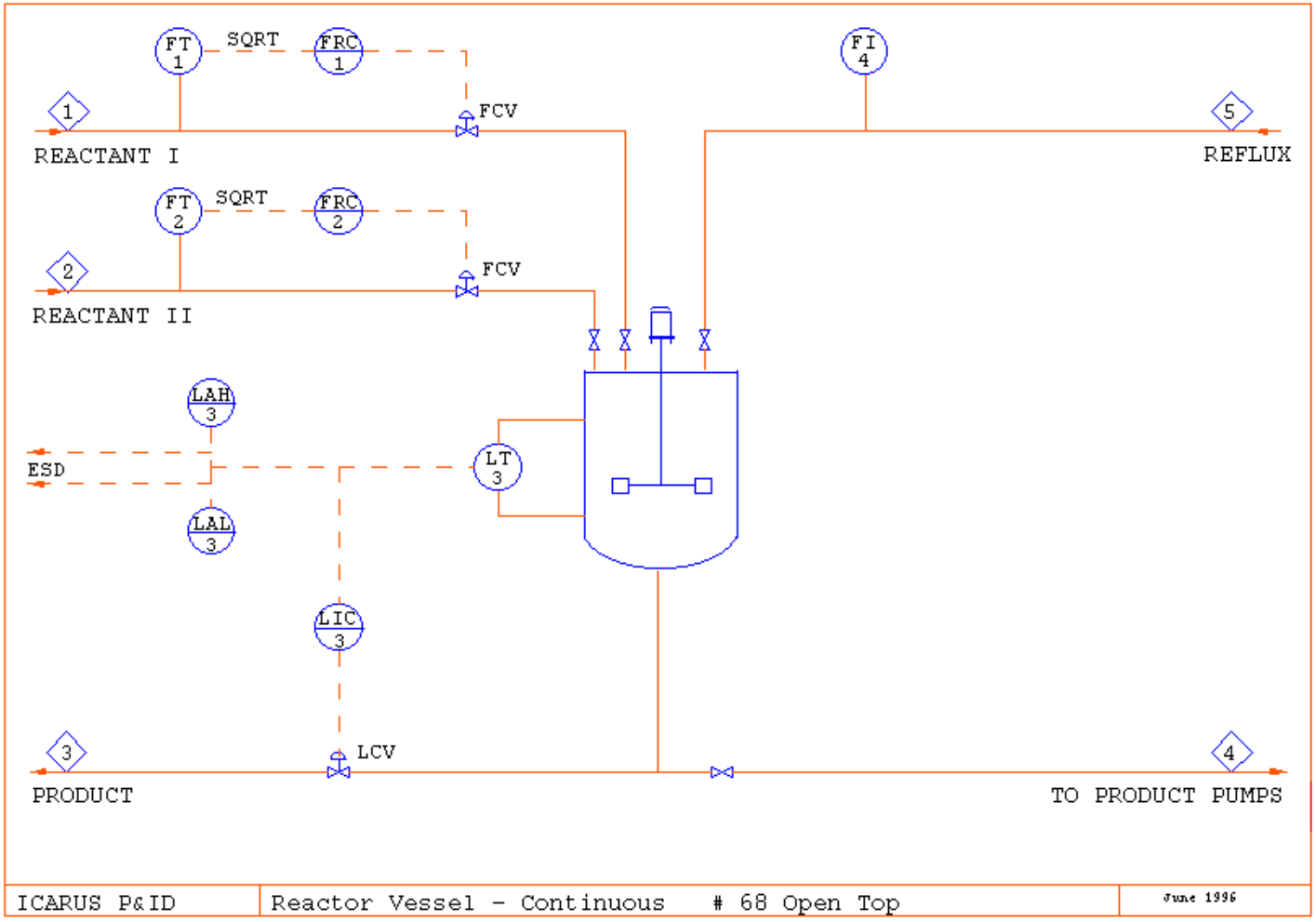
Jacket: See Drawing 23 and 623

668 Enclosed Reactor Vessel – Continuous



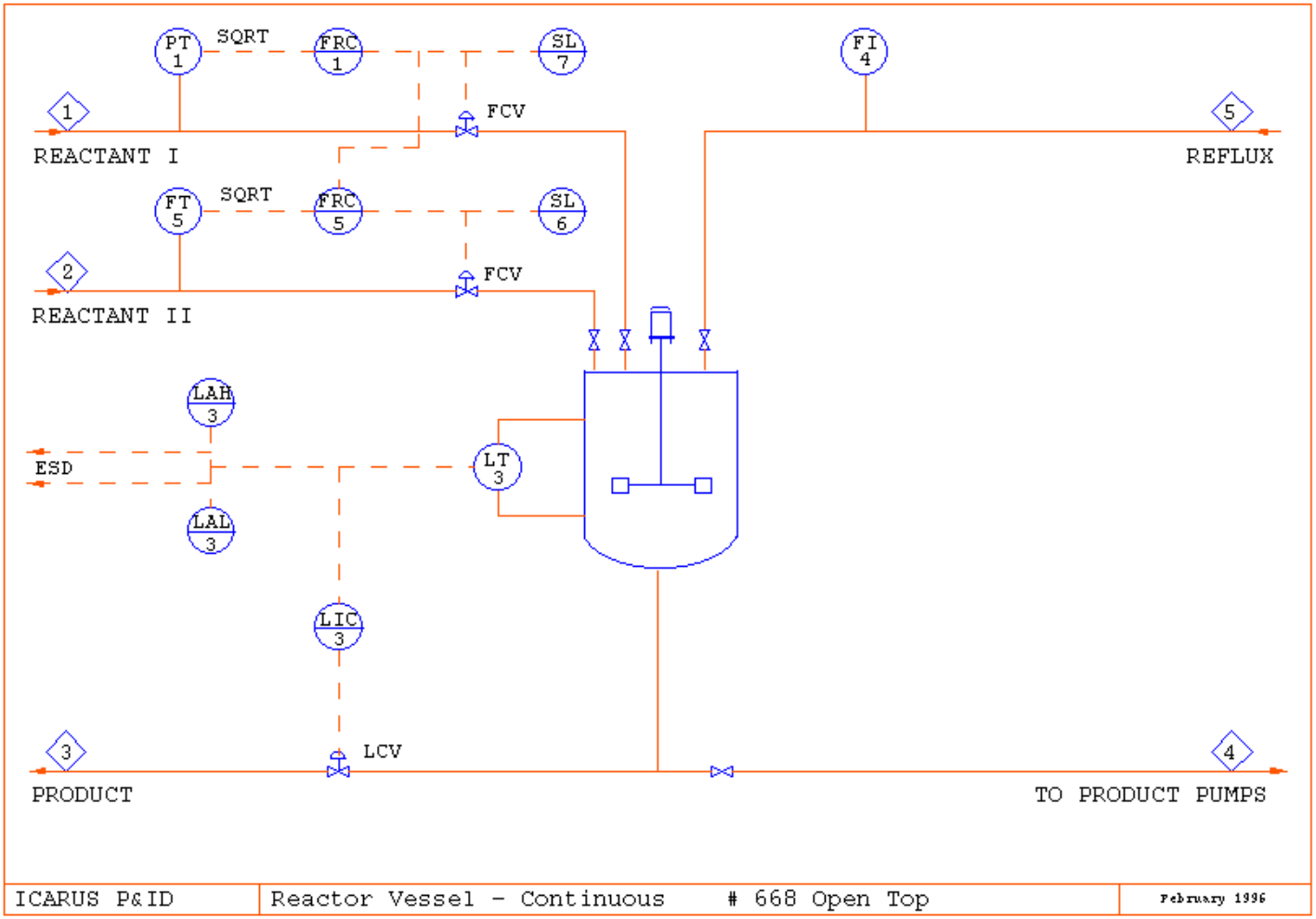
Jacket: See Drawing 23 and 623

68 Open Top Reactor Vessel – Continuous



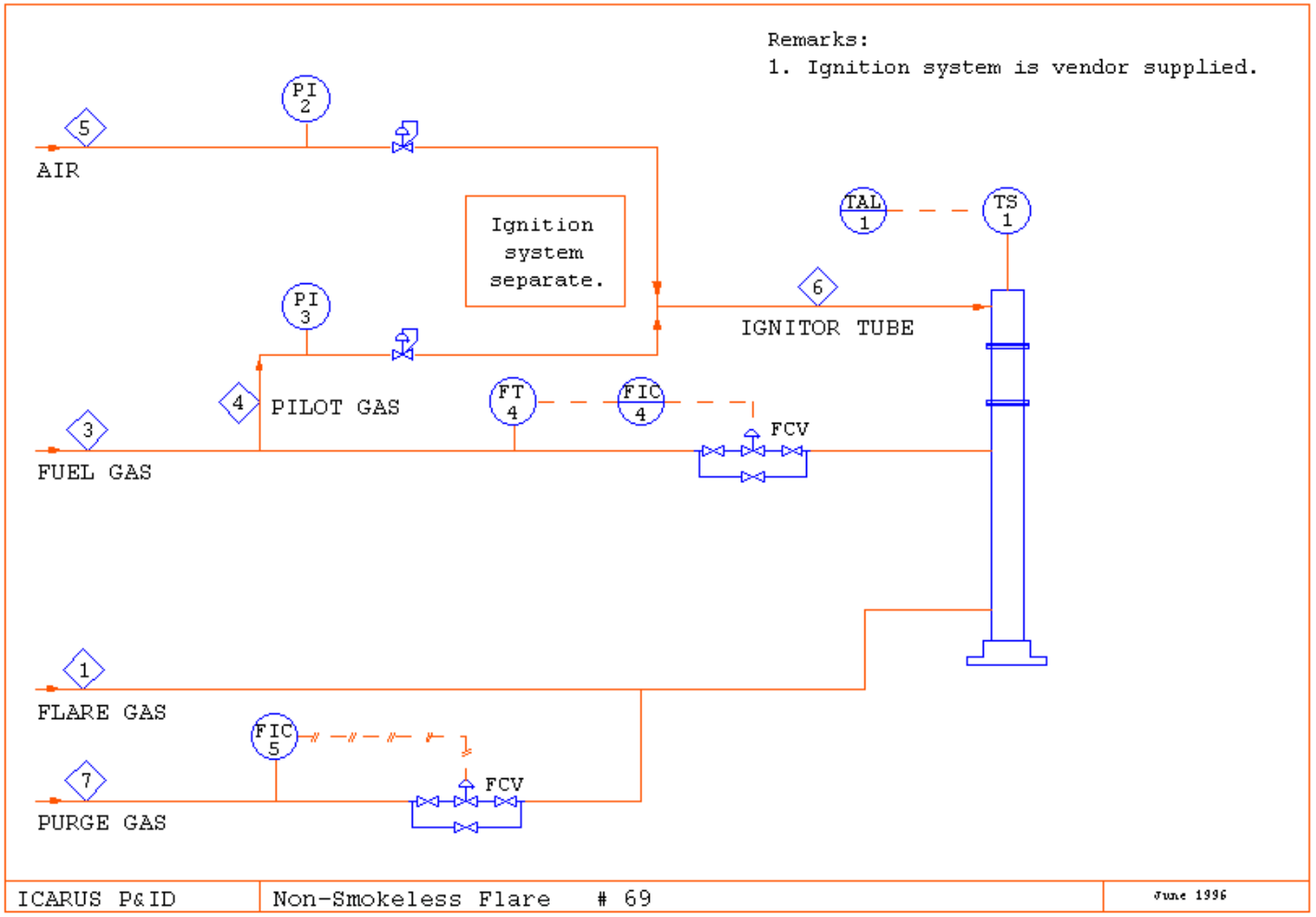
Jacket: See Drawing 23 and 623

668 Open Top Reactor Vessel – Continuous

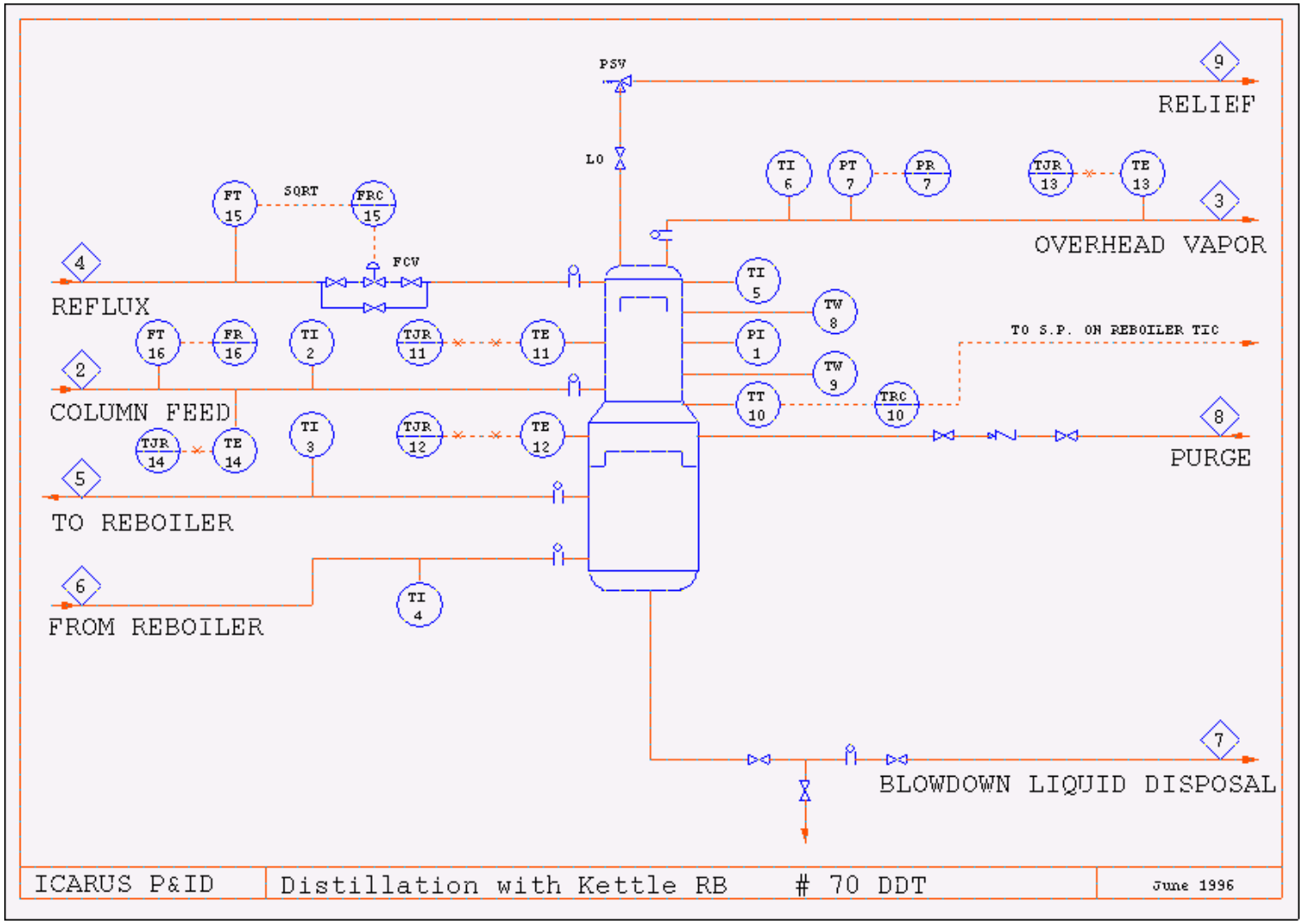


Jacket: See Drawing 23 and 623

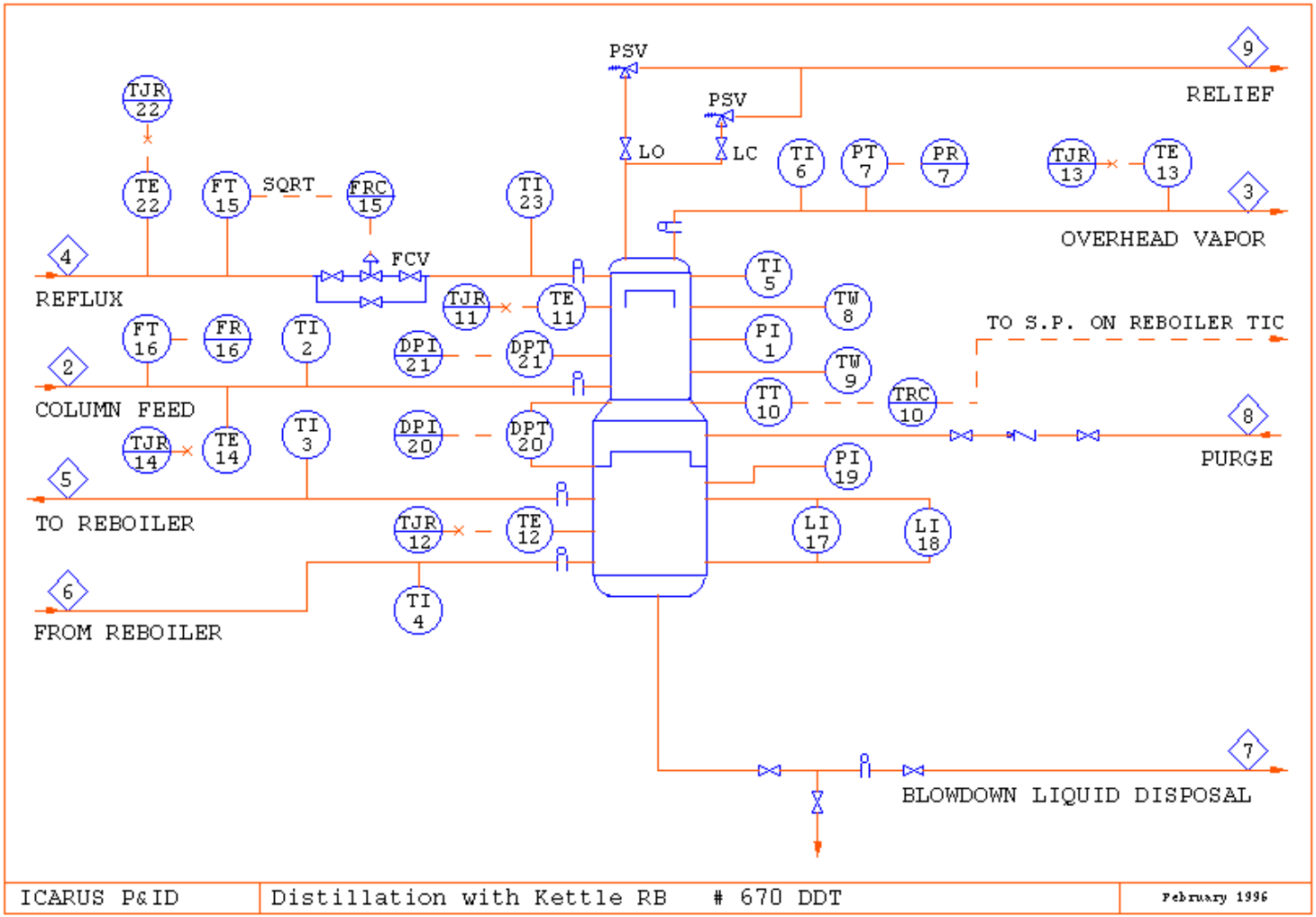
69 Non-Smokeless Flare



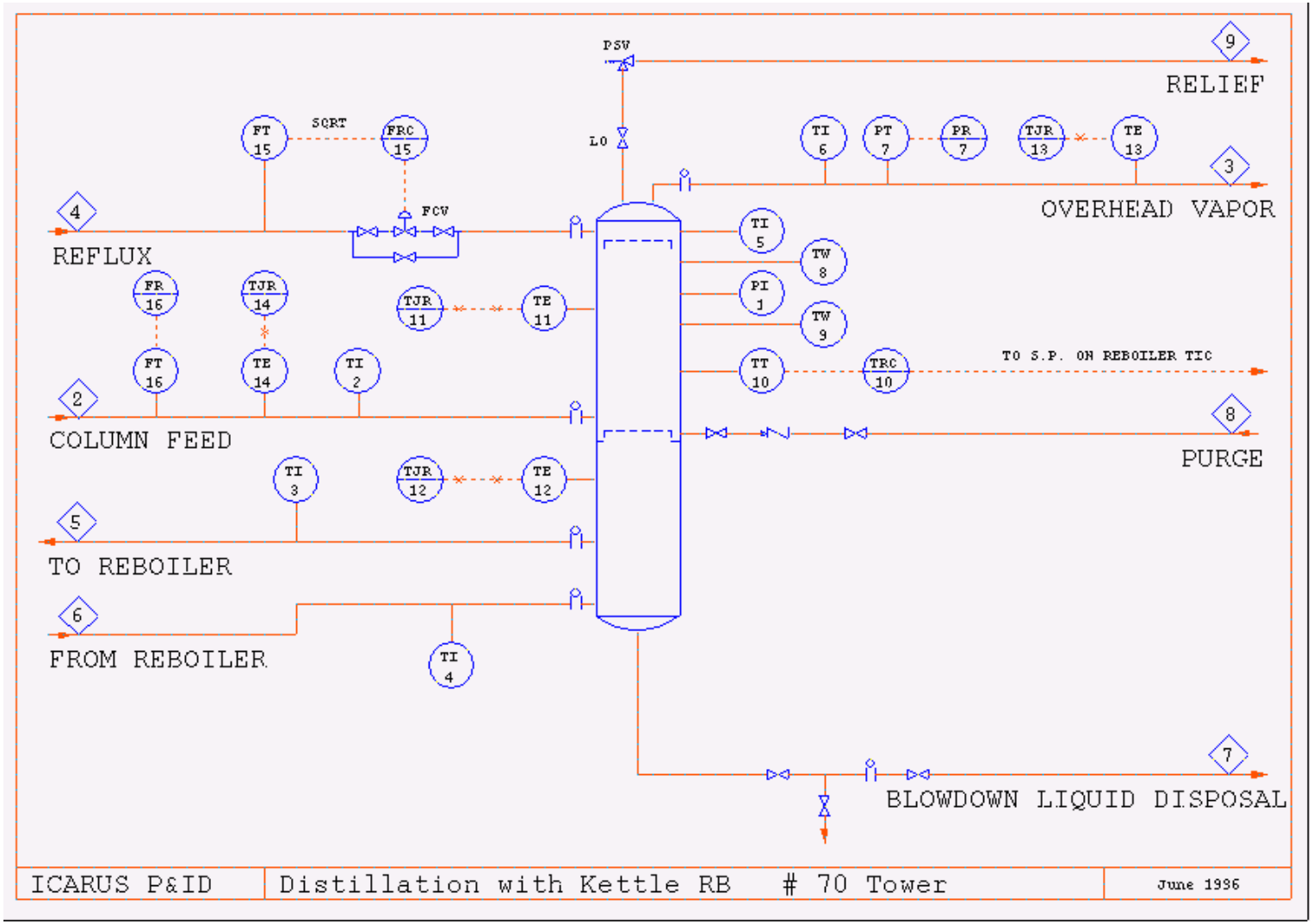
70 DDT – Distillation with Kettle RB


PSV
9
RELIEF
LO
TI 6
PT 7
PR 7
TJR 13
TE 13
3
OVERHEAD VAPOR
FT 15
SQRT
FRC 15
FCV
4
REFLUX
TI 5
TW 8
PI 1
TO S.P. ON REBOILER TIC
FT 16
FR 16
TI 2
TJR 11
TE 11
2
COLUMN FEED
TW 9
TT 10
TRC 10
8
PURGE
TJR 14
TE 14
TI 3
TJR 12
TE 12
5
TO REBOILER
6
FROM REBOILER
TI 4
7
BLOWDOWN LIQUID DISPOSAL
ICARUS P&ID
Distillation with Kettle RB # 70 DDT
June 1996

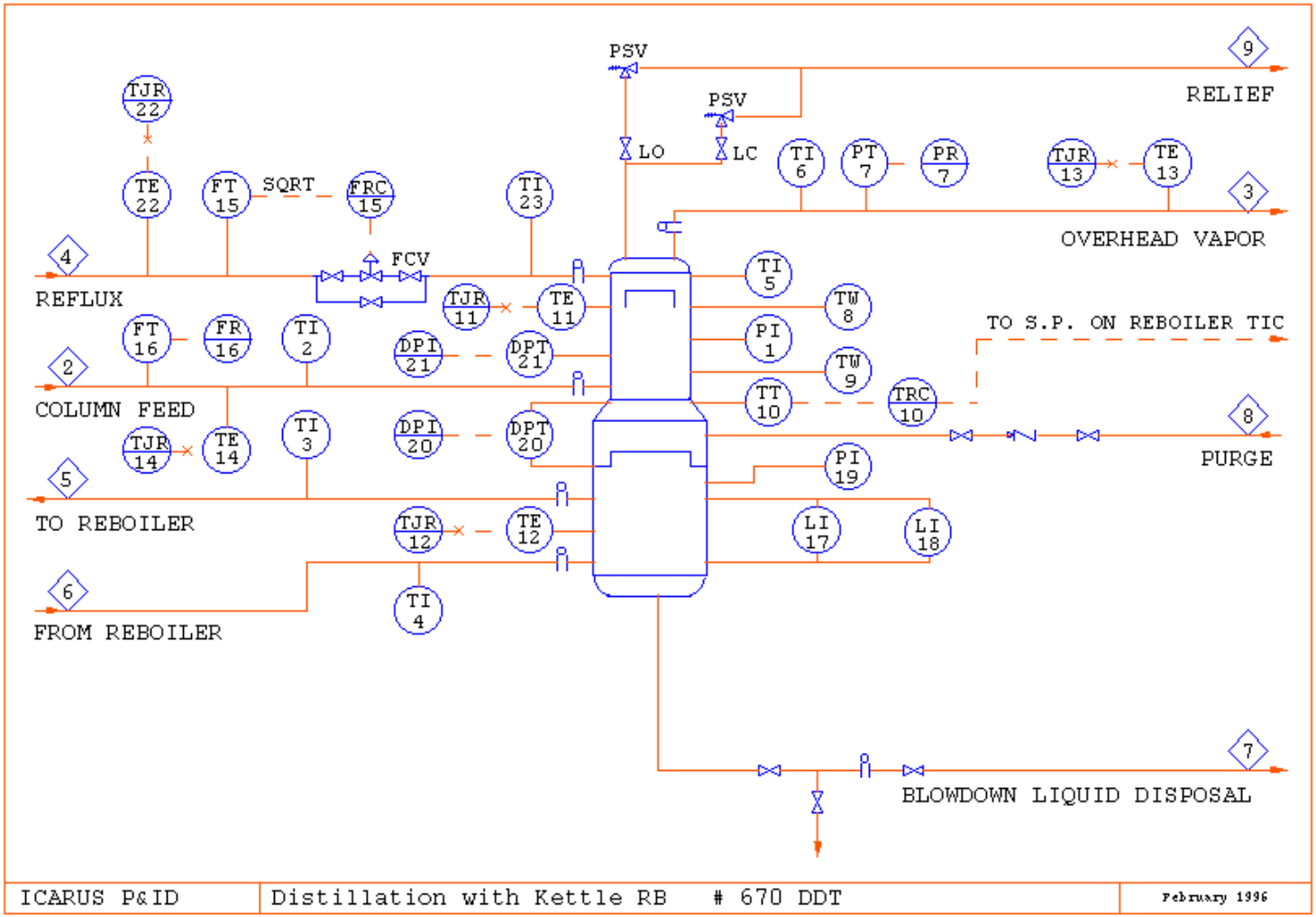
670 DDT – Distillation with Kettle RB



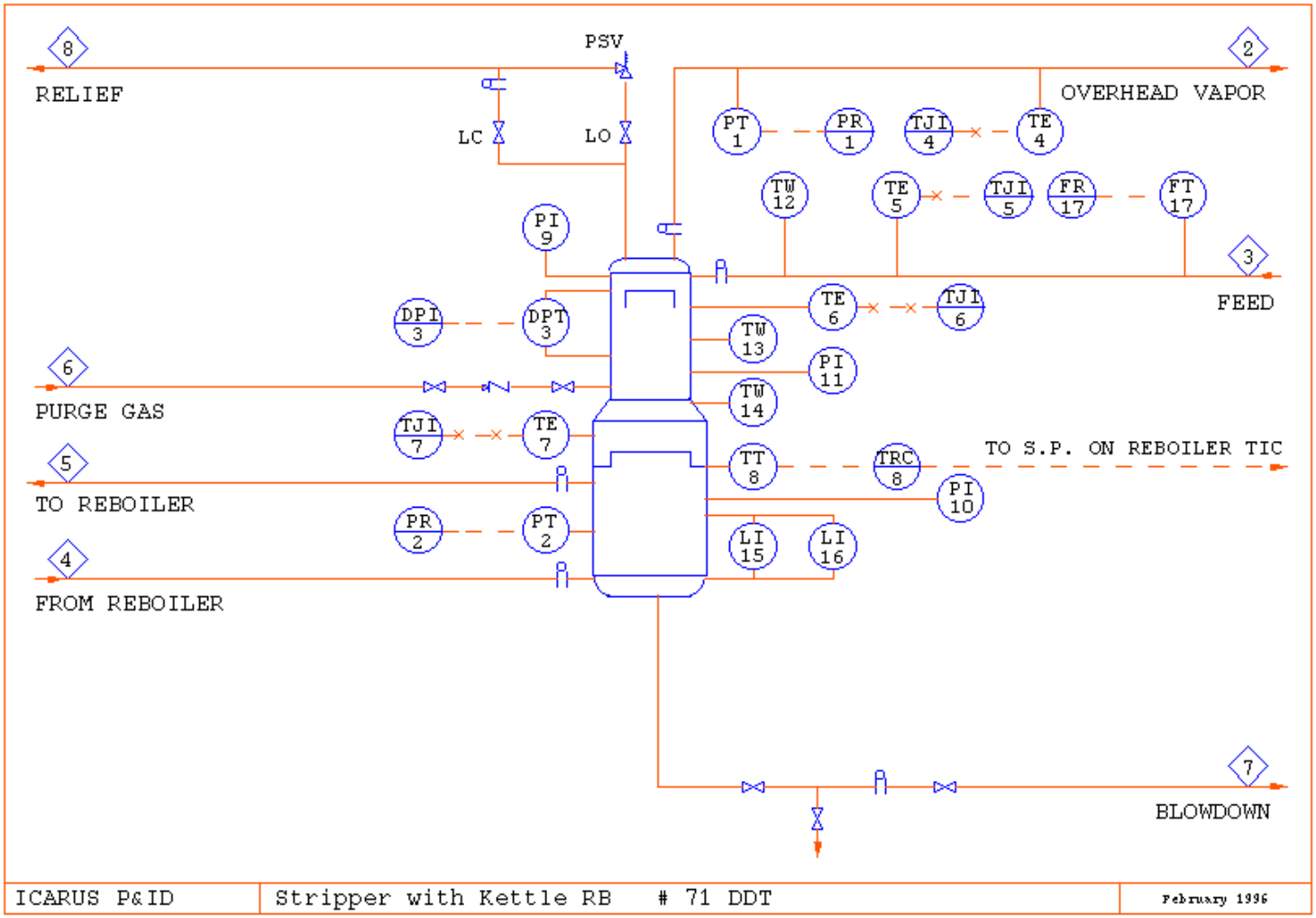
70 Tower – Distillation with Kettle RB



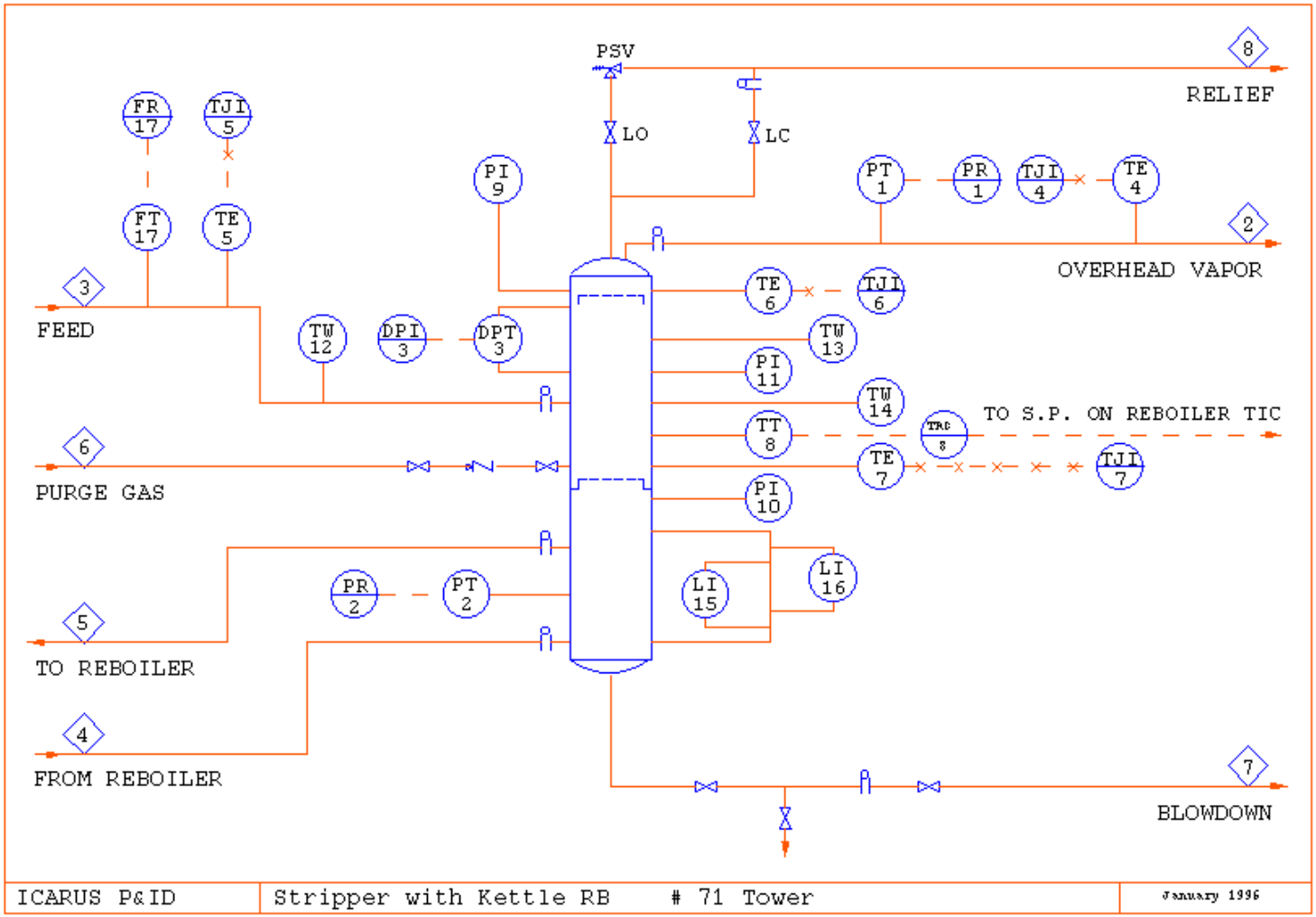
670 Tower – Distillation with Kettle RB



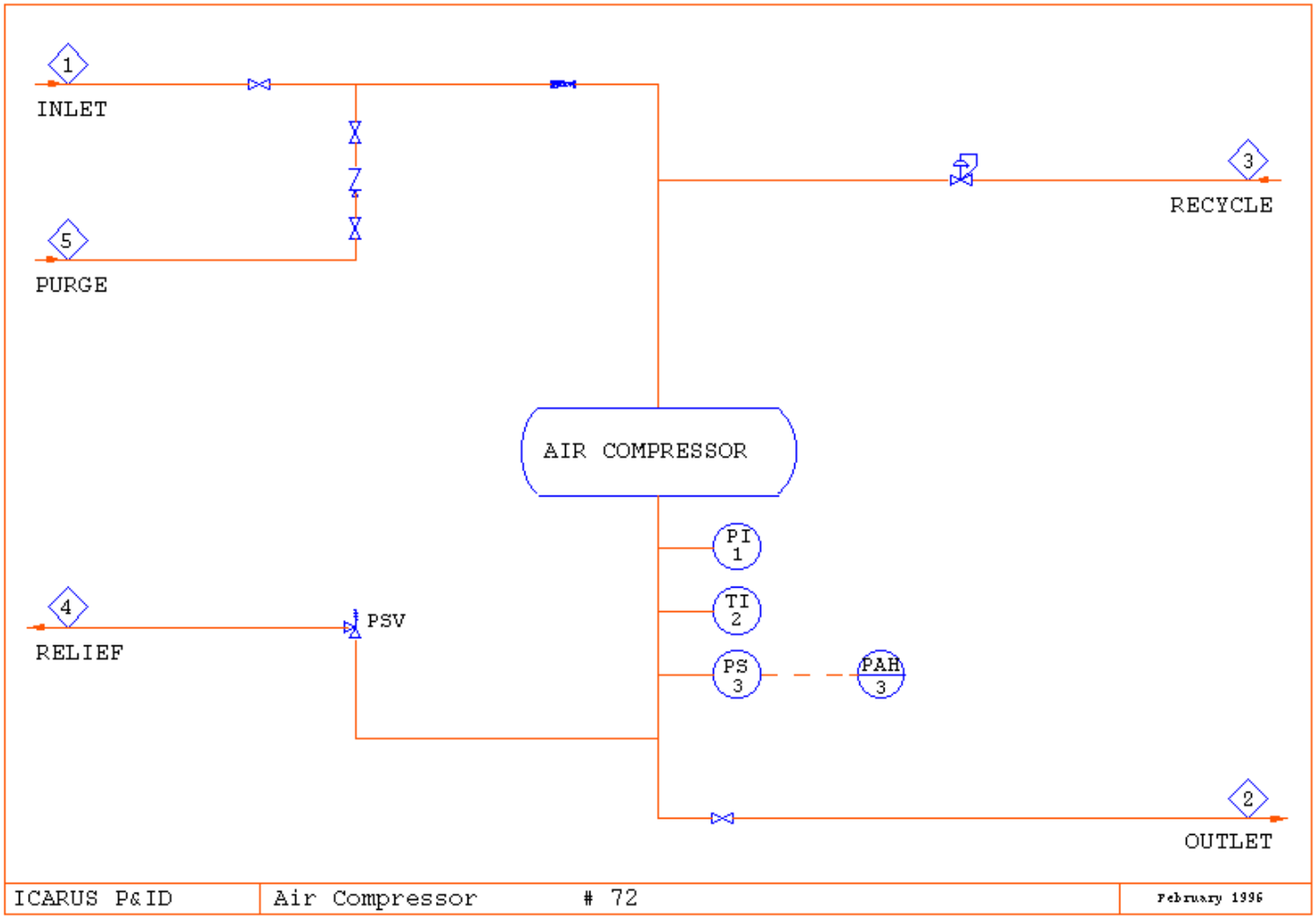
71 DDT – Stripper with Kettle RB



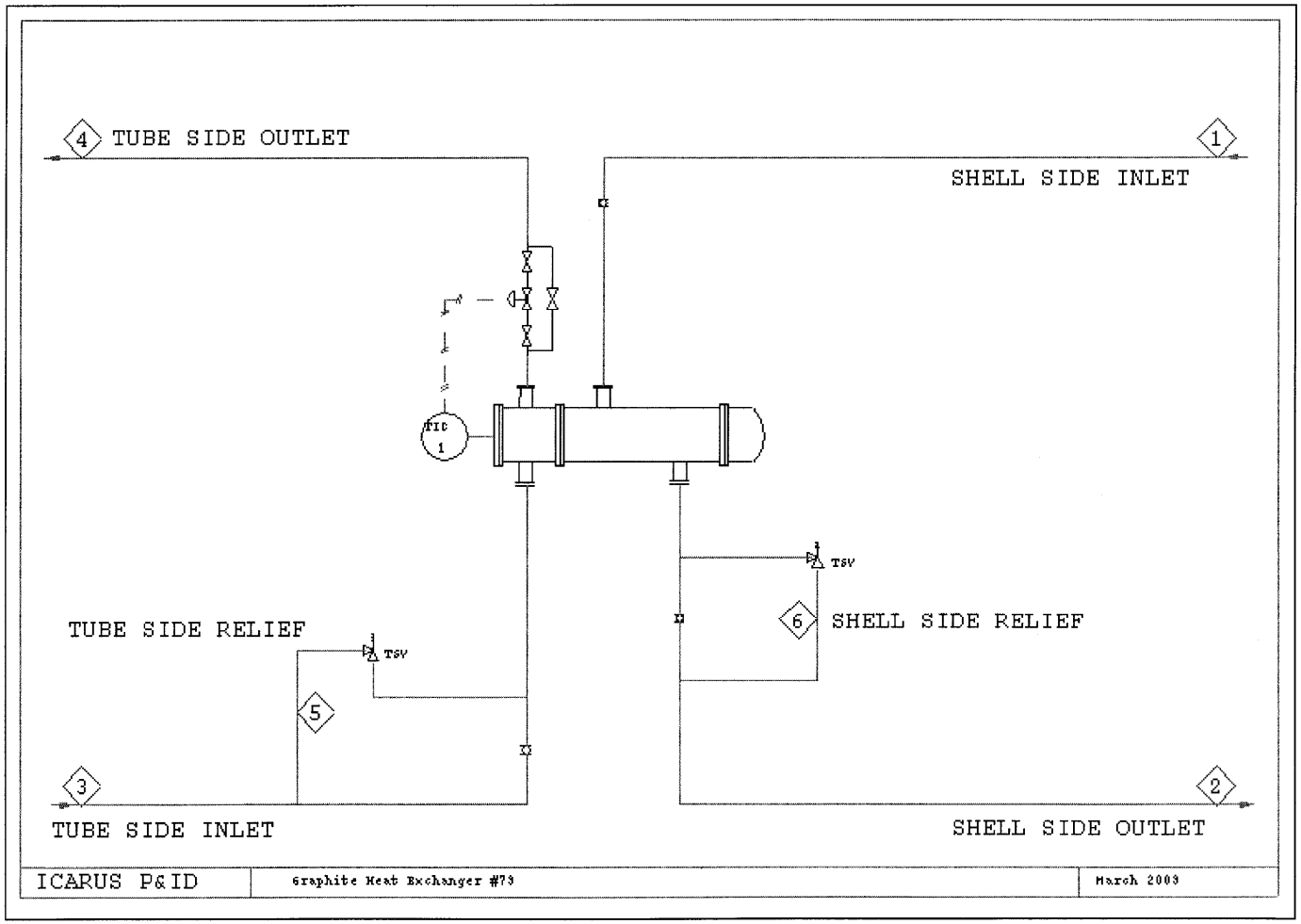
71 Tower – Stripper with Kettle RB



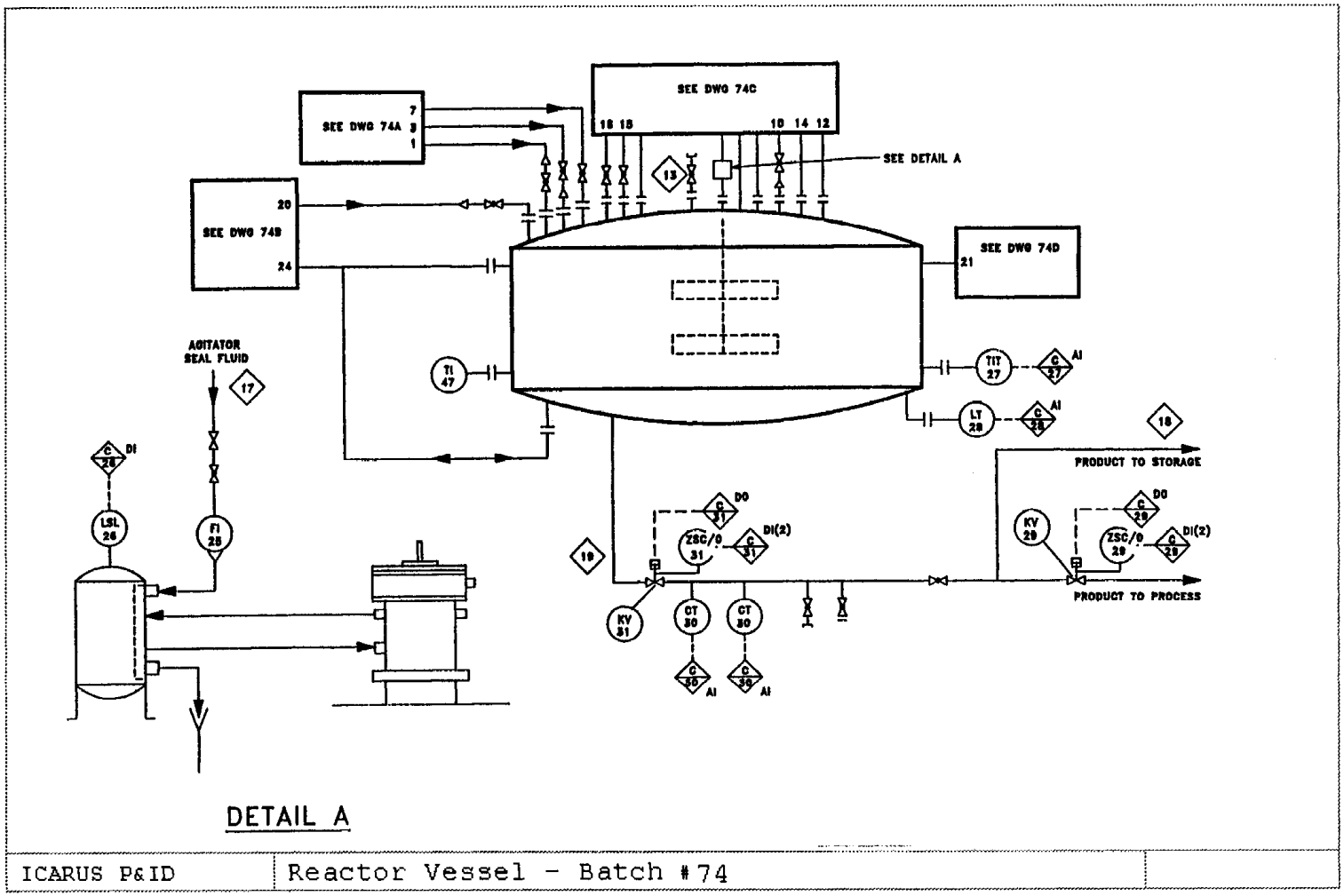
72 Air Compressor



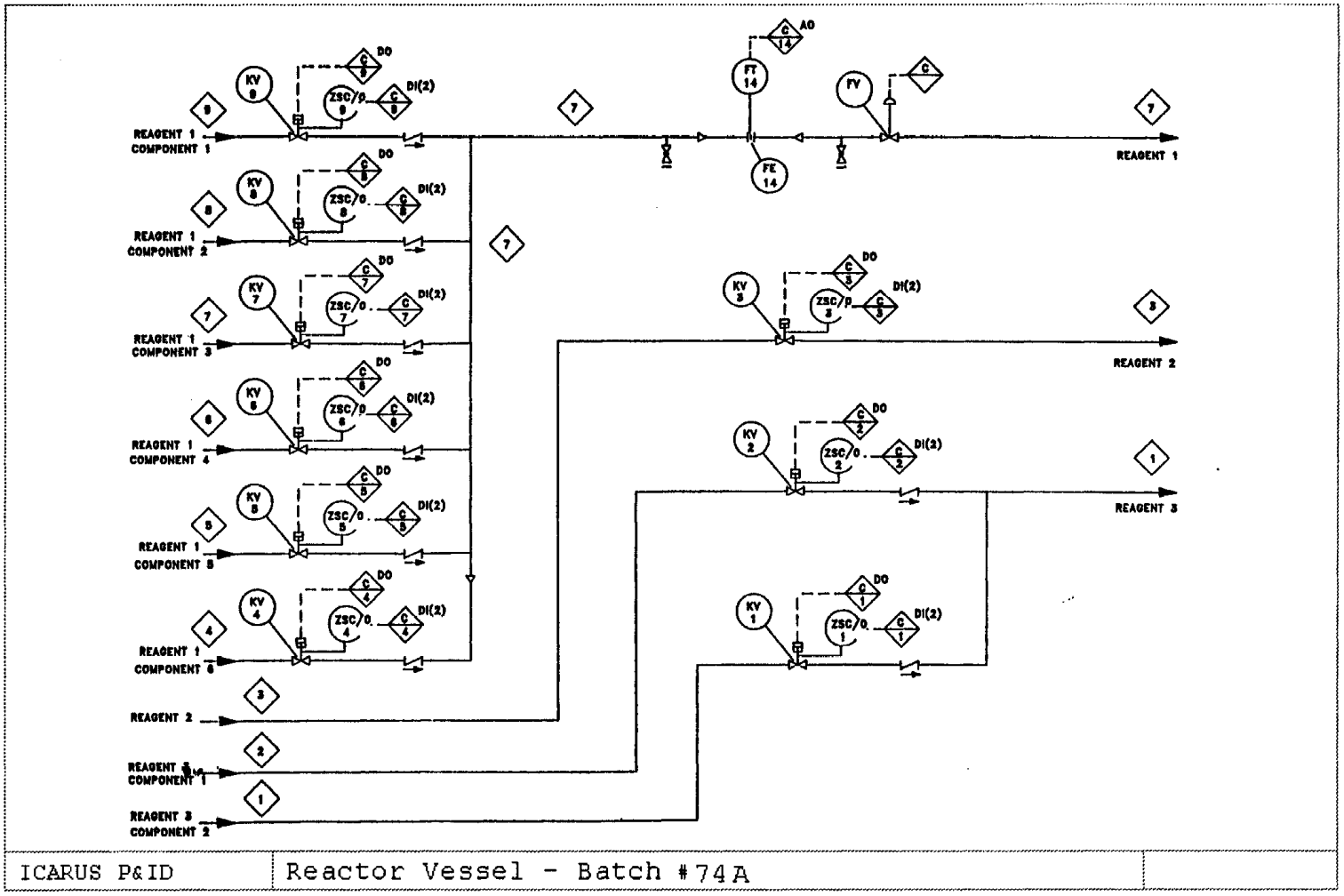
73 Graphite Heat Exchanger



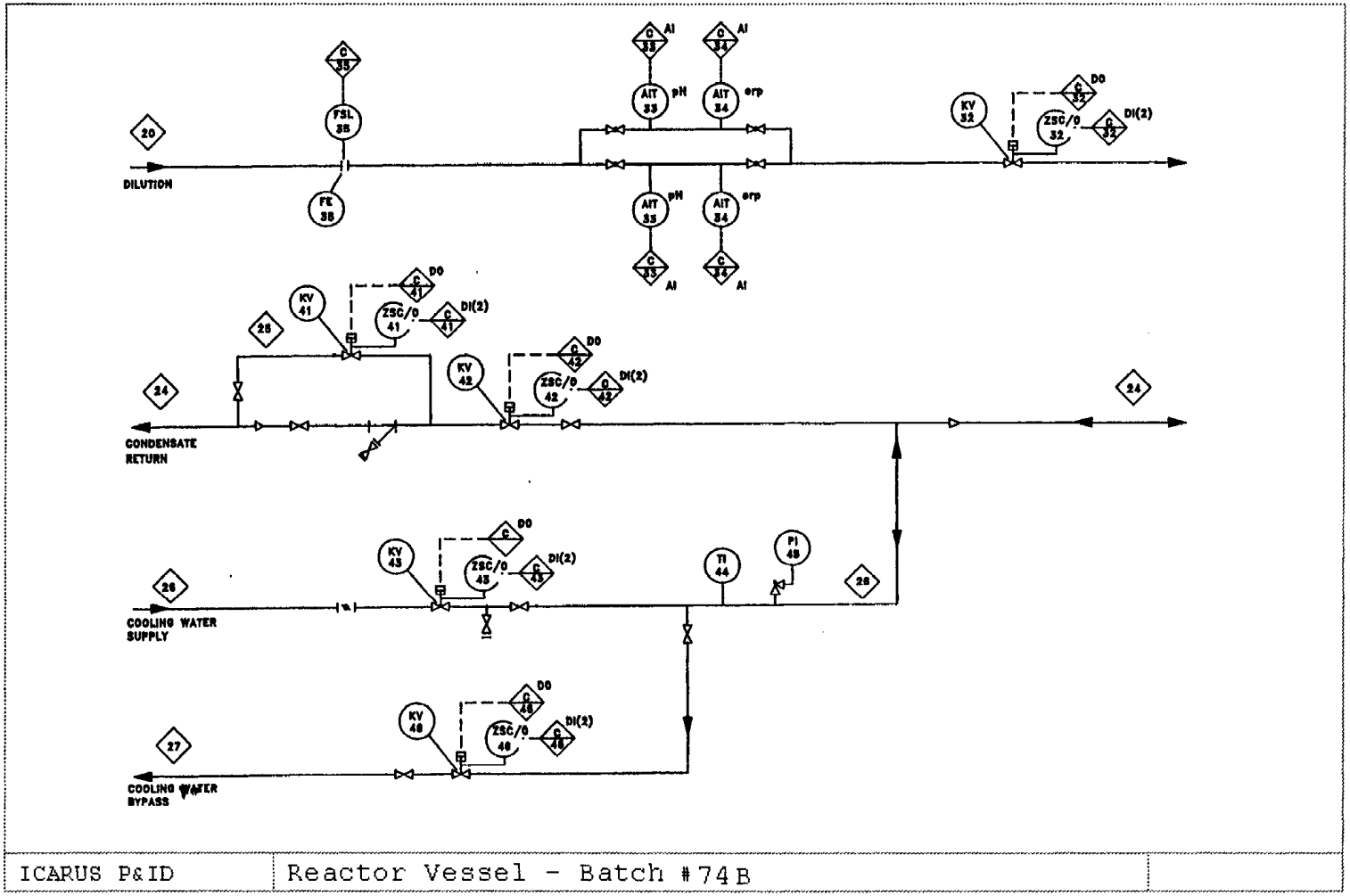
74 Reactor Vessel – Batch



74A Reactor Vessel – Batch

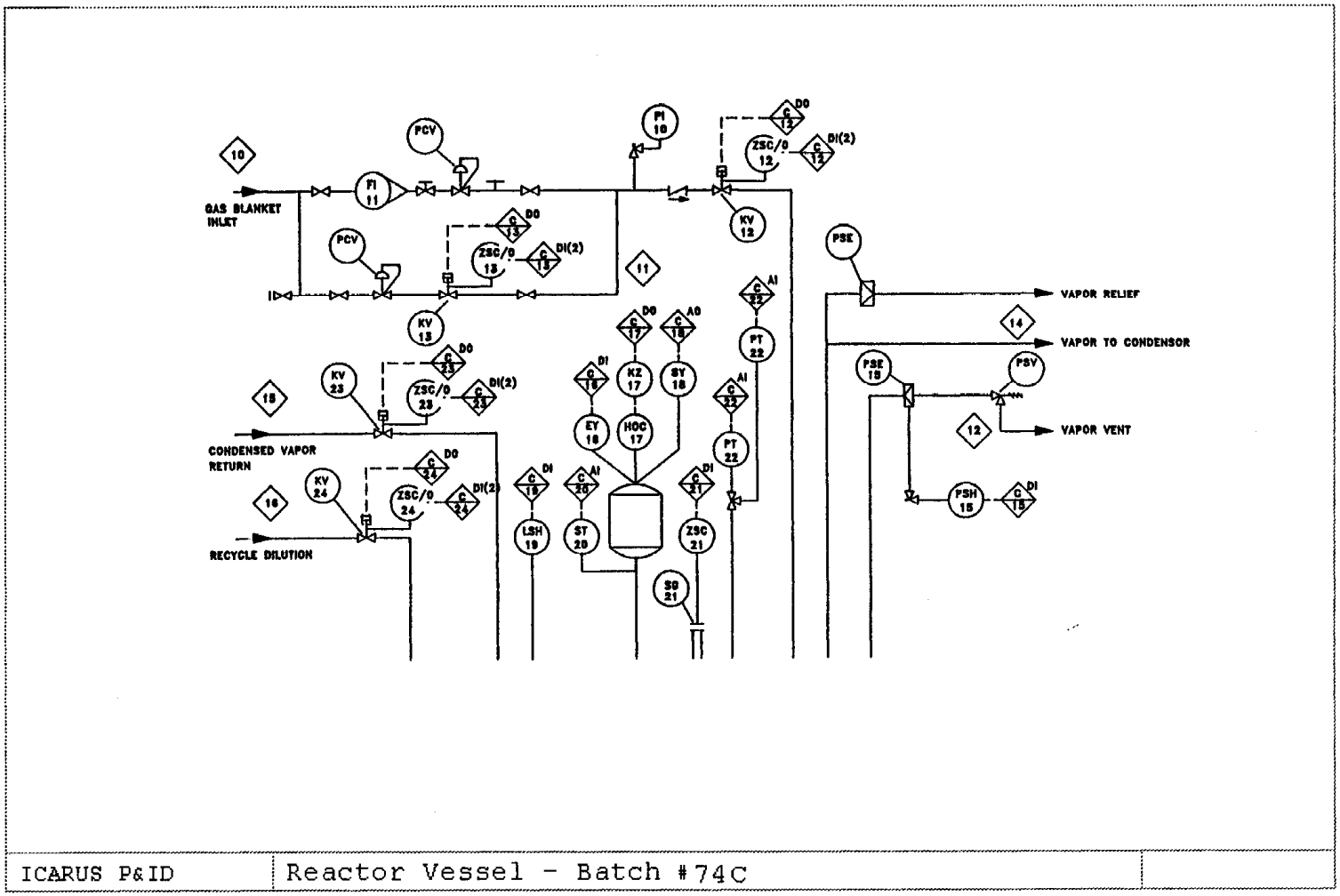


74B Reactor Vessel – Batch

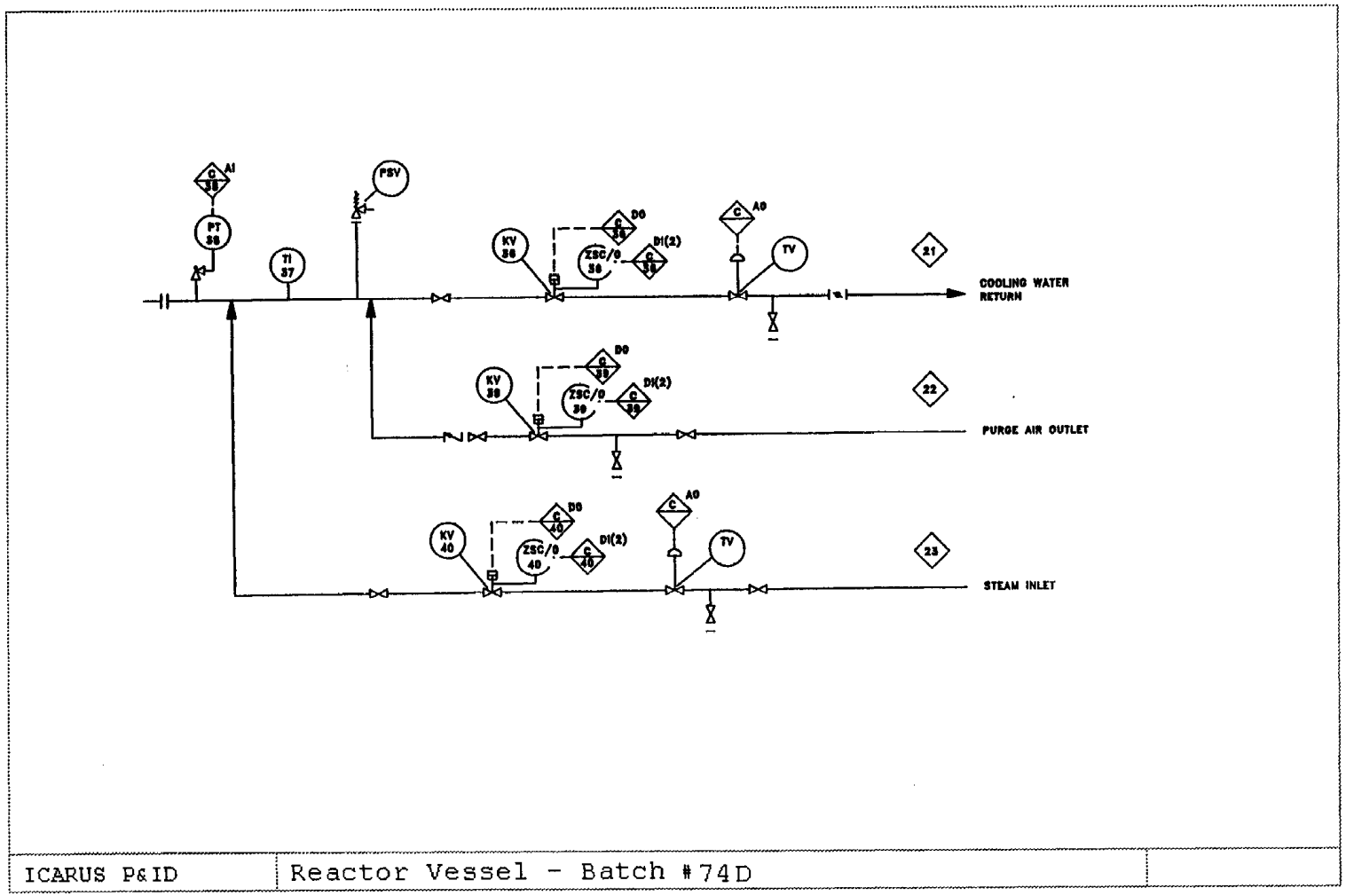


ICARUS P&ID	Reactor Vessel - Batch #74B	

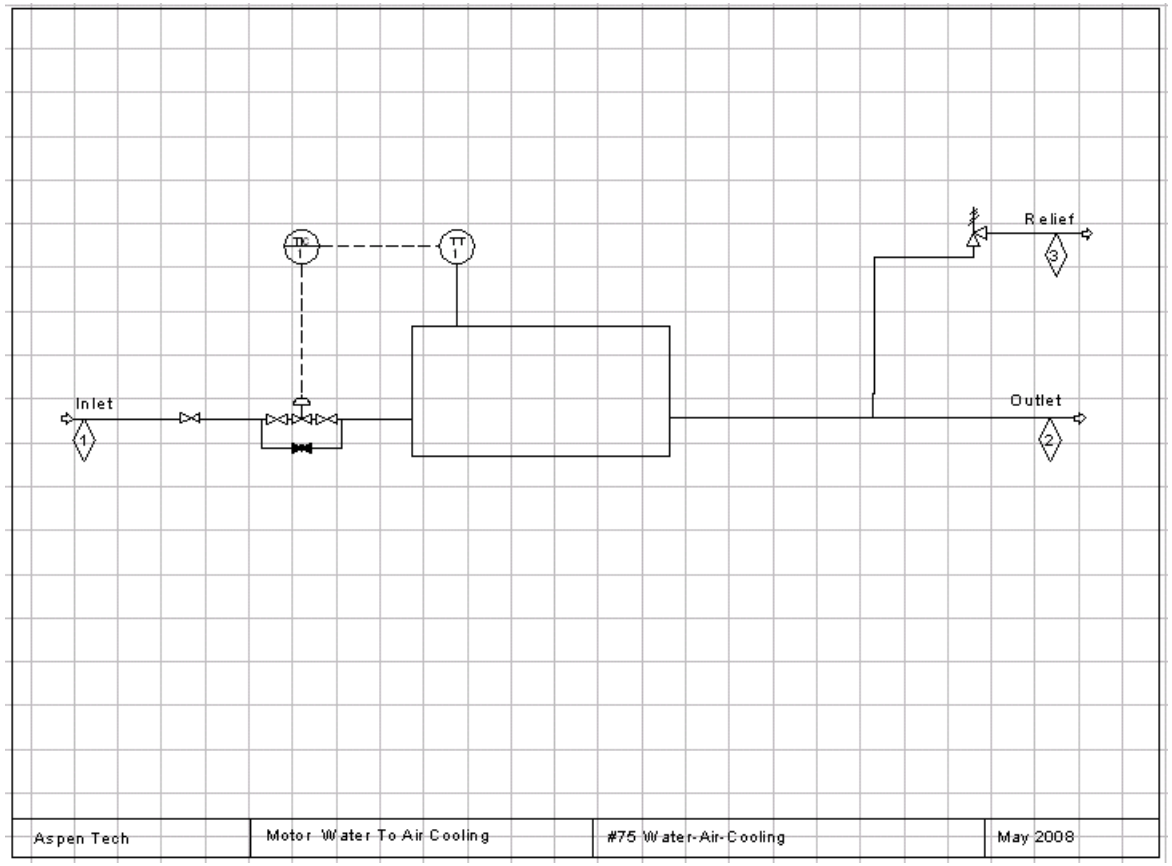
74C Reactor Vessel – Batch



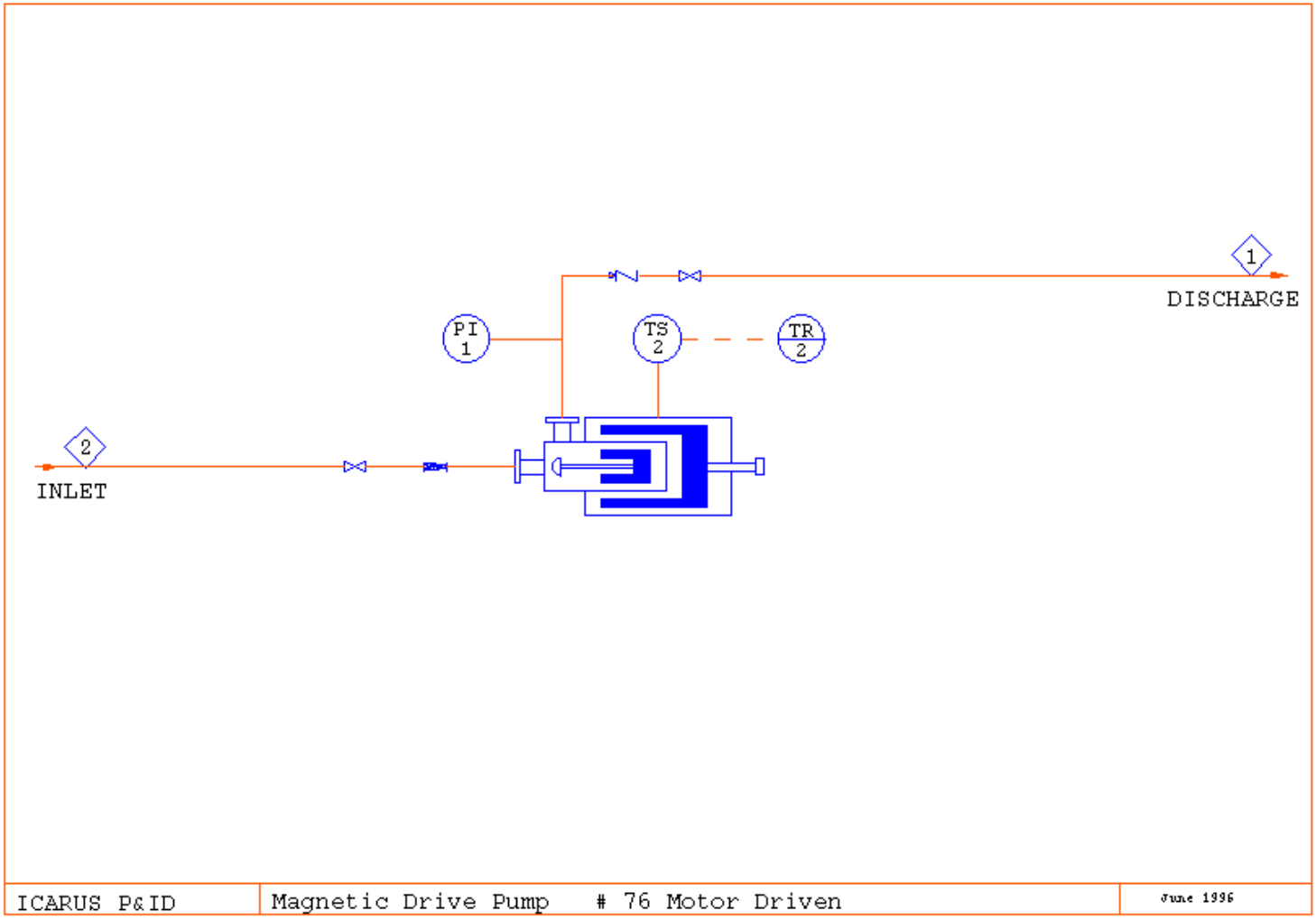
74D Reactor Vessel – Batch



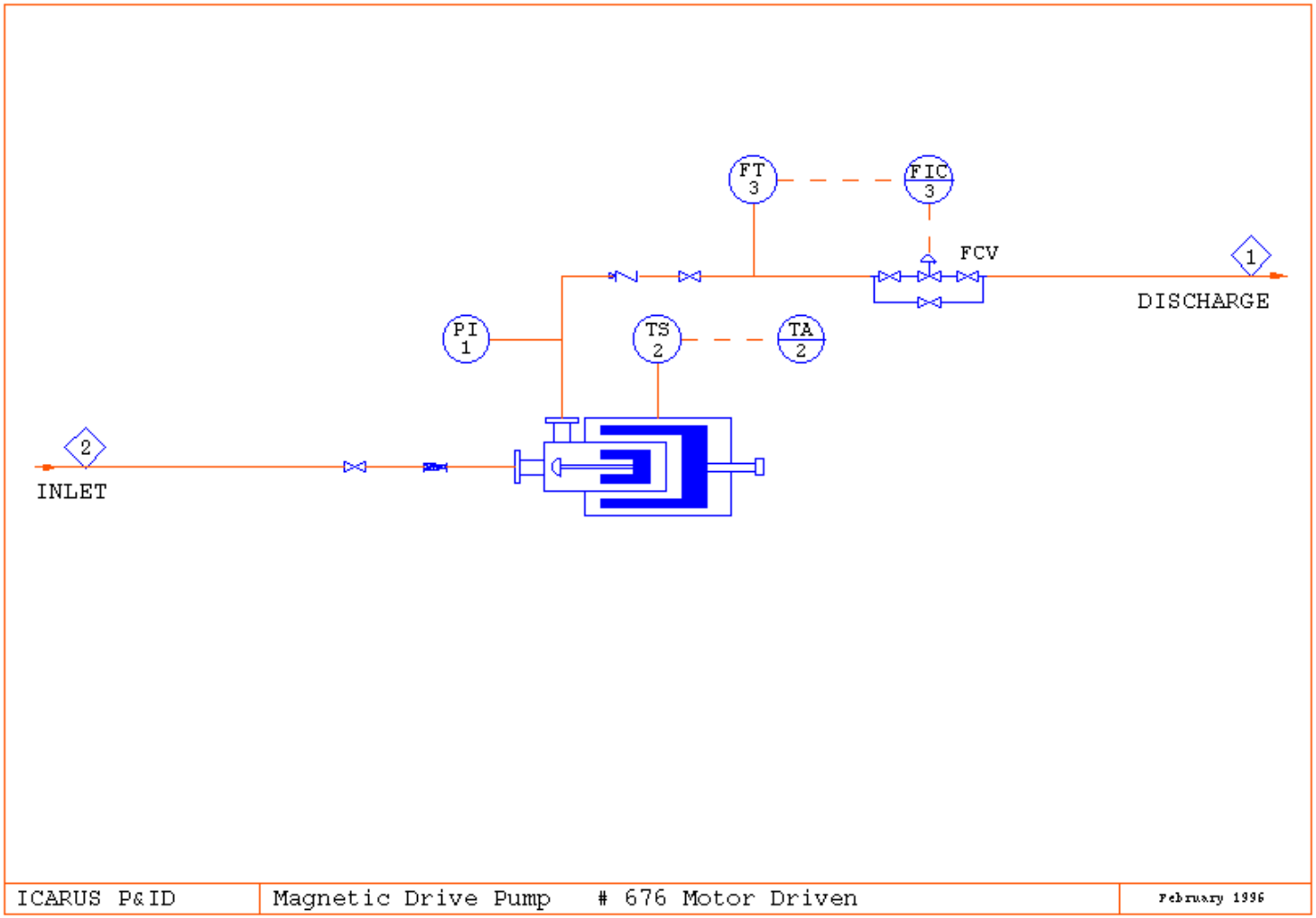
75 Motor Water to Air Cooling



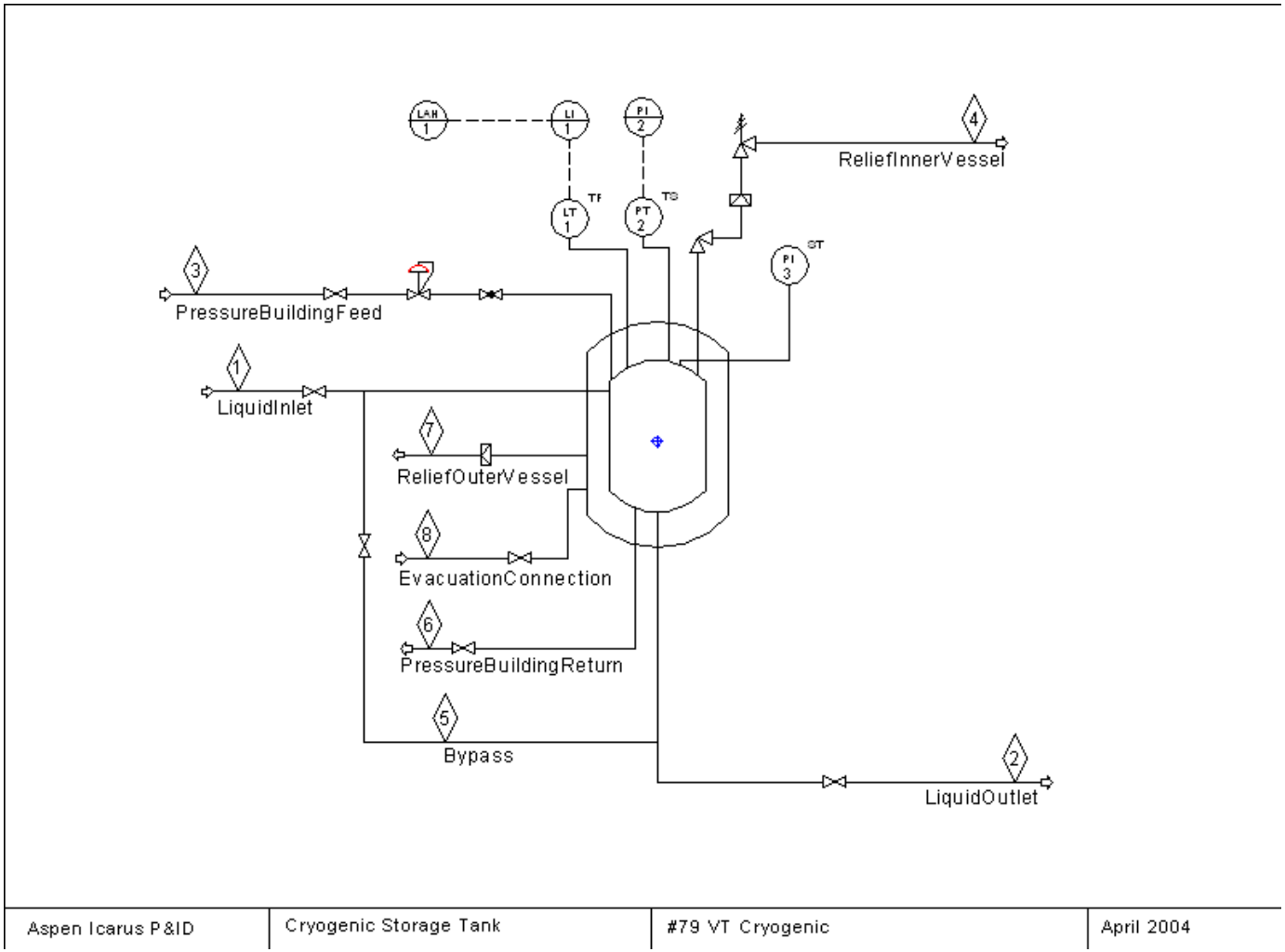
76 Motor Driven Magnetic Drive Pipe



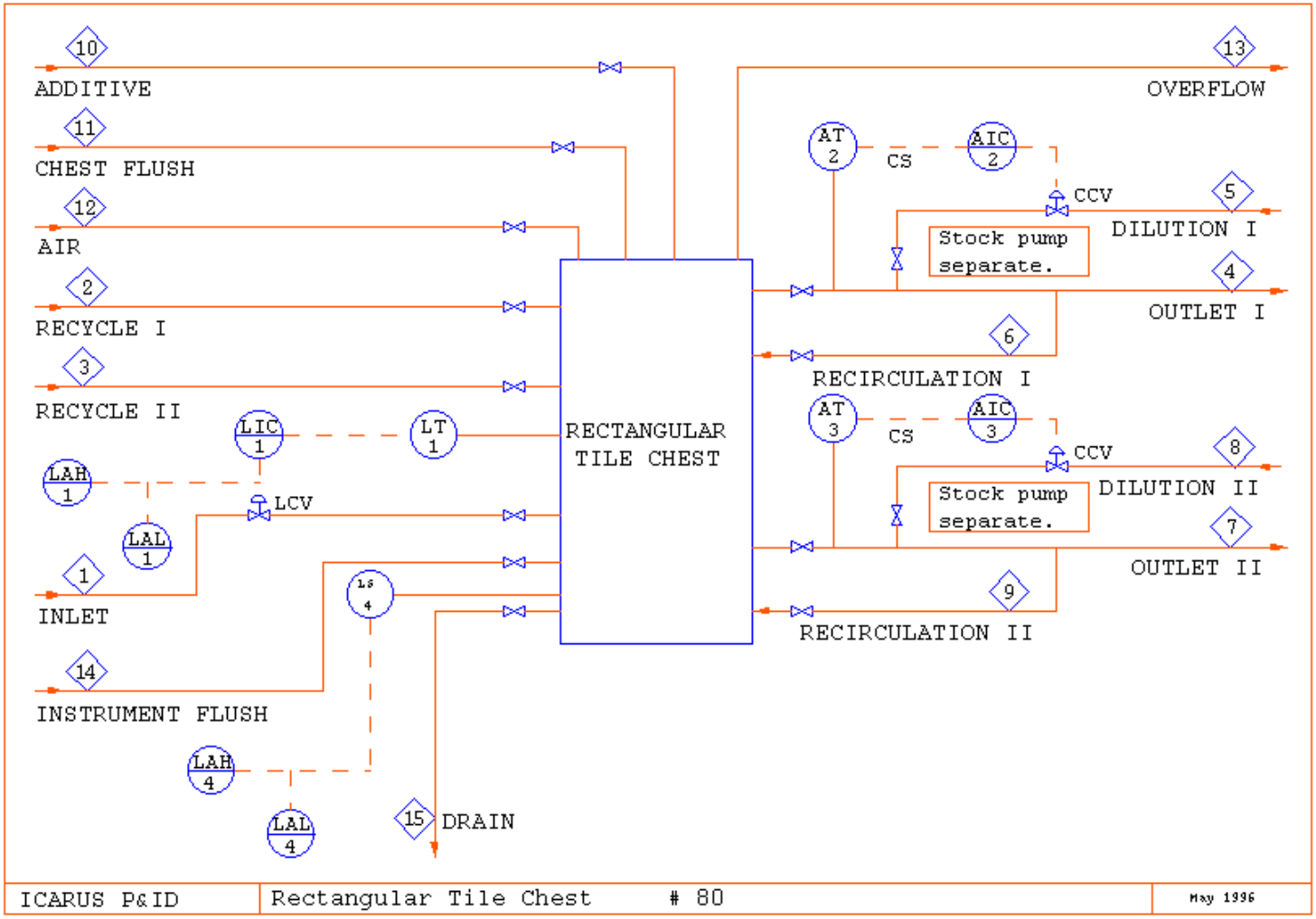
676 Motor Driven Magnetic Drive Pump



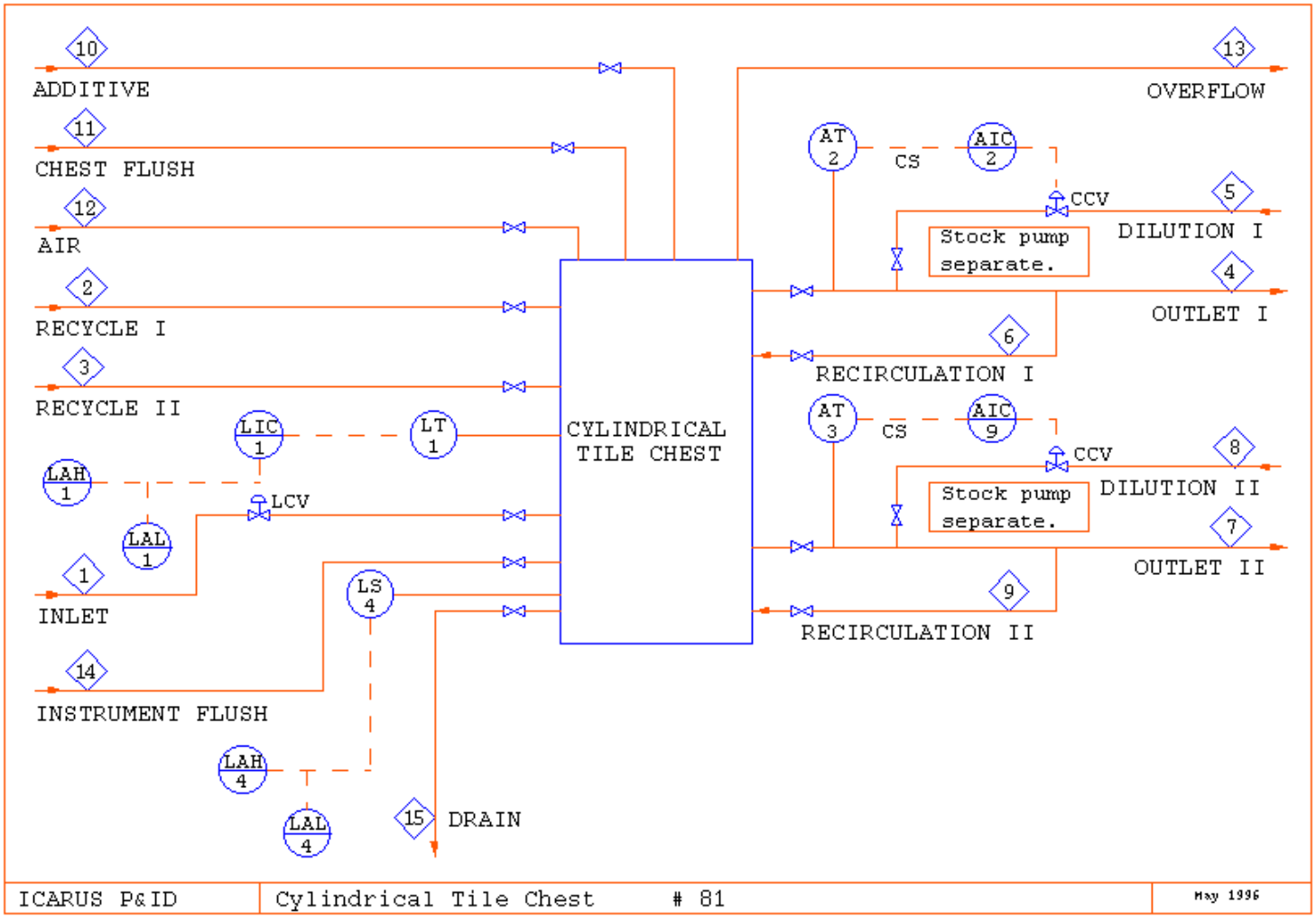
79 Cryogenic Storage Tank


LAH 1
LI 1
PI 2
4
ReliefInnerVessel
LT 1
TF
PT 2
TS
PI 3
ST
3
PressureBuildingFeed
1
LiquidInlet
7
ReliefOuterVessel
8
EvacuationConnection
6
PressureBuildingReturn
5
Bypass
2
LiquidOutlet
Aspen Icarus P&ID
Cryogenic Storage Tank
#79 VT Cryogenic
April 2004

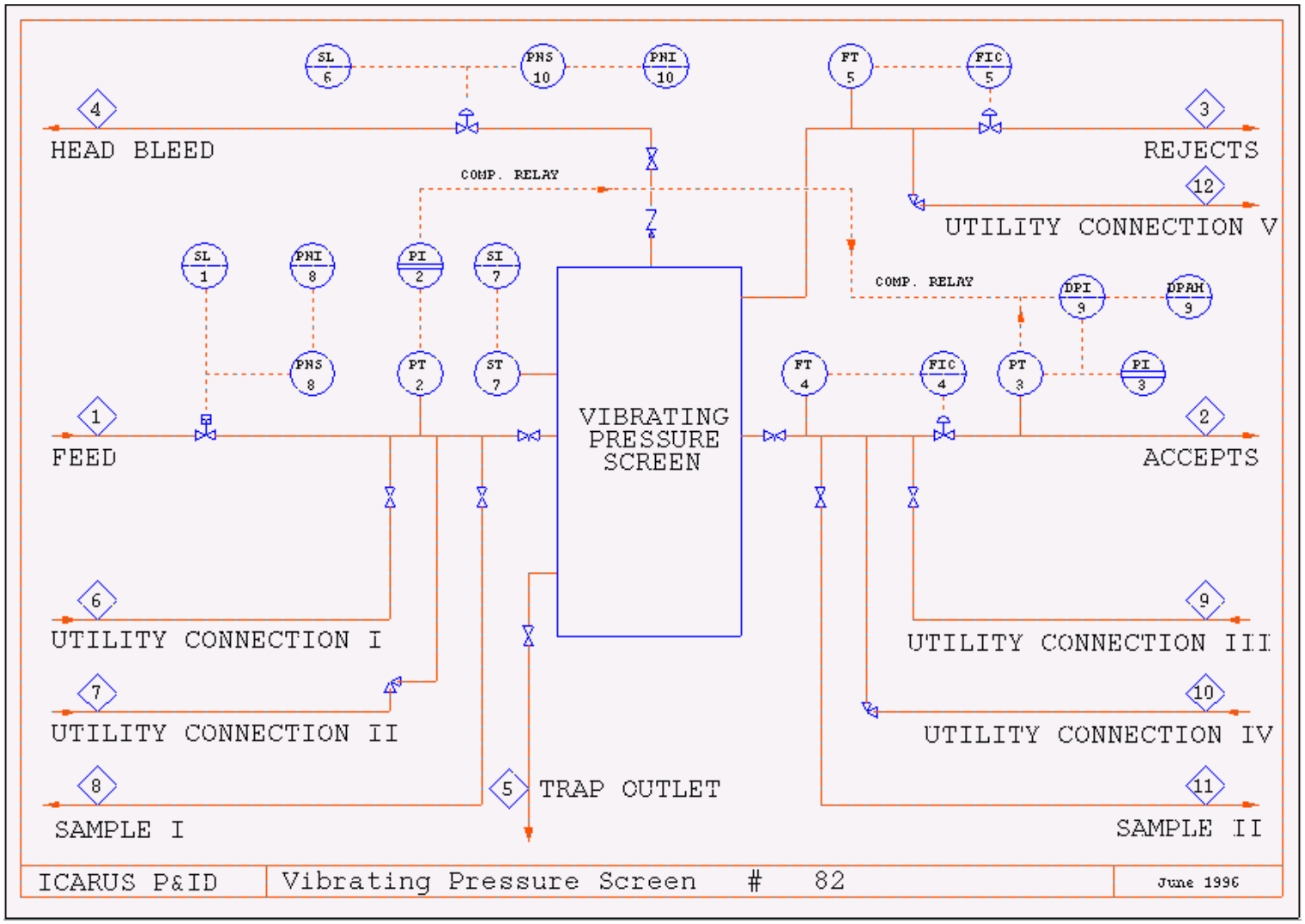
80 Rectangular Tile Chest



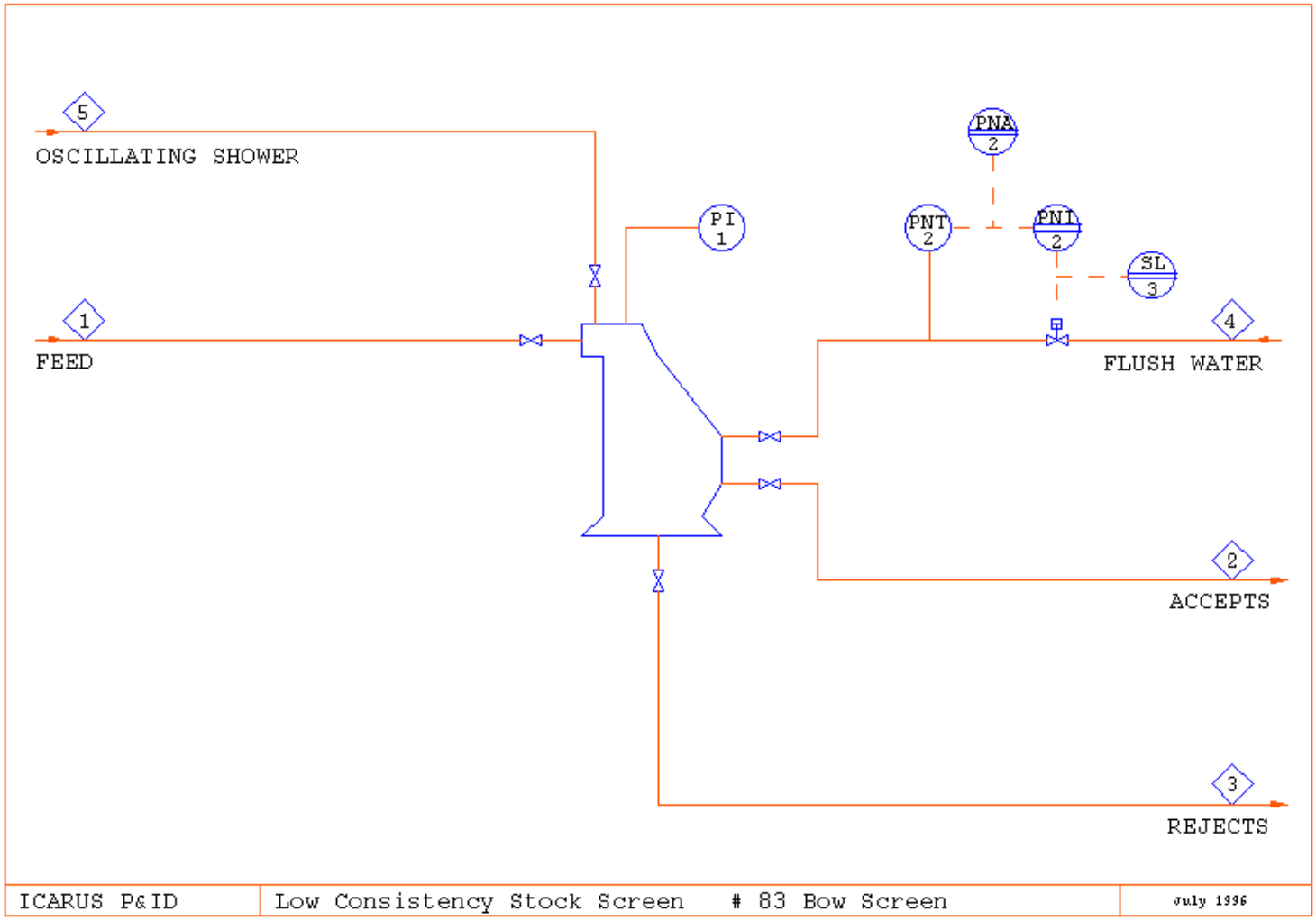
81 Cylindrical Tile Chest



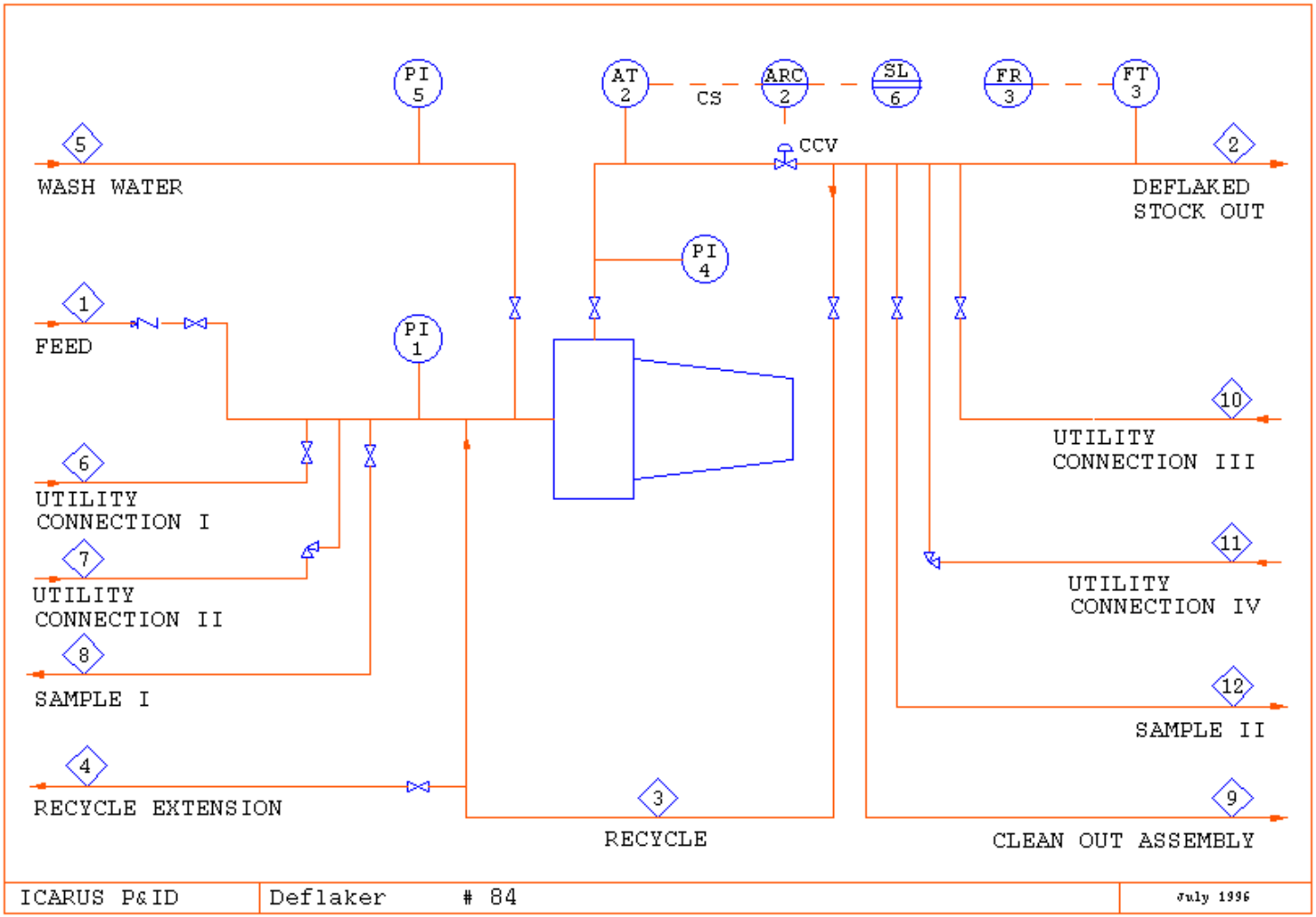
82 Vibrating Pressure Screen


SL 6
PNS 10
PNI 10
FT 5
FIC 5
4
HEAD BLEED
3
REJECTS
COMP. RELAY
12
UTILITY CONNECTION V
SL 1
PNI 8
PI 2
SI 7
COMP. RELAY
DPI 9
DPAH 9
PNS 8
PT 2
ST 7
FT 4
FIC 4
PT 3
PI 3
VIBRATING PRESSURE SCREEN
1
FEED
2
ACCEPTS
6
UTILITY CONNECTION I
9
UTILITY CONNECTION III
7
UTILITY CONNECTION II
10
UTILITY CONNECTION IV
8
SAMPLE I
5
TRAP OUTLET
11
SAMPLE II
ICARUS P&ID
Vibrating Pressure Screen # 82
June 1996

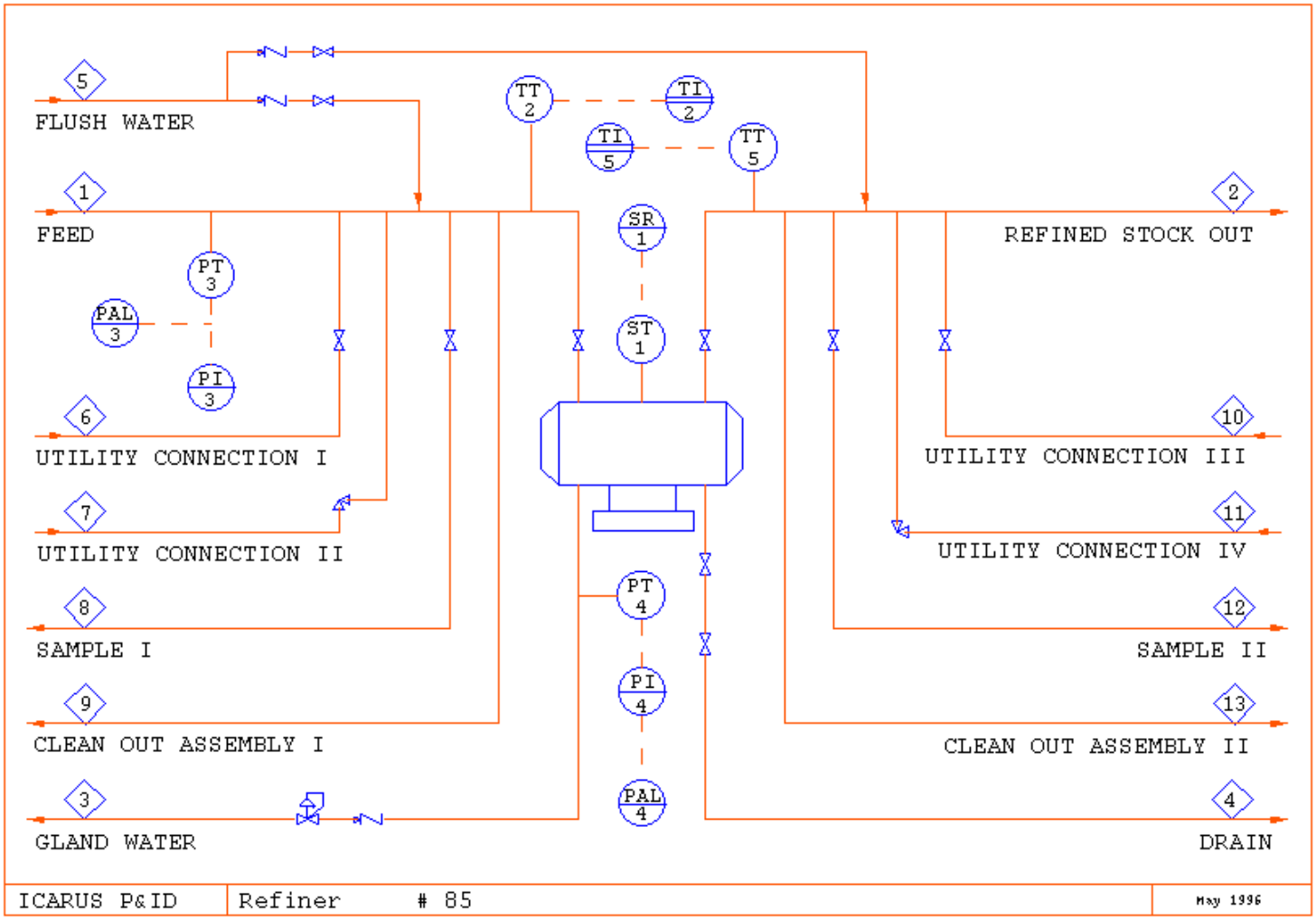
83 Bow Screen – Low Consistency Stock Screen



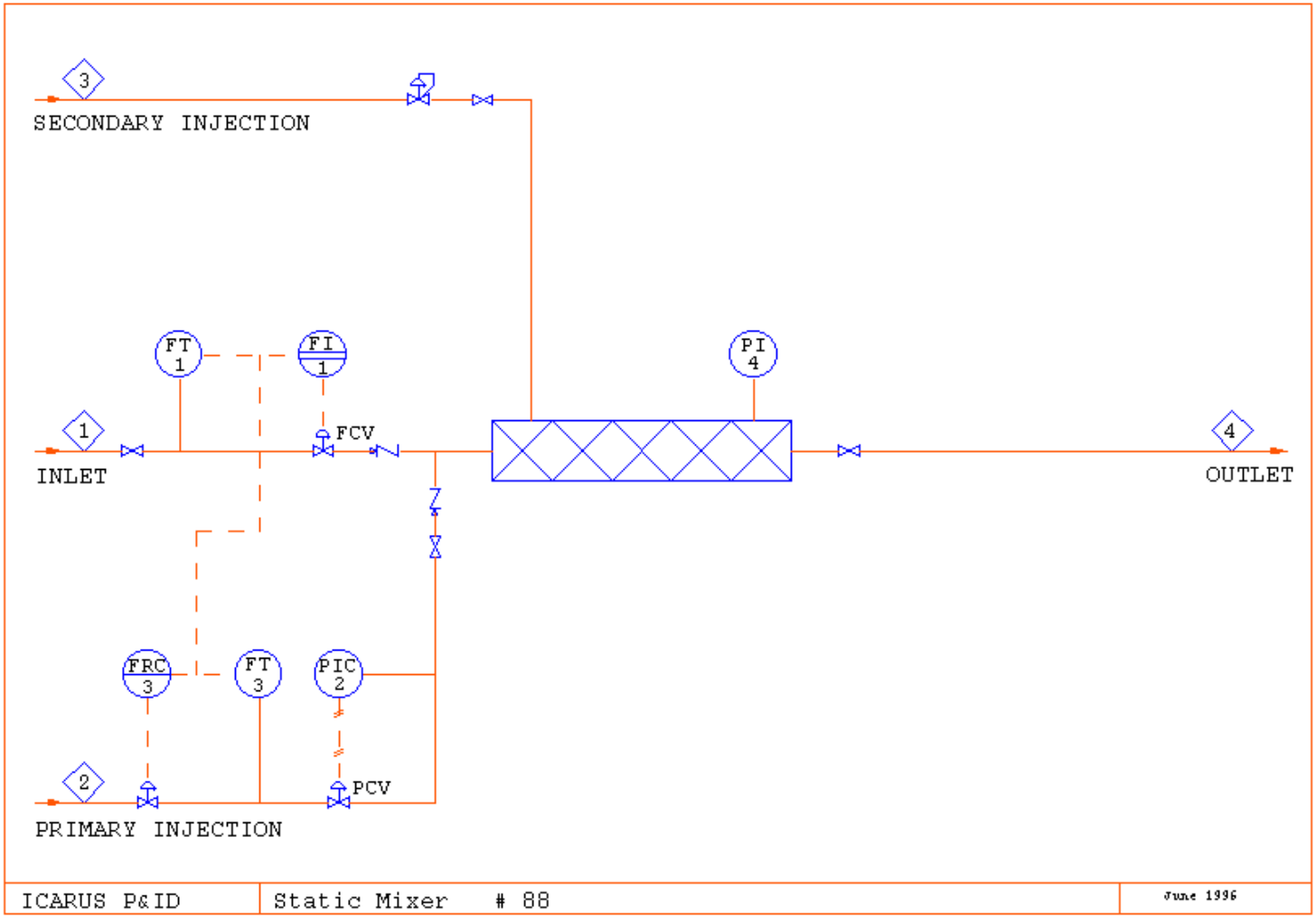
84 Deflaker


PI 5
AT 2
CS
ARC 2
SL 6
FR 3
FT 3
5
WASH WATER
CCV
2
DEFLAKED STOCK OUT
PI 4
1
FEED
PI 1
10
UTILITY CONNECTION III
6
UTILITY CONNECTION I
11
UTILITY CONNECTION IV
7
UTILITY CONNECTION II
8
SAMPLE I
12
SAMPLE II
4
RECYCLE EXTENSION
3
RECYCLE
9
CLEAN OUT ASSEMBLY
ICARUS P&ID
Deflaker # 84
July 1996

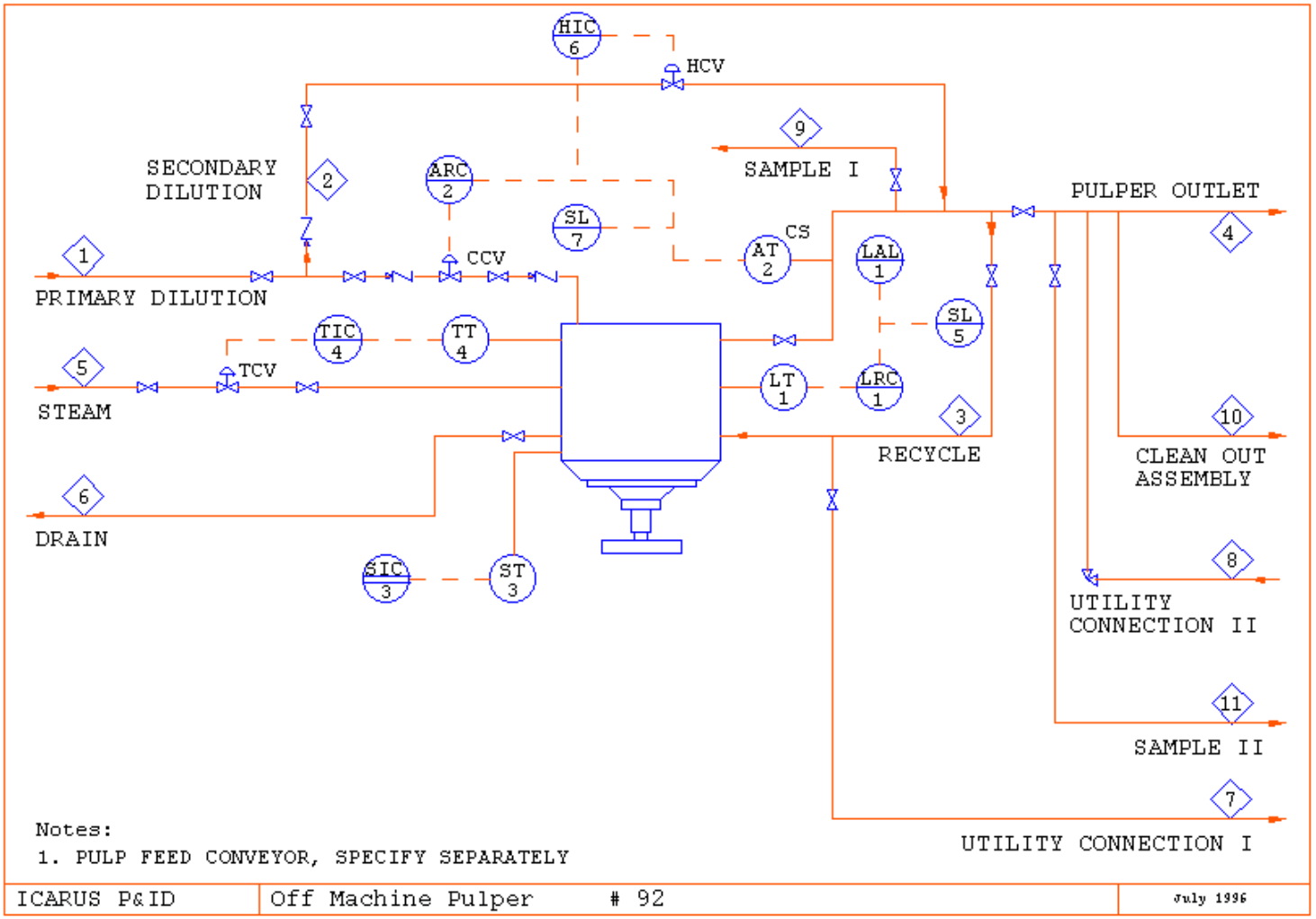
85 Refiner


5
FLUSH WATER
1
FEED
PT 3
PAL 3
PI 3
6
UTILITY CONNECTION I
7
UTILITY CONNECTION II
8
SAMPLE I
9
CLEAN OUT ASSEMBLY I
3
GLAND WATER
TT 2
TI 2
TI 5
TT 5
SR 1
ST 1
PT 4
PI 4
PAL 4
2
REFINED STOCK OUT
10
UTILITY CONNECTION III
11
UTILITY CONNECTION IV
12
SAMPLE II
13
CLEAN OUT ASSEMBLY II
4
DRAIN
ICARUS P&ID
Refiner # 85
May 1996

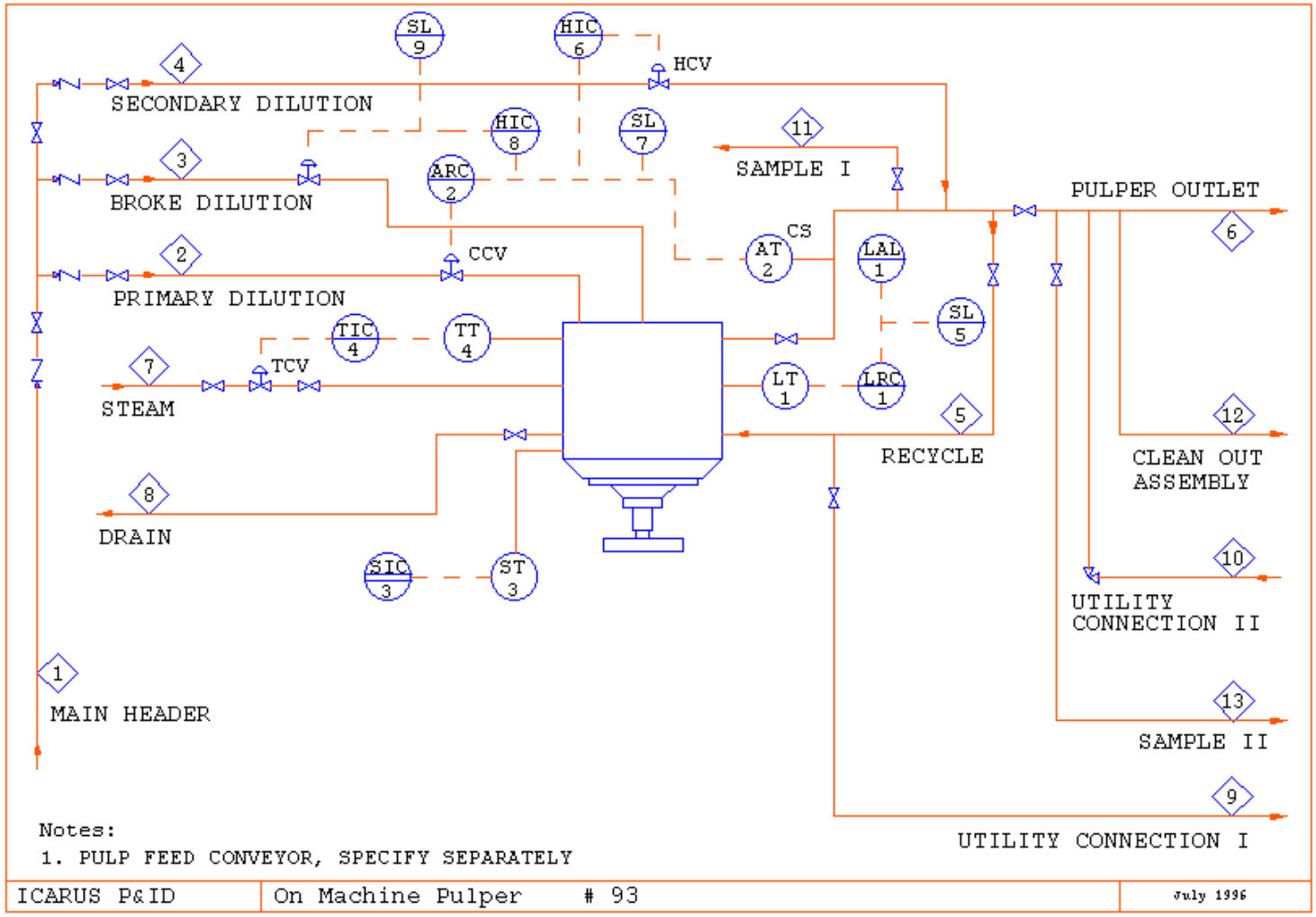
88 Static Mixer



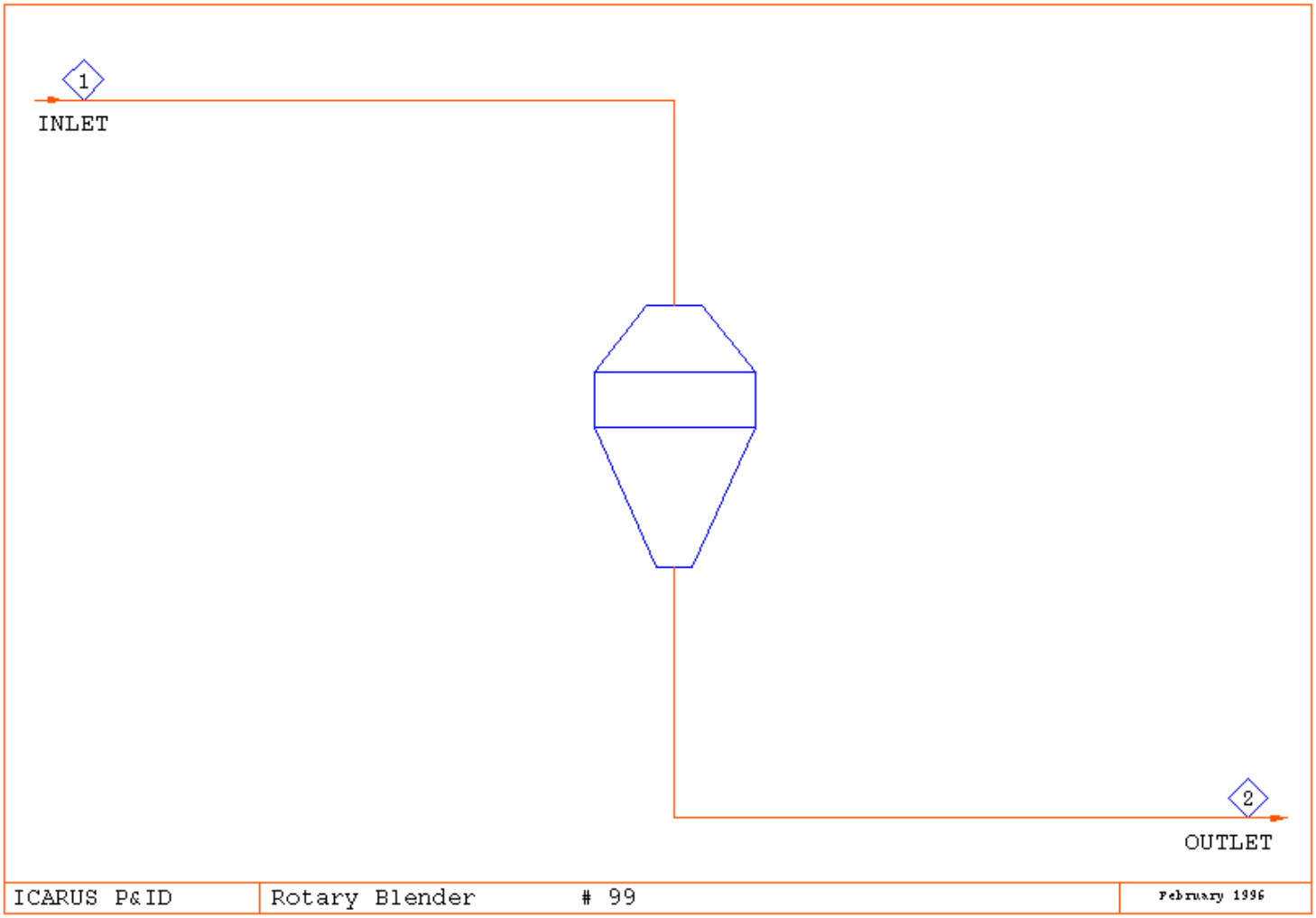
92 Off Machine Pulper



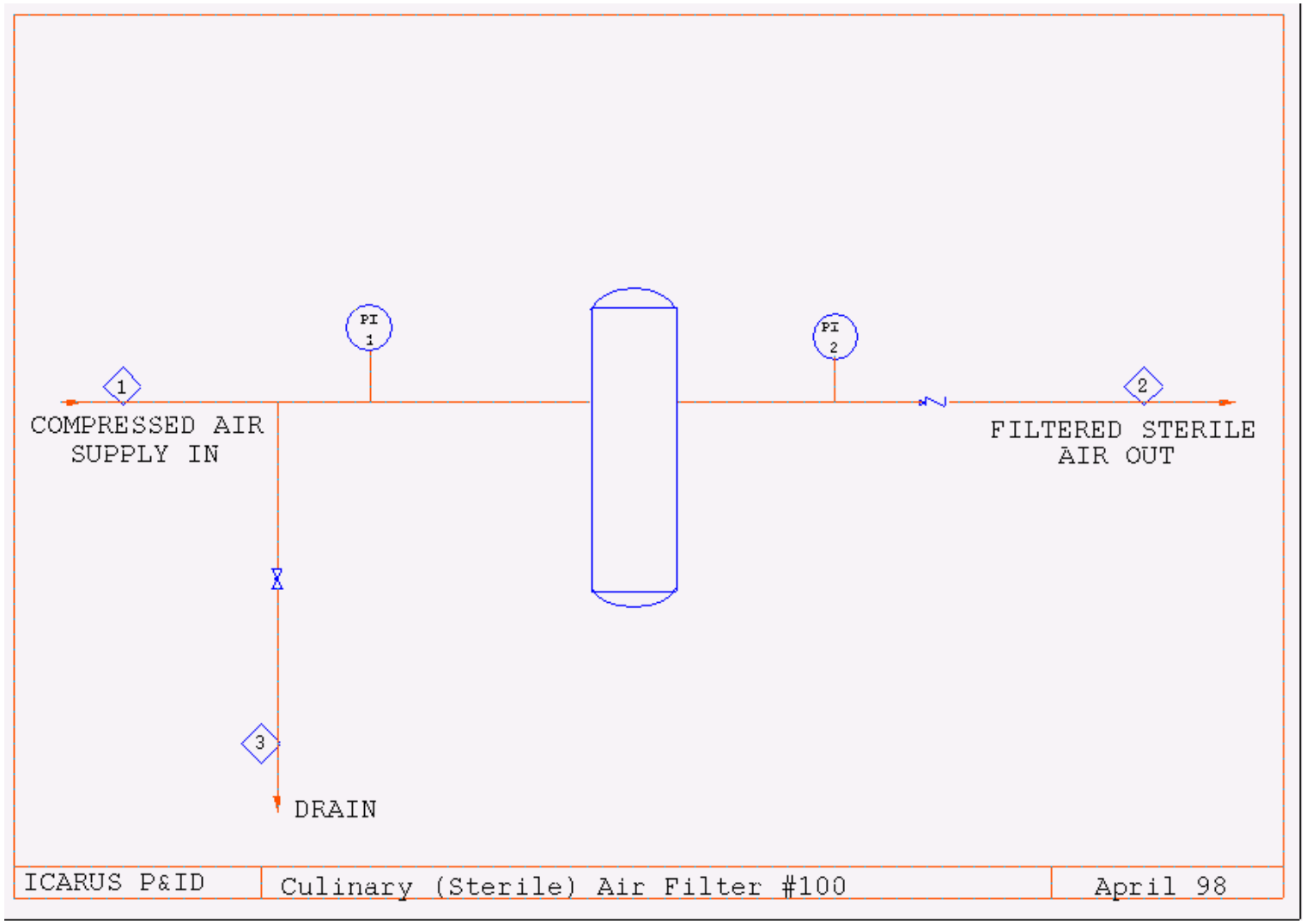
93 On Machine Pulper



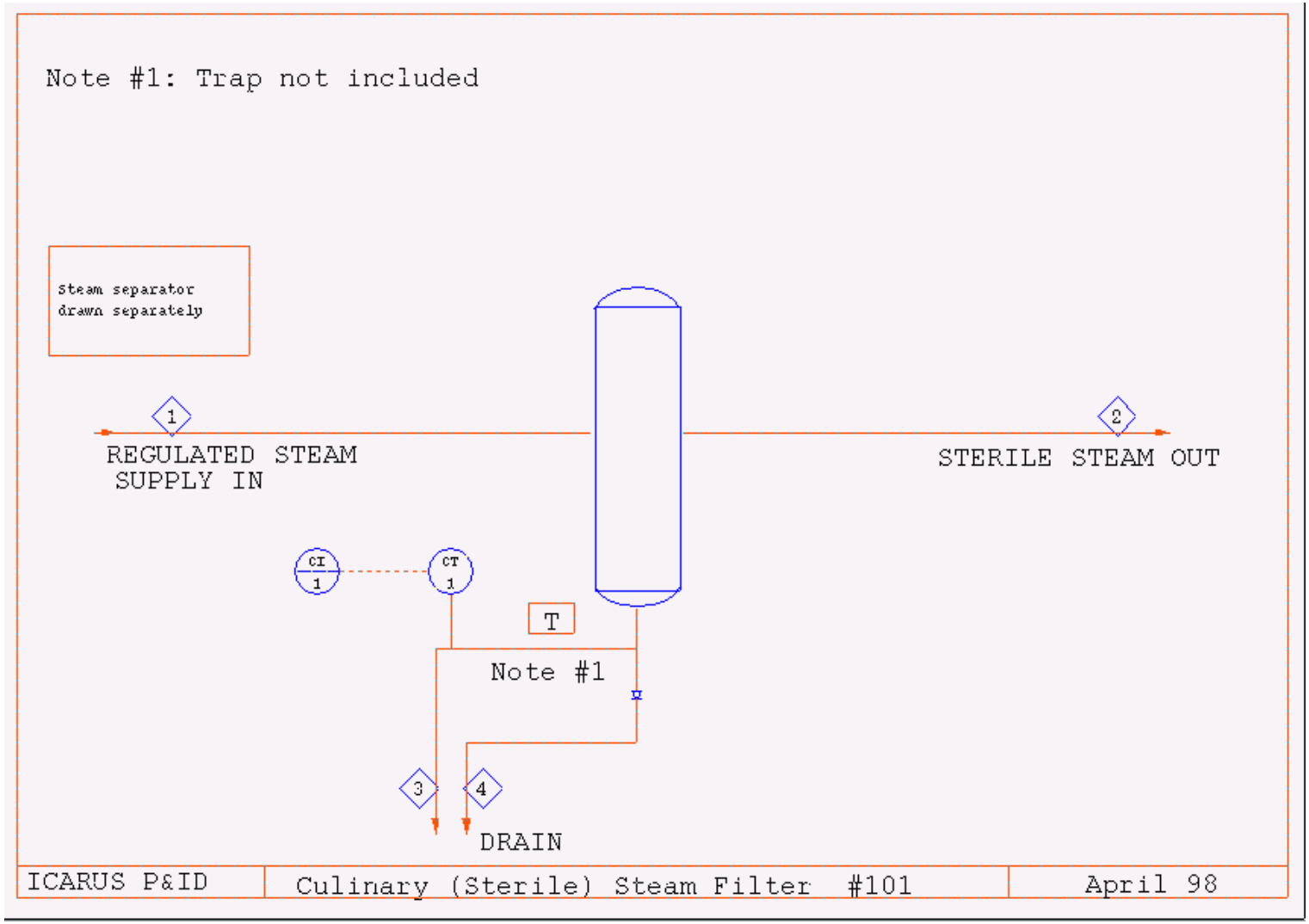
99 Rotary Blender



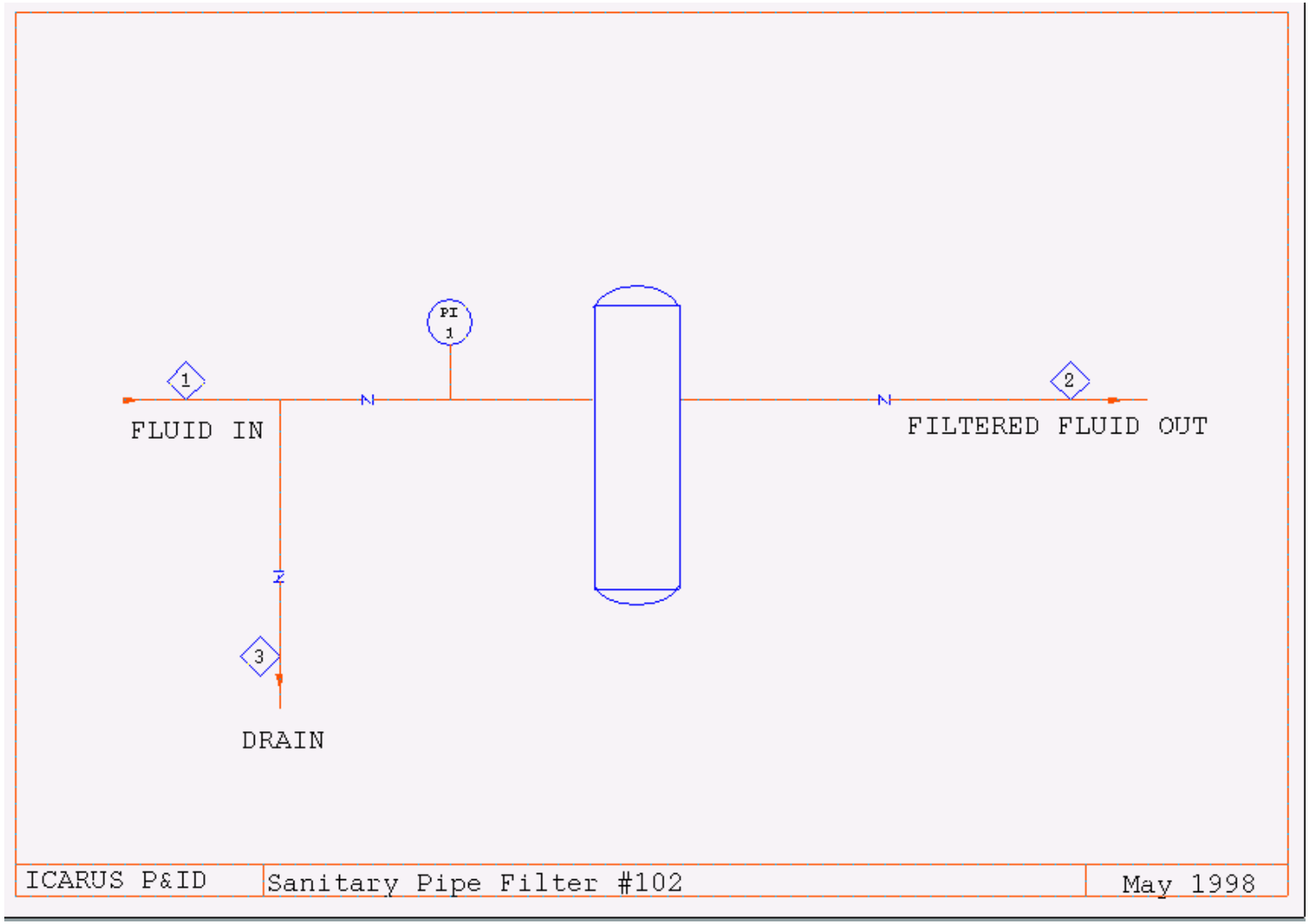
100 Culinary Air Filter


PI
1
PI
2
1
2
3
COMPRESSED AIR
SUPPLY IN
FILTERED STERILE
AIR OUT
DRAIN
ICARUS P&ID
Culinary (Sterile) Air Filter #100
April 98

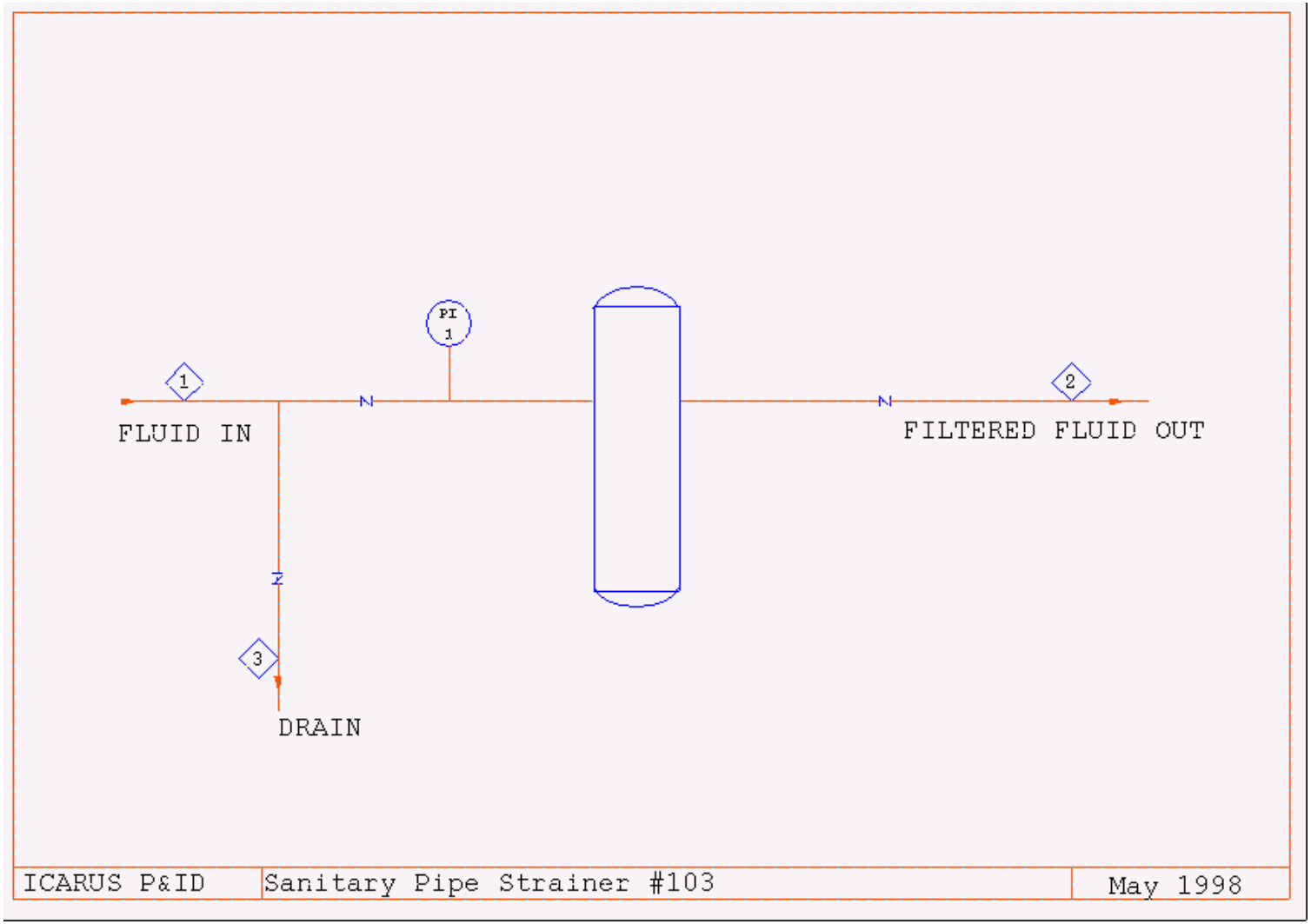
101 Culinary (Sterile) Steam Filter F-6


Note #1: Trap not included
Steam separator
drawn separately
1
REGULATED STEAM
SUPPLY IN
2
STERILE STEAM OUT
CI
1
CT
1
T
Note #1
3
4
DRAIN
ICARUS P&ID
Culinary (Sterile) Steam Filter #101
April 98

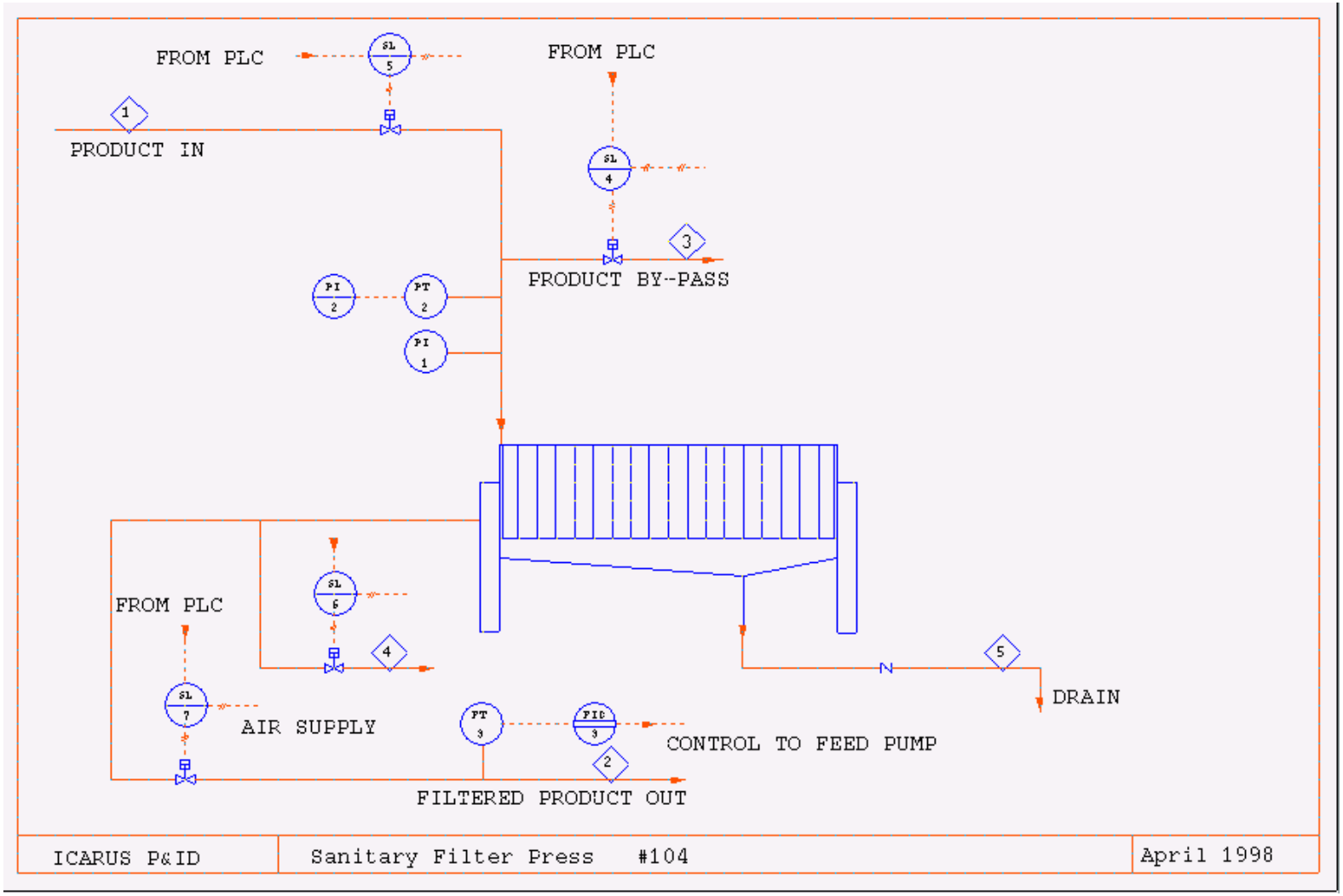
102 Sanitary Pipe Filter


PI
1
1
FLUID IN
2
FILTERED FLUID OUT
3
DRAIN
ICARUS P&ID
Sanitary Pipe Filter #102
May 1998

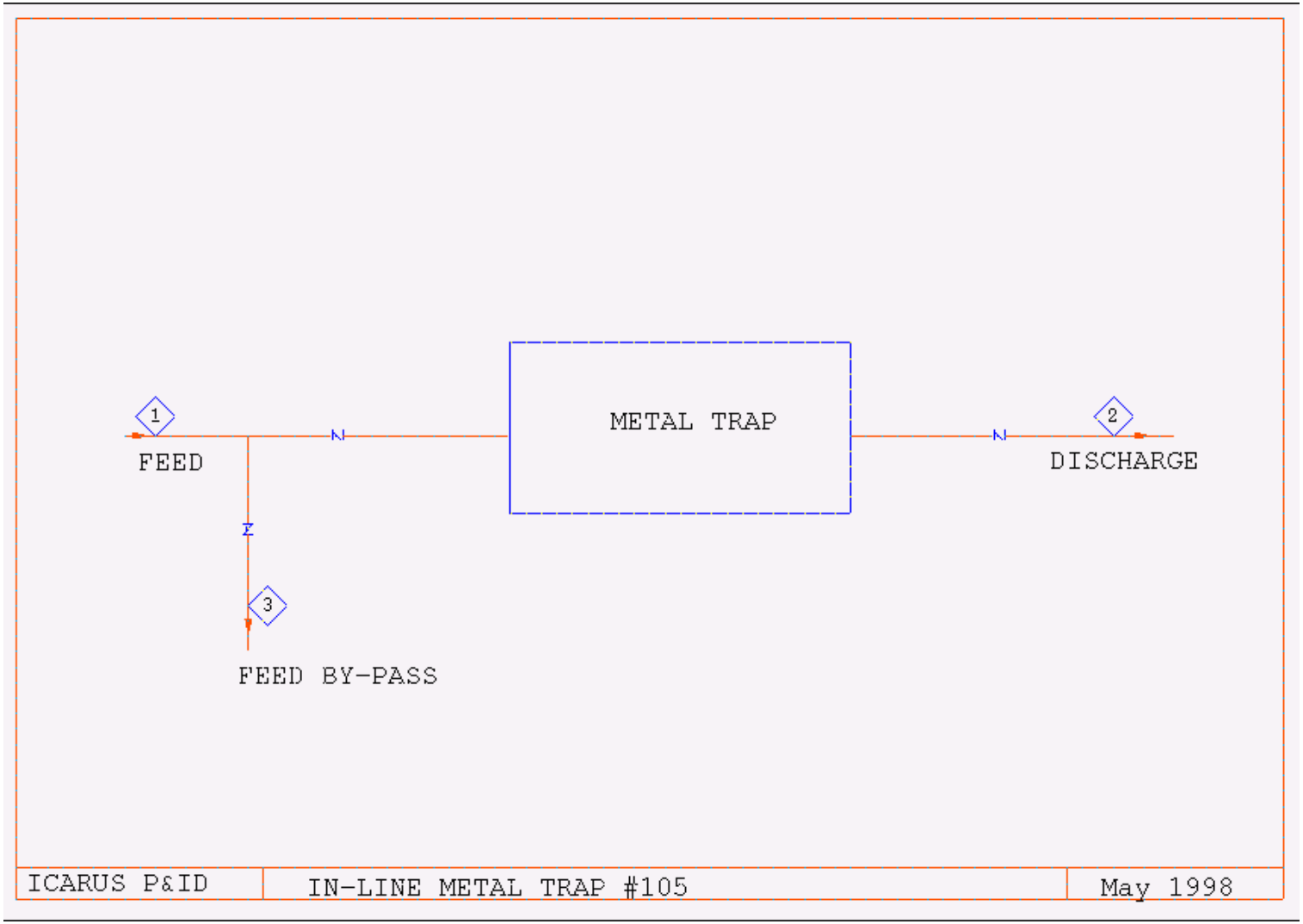
103 Sanitary Pipe Strainer



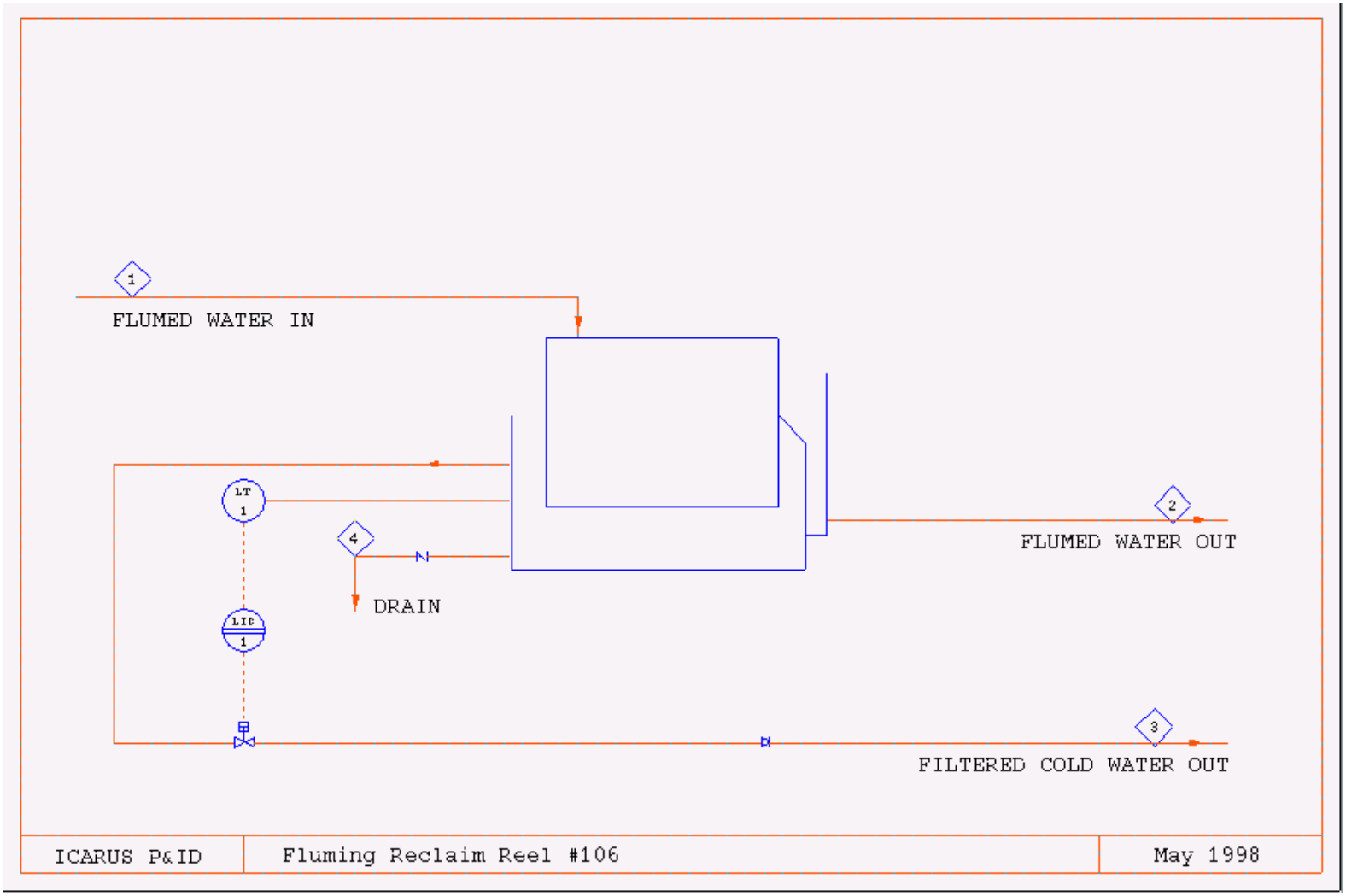
104 Sanitary Filter Press



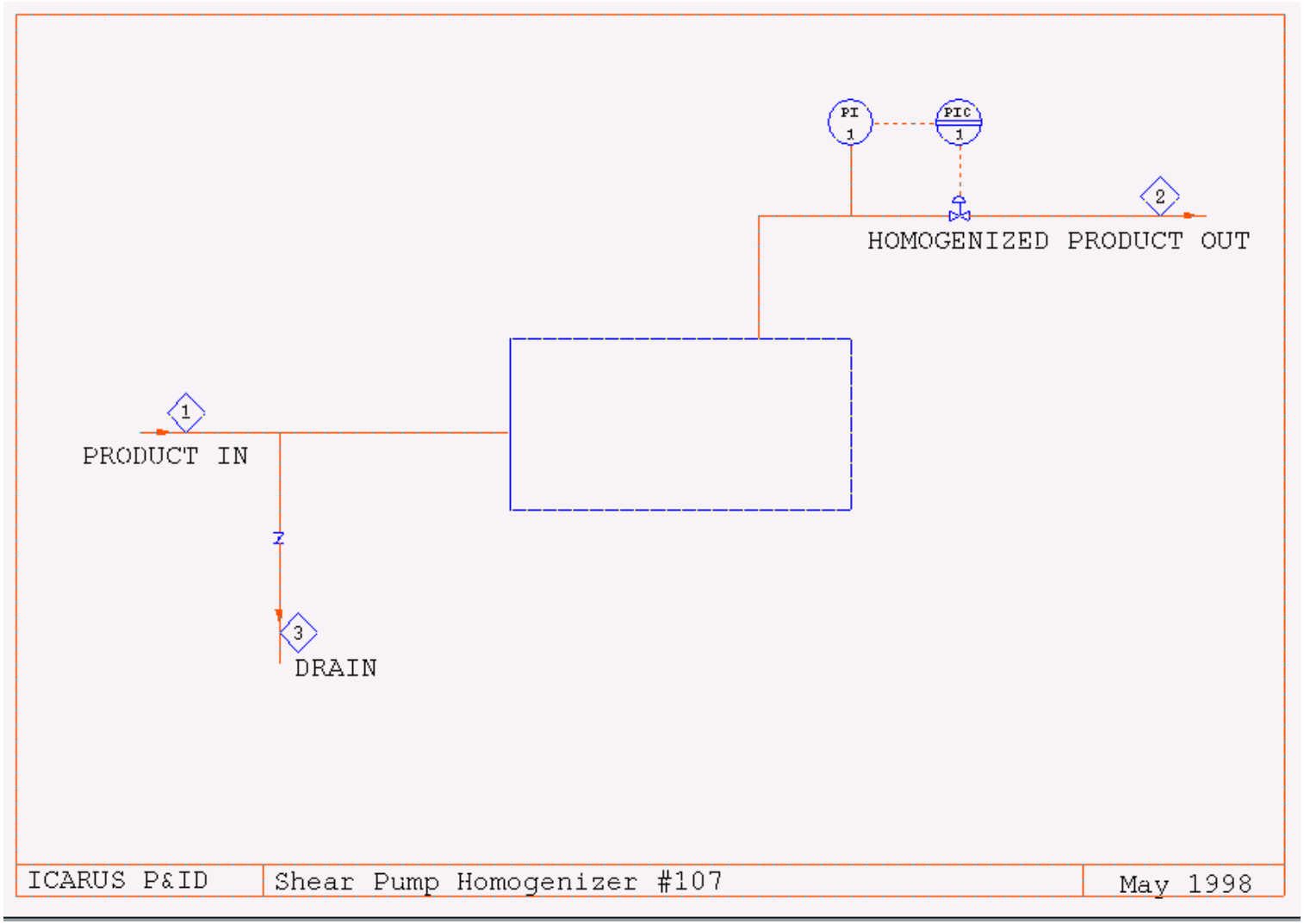
105 In-Line Metal Trap


1
FEED
METAL TRAP
2
DISCHARGE
3
FEED BY-PASS
ICARUS P&ID
IN-LINE METAL TRAP #105
May 1998

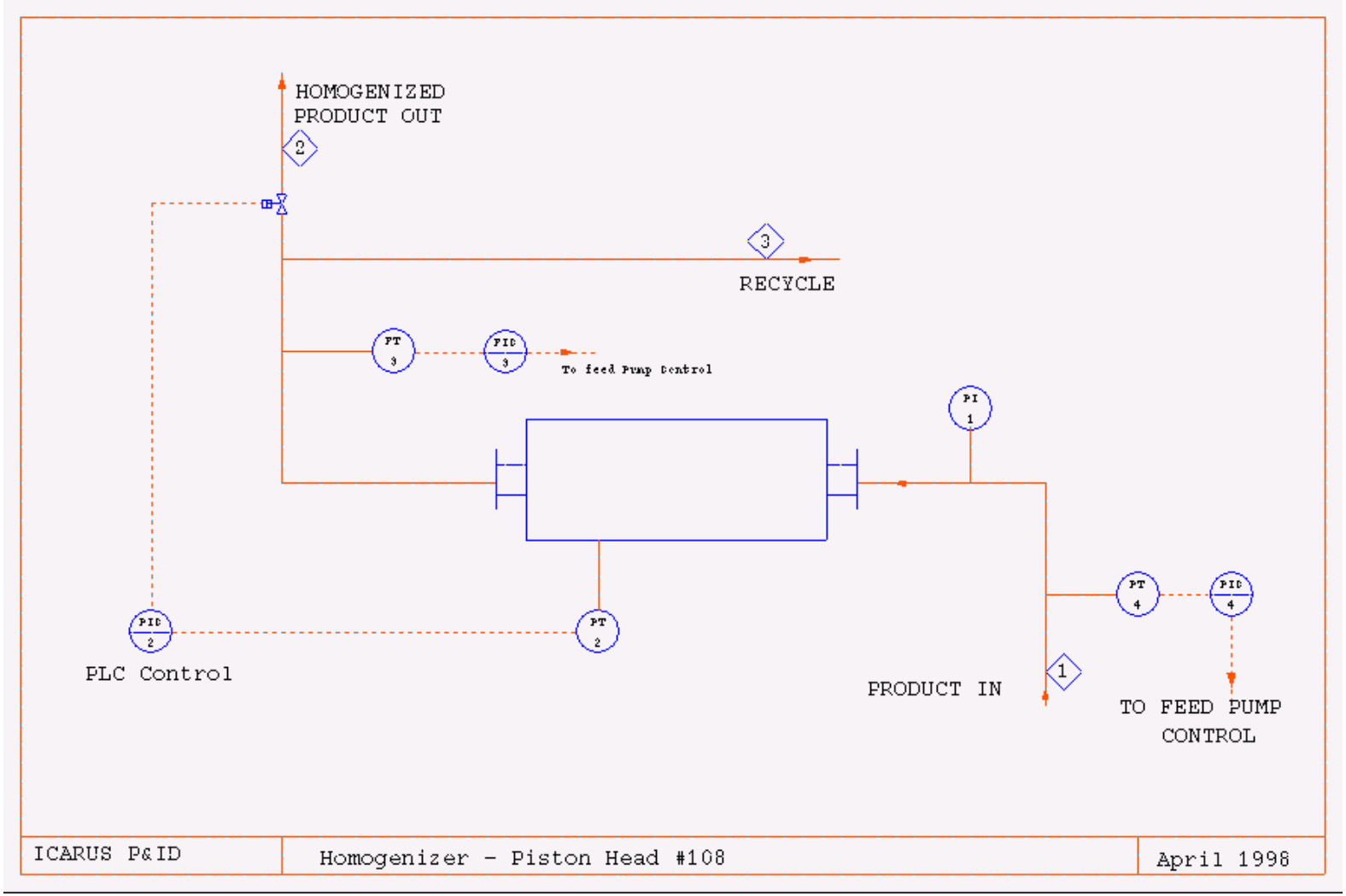
106 Fluming Reclaim Reel



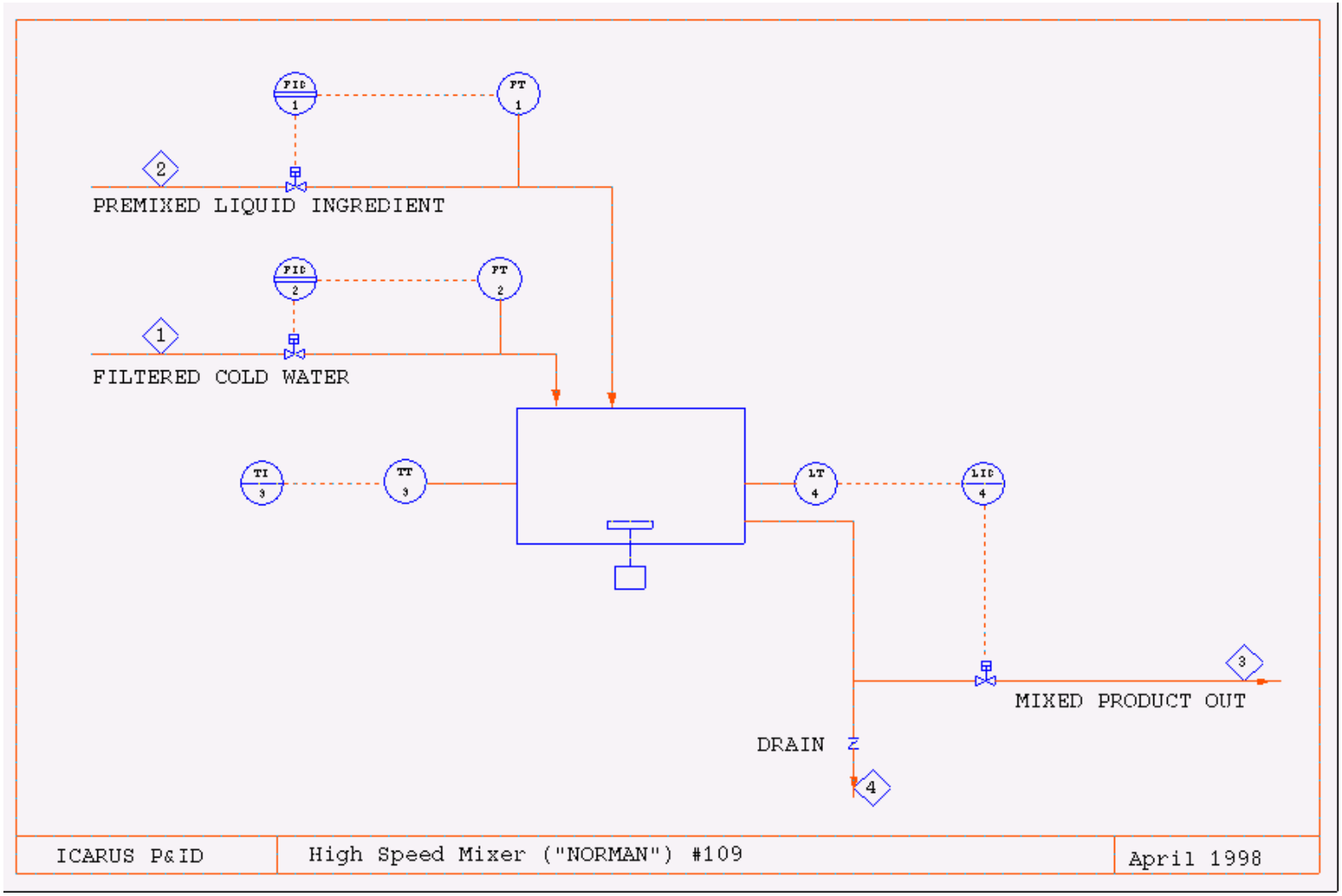
107 Shear Pump Homogenizer


PI
1
PIC
1
2
HOMOGENIZED PRODUCT OUT
1
PRODUCT IN
Z
3
DRAIN
ICARUS P&ID
Shear Pump Homogenizer #107
May 1998

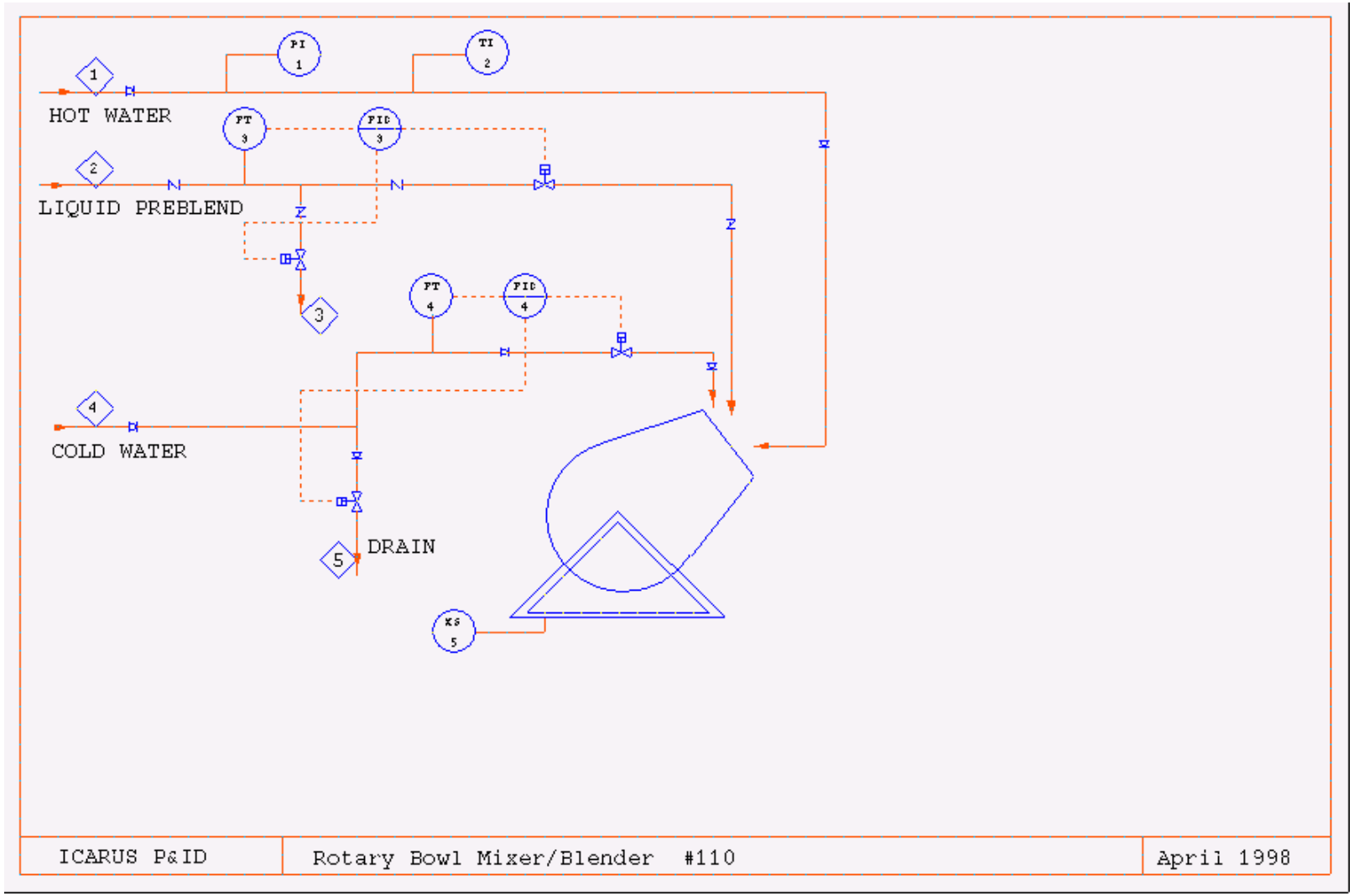
108 Homogenizer – Piston Head



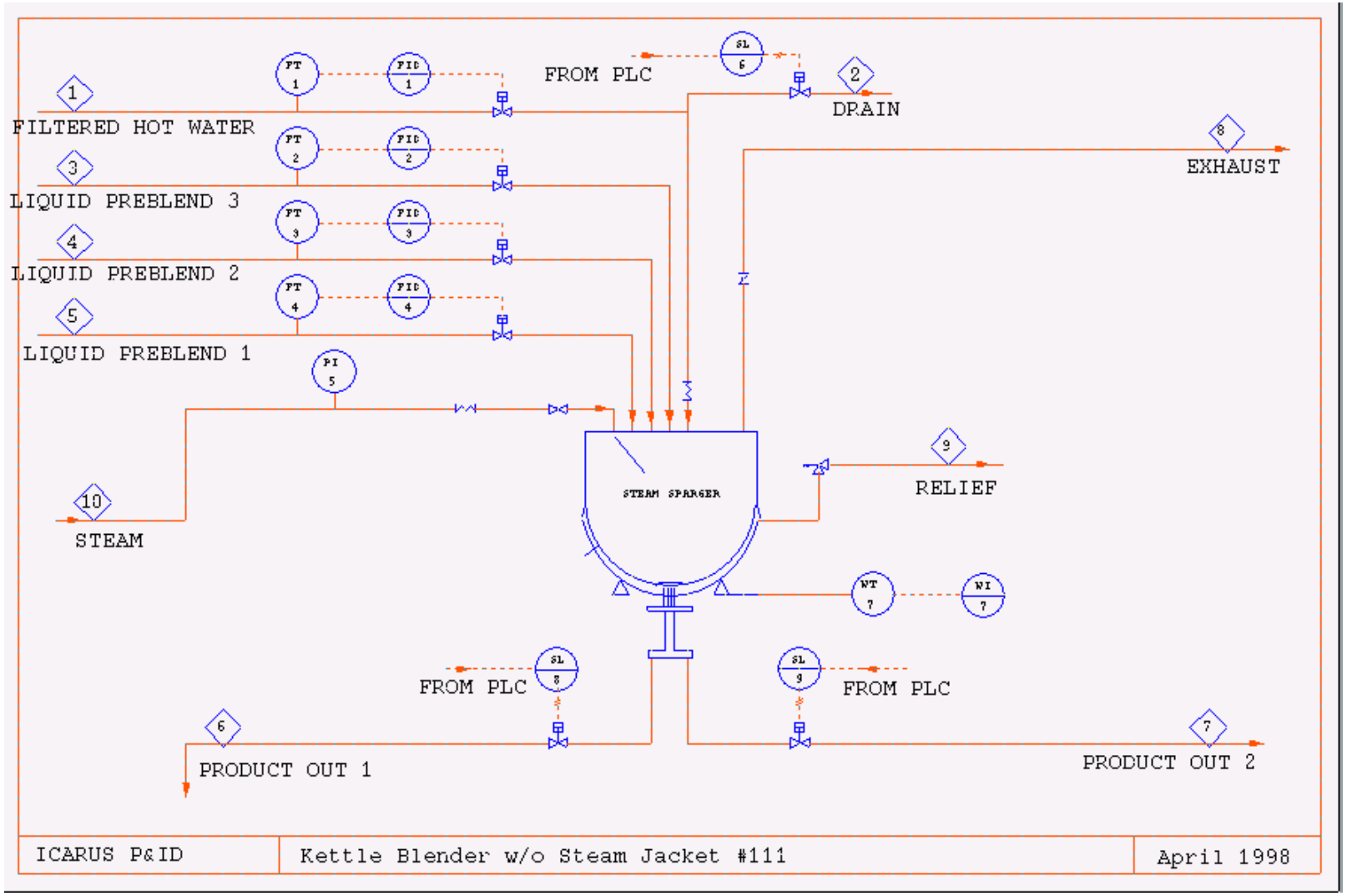
109 High-Speed Mixer (“Norman”)



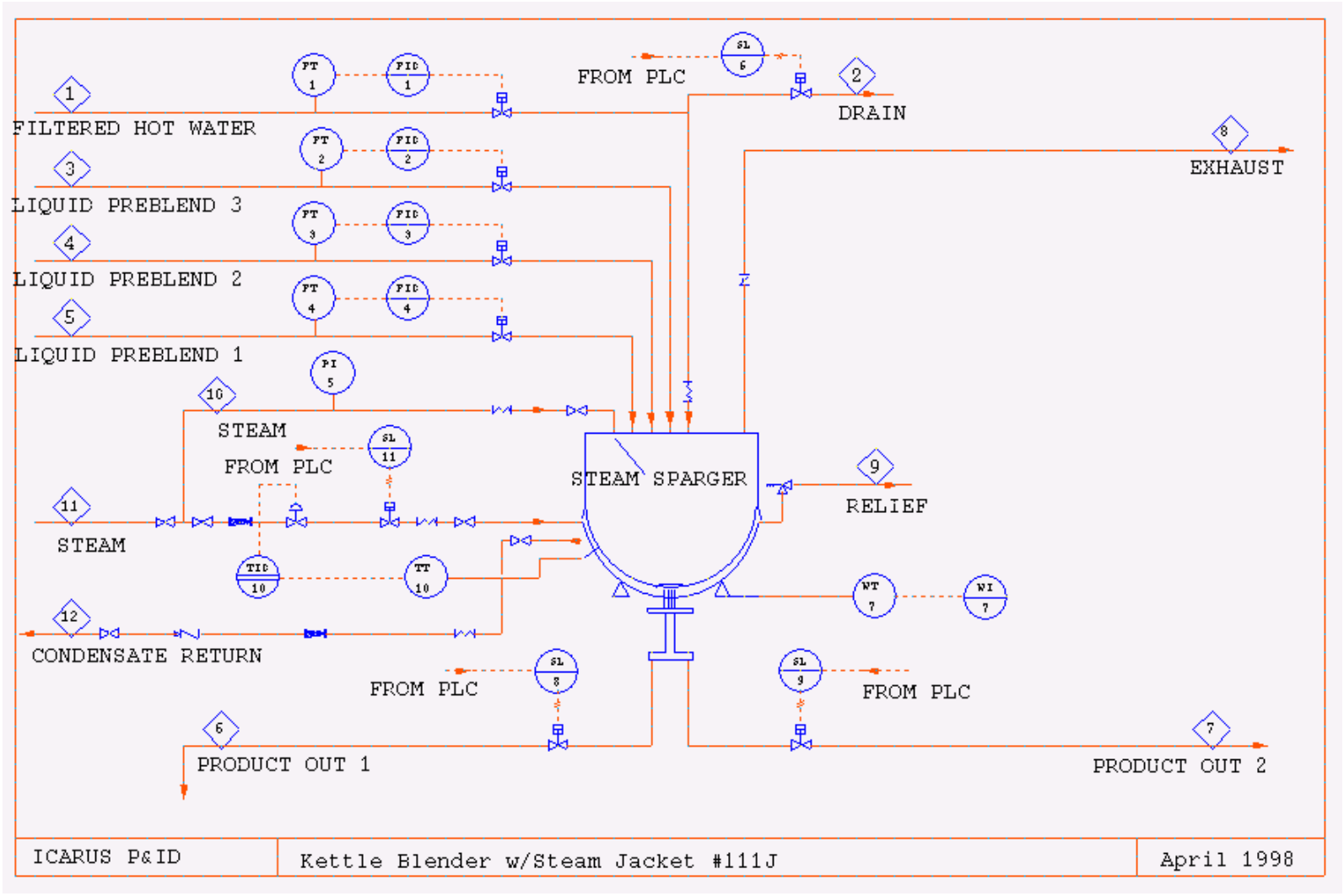
110 Rotary Bowl/Mixer Blender



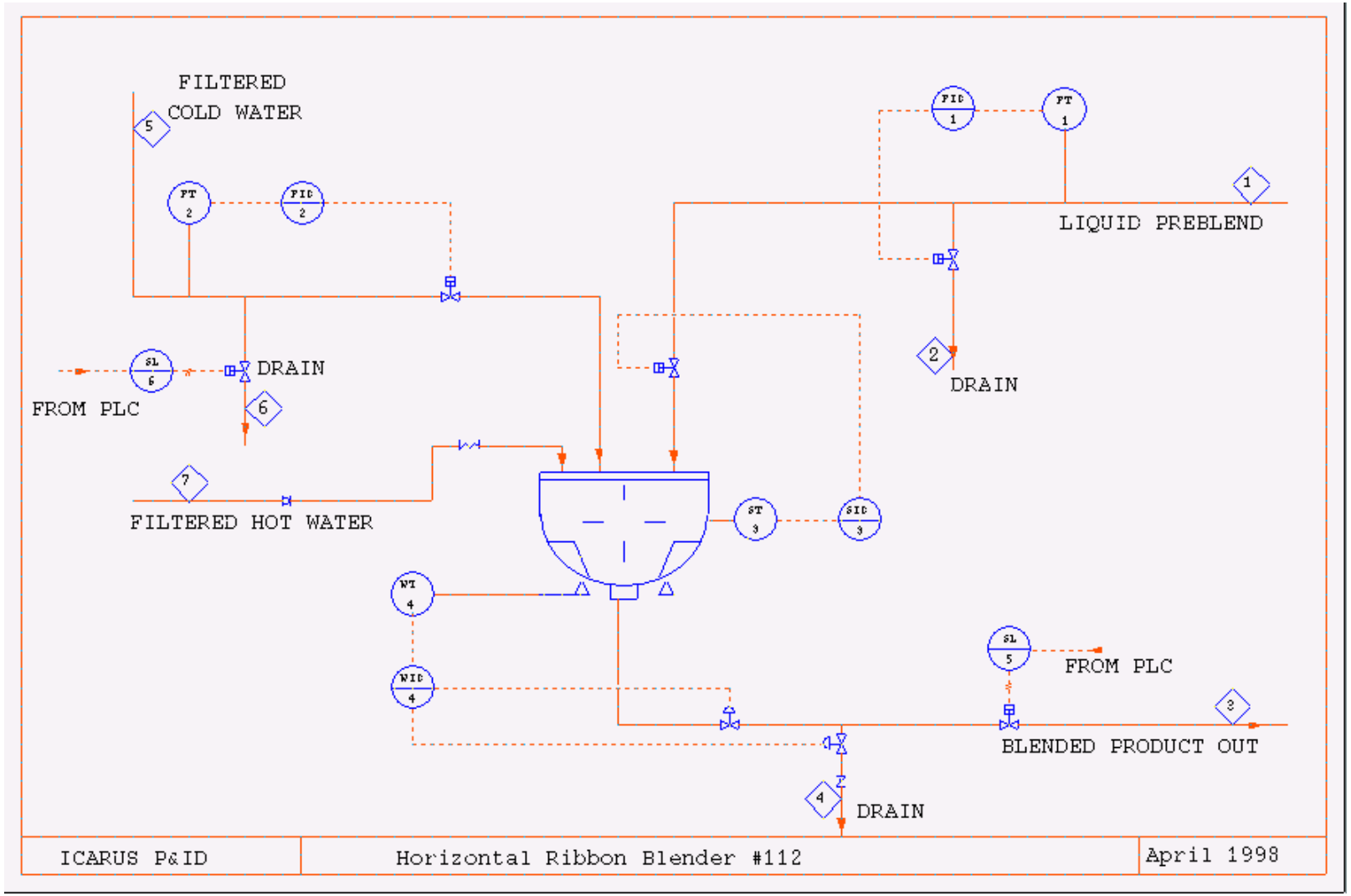
111 Kettle Blender Without Steam Jacket


FILTERED HOT WATER
LIQUID PREBLEND 3
LIQUID PREBLEND 2
LIQUID PREBLEND 1
STEAM
FROM PLC
DRAIN
EXHAUST
RELIEF
STEAM SPARGER
FROM PLC
FROM PLC
PRODUCT OUT 1
PRODUCT OUT 2
ICARUS P&ID
Kettle Blender w/o Steam Jacket #111
April 1998

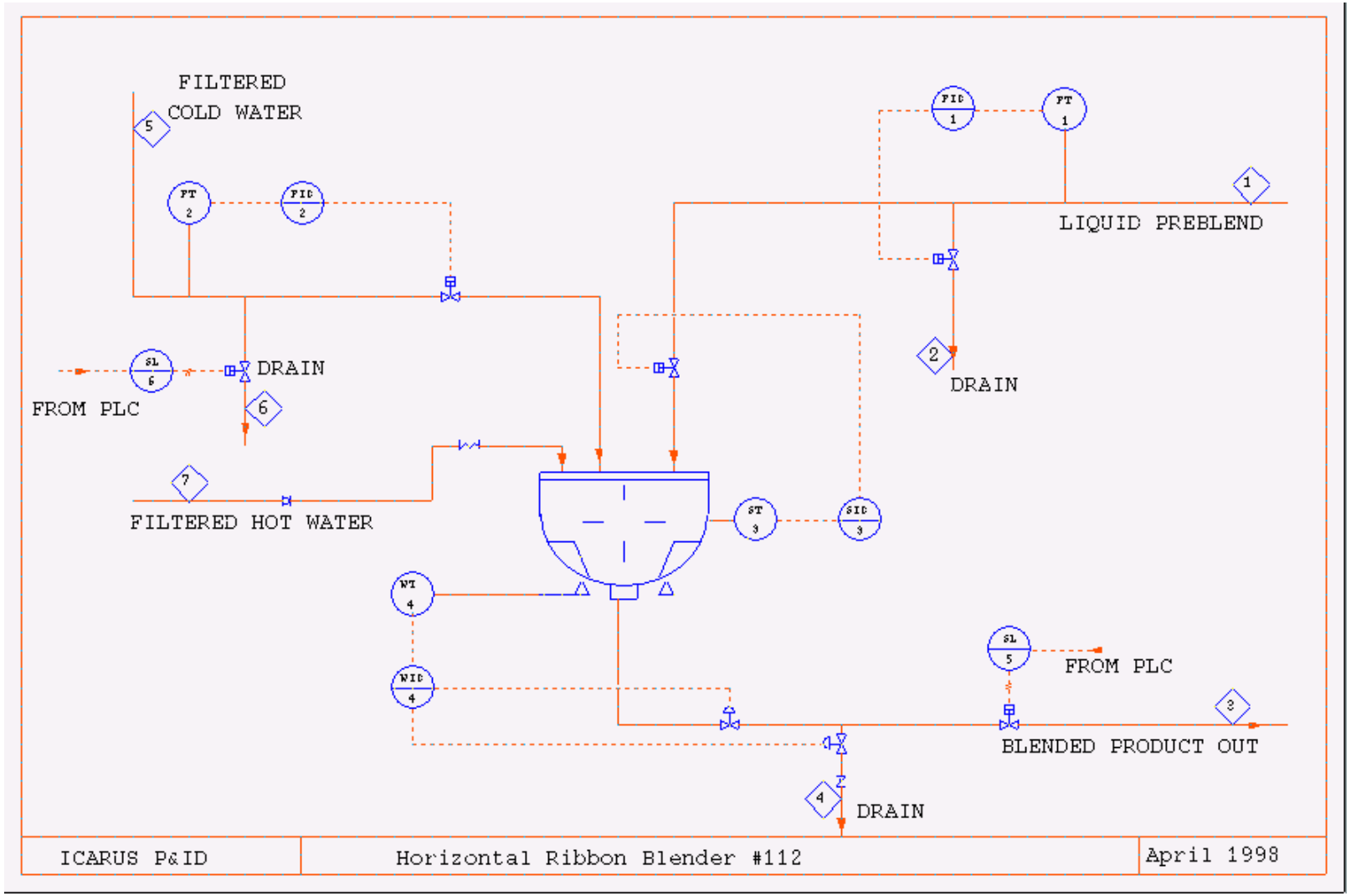
111 Kettle Blender With Steam Jacket



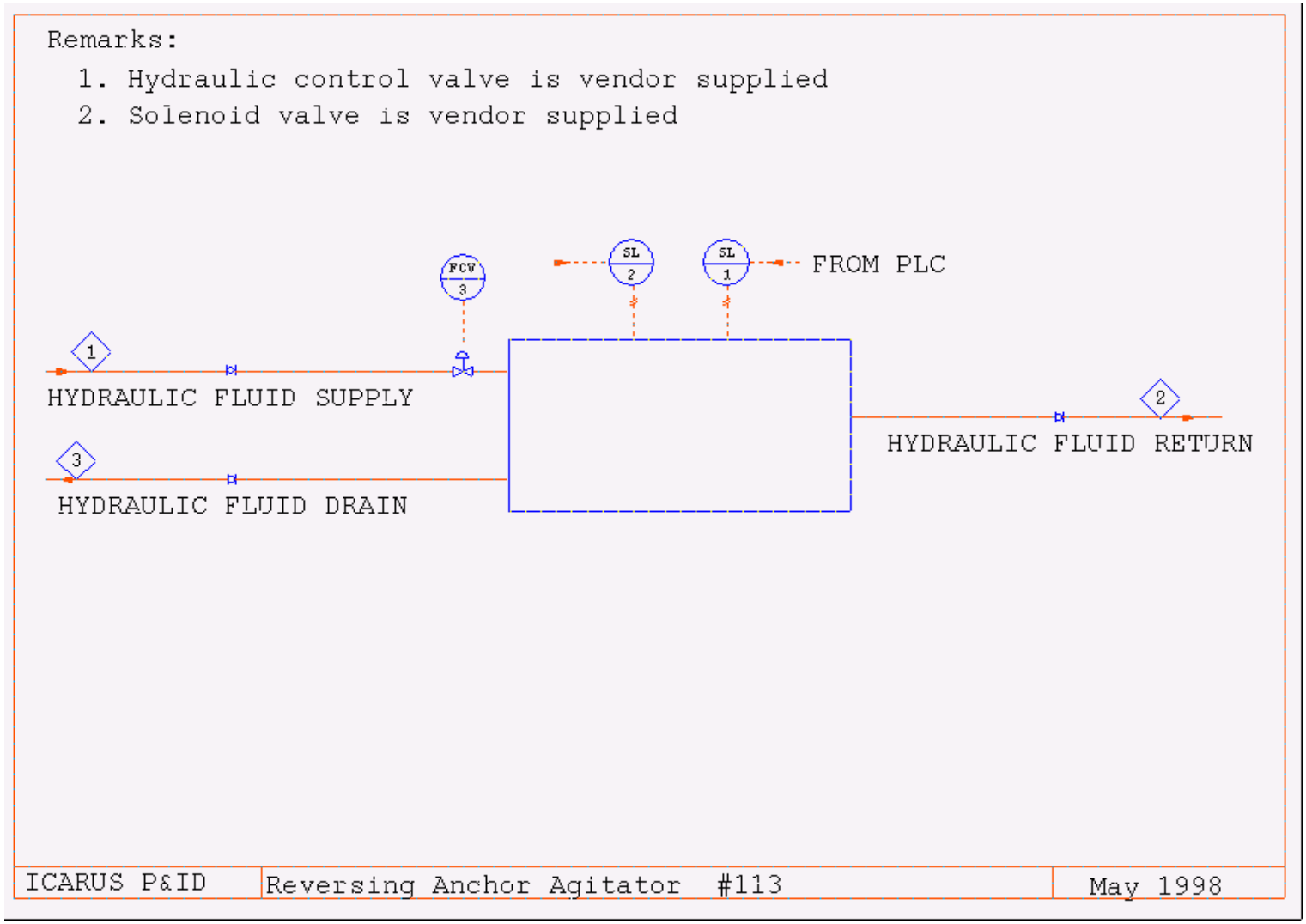
112 Horizontal Ribbon Blender



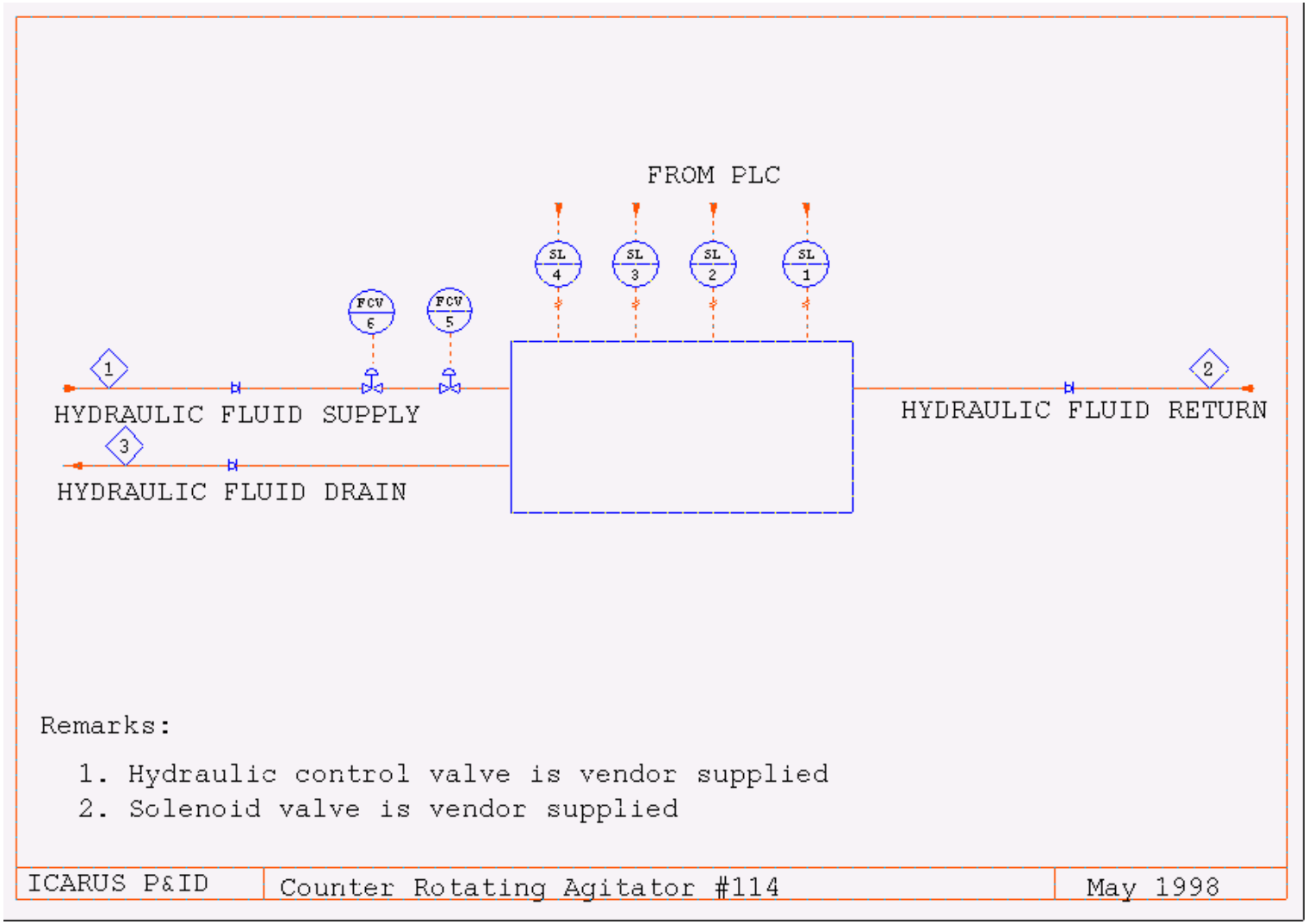
112 Jacket Horizontal Ribbon Blender



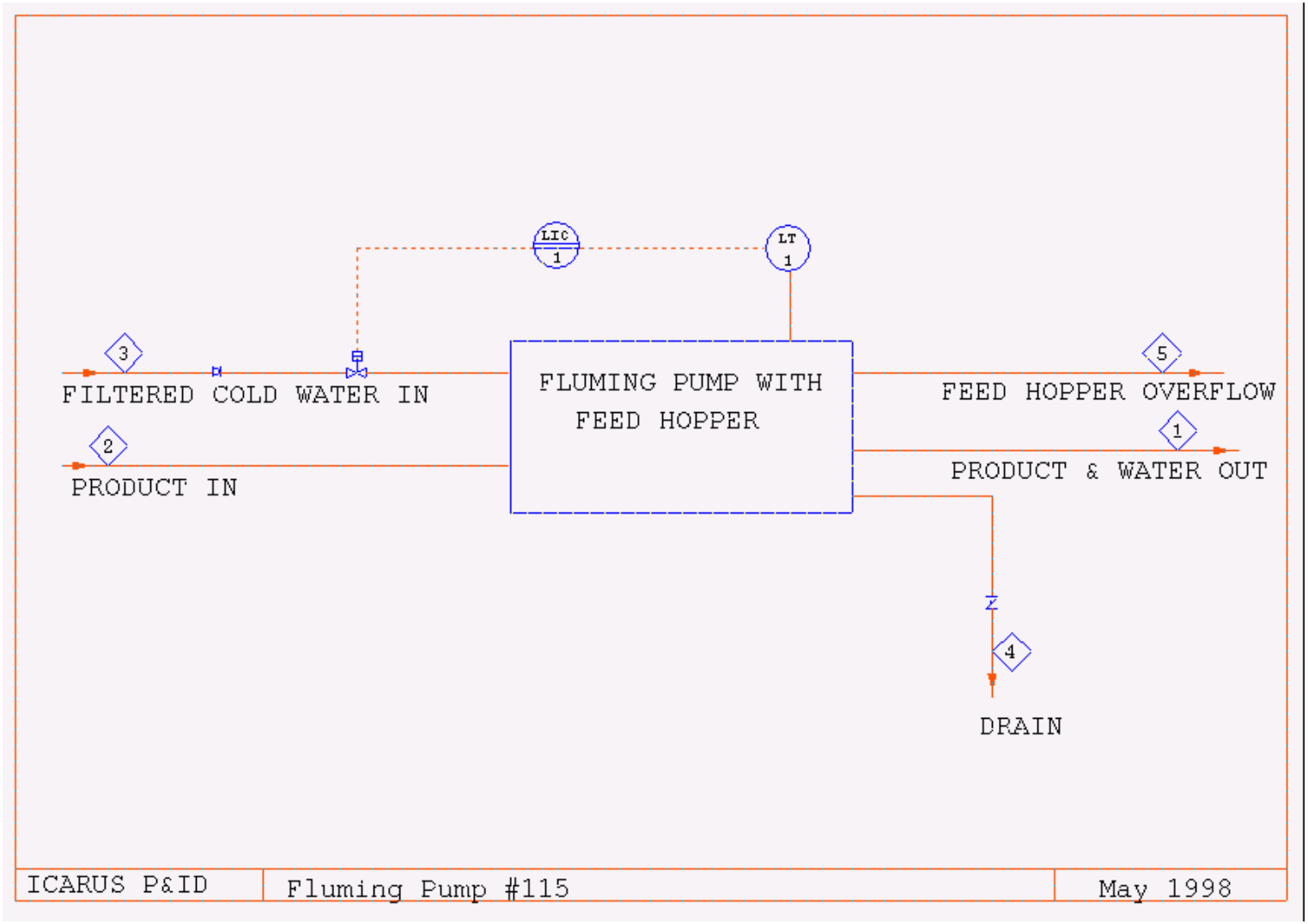
113 Reversing Anchor Agitator


Remarks:
1. Hydraulic control valve is vendor supplied
2. Solenoid valve is vendor supplied
FCV 3
SL 2
SL 1
FROM PLC
1
HYDRAULIC FLUID SUPPLY
3
HYDRAULIC FLUID DRAIN
2
HYDRAULIC FLUID RETURN
ICARUS P&ID
Reversing Anchor Agitator #113
May 1998

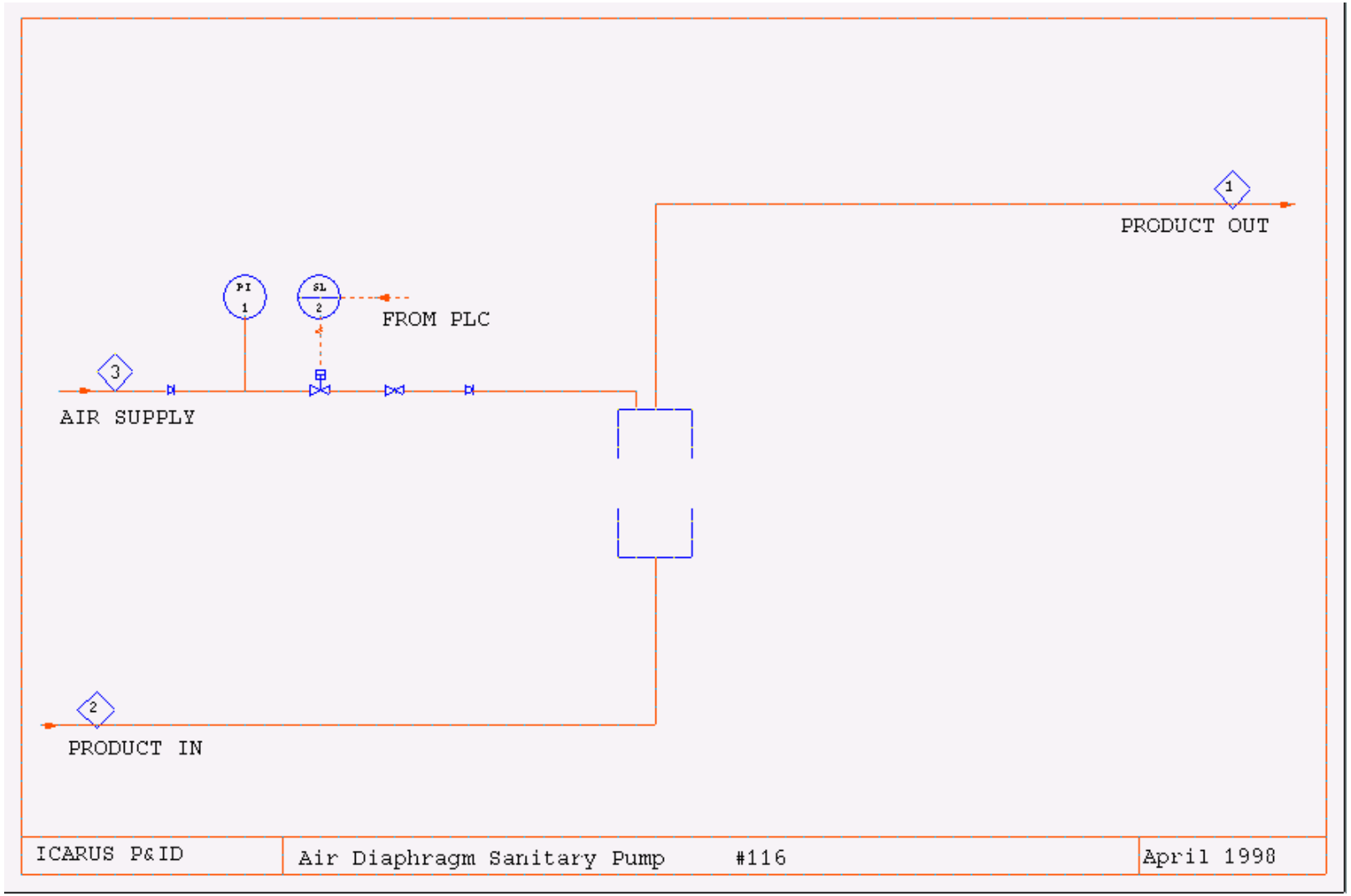
114 Double Motion Agitator


FROM PLC
SL 4
SL 3
SL 2
SL 1
FCV 6
FCV 5
1
HYDRAULIC FLUID SUPPLY
3
HYDRAULIC FLUID DRAIN
2
HYDRAULIC FLUID RETURN
Remarks:
1. Hydraulic control valve is vendor supplied
2. Solenoid valve is vendor supplied
ICARUS P&ID
Counter Rotating Agitator #114
May 1998

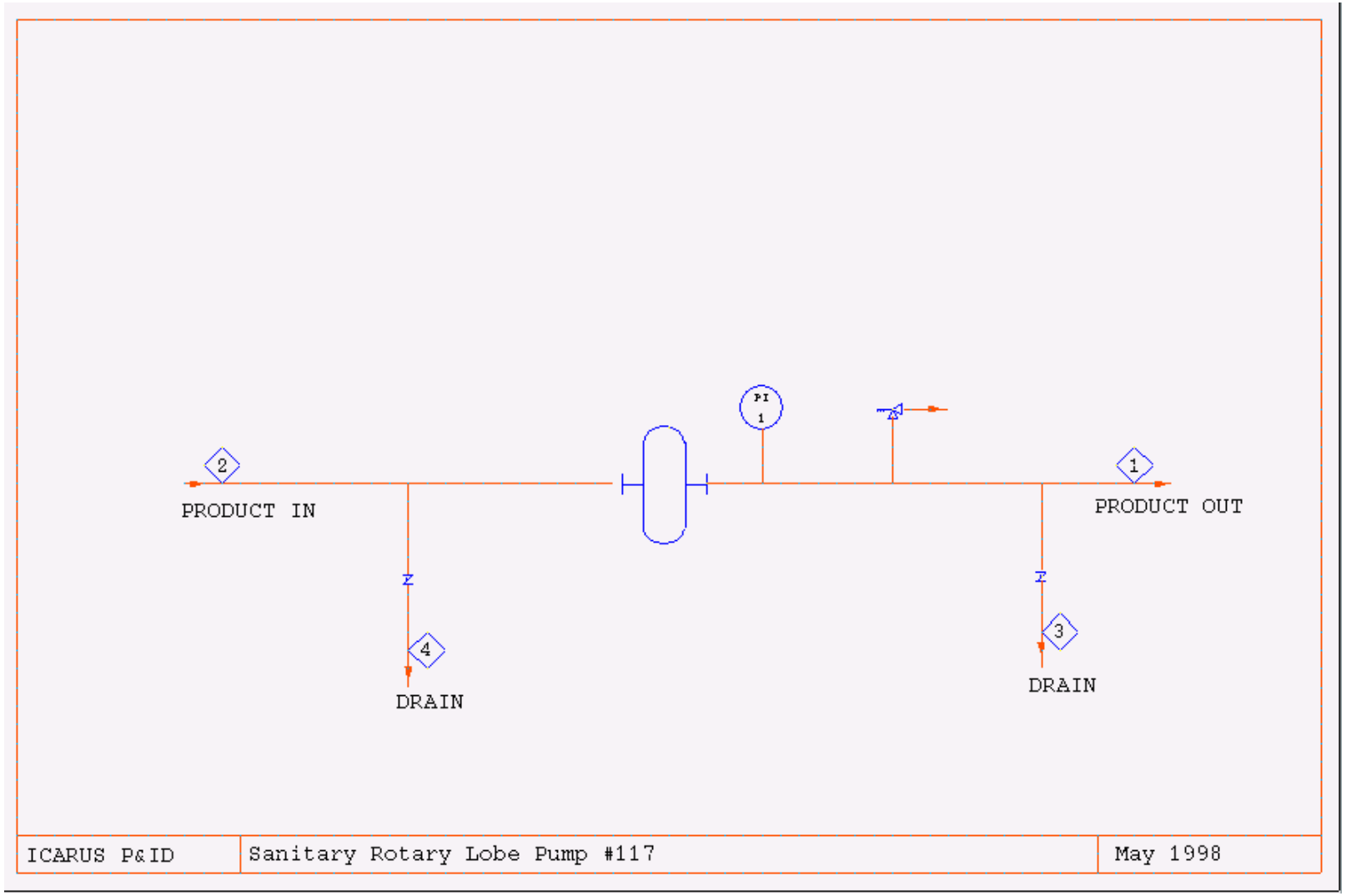
115 Fluming Pump


LIC
1
LT
1
3
FILTERED COLD WATER IN
2
PRODUCT IN
FLUMING PUMP WITH
FEED HOPPER
5
FEED HOPPER OVERFLOW
1
PRODUCT & WATER OUT
4
DRAIN
ICARUS P&ID
Fluming Pump #115
May 1998

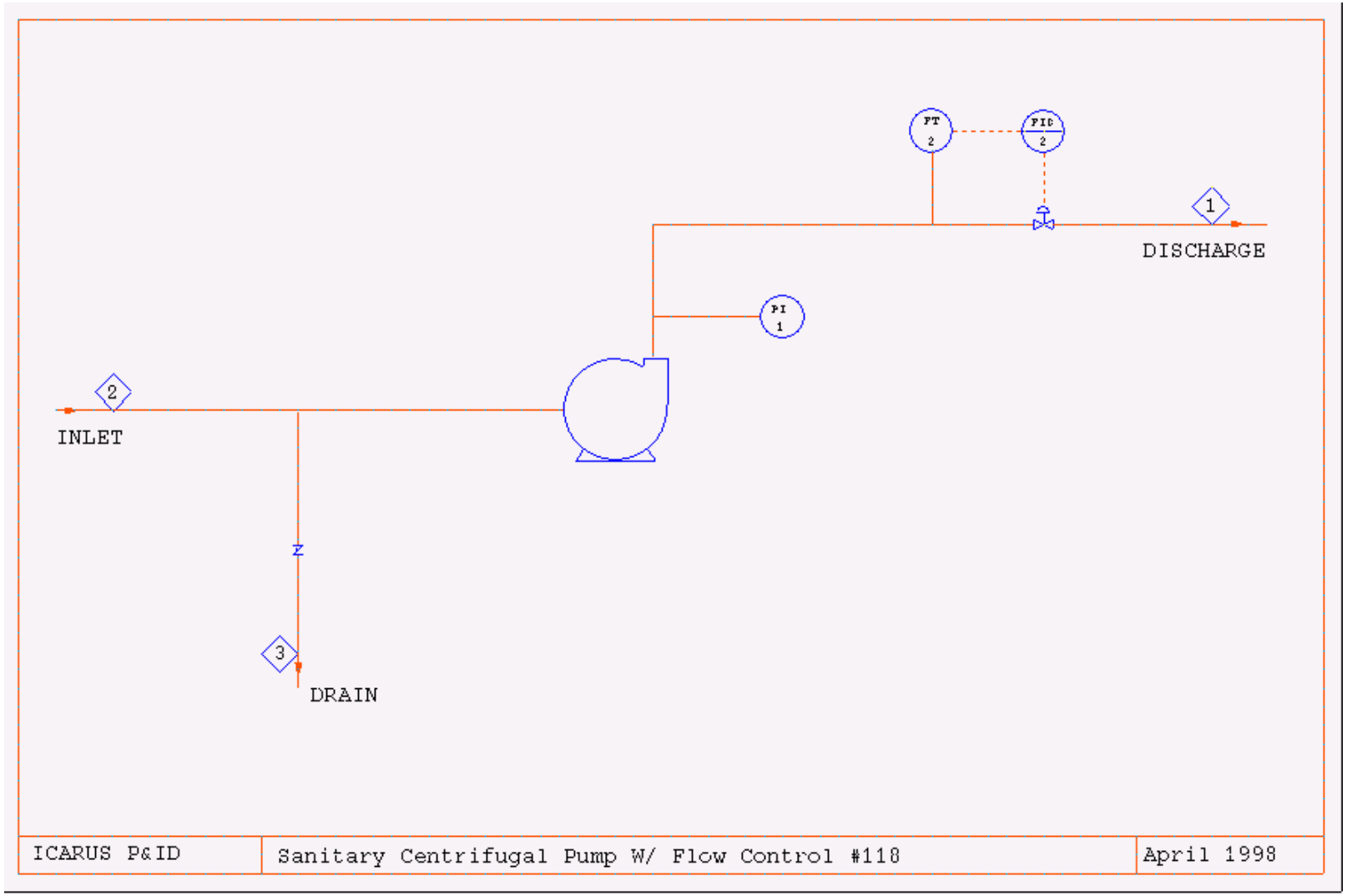
116 Air Diaphragm Sanitary Pump



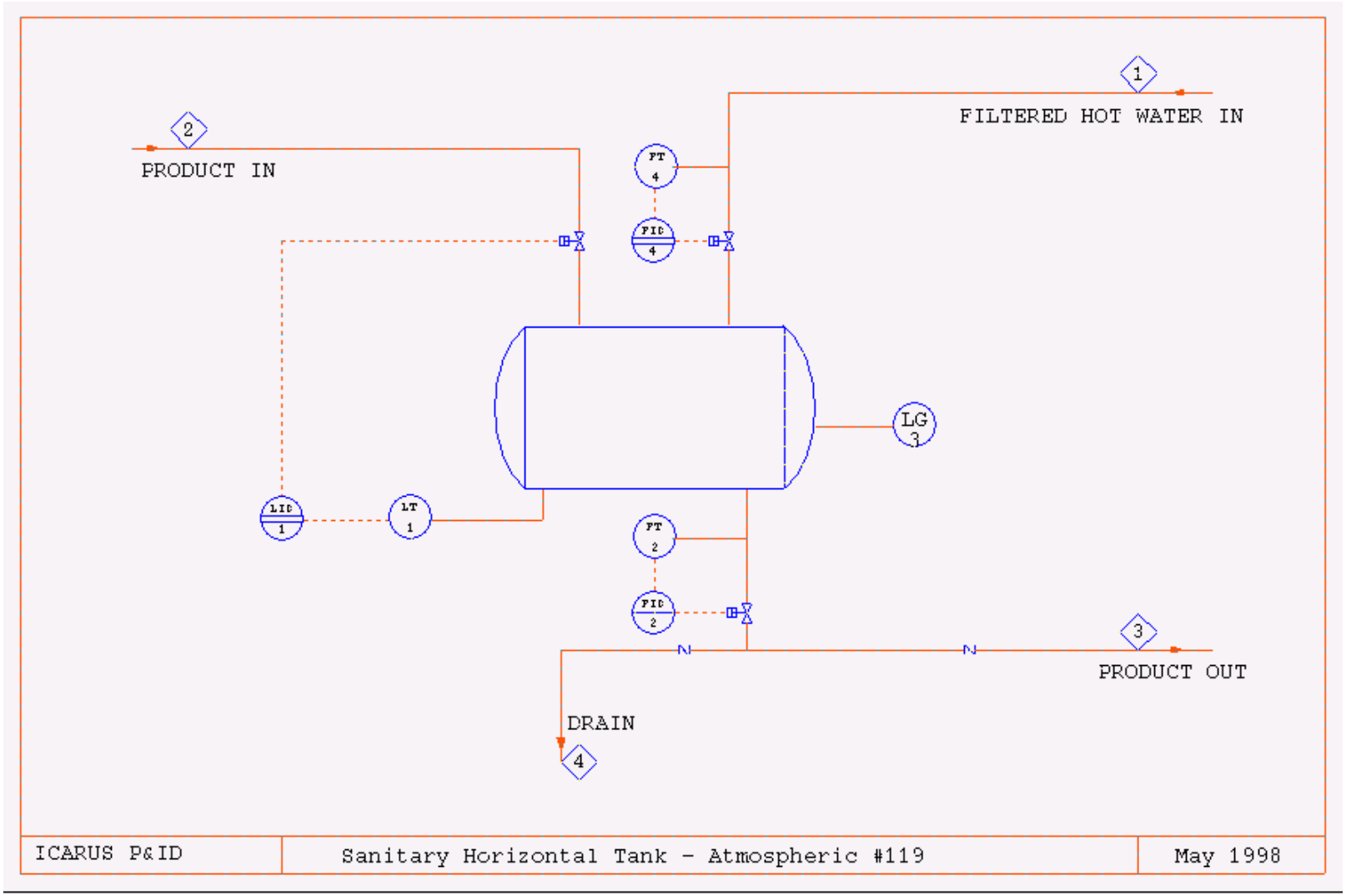
117 Sanitary Rotary Lobe Pump


PI
1
2
PRODUCT IN
1
PRODUCT OUT
4
DRAIN
3
DRAIN
ICARUS P&ID
Sanitary Rotary Lobe Pump #117
May 1998

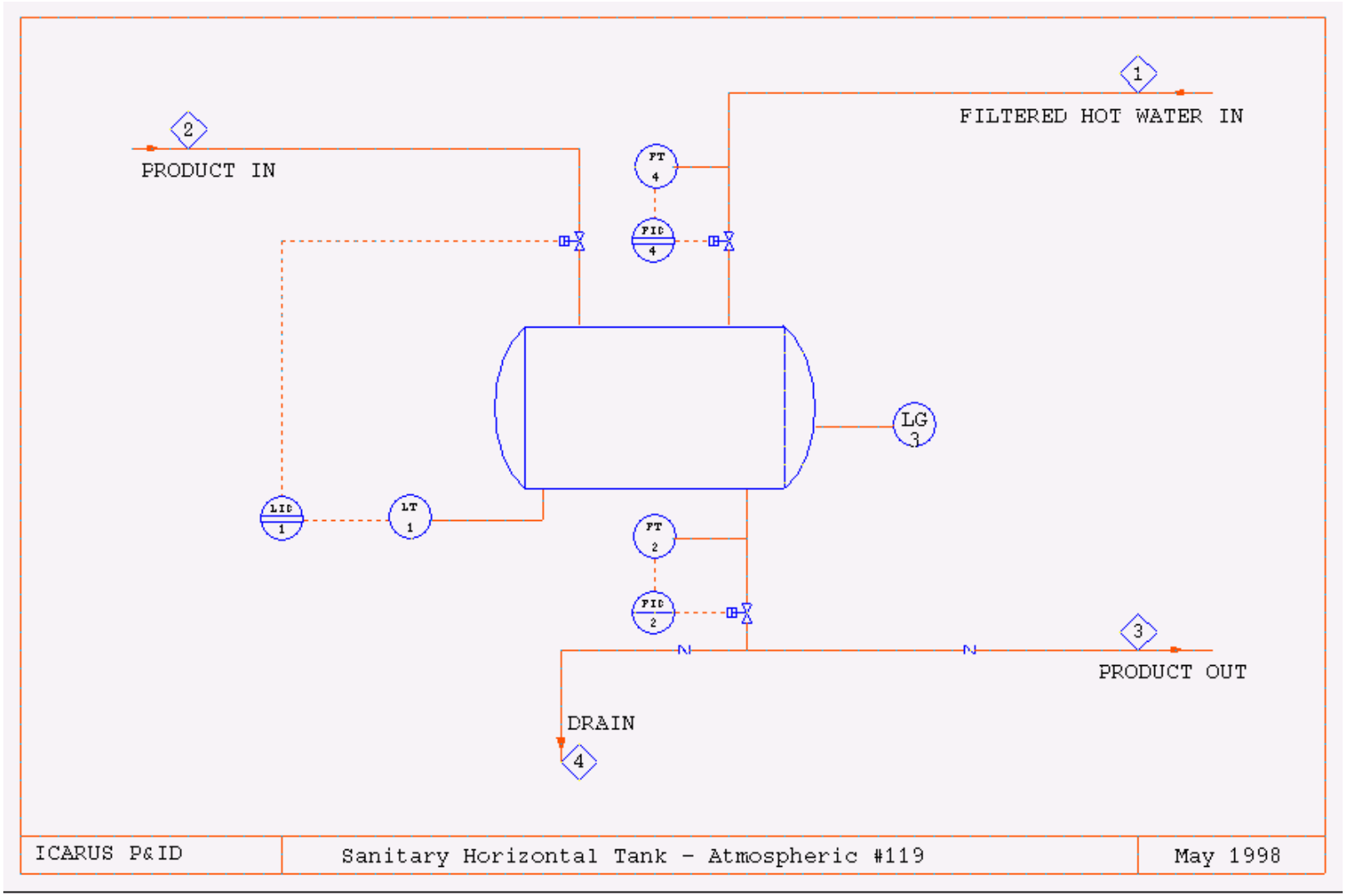
118 Sanitary Centrifugal Pump With Flow Control


FT
2
FIC
2
1
DISCHARGE
PI
1
2
INLET
Z
3
DRAIN
ICARUS P&ID
Sanitary Centrifugal Pump W/ Flow Control #118
April 1998

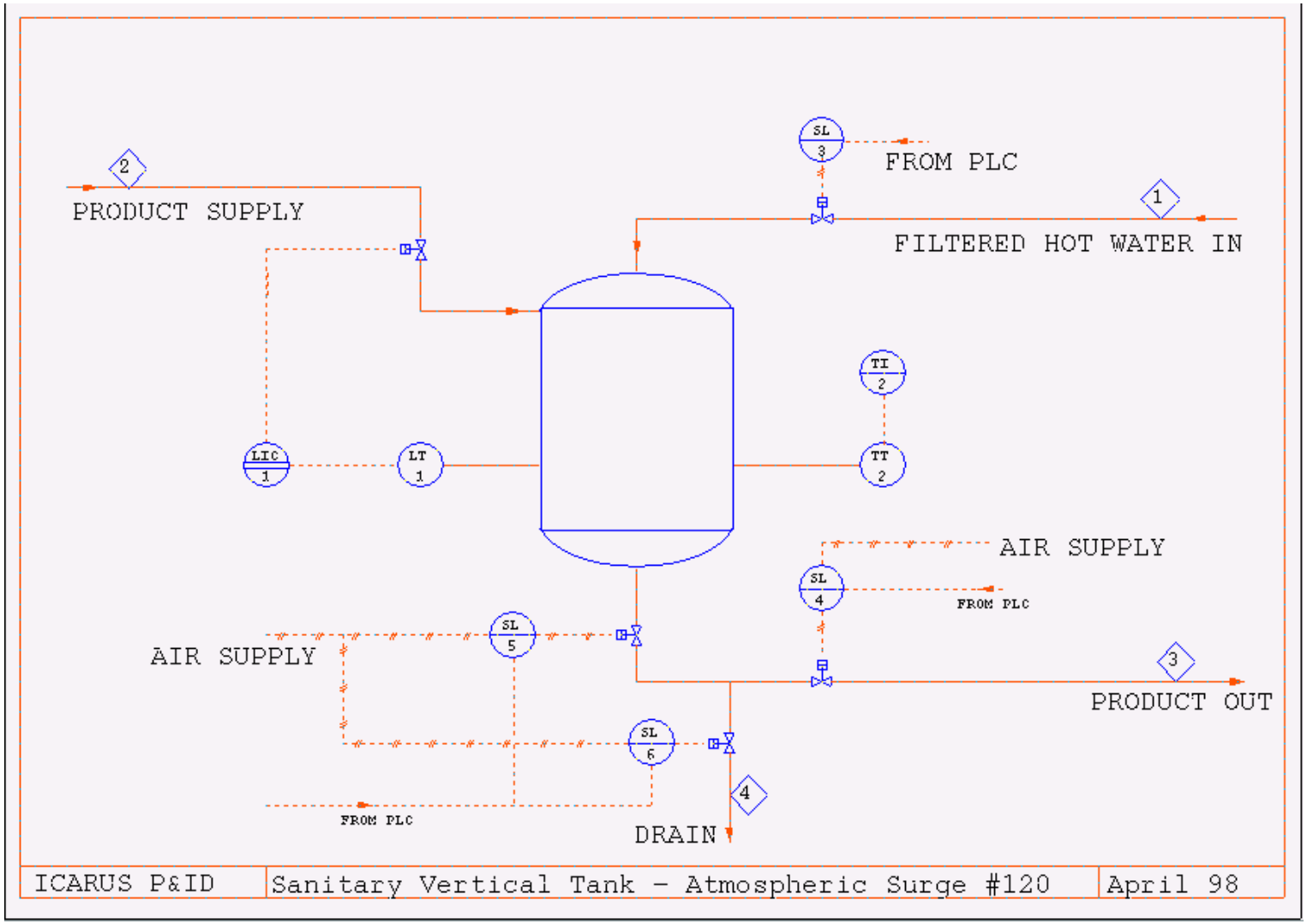
119 Sanitary Horizontal Tank


1
FILTERED HOT WATER IN
2
PRODUCT IN
FT 4
FIC 4
LG 3
LIC 1
LT 1
FT 2
FIC 2
3
PRODUCT OUT
DRAIN
4
ICARUS P&ID
Sanitary Horizontal Tank - Atmospheric #119
May 1998

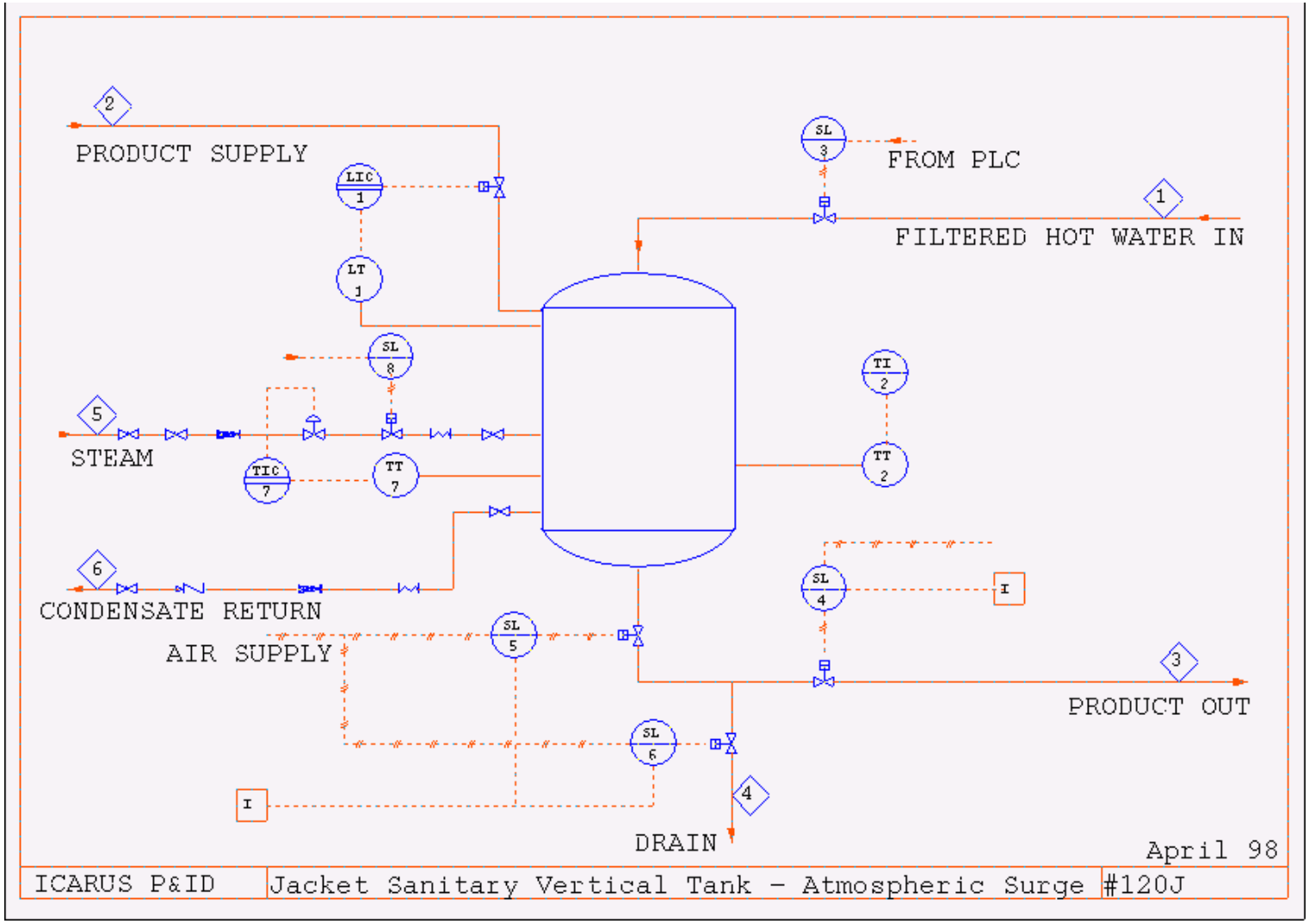
119 Jacket Sanitary Horizontal Tank


1
FILTERED HOT WATER IN
2
PRODUCT IN
FT 4
FIC 4
LG 3
LIC 1
LT 1
FT 2
FIC 2
3
PRODUCT OUT
DRAIN
4
ICARUS P&ID
Sanitary Horizontal Tank - Atmospheric #119
May 1998

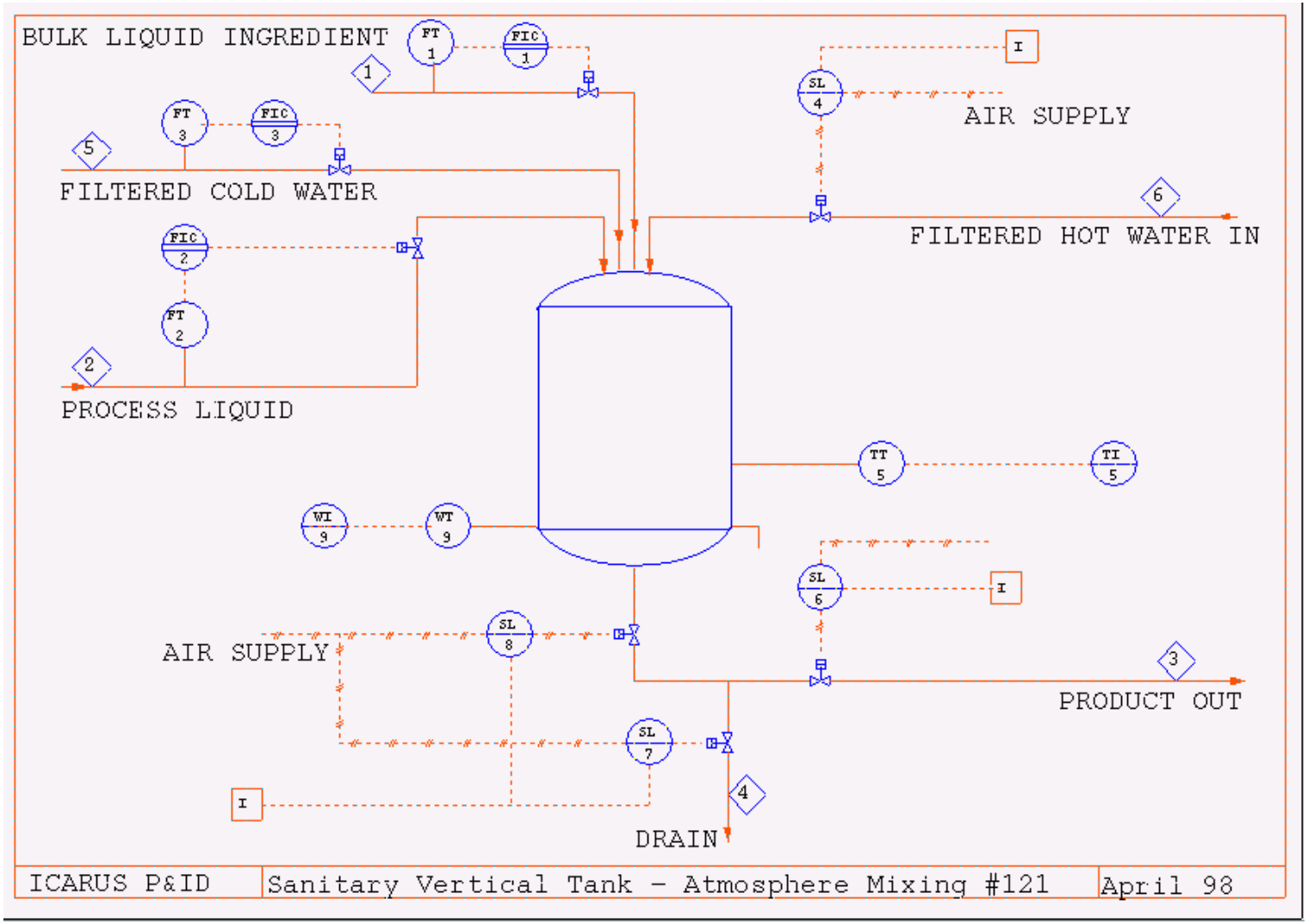
120 Sanitary Vertical Tank – Atmospheric Surge


SL 3
FROM PLC
2
PRODUCT SUPPLY
1
FILTERED HOT WATER IN
TI 2
LIC 1
LT 1
TT 2
AIR SUPPLY
SL 4
FROM PLC
AIR SUPPLY
SL 5
3
PRODUCT OUT
SL 6
4
FROM PLC
DRAIN
ICARUS P&ID
Sanitary Vertical Tank - Atmospheric Surge #120
April 98

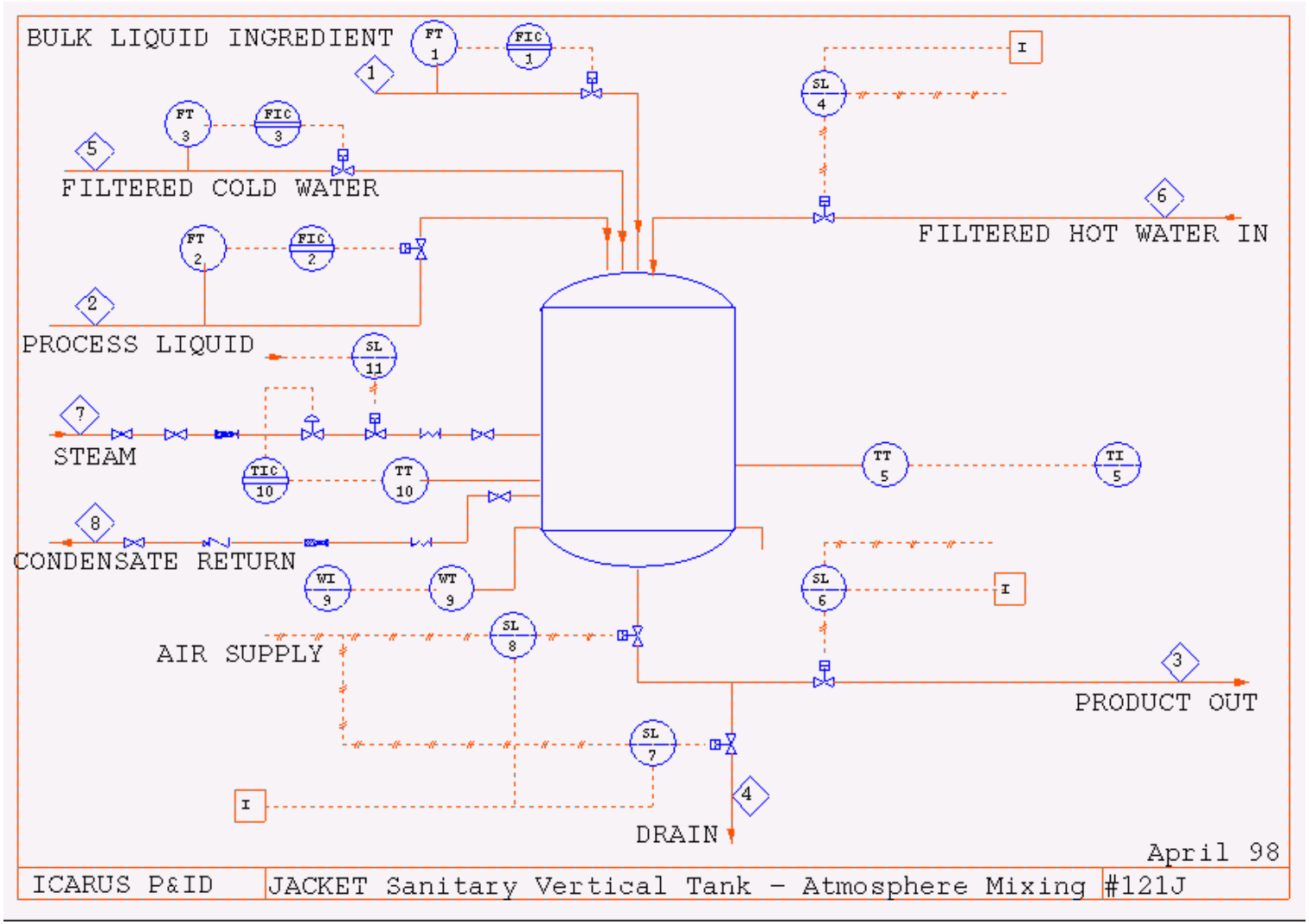
120 Jacket Sanitary Vertical Tank – Atmospheric Surge


2
PRODUCT SUPPLY
LIC 1
LT 1
SL 8
5
STEAM
TIC 7
TT 7
6
CONDENSATE RETURN
AIR SUPPLY
SL 5
SL 6
I
4
DRAIN
SL 3
FROM PLC
1
FILTERED HOT WATER IN
TI 2
TT 2
SL 4
I
3
PRODUCT OUT
April 98
ICARUS P&ID
Jacket Sanitary Vertical Tank - Atmospheric Surge
#120J

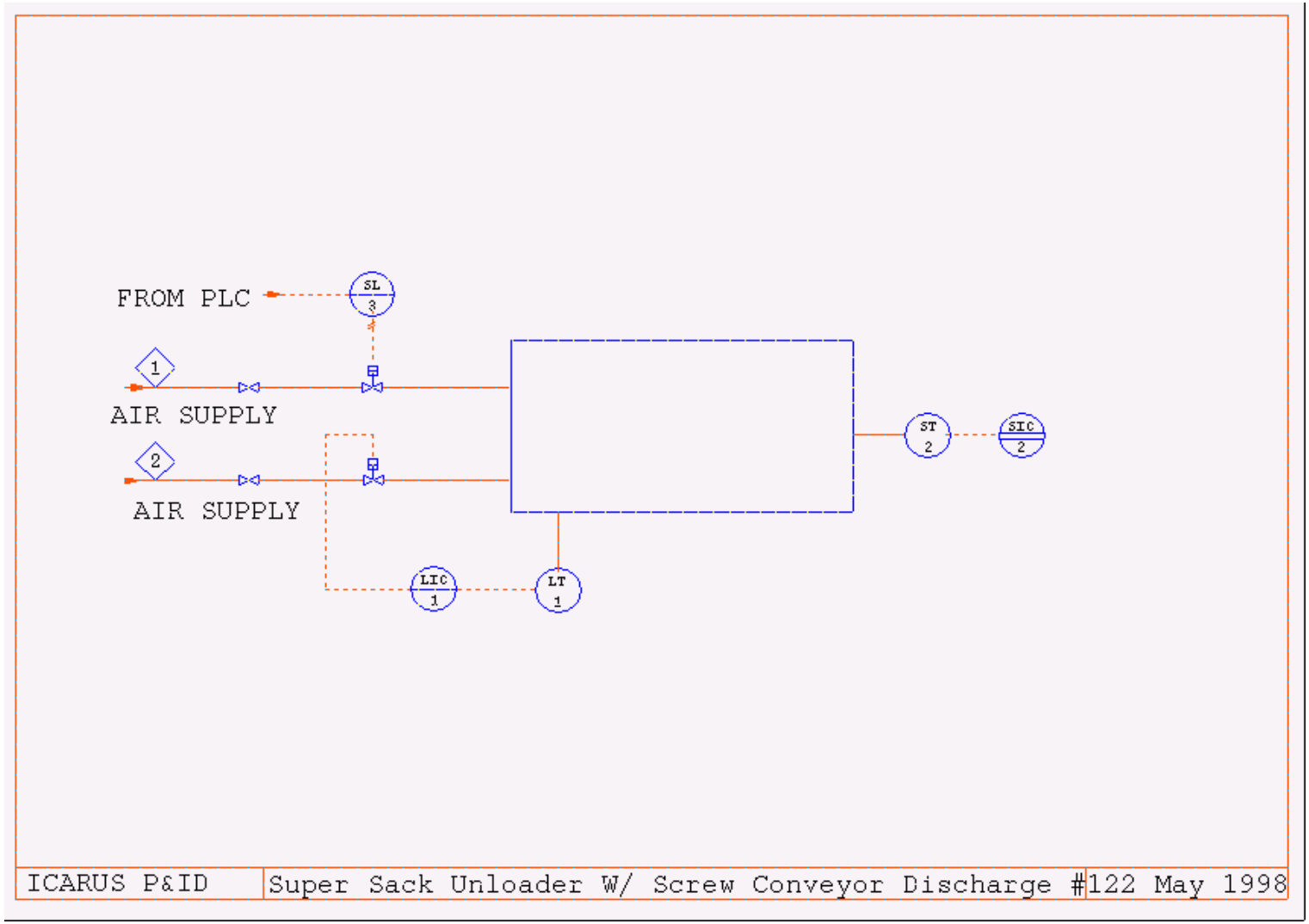
121 Sanitary Vertical Tank – Atmospheric Mixing


BULK LIQUID INGREDIENT
FT 1
FIC 1
1
SL 4
I
AIR SUPPLY
FT 3
FIC 3
5
FILTERED COLD WATER
6
FILTERED HOT WATER IN
FIC 2
FT 2
2
PROCESS LIQUID
TT 5
TI 5
WI 9
WT 9
SL 6
I
AIR SUPPLY
SL 8
3
PRODUCT OUT
SL 7
I
4
DRAIN
ICARUS P&ID
Sanitary Vertical Tank - Atmosphere Mixing #121
April 98

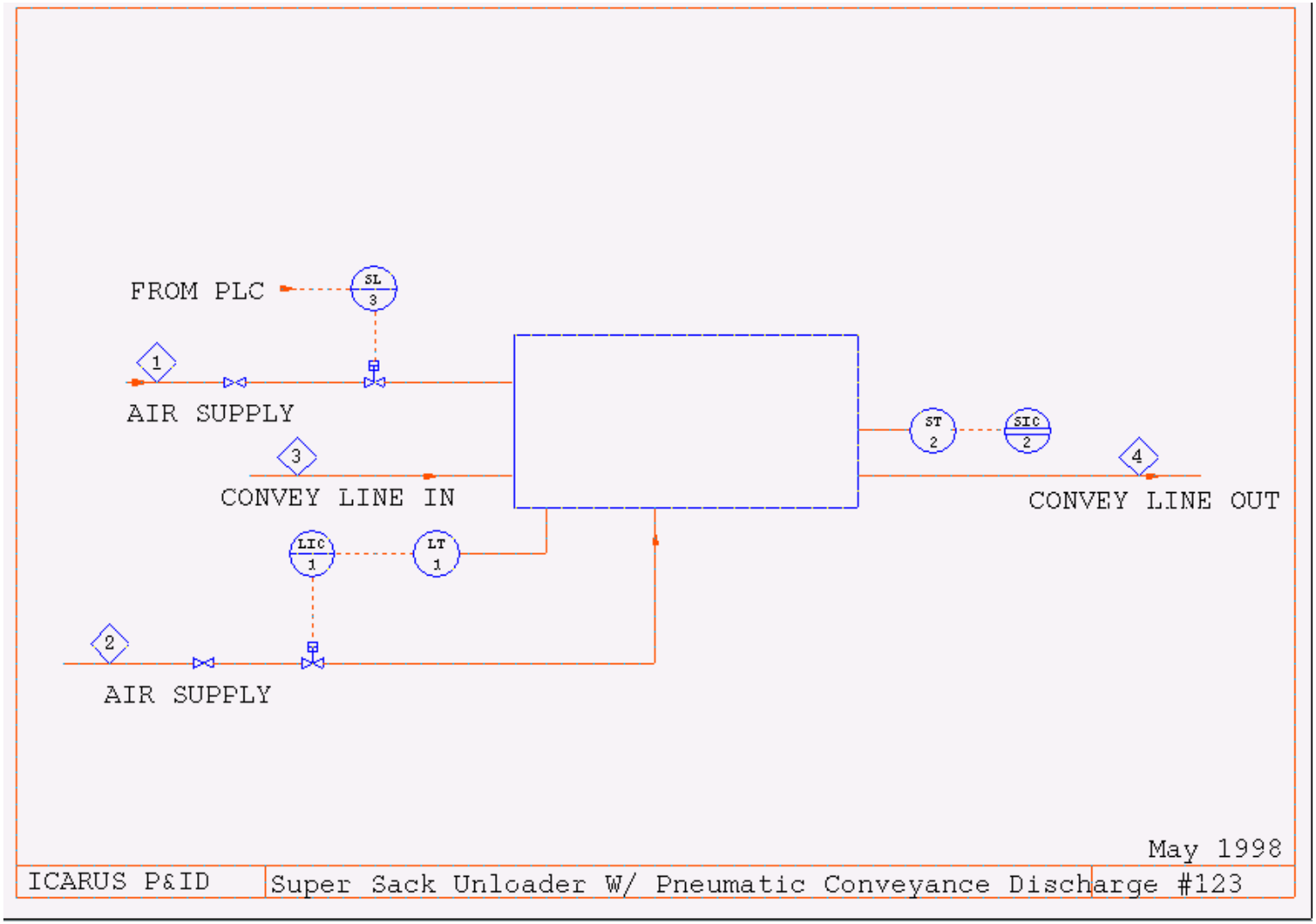
121 Jacket Sanitary Vertical Tank – Atmospheric Mixing


BULK LIQUID INGREDIENT
FT 1
FIC 1
1
FT 3
FIC 3
5
FILTERED COLD WATER
FT 2
FIC 2
2
PROCESS LIQUID
SL 11
7
STEAM
TIC 10
TT 10
8
CONDENSATE RETURN
WI 9
WT 9
AIR SUPPLY
SL 8
SL 7
I
4
DRAIN
I
SL 4
6
FILTERED HOT WATER IN
TT 5
TI 5
SL 6
I
3
PRODUCT OUT
April 98
ICARUS P&ID
JACKET Sanitary Vertical Tank - Atmosphere Mixing
#121J

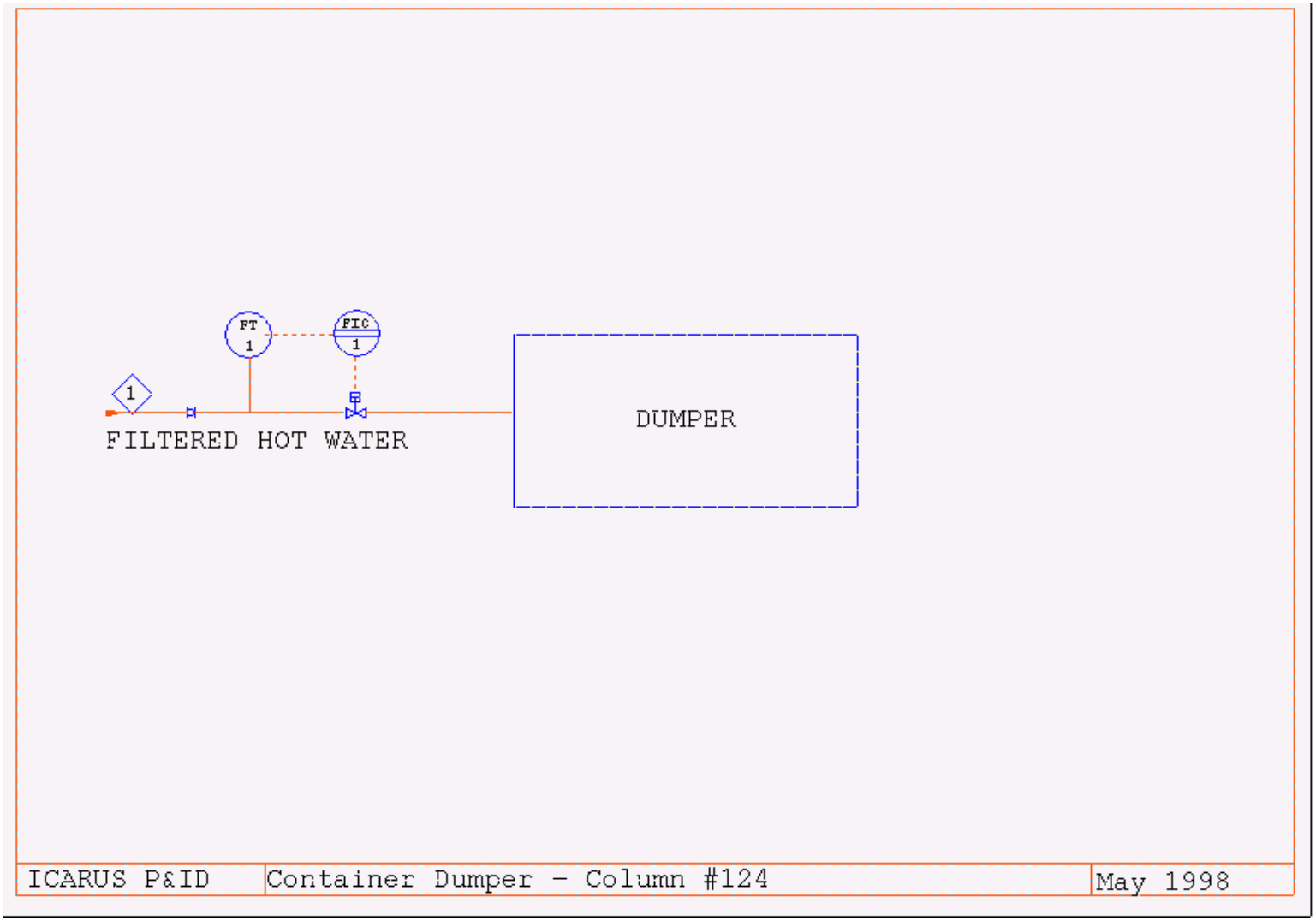
122 Super Sack Unloader With Screw Conveyor Discharge


FROM PLC
SL
3
1
AIR SUPPLY
2
AIR SUPPLY
ST
2
SIC
2
LIC
1
LT
1
ICARUS P&ID
Super Sack Unloader W/ Screw Conveyor Discharge #1
22 May 1998

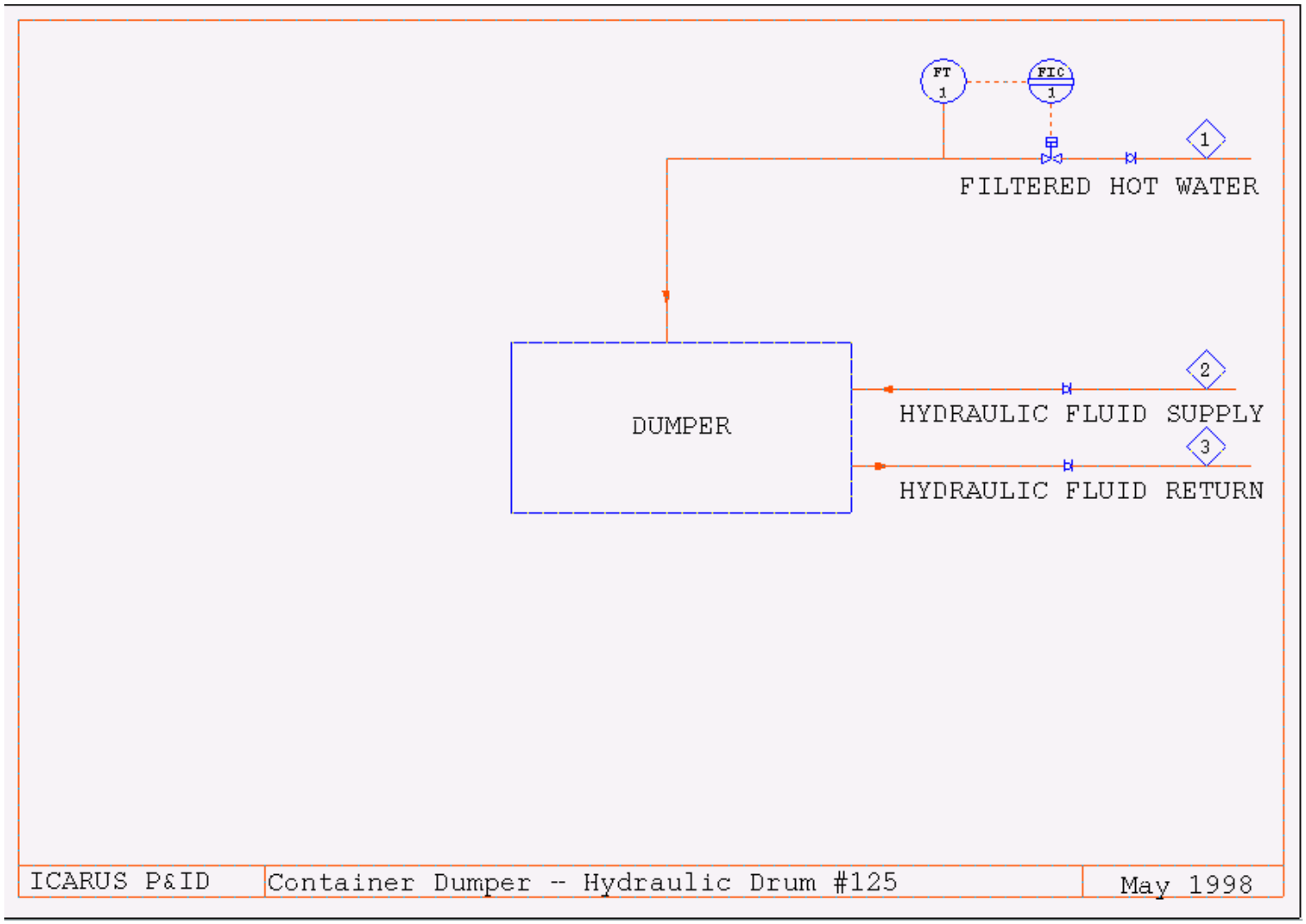
123 Super Sack Unloader With Pneumatic Conveyance Discharge


FROM PLC
SL 3
1
AIR SUPPLY
3
CONVEY LINE IN
LIC 1
LT 1
2
AIR SUPPLY
ST 2
SIC 2
4
CONVEY LINE OUT
May 1998
ICARUS P&ID
Super Sack Unloader W/ Pneumatic Conveyance Discharge #123

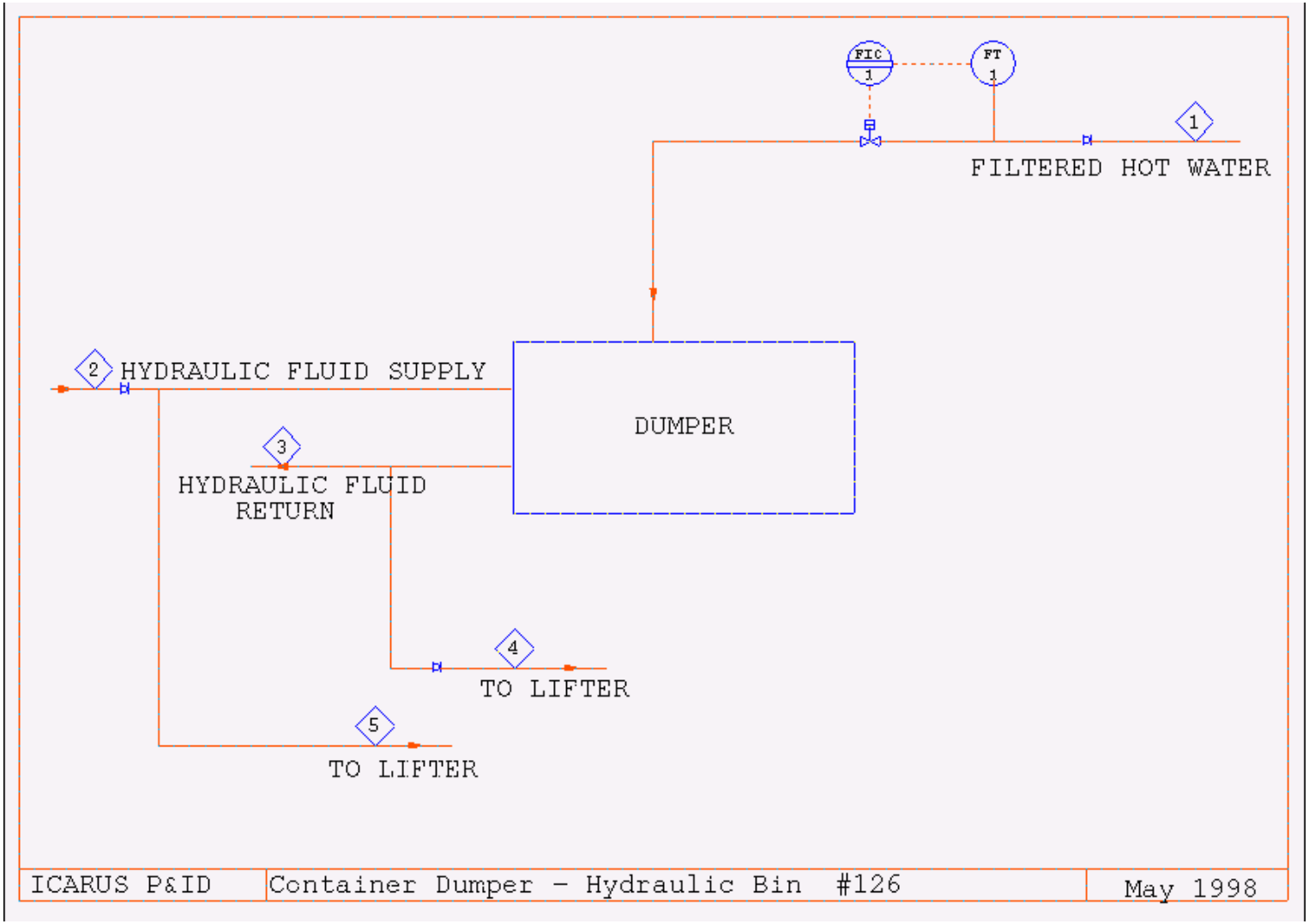
124 Container Dumper – Column


FT
1
FIC
1
1
FILTERED HOT WATER
DUMPER
ICARUS P&ID
Container Dumper - Column #124
May 1998

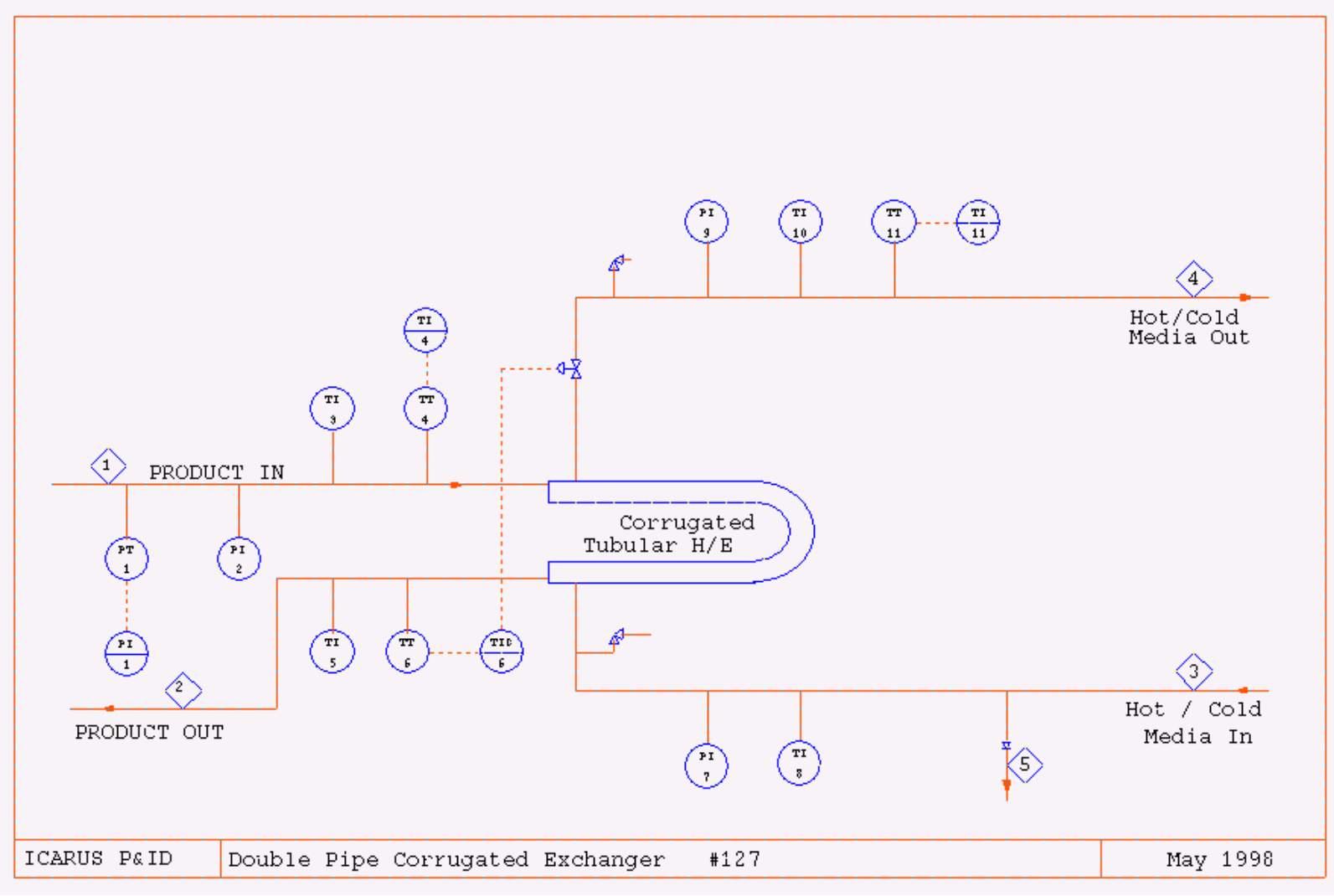
125 Container Dumper – Hydraulic Drum


FT
1
FIC
1
1
FILTERED HOT WATER
DUMPER
2
HYDRAULIC FLUID SUPPLY
3
HYDRAULIC FLUID RETURN
ICARUS P&ID
Container Dumper -- Hydraulic Drum #125
May 1998

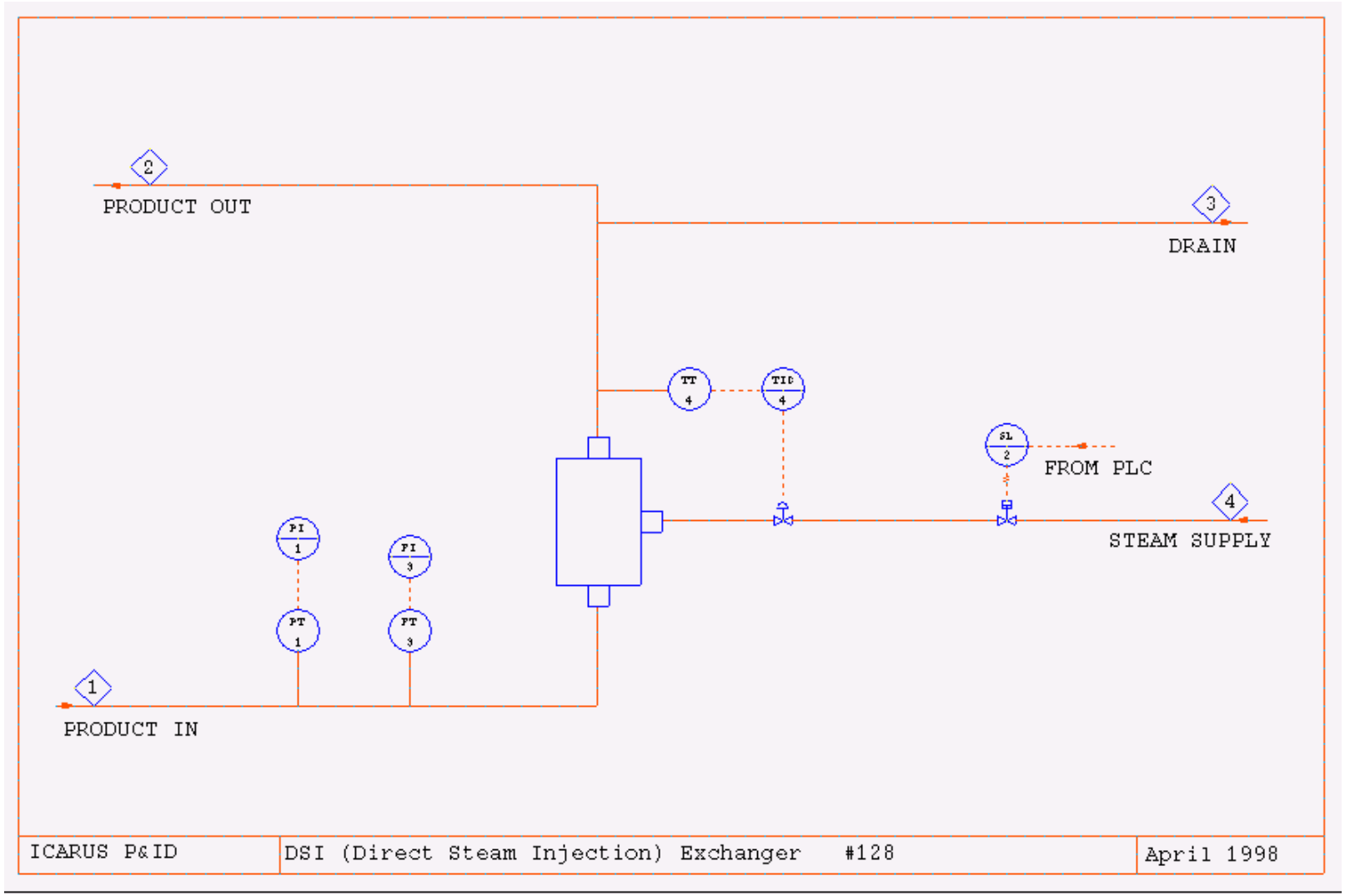
126 Container Dumper – Hydraulic Bin


FIC
1
FT
1
1
FILTERED HOT WATER
2
HYDRAULIC FLUID SUPPLY
DUMPER
3
HYDRAULIC FLUID
RETURN
4
TO LIFTER
5
TO LIFTER
ICARUS P&ID
Container Dumper - Hydraulic Bin #126
May 1998

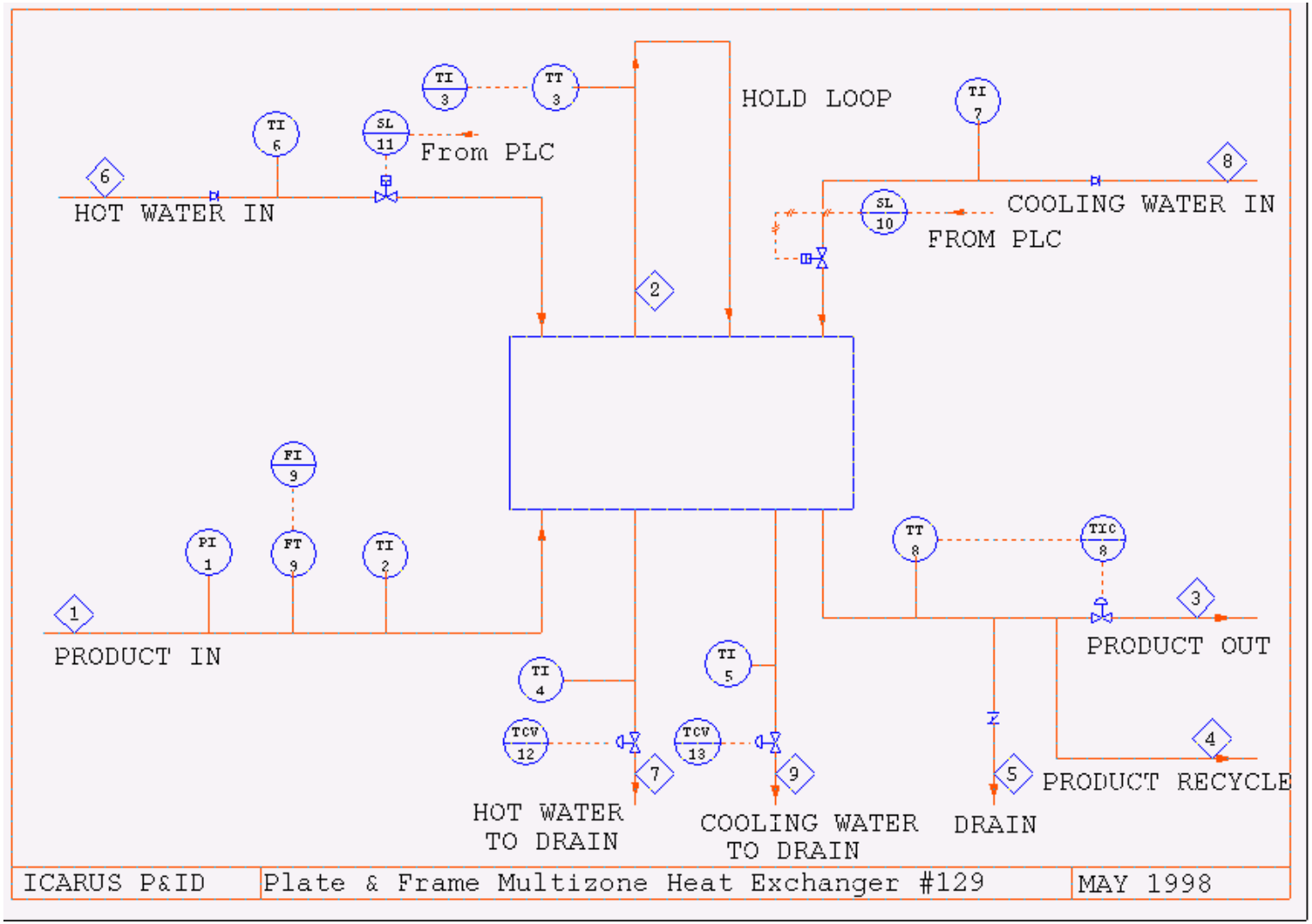
127 Double Pipe Corrugated Exchanger


PI 9
TI 10
TT 11
TI 11
4
Hot/Cold
Media Out
TI 4
TI 3
TT 4
1
PRODUCT IN
Corrugated
Tubular H/E
PT 1
PI 2
PI 1
TI 5
TT 6
TIC 6
2
PRODUCT OUT
3
Hot / Cold
Media In
PI 7
TI 8
5
ICARUS P&ID
Double Pipe Corrugated Exchanger #127
May 1998

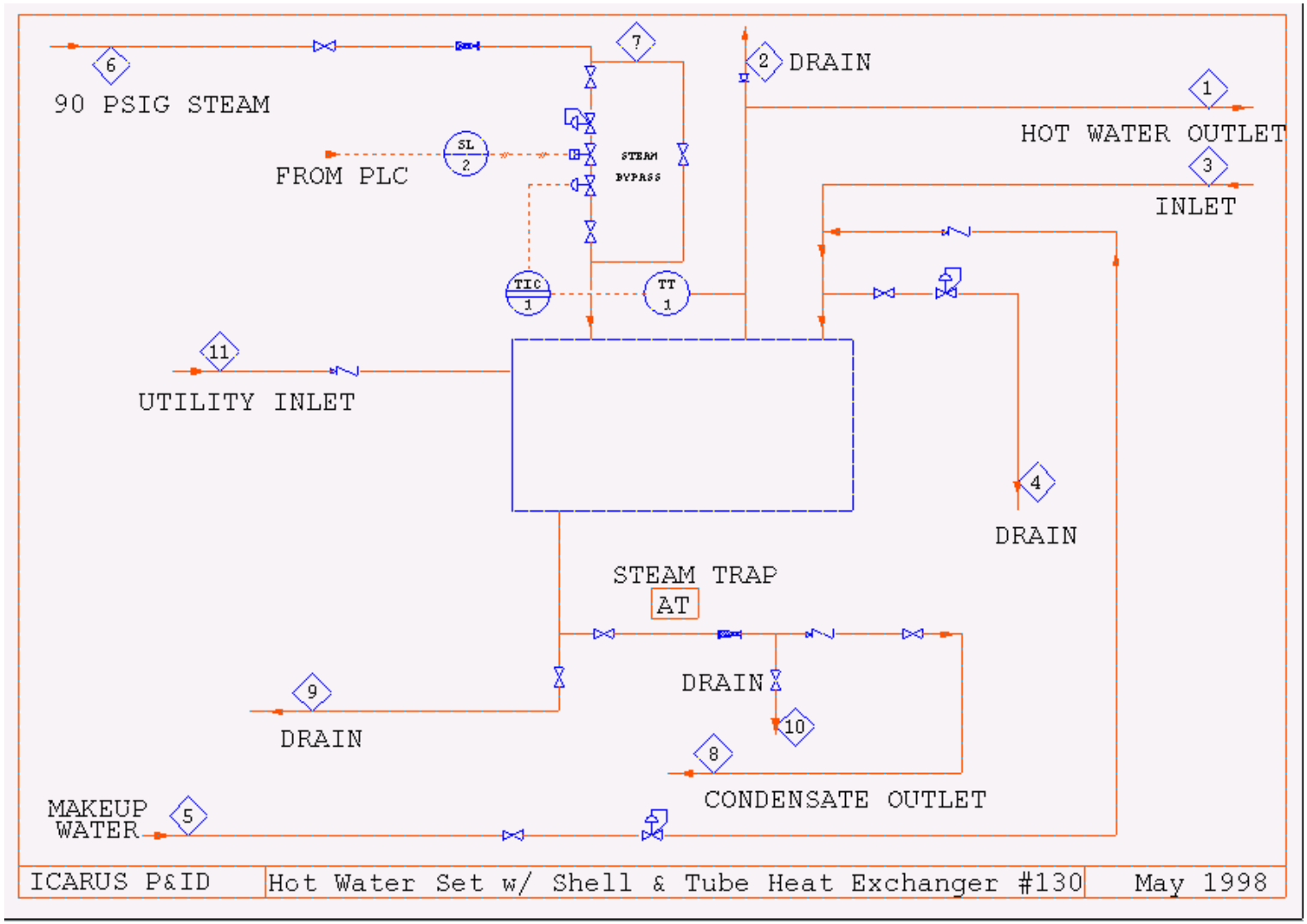
128 Direct Steam Injection (DSI) Exchanger


2
PRODUCT OUT
3
DRAIN
TT
4
TIC
4
SL
2
FROM PLC
4
STEAM SUPPLY
PI
1
PT
1
FI
3
FT
3
1
PRODUCT IN
ICARUS P&ID
DSI (Direct Steam Injection) Exchanger #128
April 1998

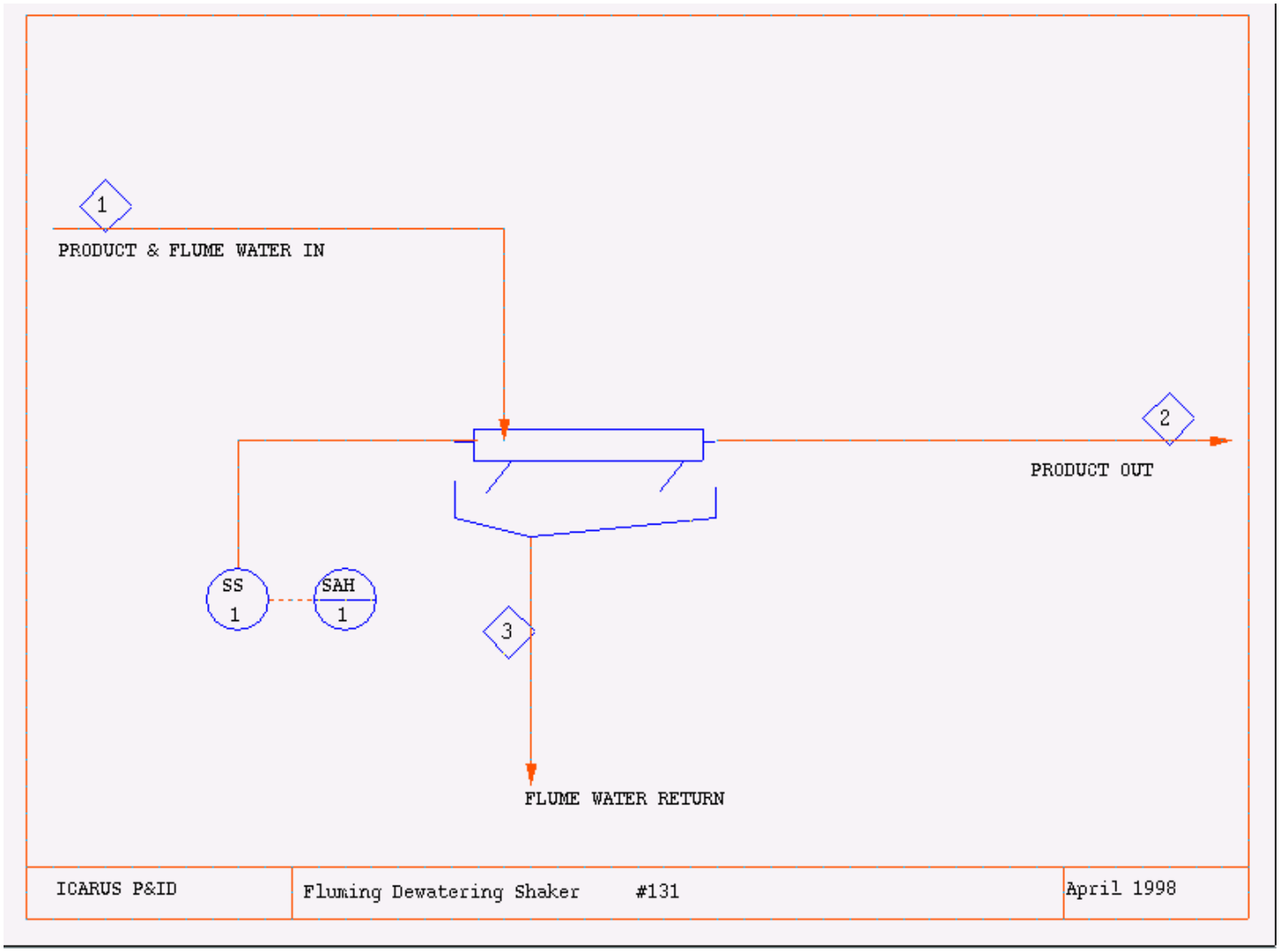
129 Plate & Frame Multizone Heat Exchanger


TI 3
TT 3
HOLD LOOP
TI 7
TI 6
SL 11
From PLC
6
HOT WATER IN
8
SL 10
COOLING WATER IN
FROM PLC
2
FI 9
PI 1
FT 9
TI 2
TT 8
TIC 8
1
PRODUCT IN
3
PRODUCT OUT
TI 4
TI 5
TCV 12
TCV 13
4
7
9
5
PRODUCT RECYCLE
HOT WATER TO DRAIN
COOLING WATER TO DRAIN
DRAIN
ICARUS P&ID
Plate & Frame Multizone Heat Exchanger #129
MAY 1998

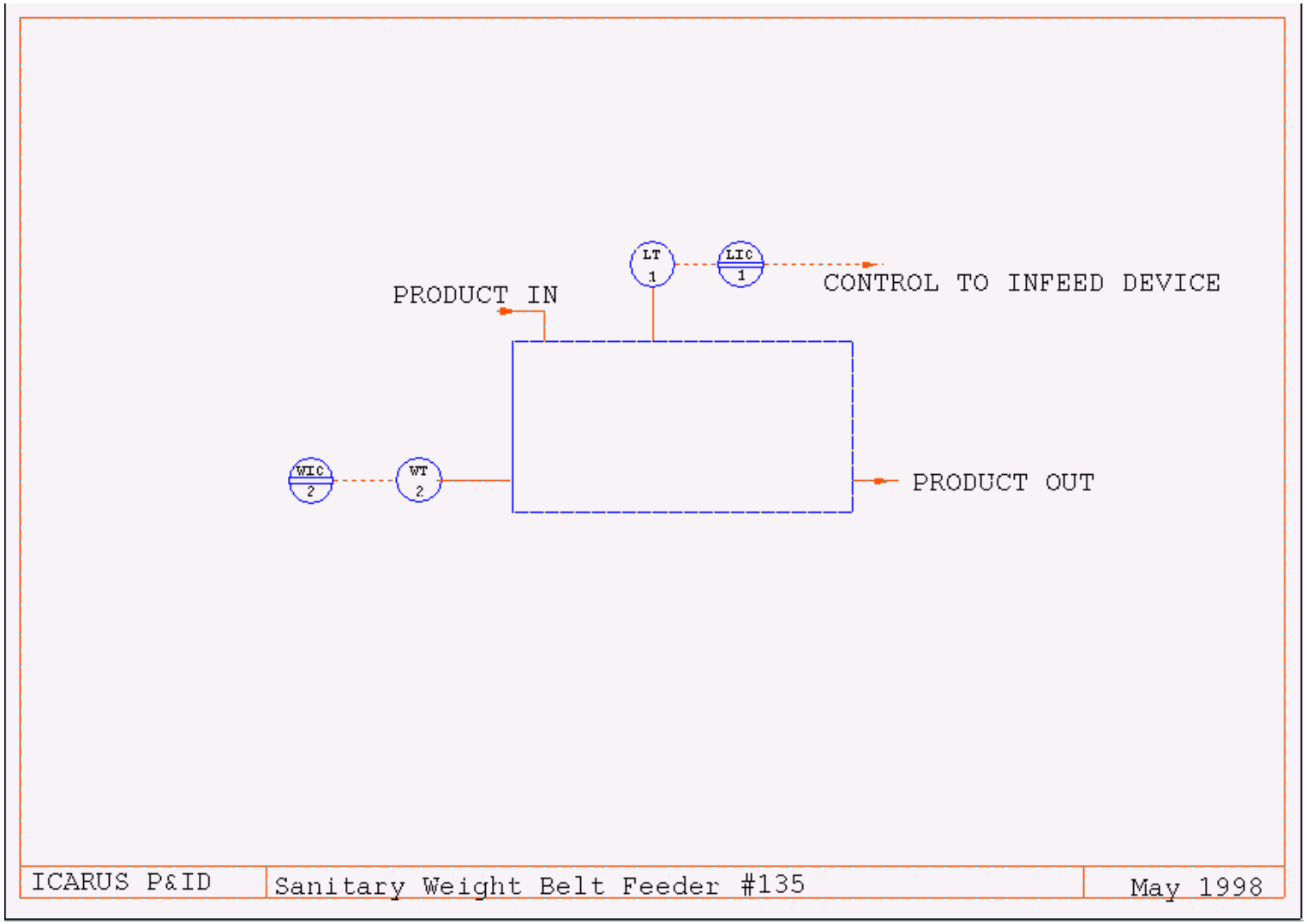
130 Hotwater Set With Shell & Tube Heat Exchanger


6
90 PSIG STEAM
7
2
DRAIN
1
HOT WATER OUTLET
3
INLET
SL
2
FROM PLC
STEAM
BYPASS
TIC
1
TT
1
11
UTILITY INLET
4
DRAIN
STEAM TRAP
AT
9
DRAIN
DRAIN
10
8
CONDENSATE OUTLET
MAKEUP
WATER
5
ICARUS P&ID
Hot Water Set w/ Shell & Tube Heat Exchanger #130
May 1998

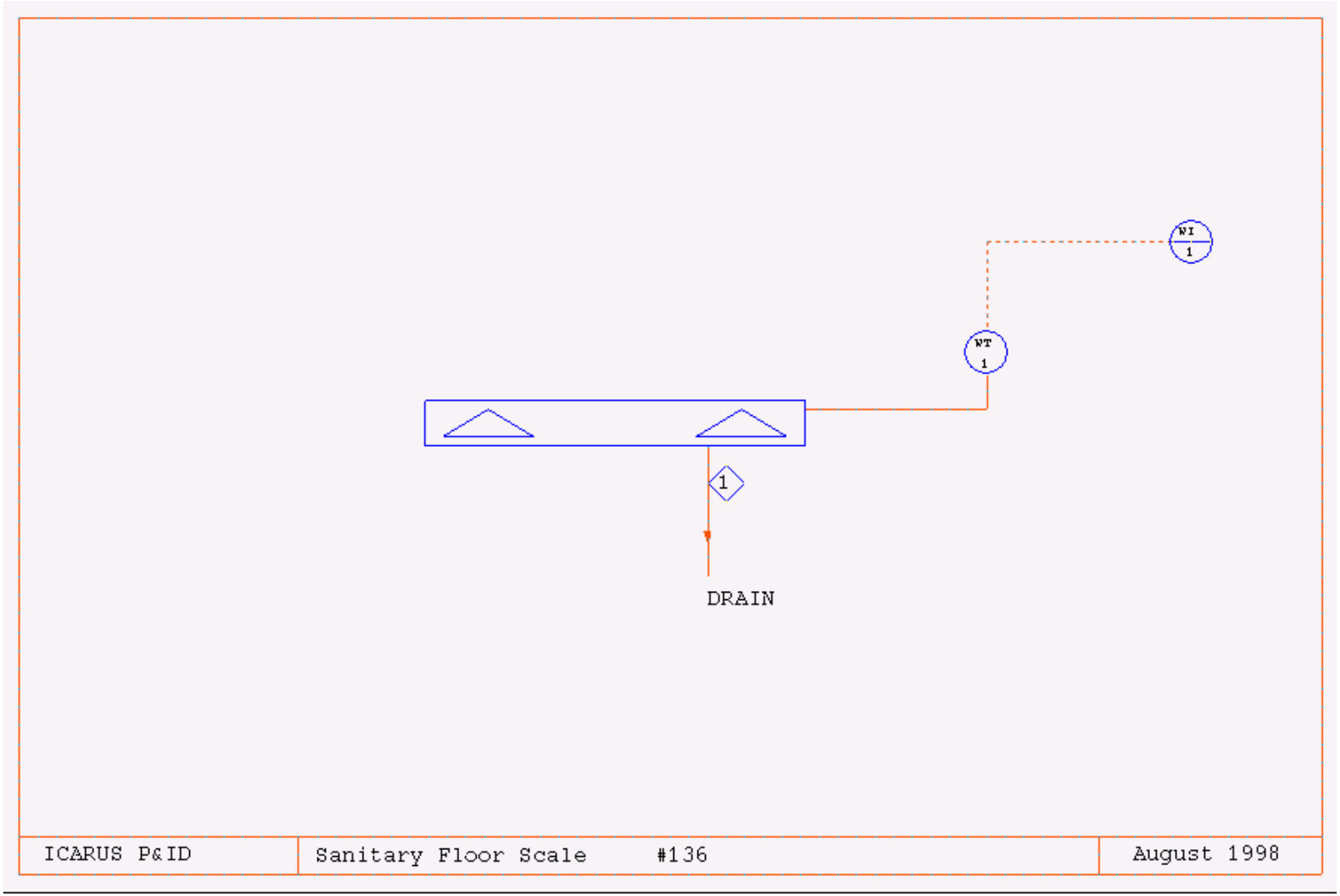
131 Fluming Dewatering Shaker


1
PRODUCT & FLUME WATER IN
2
PRODUCT OUT
SS
1
SAH
1
3
FLUME WATER RETURN
ICARUS P&ID
Fluming Dewatering Shaker #131
April 1998

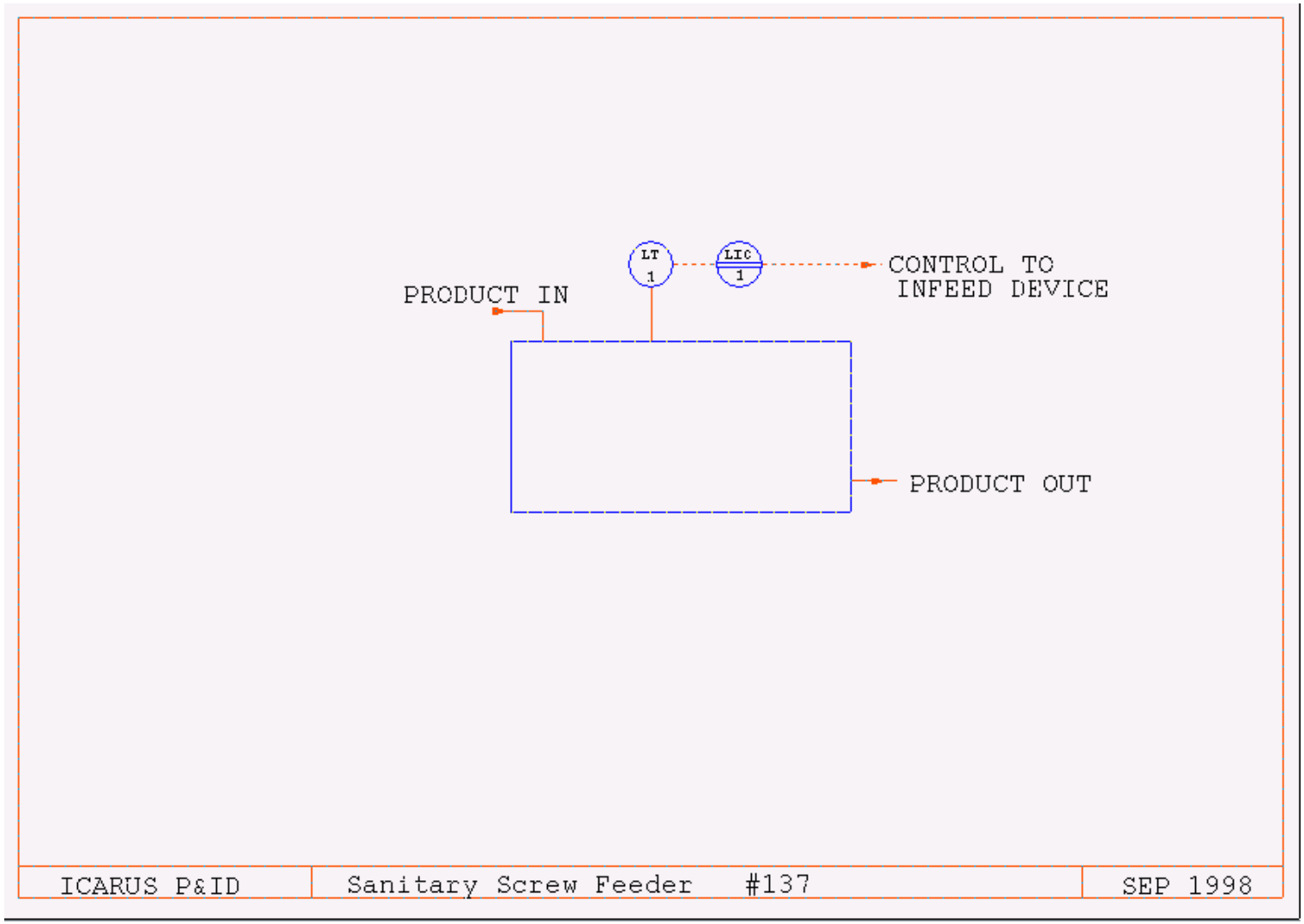
135 Sanitary Weight Belt Feeder


LT
1
LIC
1
CONTROL TO INFEED DEVICE
PRODUCT IN
WIC
2
WT
2
PRODUCT OUT
ICARUS P&ID
Sanitary Weight Belt Feeder #135
May 1998

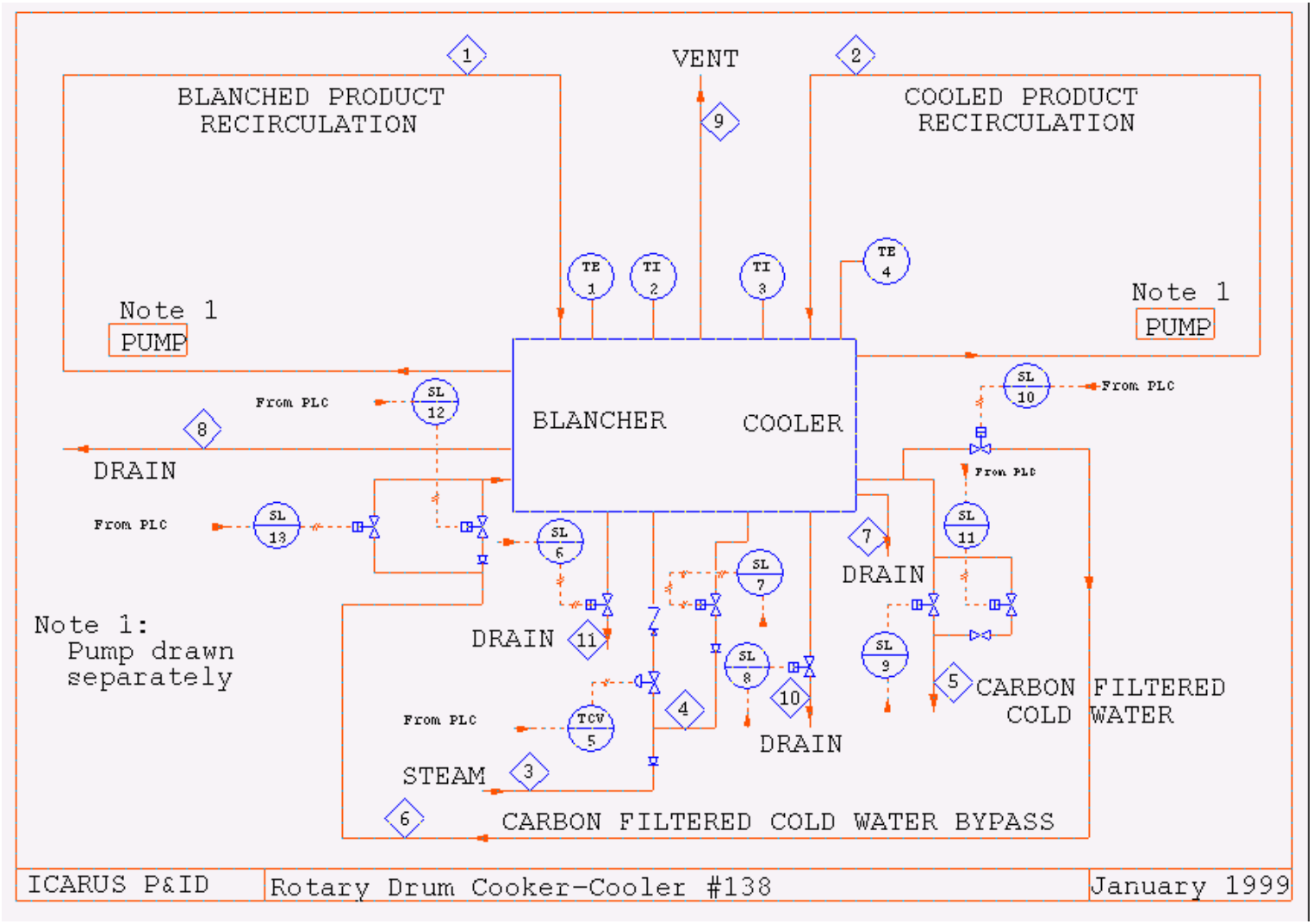
136 Sanitary Floor Scale


WI
1
WT
1
1
DRAIN
ICARUS P&ID
Sanitary Floor Scale #136
August 1998

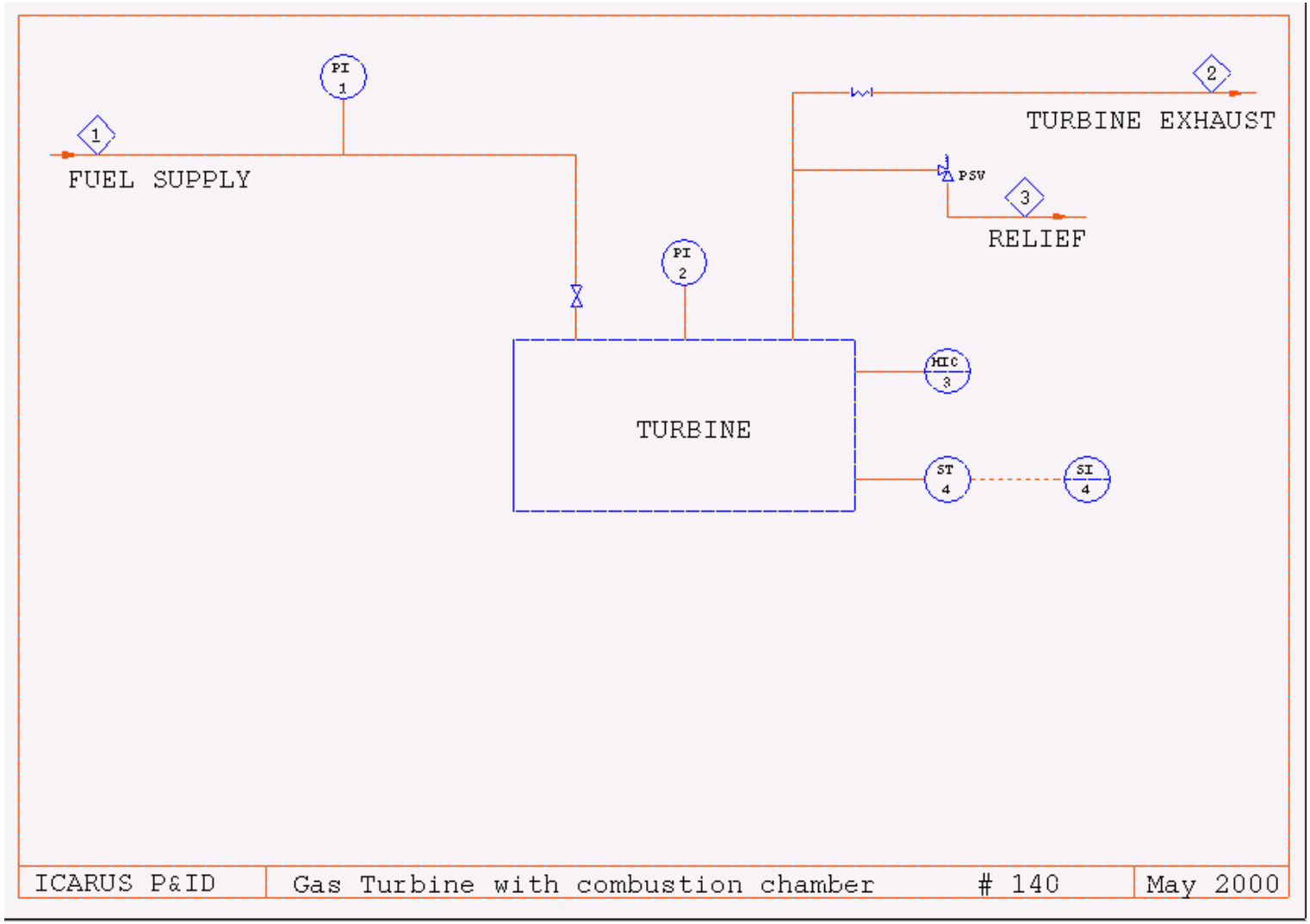
137 Sanitary Screw Feeder


LT
1
LIC
1
CONTROL TO
INFEED DEVICE
PRODUCT IN
PRODUCT OUT
ICARUS P&ID
Sanitary Screw Feeder #137
SEP 1998

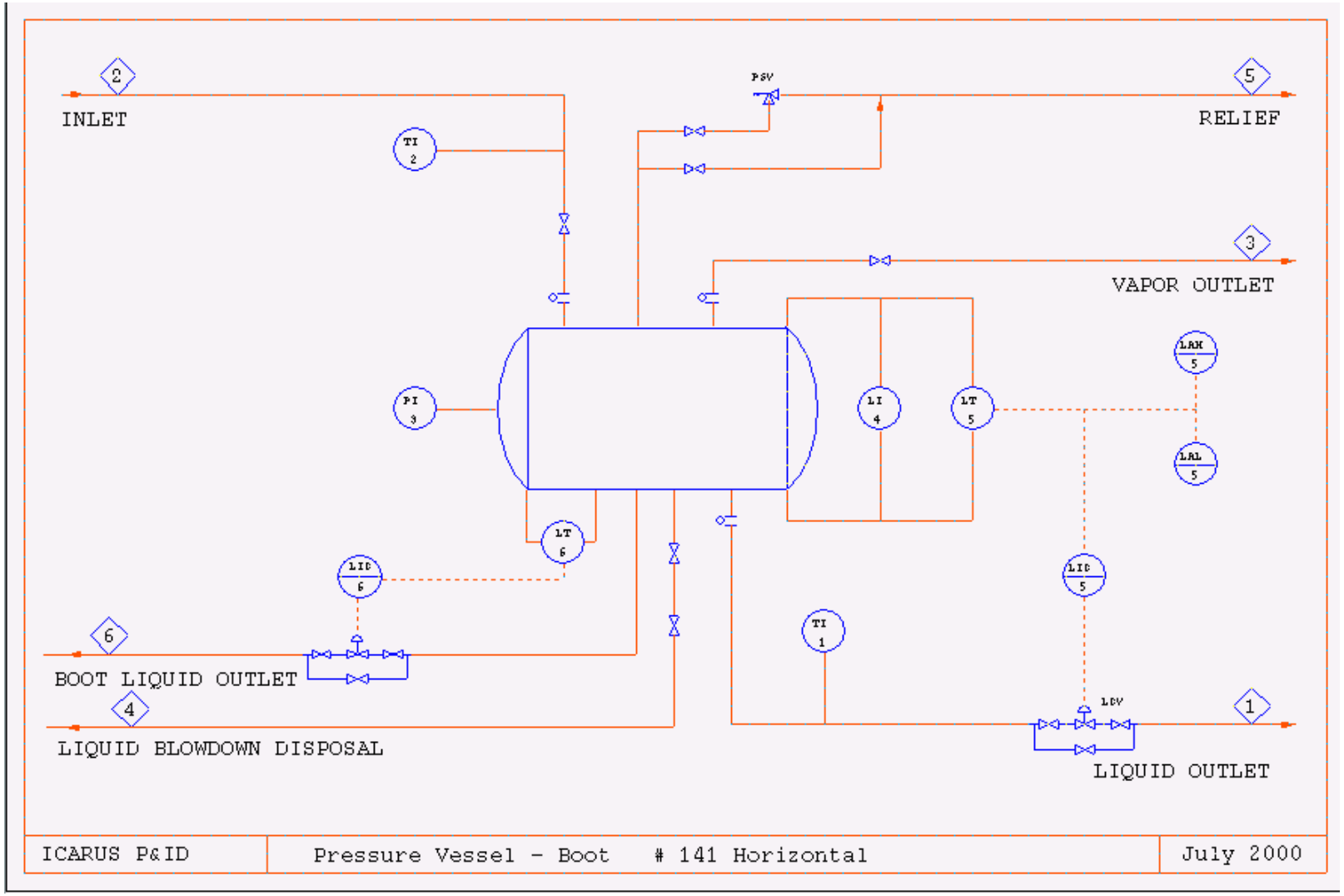
138 Rotary Drum Cooker-Cooler


1
VENT
2
BLANCHED PRODUCT
RECIRCULATION
9
COOLED PRODUCT
RECIRCULATION
TE 1
TI 2
TI 3
TE 4
Note 1
PUMP
Note 1
PUMP
SL 12
From PLC
BLANCHER
COOLER
SL 10
From PLC
8
DRAIN
From PLC
From PLC
SL 13
SL 6
SL 11
7
DRAIN
SL 7
Note 1:
Pump drawn
separately
DRAIN
11
SL 8
SL 9
5
CARBON FILTERED
COLD WATER
From PLC
TCV 5
4
10
DRAIN
STEAM
3
6
CARBON FILTERED COLD WATER BYPASS
ICARUS P&ID
Rotary Drum Cooker-Cooler #138
January 1999

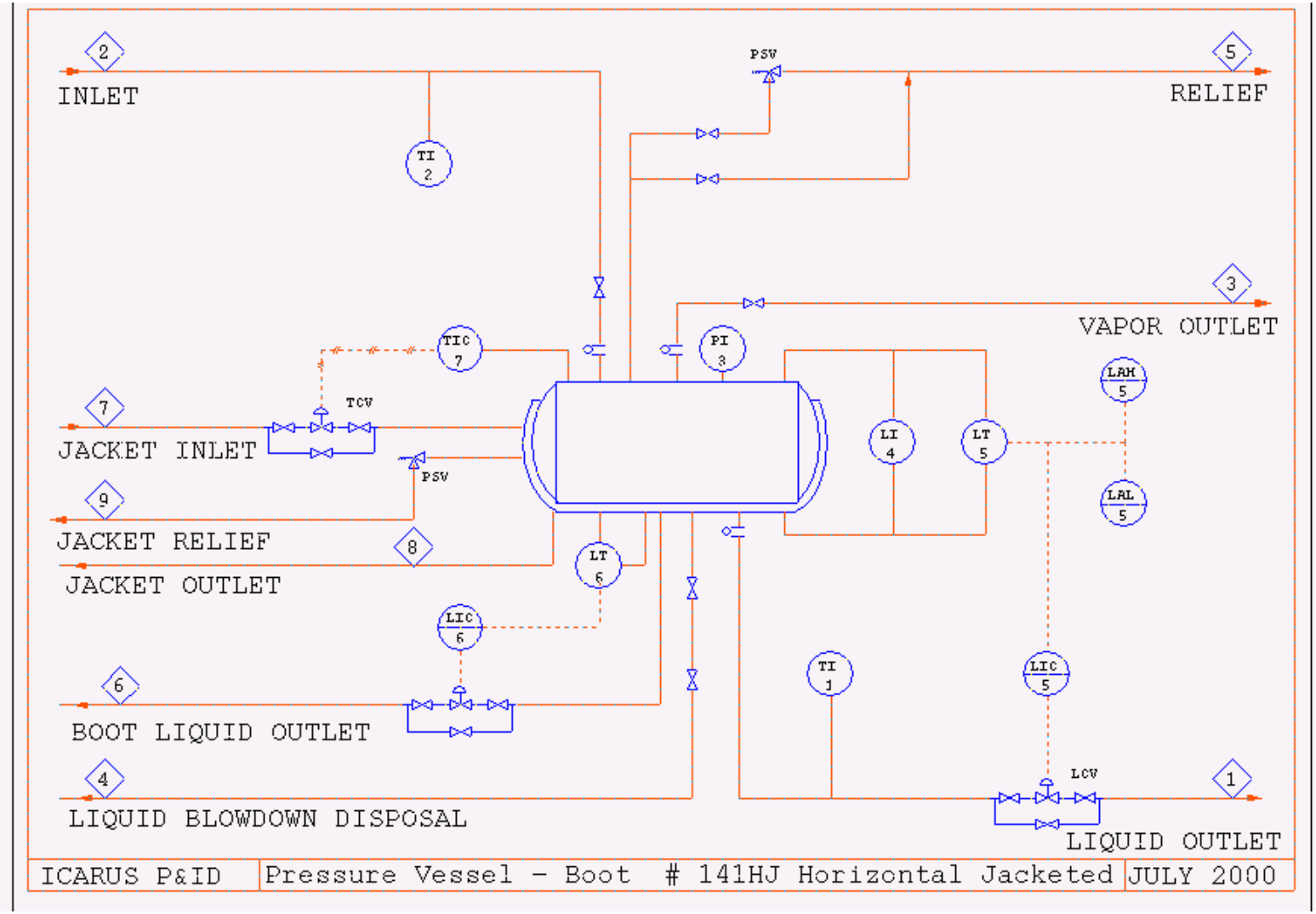
140 Gas Turbine With Combustion Chamber



141 Horizontal Pressure Vessel With Boot



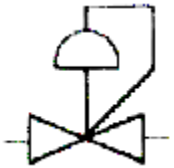
141 Horizontal Jacketed Pressure Vessel With Boot



Appendix A: Symbols

The symbols represented in Appendix A are superseded by the symbols depicted in the Radpfs program. See the Radpfs drawing application for the latest and most complete drawing symbols.

Piping Symbols



Regulating Valve

Pressure Safety Valve

Spectacle Blind

Rupture Disk

Check Valve

or

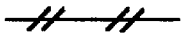
Flanged Connection

Reducer

Drain

Expansion Joint

Instrument Symbols



Pneumatic Signal

Electronic Signal

Direct Connection

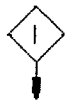
Thermocouple Wire

Solenoid

Flow Indicator (Rotometer

Flow Indicator (Gauge)

Orifice Plate



Interlock

Input/Output Card

(s = A for Analog or D for Digital)
(d = I for Input or O for Output)

Relay Function

Mounted Local to Equipment

(v = Sensor Type)
(n = Loop Number)

Mounted on Control Center Panel

Front of Panel Back of Panel

Mounted on Equipment Panel

Front of Panel Back of Panel

Note: Displayed on Operator Center CRT with Digital Controls

Appendix B: Abbreviations

Instrument Identification

Process Variable (first position of name)

Symbol	Description
C	Consistency
F	Flow
T	Temperature
P	Pressure
dP	Differenctial Pressure
L	Level
S	Speed
PN	Position
PH	pH Analysis
XM	Axial Motion
XR	Radial Motion
H	Hand (no measurement)
X	Miscellaneous (e.g., Vibration)

Device (second position of name; MODE: F=field, P=panel)

Symbol	Mode	Description
R	R,P	Recorder
I	F,P	Indicator
C	F,P	Controller
RC	F,P	Recording Controller
IT	F	Indicating Transmitter
S	F	Switch
E	F	Element
A	O	Alarm (F-O-P)
Y	P	Relay (B-O-P)
EY	F	Solenoid
EL	P	Electric Light, Indicator
PB	P	Push Buttons, Start/Stop
CV	F	Control Valve
SV	F	Safety Valve

Qualifiers (last position)

Symbol	Description
H	High
L	Low
HH	High High
LL	Low Low

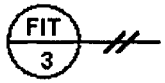
Special

TW	Thermowell
S.P.	Set Point
ESD	Emergency Shut-Down

Thermocouple Devices

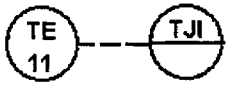
JI	P	Multipoint Indicator
JR	P	Multipoint Recorder

Examples:



Local flow indicating transmitter, pneumatic; Loop No. 3.

Pressure recording controller, electronic, mounted on panel; displayed, if digital at Loop No. 2.



Thermocouple element, local to equipment, connected via thermocouple wire to multipoint temperature indicator mounted on panel; displayed, if digital at Loop No. 11.

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