

- PIPE MATERIALS**
1. ALL PIPING SHOULD BE SIZED AND INSTALLED AS SHOWN ON THE THAW-PAK SYSTEM DRAWING.
 2. NO CHANGES SHALL BE MADE TO THE SYSTEM LAYOUT OR PIPE SIZE WITHOUT PRIOR APPROVAL IN WRITING FROM THAW-PAK REPRESENTATIVE.
 3. A MINIMUM OF TYPE L COPPER TUBING IS SUGGESTED FOR SUPPLY AND RETURN MAINS. OTHER TYPES OF PIPING AND MATERIALS SHOULD BE APPROVED IN WRITING FROM A THAW-PAK REPRESENTATIVE.

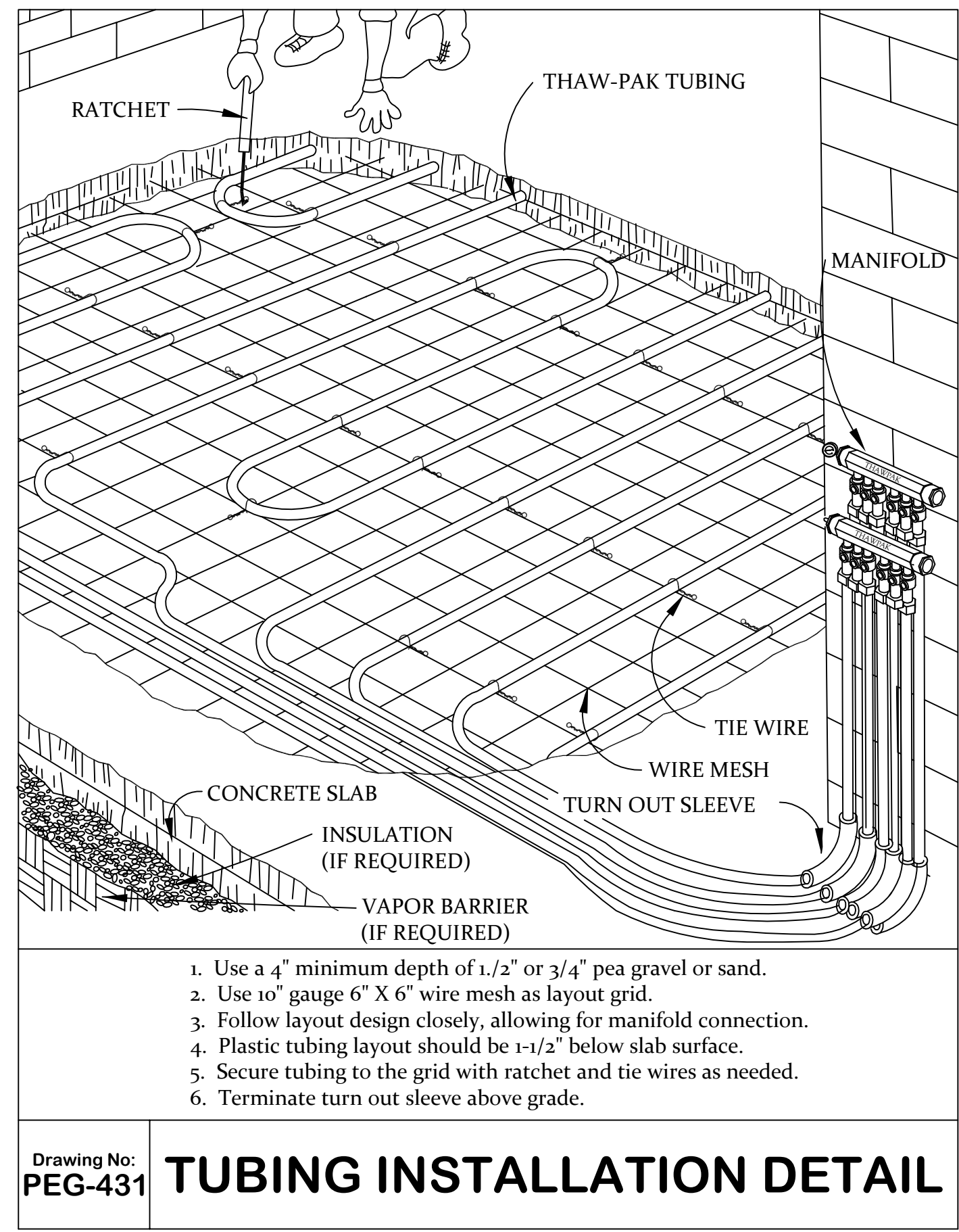
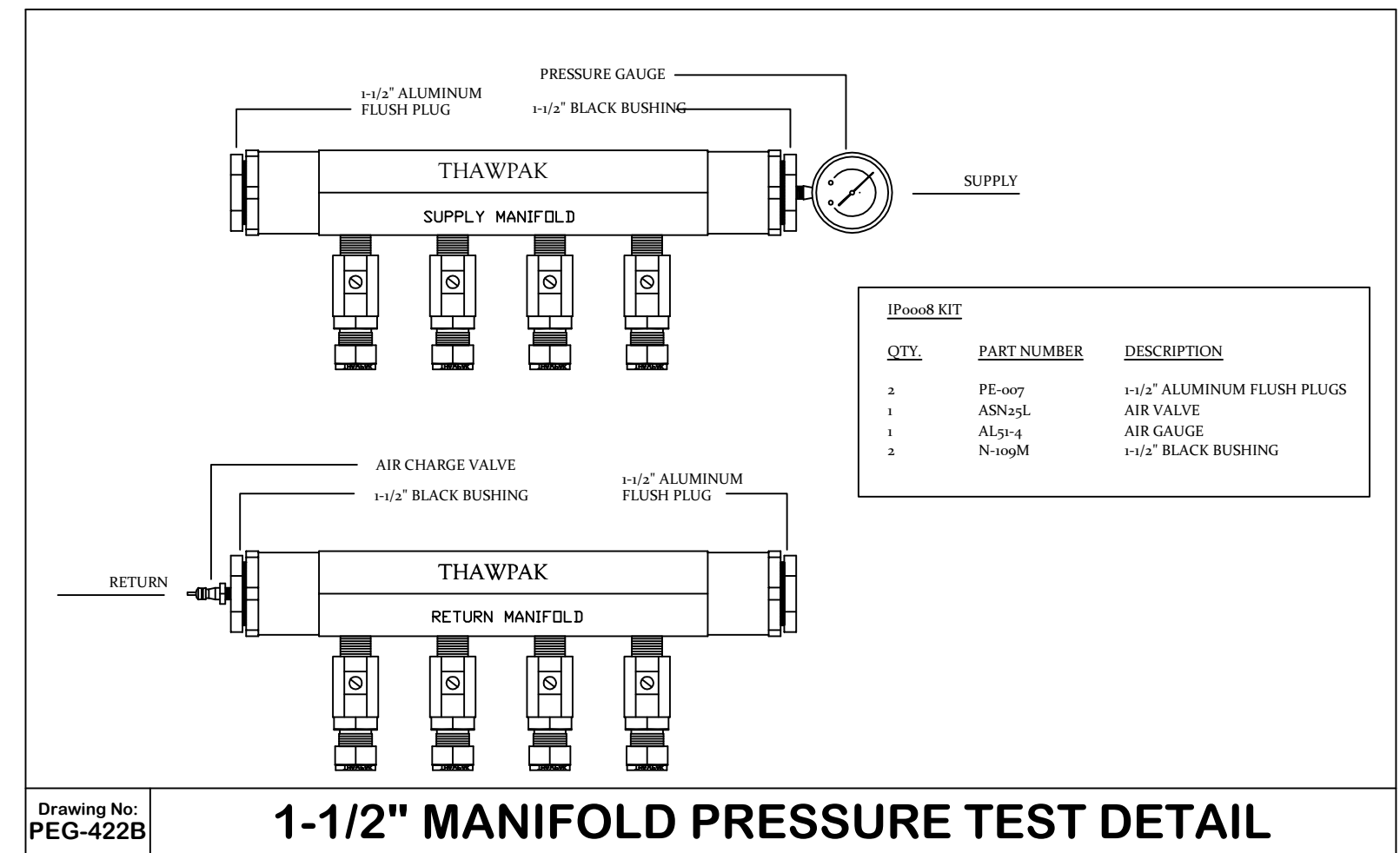
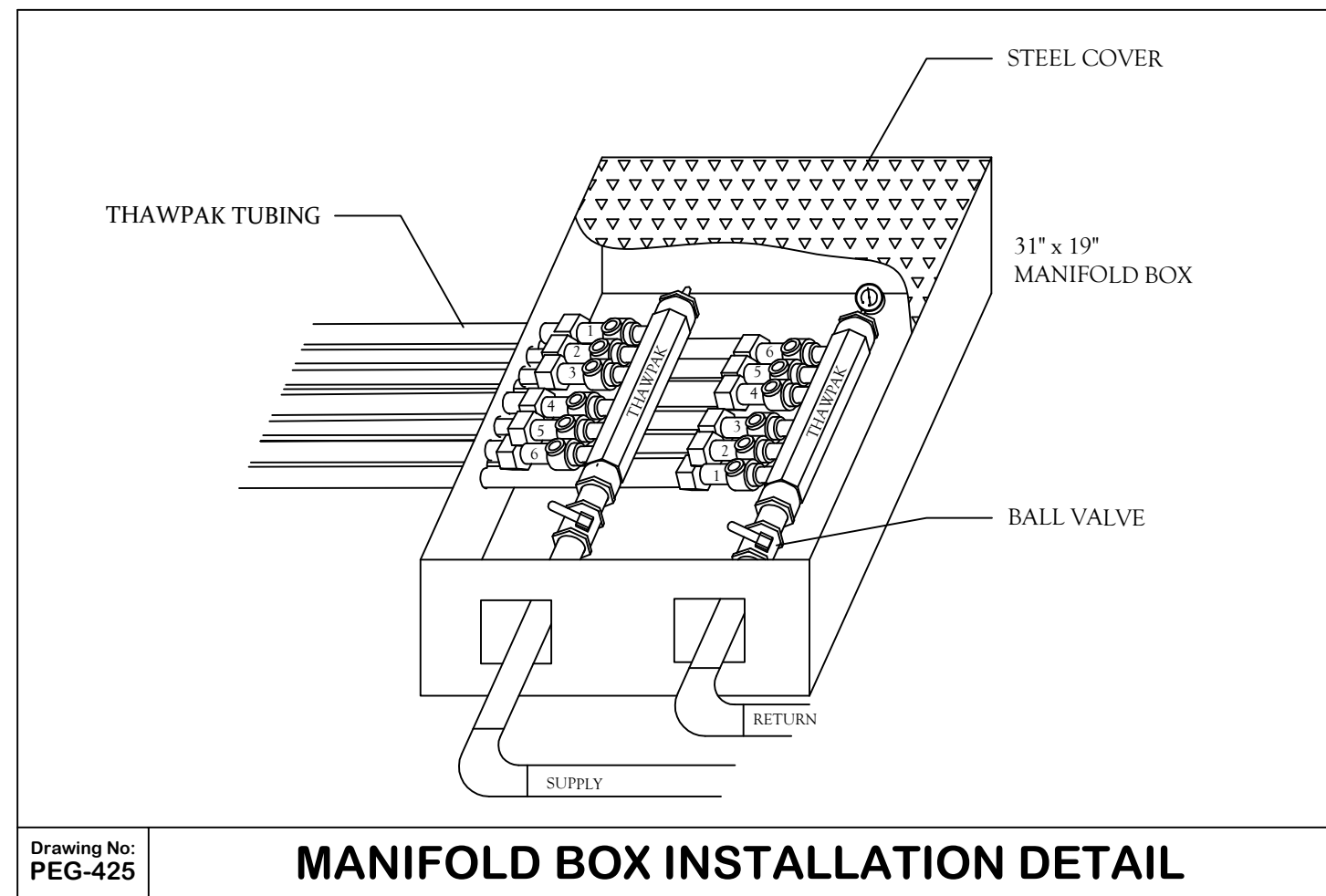
- INSULATION**
- UNDERGROUND INSTALLATIONS:**
1. IT IS SUGGESTED THAT ALL SUPPLY AND RETURN MAINS BE INSULATED TO CONSERVE ENERGY AND PROTECT ALL PIPE FROM POSSIBLE DAMAGE FROM SOIL CONDITIONS. INSULATION WILL MINIMIZE WARM SPOTS IN UNHEATED AREAS.
 2. RIGID FOAM GLASS, INSULATION WITH PIT WRAP IS RECOMMENDED.
PIPE SIZES UP TO 2" USE 1-1/2" FOAM GLASS INSULATION THICKNESS
PIPE SIZES OVER 2" USE 2" FOAM GLASS INSULATION THICKNESS
- ABOVE GROUND INSTALLATIONS:**
1. WATERPROOF COVER IS NOT REQUIRED ON INDOOR INSTALLATIONS OR OUTDOOR INSTALLATIONS UNLESS THE INSULATION IS SUBJECTED TO VAPOR LADEN AIR OR WET CONDITIONS THAT WOULD SATURATE THE INSULATING MATERIAL.

- AIR TESTING**
- POURED / UNDERGROUND INSTALLATIONS:**
1. REFER TO DRAWING:
PEG-422A - 1" MANIFOLD
PEG-422B - 1 1/2" MANIFOLD
 2. EACH SUPPLY AND RETURN MANIFOLD WITH TUBING CIRCUITS MUST BE AIR TESTED
 3. IF SUPPLY AND RETURN MAINS ARE INSTALLED UNDERGROUND OR IN CONCEALED LOCATIONS THEY MUST BE TESTED AS A PART OF THE COMPLETE SYSTEM FOR LEAKS BEFORE BEING CONCEALED OR COVERED.
 4. INSTALL THE SOLID BLACK BUSHING WITH PRESSURE GAUGE ON THE RETURN MANIFOLD OR MAIN AS SHOWN ON THE DRAWING PEG-422A OR 422B.
 5. INSTALL TEFLON BASED PIPE JOINT COMPOUND ON EACH MANIFOLD WHERE 1" OR 1-1/2" ALUMINUM FLUSH PLUGS WILL BE INSTALLED.
 6. TAKE THE ALUMINUM FLUSH PLUGS AND WRAP EACH ONE WITH FOUR LAYERS OF PTFE THREAD SEAL TAPE AND INSTALL IN MANIFOLD AS SHOWN ON DRAWING. PLUGS ARE DESIGNED TO BE FLUSH AND SNUG.
 7. INSTALL THE SOLID BLACK BUSHING WITH THE AIR CHARGE VALVE ON THE SUPPLY MANIFOLD OR MAIN AS SHOWN ON THE DRAWING.
 8. PRESSURIZE THE SYSTEM AT THE AIR CHARGE VALVE TO 100 POUNDS PER SQUARE INCH.
 9. MAINTAIN AIR PRESSURE IN THE UNDERFLOOR SYSTEM AT 1-1/2 TIMES THE SYSTEM OPERATING PRESSURE OR AT 100 PSI, WHICH EVER IS GREATER FOR A MINIMUM OF 30 MINUTES TO DETERMINE IF ANY LEAKS EXIST IN THE SYSTEM.
 10. THE PRESSURE MAY DROP 3-4 POUNDS OVERNIGHT DUE TO COOLING.
 11. SOAP AND WATER SOLUTION MAY BE USED TO FIND THE LOCATION OF ANY LEAKS.
 12. IF A LEAK OCCURS IN A RUN OF THAW-PAK TUBING CONTACT YOUR THAW-PAK DISTRIBUTOR FOR A NEW ROLL OF TUBING. REPLACE THE DAMAGED TUBING RUN AND TEST THE SYSTEM AGAIN AS OUTLINED ABOVE.
 13. WHILE POURING CONCRETE OR COVERING TUBING WITH OTHER MATERIALS CONNECT AN AIR COMPRESSOR AND PROVIDE A CONTINUOUS FORTY (40) PSI OF AIR PRESSURE TO INSURE THAT NO LEAKS DEVELOP DURING THE POURING PROCESS.
 14. IF A LEAK OCCURS THE COMPRESSOR WILL BEGIN TO RUN AND THE DAMAGED TUBING WILL BEGIN TO LEAK AIR UP THROUGH THE CONCRETE.
 15. LOCATE THE LEAK AND CUT THE TUBING AT THAT POINT. INSTALL ONE OF THE BRASS COUPLINGS FROM THE REPAIR KIT AND COMPLETELY WRAP THE FITTING.
 16. AFTER THE CONCRETE INSTALLATION IS COMPLETED, REMOVE THE COMPRESSOR AND MAINTAIN 40 PSI FOR A MINIMUM OF 24 HOURS. IF NO LEAKS ARE DETECTED REMOVE SOLID BLACK BUSHINGS, AIR VALVE & AIR GAUGE FROM THE SUPPLY AND RETURN MAINS AND CONNECT BOILER AS SHOWN ON DRAWINGS PROVIDED.
 17. FILL THE SYSTEM AS OUTLINED IN THE FILLING INSTRUCTIONS.

- TUBE CUTTING**
1. DO NOT PRE-CUT TUBING LENGTHS.
 2. IDENTIFY THE LENGTH AND SIZE OF TUBING ON EACH ROLL AND LABEL THE ROLL WITH A NUMBER CORRESPONDING TO THE TUBE CUTTING SCHEDULE ON THE THAW-PAK SYSTEM DRAWING.
 3. EACH RUN SHOULD BE INSTALLED AND LENGTH VERIFIED BEFORE CUTTING FROM THE ROLL.
 4. TUBING IS MANUFACTURED WITH FOOT MARKERS PRINTED DOWN THE ENTIRE LENGTH OF THE TUBING ROLL. THESE NUMBERS PROVIDE THE INSTALLER WITH A METHOD TO DETERMINE THE AMOUNT OF TUBING USED FROM THE ROLL.
 5. RECORD THE NUMBER AT THE BEGINNING OF THE TUBE ROLL.
 6. LAY-OUT THE ENTIRE TUBING RUN AS SHOWN ON THE THAW-PAK SYSTEM DRAWINGS.
 7. RECORD THE NUMBER AT THE END OF THE RUN LAID OUT.
 8. SUBTRACT THE SMALLER NUMBER FROM THE LARGER NUMBER TO CONFIRM THE LENGTH OF TUBING USED.
 9. COMPARE THIS NUMBER TO THE LENGTH OF THE CIRCUIT PRINTED ON THE THAW-PAK DRAWING. THE ACTUAL INSTALLED LENGTH MAY BE DIFFERENT, BUT SHALL BE WITHIN THE LENGTHS INDICATED ON THE CHART BELOW.
 10. IF THE LENGTH OF TUBING FALLS BETWEEN THE MINIMUM AND MAXIMUM LENGTHS INDICATED ON THE CHART, THE TUBING CAN BE CUT FOR ATTACHMENT TO THE SYSTEM MANIFOLD.
 11. IF TUBING LENGTH IS NOT WITHIN THE MINIMUM AND MAXIMUM LENGTHS INDICATED ON THE CHART, INSPECT THE TUBING INSTALLATION FOR ERRORS AND MAKE CORRECTIONS. IF THE TUBING LAYOUT ERROR CANNOT BE VERIFIED CONTACT YOUR THAW-PAK DISTRIBUTOR FOR FURTHER INSTRUCTIONS.

UNION INSTALLATION INSTRUCTIONS

1. Insert the tubing into the THAW-PAK tube fitting. Make sure the tubing rests firmly on the shoulder of the fitting and the nut is finger tight.
2. Before tightening the THAW-PAK nut, scribe the nut at the 6 o'clock position.
3. While holding the fitting body steady with a back-up wrench, tighten the nut 1-1/4 turns. Watch the scribe mark, make one complete revolution and continue to the 9 o'clock position.



PROJECT DESIGN SUMMARY

TOTAL AREA:	7,899 SQ.FT.
NUMBER OF ZONES:	4
NUMBER OF MANIFOLDS:	4 SETS
BTU'S/SF:	223 BTU
MAX. HEAT LOAD:	1,761,477 MBTU
FLUID TYPE:	40% PROPYLENE GLYCOL
SYSTEM VOLUME:	381 GALLONS
TOTAL NUMBER OF LOOPS:	35
DESIGN TEMP:	-10°
TEMP. RISE:	36.1°

**THAWPAK MATERIAL LIST
RADIANT EQ. LIST**

QTY.	PART NUMBER	DESCRIPTION
1	1K005	RADIANT FLOOR EMBEDDED 3/4"
1	1P008	MANIFOLD PRESSURIZATION RITS 1-1/2"
1	BAM05-15-75	5-CIRCUIT MANIFOLD SET
1	BAM05-15-75	10-CIRCUIT MANIFOLD SET
3000	80008	1/2" WHITE 60 GAL/4' X 6'
4	00888	MANIFOLD BOX COVER
12	TPA400	TUBING - 3/4" X 1000' PEX (WHITE)
2	BDU404	7/8" REPAIR COUPLERS
1	TE 604090190	TERMAS SNOW CONTROL AND SENSOR
8	8406-4076-50	PREMIXED PROPYLENE GLYCOL

HEATING EQUIPMENT:

QTY.	PART NUMBER	DESCRIPTION

MODEL TYPE HP PRESS. SPEED FLANGE MAT. # SIZE HAMB. UPS CI

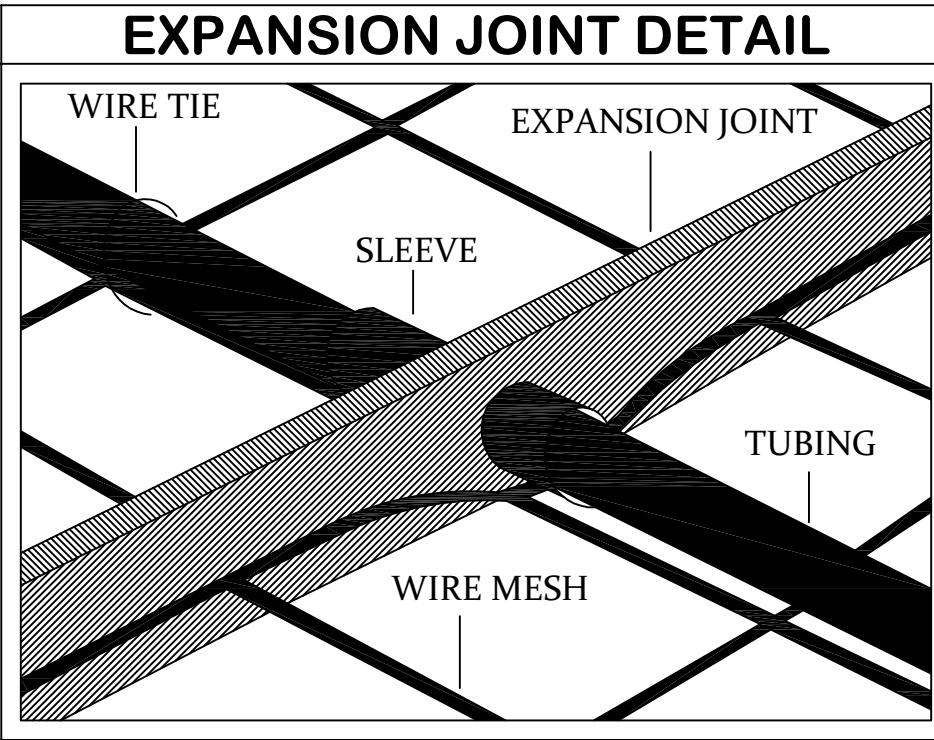
TUBE LENGTH VARIANCE ALLOWED FROM DRAWING DESIGN LENGTH (FEET)

TUBING LENGTH	50'	100'	150'	200'	250'	300'	350'	400'	450'	500'
1/2" ID										
MINIMUM	45'	91'	136'	182'	227'	270'	N/A	N/A	N/A	N/A
MAXIMUM	55'	110'	165'	220'	275'	330'	N/A	N/A	N/A	N/A
3/4" ID										
MINIMUM	45'	91'	136'	182'	227'	270'	318'	364'	409'	455'
MAXIMUM	55'	110'	165'	220'	275'	330'	385'	440'	495'	550'

TUBE CUTTING SCHEDULE

ROLL #	SIZE	LENGTH
ROLL #1	3/4" X 1000' PEX	329'-310'-325'
ROLL #2	3/4" X 1000' PEX	323'-323'-323'
ROLL #3	3/4" X 1000' PEX	323'-323'-322'
ROLL #4	3/4" X 1000' PEX	323'-321'-321'
ROLL #5	3/4" X 1000' PEX	321'-319'-319'
ROLL #6	3/4" X 1000' PEX	317'-317'-317'
ROLL #7	3/4" X 1000' PEX	318'-315'-314'
ROLL #8	3/4" X 1000' PEX	310'-310'-310'
ROLL #9	3/4" X 1000' PEX	315'-313'-313'
ROLL #10	3/4" X 1000' PEX	315'-313'-312'
ROLL #11	3/4" X 1000' PEX	312'-310'-310'
ROLL #12	3/4" X 1000' PEX	310'-310'

- NOTES:**
1. SEE INSTALLATION INSTRUCTIONS FOR LAYOUT DETAILS
 2. SYSTEM BY-PASS VALVE MUST BE INSTALLED
 3. ALL PIPING FROM BOILER TO MANIFOLDS, SUPPLIED BY OTHERS
 4. DUE TO UNFORESEEN CONDITIONS AT TIME OF INSTALLATION, RUNS MAY VARY FROM GIVEN LENGTH
 5. LAY PLASTIC TUBING BEFORE CUTTING FROM ROLL
 6. KEEP TUBING 6" MAX FROM SIDES & DRAINS
 7. NOT RESPONSIBLE FOR SYSTEM OPERATION IF NOT INSTALLED AS SHOWN ON PRINT
 8. KEEP TUBING 6" AWAY FROM ALL TOILETS.
 9. ALL CIRCUIT LENGTHS INCLUDE A 30" ALLOWANCE FOR RISERS TO MANIFOLDS AND PLACEMENT TOLERANCE.

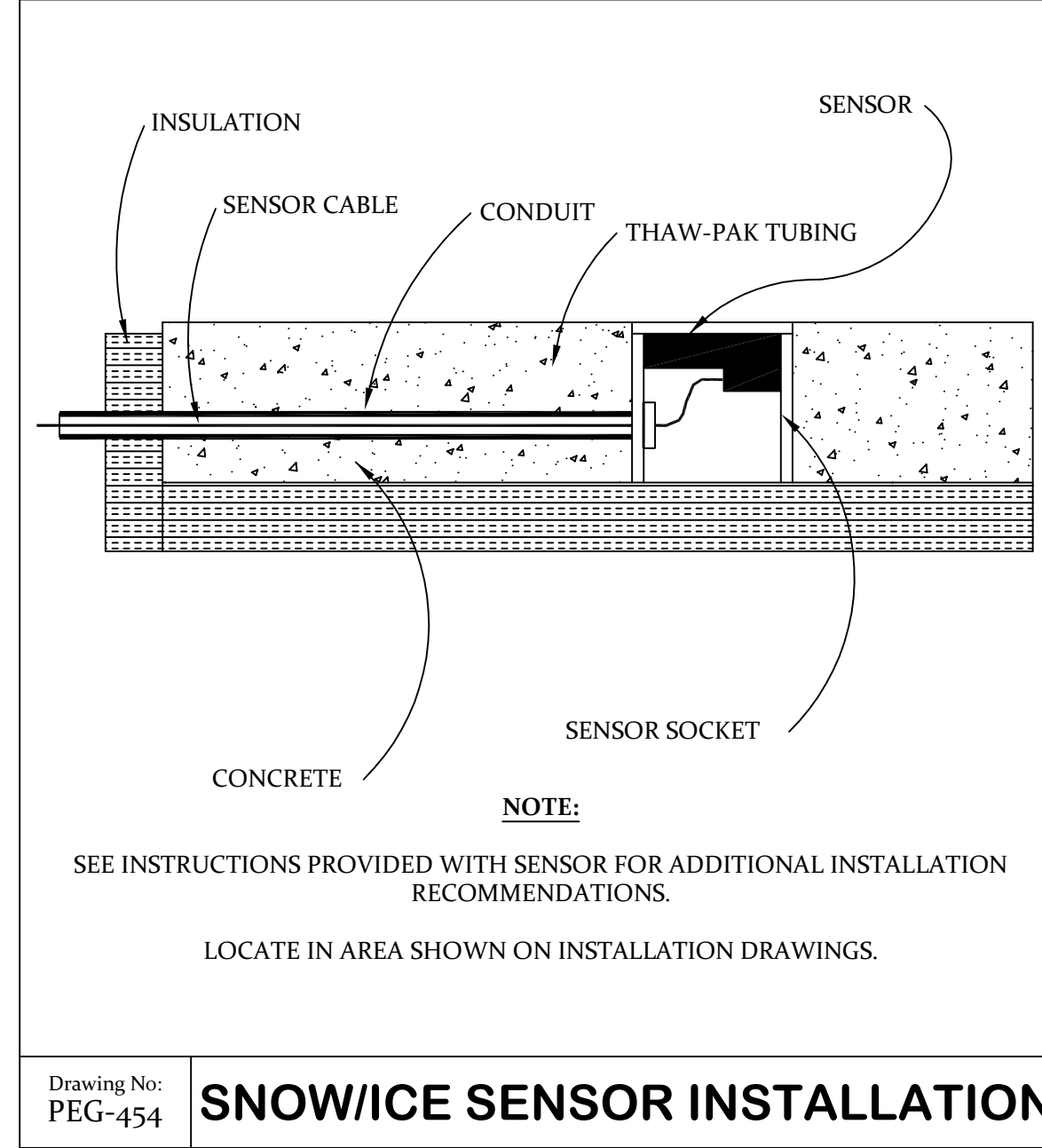
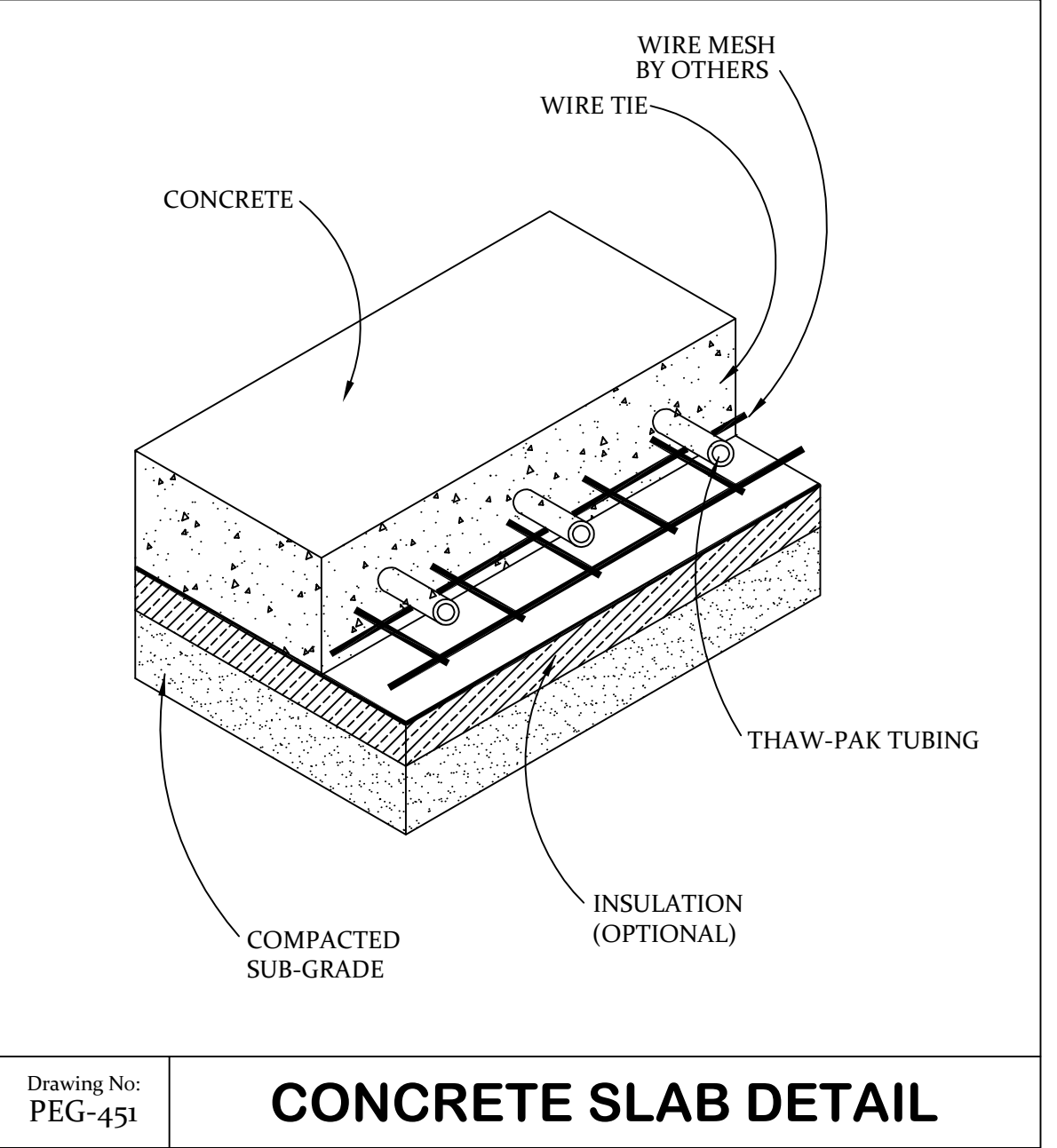


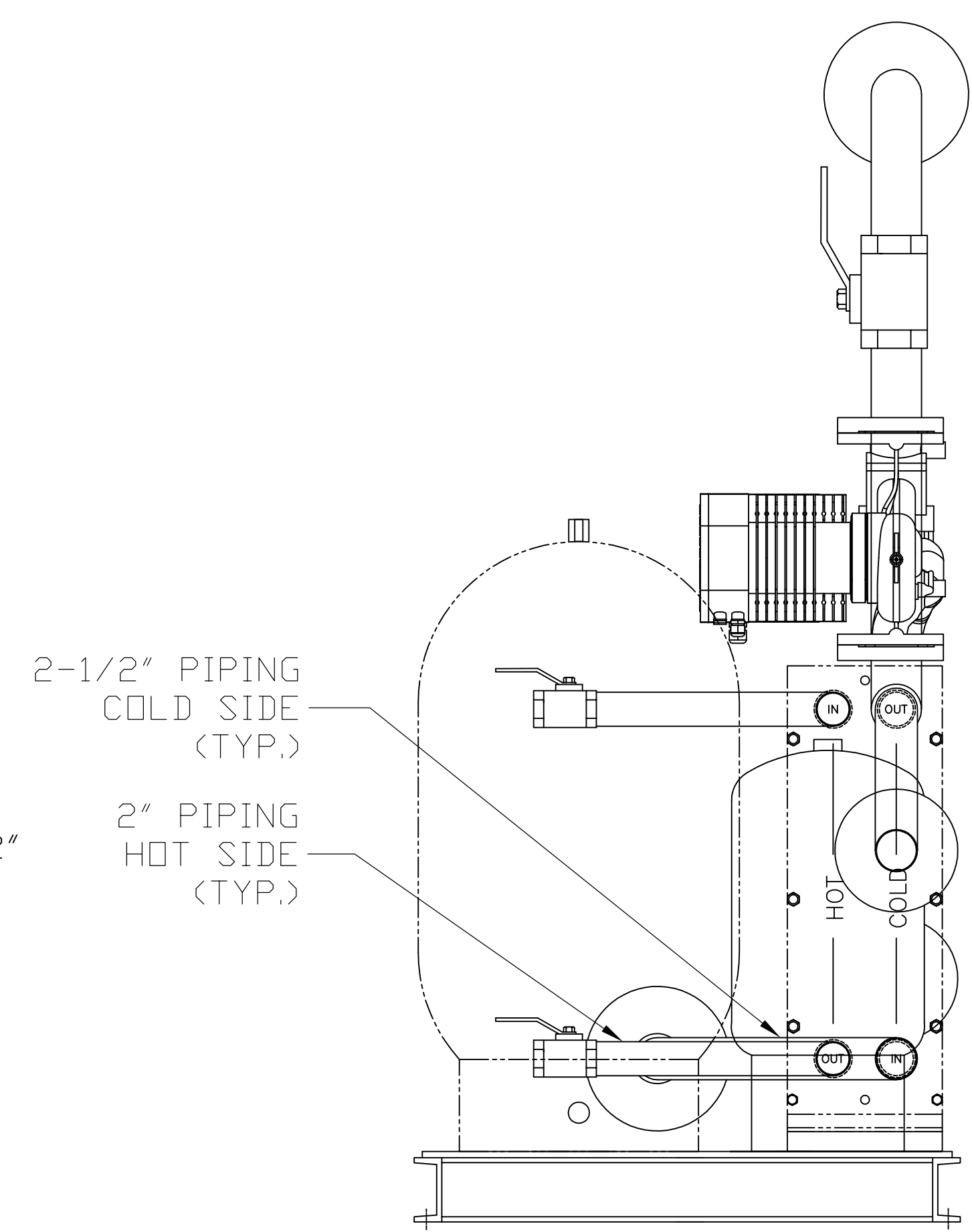
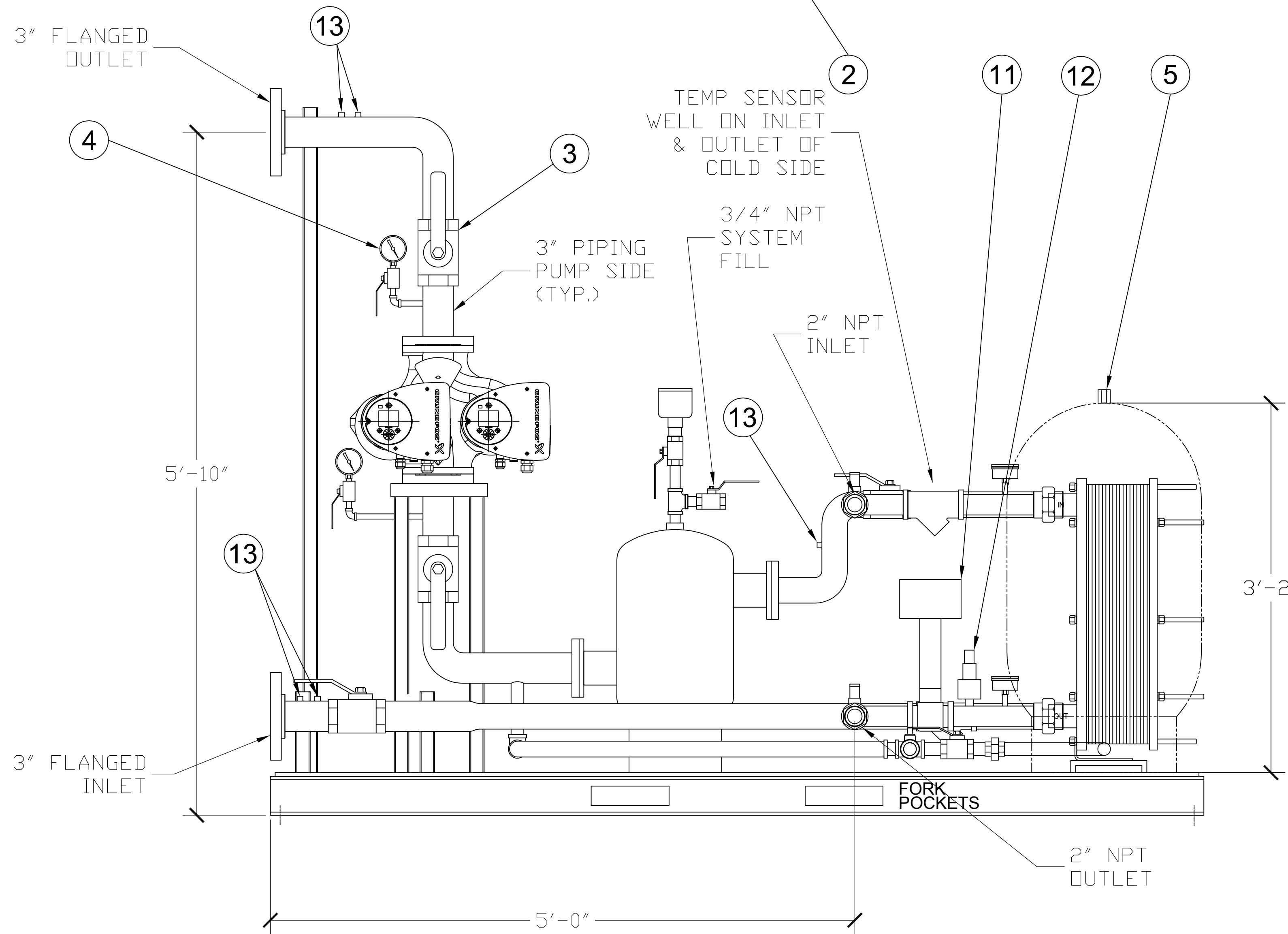
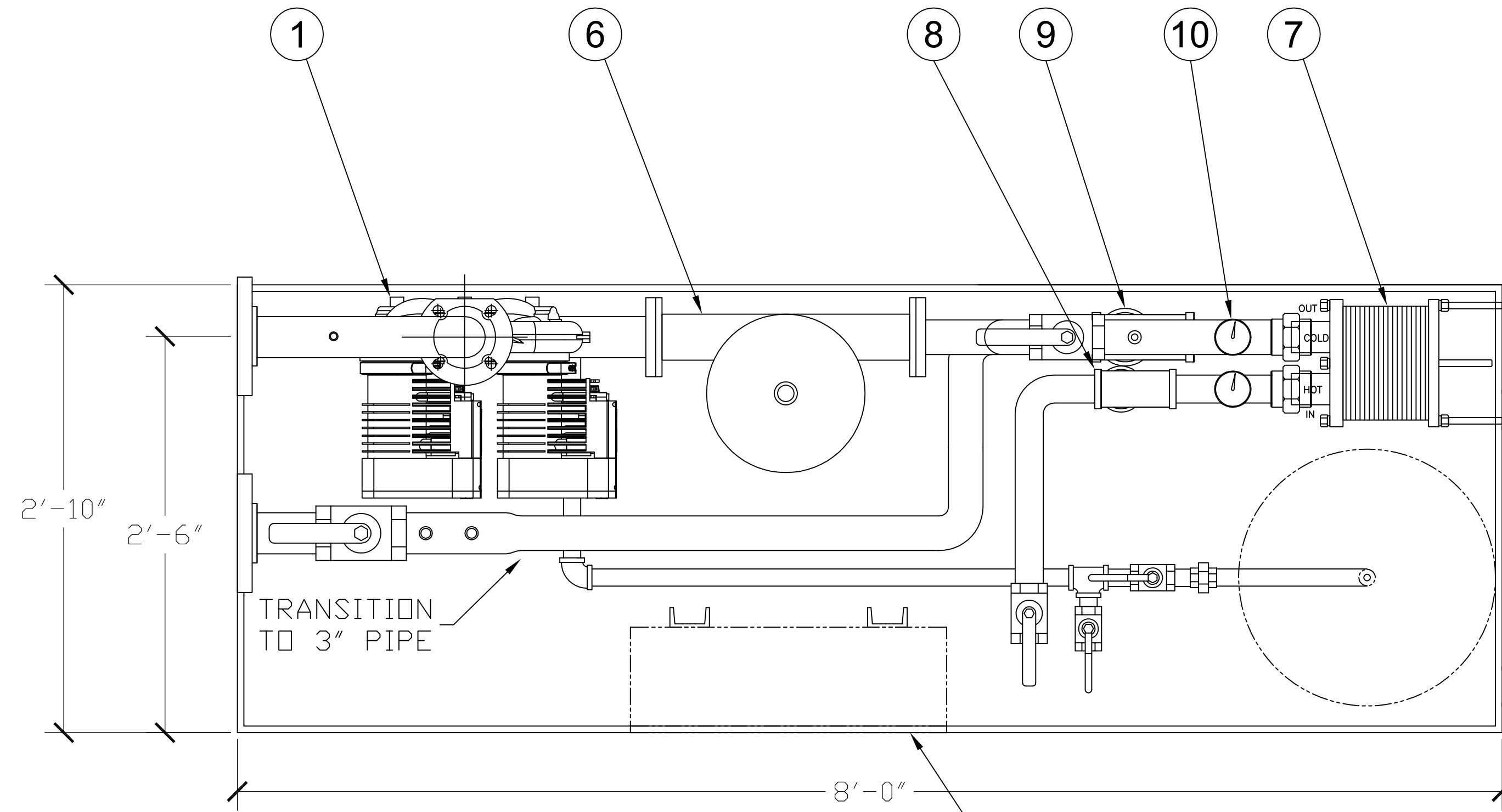
- TUBE FASTENER - SPACING**
- TUBE TIE WIRES OR FASTENERS AS PROVIDED SHALL BE INSTALLED AT LEAST EVERY 36" AND AT THE ENDS OF TURNS. TIES OR FASTENERS MAY BE ADDED AS NEEDED TO PROPERLY HOLD THE TUBING IN PLACE.
- SNAP TRACK CHANNEL SHOULD BE PLACED 24" TO 36" APART ON STRAIGHT RUNS AND AT THE ENDS OF THE TUBING RUNS TO PROPERLY HOLD THE TUBING IN PLACE.
- 4.2.8

LIABILITY

This drawing and our recommendations and suggestions, are intended to assist our customers. Our design represents our best judgment based on our experience and the best facts provided to us, any use thereof is at the sole risk of the customer.

It is assumed that the customer will install the THAW-PAK system in compliance with all local, state and national codes.





EQUIPMENT LIST		
ITEM	QTY.	DESCRIPTION
1	1	GRUNDFOS MAGNA3 D 65-150 F 60 Hz MATERIAL # 98126863 CAPACITY: 105 GPM AT 46' TDH
2	1	NEMA 12 CONTROL PANEL
3	4	WATTS 3" BRASS FP BALL VALVE MODEL # FBV-3C
4	2	WEISS LIQ-FILLED PRESSURE GAUGE 0-60 PSI MODEL # LF25S-1
5	1	WESSELS EXPANSION TANK MODEL # NTA-80
6	1	WESSELS AIR SEPERATOR MODEL # SPA-3
7	1	ALFA LAVAL PLATE AND FRAME HEAT EXCHANGER MODEL T5-BFG WITH 2.375" NPT CONNECTIONS
8	1	WATTS SERIES 77SI Y-STRAINER SIZE: 2"
9	1	WATTS SERIES 77SI Y-STRAINER SIZE: 2.5"
10	4	WATTS TEMP & PRESSURE GAUGE 1/2 LFDPTG3-3 0-200 60-320 F MODEL NO.: 0121662
11	1	2" HONEYWELL CONTROL VALVE W/ ACTUATOR VALVE BODY MODEL V5011N1099 ACTUATOR MODEL ML69841006
12	1	WATTS PRESSURE RELIEF VALVE SIZE 3/4" MODEL # 740
13	4	1/2" TEMPERATURE SENSING WELL

HEAT EXCHANGER SKID PLAN

SCALE: 1:8

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CONSULTANTS:
LIMBACH CO. LLC
MICHIGAN CITY

thawPAK
Thawing and Freezing Systems

PROJECT NAME:
JACKSON NATIONAL LIFE
MICHIGAN

THAW-PAK DISTRIBUTOR:
PERFORMANCE engineering group

DRAWN BY:	Gordon Faustich
REVIEWED BY:	AD
APPROVED BY:	AD
ISSUED FOR	
12/09/14	APPROVAL
12/31/14	INCREASED FLOW AND FILLUSE
02/24/15	ADDED SENSOR WELLS TO SKID
03/23/15	UPDATED CONTROL
03/24/15	UPDATED SENSORS ON SKID

PROPERTY OF THAW-PAK
This drawing is the property of THAW-PAK, it has been prepared to assist in the installation of our system. Customer agrees to keep confidential and not disclose this drawing or copies thereof without our written consent.

DRAWING NO.
PEG14-009S_E

SHEET NO.
M6