Radiant Design Summary - Manifold View

Project #: 09-127
Date: Sep 08, 2009
Prepared For: Monterey Energy Group

Monterey Energy Group 227 Forest Ave Pacific Grove, California 93950
Prepared By: Abe Stallcup Phone: 831-372-8328 Fax: 831-372-4613 Email: cad@meg4.com

Project Summary

Project #:	09-127	**Total Flowrate:**	14 USGPM
Project Name:	[redacted]	**Maximum Head Loss:**	11.6 ft(H2O)
Project Location:	Ketchikan, AK	**Total Loops:**	20
Engineer:	MEG INC.	**Total Manifolds:**	3
		Total Zones:	9
Design Data Location:	Ketchikan, Alaska	**Min. Tubing Required:**	4415 ft
		Total Load:	105,042 Btu/hr
Outdoor Temperature:	13 °F	**Total Radiant Load:**	66,708 Btu/hr
Wind Speed:	0 mph	**Total Supplemental Load:**	0 Btu/hr
Total Area:	3,656 ft²		
Heated Area:	3,656 ft²		
Construction Quality:	Average		
RFH Glycol Level:	100% Water		
Design Temp. Drop:	15 °F		
Radiant Tubing Volume:	40.5 gallons(US)		

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Radiant Design Data

Manifold 1

Water Temperature:	122.9 °F	**Flow Rate:**	4.7 USGPM
Zone Control:	None	**Head Loss:**	10.4 ft(H2O)
Control Method:	None Specified	**Head Loss S/R:**	0 ft(H2O)
Total Loops:	6	**S/R Tube Length (One way):**	0 ft
		S/R Tube Type:	hePEX 3/4"

Room	Zone #	Attach Method	Tube Type	Loop #	Area	Unit Heat	Tube Spacing	Leader Length	Loop Length	Flow Rate	Head Loss	Valve Turns	Cover Rv	Surface Temp.	Req. Water Temp.	Design Temp. Drop
Bed 1 - Floor	1	Concrete Overpour	hePEX 1/2"	1	183	16.0	12	3	189	0.8	4.2	2.69	2	73	116.7	15
Family - Floor	2	Concrete Overpour	hePEX 1/2"	2	205	17.0	12	3	205	0.9	6	2.92	2	73.5	119.8	15
Family - Floor	2	Concrete Overpour	hePEX 1/2"	3	205	17.0	12	3	216	0.9	6.4	3.08	2	73.5	119.8	15
Utility - Floor	2	Concrete Overpour	hePEX 1/2"	4	217.5	10.0	9	3	295	0.6	4.1	4.2	0.5	70	81.3	15
Bed 2 - Floor	3	Concrete Overpour	hePEX 1/2"	5	262	15.0	12	3	268	1	10.4	3.82	2	72.5	113.7	15
Bath 1 - Floor	4	Concrete Overpour	hePEX 1/2"	6	56.2	11.0	9	3	81	0.5	0.8	1.15	2	70.5	99.2	15

Manifold 2

Water Temperature:	122.9 °F	**Flow Rate:**	5.1 USGPM
Zone Control:	None	**Head Loss:**	11.6 ft(H2O)
Control Method:	None Specified	**Head Loss S/R:**	0 ft(H2O)
Total Loops:	6	**S/R Tube Length (One way):**	0 ft
		S/R Tube Type:	hePEX 3/4"

Room	Zone #	Attach Method	Tube Type	Loop #	Area	Unit Heat	Tube Spacing	Leader Length	Loop Length	Flow Rate	Head Loss	Valve Turns	Cover Rv	Surface Temp.	Req. Water Temp.	Design Temp. Drop
Kitchen - Floor	5	Concrete Overpour	hePEX 1/2"	1	177	22.0	9	3	242	0.8	6	3.76	0.5	76	98	15
Living - Floor	5	Concrete Overpour	hePEX 1/2"	2	233	22.0	12	3	239	1.1	10.6	3.72	1	76	113.2	15
Living - Floor	5	Concrete Overpour	hePEX 1/2"	3	233	22.0	12	3	239	1.1	10.6	3.72	1	76	113.2	15
M. Bed - Floor	6	Concrete Overpour	hePEX 1/2"	4	264	16.0	12	3	270	1.1	11.6	4.2	2	73	116.7	15
Bath 2 - Floor	7	Concrete Overpour	hePEX 1/2"	5	51	13.0	9	3	74	0.2	0.1	1.15	0.5	71.5	85.5	15
Bed 3 - Floor	8	Concrete Overpour	hePEX 1/2"	6	171	18.0	12	3	177	0.8	4.1	2.75	2	74	122.9	15

Manifold 3

Water Temperature:	122.9 °F	**Flow Rate:**	4.3 USGPM
Zone Control:	Zone valves	**Head Loss:**	2.8 ft(H2O)
Control Method:	None Specified	**Head Loss S/R:**	0 ft(H2O)
Total Loops:	8	**S/R Tube Length (One way):**	0 ft
		S/R Tube Type:	hePEX 3/4"

Room	Zone #	Attach Method	Tube Type	Loop #	Area	Unit Heat	Tube Spacing	Leader Length	Loop Length	Flow Rate	Head Loss	Valve Turns	Cover Rv	Surface Temp.	Req. Water Temp.	Design Temp. Drop
Bsmnt - Floor	9	Embedded	hePEX 1/2"	1	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15
Bsmnt - Floor	9	Embedded	hePEX 1/2"	2	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15
Bsmnt - Floor	9	Embedded	hePEX 1/2"	3	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15
Bsmnt - Floor	9	Embedded	hePEX 1/2"	4	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15
Bsmnt - Floor	9	Embedded	hePEX 1/2"	5	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15
Bsmnt - Floor	9	Embedded	hePEX 1/2"	6	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15
Bsmnt - Floor	9	Embedded	hePEX 1/2"	7	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15
Bsmnt - Floor	9	Embedded	hePEX 1/2"	8	175.5	20.0	9	3	240	0.5	2.8	4.2	1	75	104.1	15

Radiant Heating Installation Notes

GENERAL INFORMATION

1. It is the installer's responsibility to assure the system functions properly, safely, and meets all local, state and regional codes.
2. Installer to supply and install all materials shown on this plan and all others needed to complete this hydronic system. Also, provide any incidental work not shown or specified, which can be reasonable inferred as belonging to the work necessary to provide the complete system.
3. This plan does not constitute a complete installation guide for a hydronic system. The installer shall be factory trained, properly licensed and reasonable experienced in the installation of hydronic heating systems. RPA and I=B=R installation procedures and recommendations shall be followed in effecting the installation.
4. Coordinate with General Contractor and the work of all other trades.
5. Work shall comply with requirements of building inspectors and all local, state and federal codes, including UBC, UMC, UPC, UFC, UL, NEC, and OSHA. Installation of equipment and materials shall comply with manufacturer's installation instructions and industry standards.
6. The Monterey Energy Group Inc. makes no guarantee for any material or components to be installed in this hydronic system.

TUBING INSTALLATION

1. Tube spacing shall not vary by more than 10% from that shown on plans.
2. Tubing shall be pressure tested at 100 psi or to 50 psig greater then the operating pressure, which ever is greater, for 30 minutes prior to and during pouring of concrete. System to be tested with air to insure freeze protection. A 30-40 psi pressure test shall remain during phases of construction. Required test shall be conducted by the owner or contractor in the presence of an authorized inspector. The piping being tested shall remain exposed during the test.
3. Installer is responsible for protecting tubing from freezing during construction and adding antifreeze and corrosion inhibiting fluids upon completion of work.
4. Tubing to be tied or stapled every 3' in straight runs. At the 180-degree turns, staple the tubing at the top of the arc, and once on each side, 12 inches from the top of the arc.
5. Installer to record length of every pipe and photograph completed installation (before concrete).
6. Refer to manufacture's guidelines for additional installation methods of their products.
7. Tubing for radiant floor heating shall be 1/2" PEX with oxygen diffusion barrier meeting CSA B137•5 certification and listed by ICBO, to ASTM F-876-93 and F-877-93 and listed by NSF to NSF 61.

PLUMBING BETWEEN MANIFOLD AND HEAT SOURCE

1. Type M or L copper tube joined with 95-5 solder shall be used. Pipe in and out of conditioned space shall be insulated to R-4. All ends of pipe shall be reamed. All lines shall be run as direct as possible.
2. Install expansion joints as needed and provide clearance around pipe passing through floors and walls.
3. Cross-linked polyethylene with an integral oxygen diffusion barrier may be used only when specifically approved by the local building department. Pipe sizing on plans is based on I.D.'s of copper piping. The use of PEX tubing may require upsizing of nominal sizes and should be verified to match the equivalent pressure loss using copper piping.

MANIFOLD INSTALLATION

1. Manifolds to be plum, level and situated in their final position.
2. Manifolds to be installed at least 18" above finished floor.
3. Manifolds to be installed with air vents and flow balancing valves. Manifolds shall be equipped with a fully sealing ball or gate valve on the supply and return to allow service. Zone valves or Telestats (if used) shall be installed on return side of manifolds. Unless otherwise specified, manifolds shall be brass type.

FLUIDS

1. Hydronic radiant heating systems, open or closed, should be purged and charged with clean water measuring a minimum pH of 7.0.
2. Fill water with high mineral content (hardness) over 8-9 grains (150 ppm) should be presoftened or replaced with de-ionized (D.I.) water.
3. When applicable, antifreeze shall be of the propylene glycol type. Refer to "Design Summary" for concentrations.
4. Where approved, combined, open systems shall utilize approved fixtures, fittings and pipe for both the heating system and the domestic potable water and pressure tested to regulatory limitations for each. A control device shall be installed on the radiant portion of the system to insure periodic circulation to avoid stagnation during the off season.
5. No chemical additives shall be used in a combined open system.

ECO-WARM INSTALLATION

1. The installer shall refer to the manufactures guidelines for installation methods of various floor coverings.
2. Custom grooves shall be routed as indicated on plans using a router jig and shall be made using a 5/8" core box router bit.
3. When applicable installation contractor shall coordinate with the plumbing contractor so as to have all plumbing stubbed out 12" above sub-floor prior to installation.
4. Remove all burrs left by custom routing and on angle holes.
5. Holes for routing tubing below sub-floor shall be drilled using a 11/16" bit at the correct location and in the appropriate direction so that the end of the tube can be passed from the groove to the under floor area in the right direction to lead to the appropriate manifold location or the boiler panel.
6. All grooves shall be inspected and cleaned of any debris prior to tubing installation.
7. Tubing shall be and remain pressurized immediately following installation into the panel diaphragm for the duration of all construction.
8. Tubing for the Eco-Warm system shall be 1/2" PEX with oxygen diffusion barrier meeting CSA B137•5 certification and listed by ICBO, to ASTM F-876-93 and F-877-93 and listed by NSF to NSF 61.

DESIGN ASSUMPTIONS

1. 13 degrees F outside design temperatures.
2. R-19 wall insulation.
3. R-49 ceiling insulation.
4. Double pane windows U=0.28.
5. R-19 floor insulation and R-19 in between floor insulation.
6. (9) Setback thermostats location per Architect or Owner. Installation per guidelines under the Controls section of the "Heat Source Schematic".
7. R-value of tile floors not to exceed 0.5. R-value of hardwood floor areas not to exceed 1.0. R-value of carpeted floor areas not to exceed 2.0.
8. R-5 under slab insulation and R-5 slab edge insulation.
9. Air change rate = 0.4.

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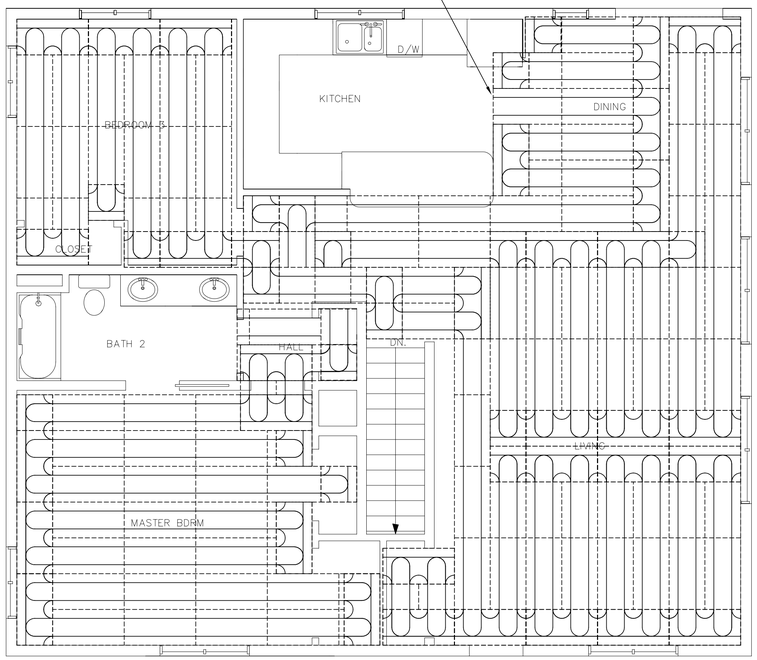
PRELIMINARY - NOT FOR CONSTRUCTION

SAMPLE HOUSE

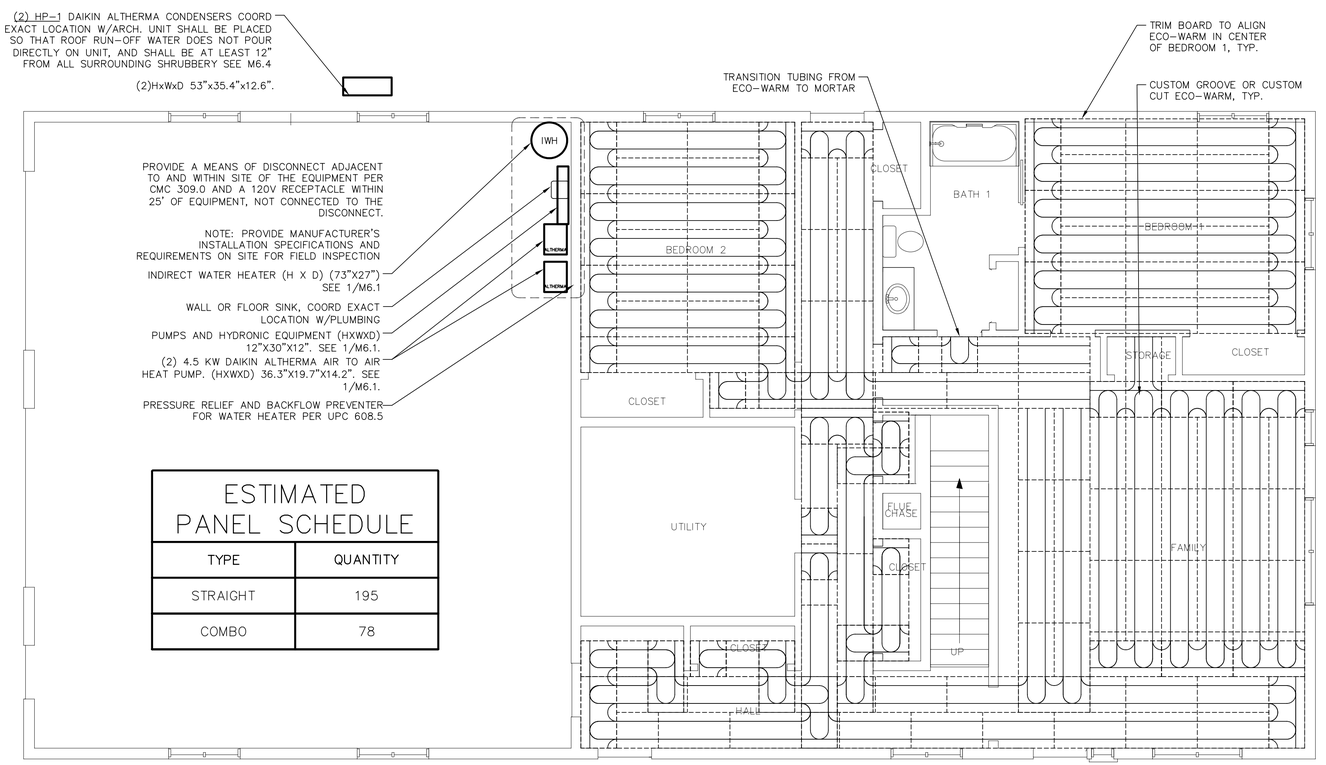
NOTES

DATE:
SCALE: AS NOTED
DRAWN: MEG
CHECKED:
CHECKED:
FILE NAME:
SHEET: M0.1
SHEET OF SHEETS



3 UPPER FLOOR RADIANT PANEL LAYOUT

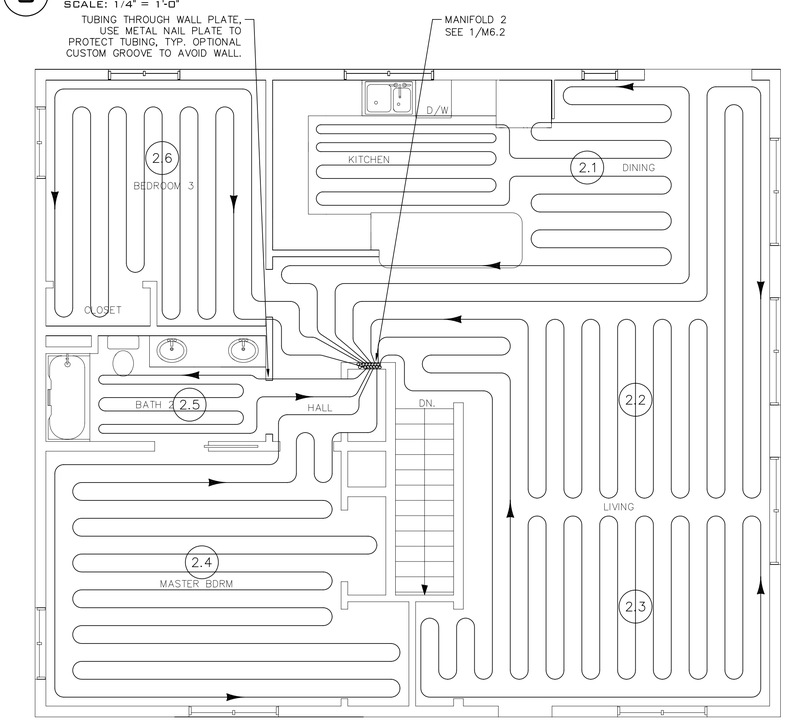
SCALE: 1/4" = 1'-0"



ESTIMATED PANEL SCHEDULE	
TYPE	QUANTITY
STRAIGHT	195
COMBO	78

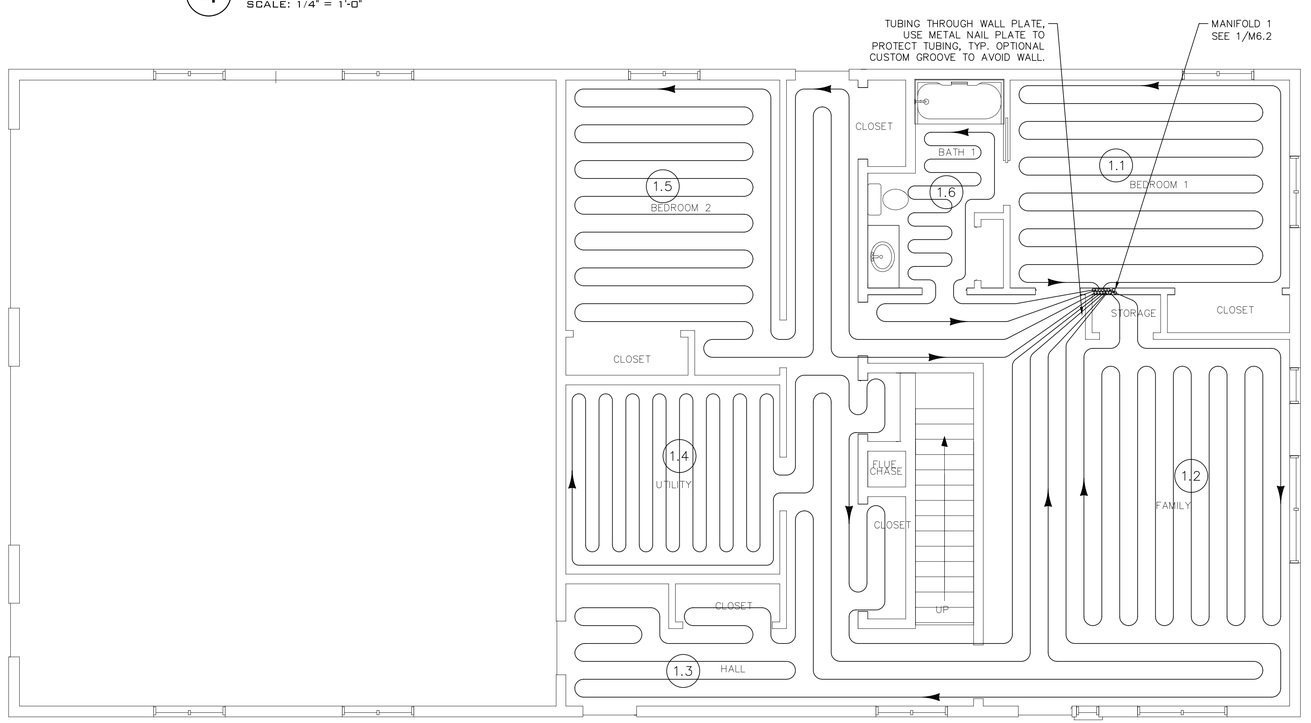
4 MAIN FLOOR RADIANT PANEL LAYOUT

SCALE: 1/4" = 1'-0"



2 UPPER FLOOR RADIANT TUBING LAYOUT

SCALE: 1/4" = 1'-0"



1 MAIN FLOOR RADIANT TUBING LAYOUT

SCALE: 1/4" = 1'-0"

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PRELIMINARY - NOT FOR CONSTRUCTION

SAMPLE HOUSE

MAIN AND UPPER FLOOR RADIANT TUBING AND PANEL LAYOUT

DATE:	
SCALE:	AS NOTED
DRAWN:	MEG
CHECKED:	
CHECKED:	
FILE NAME:	
SHEET:	M2.1
	SHEET OF SHEETS

LEGEND

BOILER

SUPPLY AND RETURN MANIFOLD

EXPANSION TANK

HEAT EXCHANGER

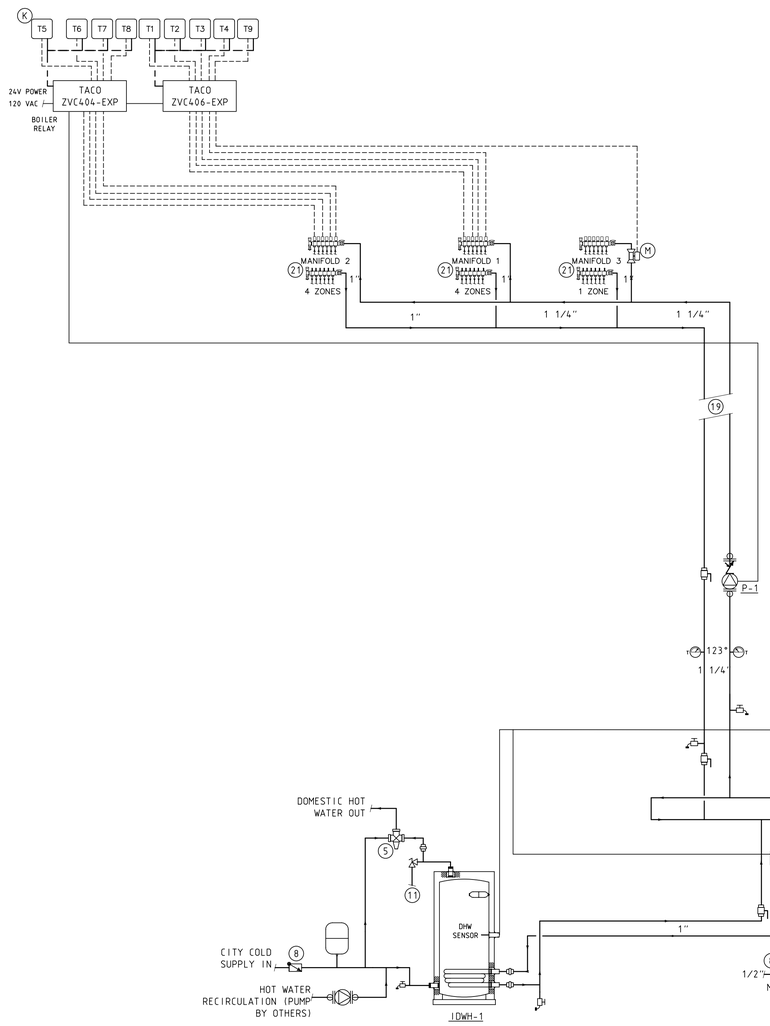
INDIRECT WATER HEATER

- PUMP W/INTERGRAL FLOW CHECK
- PUMP W/ISOLATION FLANGES
- BALL VALVE
- 3-WAY MOTORIZED MIXING VALVE
- TEMPERATURE GUAGE
- TEMPERATURE/ PRESSURE GUAGE
- PRESSURE GUAGE
- PRESSURE REDUCING VALVE
- BACKFLOW PREVENTER
- AIR SEPERATOR
- CHECK VALVE - FLOW
- CHECK VALVE - SWING
- AIR VENT
- THERMOSTATIC MIXING VALVE
- GLOBE VALVE
- 4-WAY MOTORIZED MIXING VALVE
- HOSE BIB/DRAIN/ PURGE VALVE
- CHECK VALVE - SPRING
- BACKFLOW PREVENTER
- ESB ZONE VALVE
- PRESSURE RELIEF VALVE
- DIFFERENTIAL PRESS REGULATOR
- FLOW METER W/CIRCUIT SETTER
- ZONE VALVE
- GATE VALVE
- UNION
- 3-WAY MIXING VALVE - MANUAL
- CIRCUIT SETTER
- THERM. RADIATOR VALVE (ANGLE)

PAIR (2 WIRES) 18 GUAGE RELAY

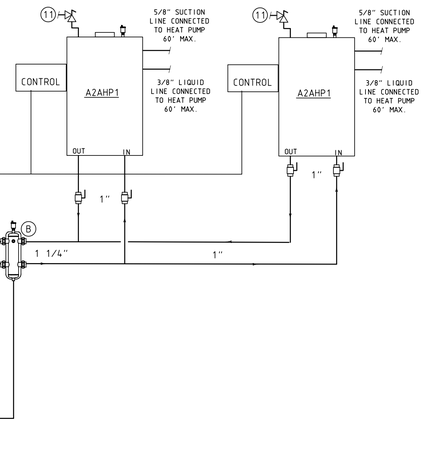
PAIR (2 WIRES) 18 GUAGE 24VAC

120 V



1 HEATING SYSTEM SCHEMATIC

NOT TO SCALE



NOTE: AT THE TIME OF SUBMITAL OF THIS DRAWING, ALTHERMA FACTORY INFORMATION ON CONTROL SYSTEM WAS UNAVAILABLE. CONTROL COMPONENTS SHOWN ON THIS DRAWING ARE CONCEPTUAL AND MAY REQUIRE ADDTIONAL COMPONENTS, RELAYS, ETC.

WATER HEATING DEVICES

MARK	KBTUH IN	KBTUH OUT	FAN V/PH	FAN AMPS	GAS CON.	HW/ CW CON.	WT LBS	AFUE	MANUFACTURER AND MODEL	NOTES
2AHP1						1"	123		DAIKIN ALTHERMA EKHBH054B6VJU	(4) (6)

INDIRECT WATER HEATERS

MARK	GAL CAP	KBTUH IN	RECOV. AT 90° F RISE	LBS FULL	DIM. HT. X DIA.	MANUF. MODEL	NOTES
IDWH-1	50					DAIKIN EKHW50S0BA3VJU	

PUMPS

MARK	GPM	FT HD	MANUF.	MODEL	MOTOR HP	MOTOR V/PH	MOTOR AMPS	MOTOR EFF. (%)	NOTES
P-1	16.0	20.5	TACO	0013-VDT	16	115/1	2.0	NA	(16) (17)
P-3	12.0	17.4	TACO	0014-BF1-IFC	1/8	115/1	1.55	NA	

SYSTEM COMPONENTS

MARK	COMPONENT	MANUF.	MODEL	NOTES
A	SUPPLY & RETURN MANIFOLD	ZURN	QUICKZONE	(9) (19)
B	HYDRAULIC SEPARATOR	CALLEFI	548082A - 3" 124 GPM	
C				
D	PRESS. REDUCING/FILL VALVE	TACO	3350	
E				
				(28)
G	TEMP/PRESSURE GUAGE			
H	TEMPERATURE GUAGE	MILI	B259951-2W	
J	STRAINER			
K				(25)
N	BACKFLOW PREVENTER	WILKINS	750-AC-1/2"	
M	ZONE VALVE	TACO	ESB V075C2A	

NOTES

GENERAL

1. This drawing is conceptual and diagrammatic and does not constitute a complete plan. Installer to supply and install all materials shown on this plan and all others needed to complete this hydronic system. Also, provide any incidental work not shown or specified, which can be reasonable inferred as belonging to the work necessary to provide the complete system.
2. Only qualified Plumbing or Heating technician shall install the heating system.
3. Refer to all manufactures guidelines pertaining to the installation, protection and maintenance of the hot water source.

COMPONENTS

4. Daikin Altherma with controls. Refer to Altherma design manual for exact configuration.
5. Anti-scald thermostatic mixing valve shall me set at 115° max.
6. See Altherma design manual for mounting of unit..
7. System shall be tested for 30 min. At 100 psi.
8. Verify with local authority having jurisdiction for backflow prevention requirements.
9. See detailed design summary for required radiant water temperatures, zones and quantity of loops for each manifold.
10. Globe valves shall be used for balancing flow in circuits to manifolds. Ball valves shall be used for component isolation only, with the exception of minor balancing of flow, not to exceed 15% throttling of total flow.
11. Provide pressure relief with direct piping to approved drain.
12. When Temperature sensors cannot be located on outlet side of a pump, they shall be kept a minimum of 10 pipe diameters downstream of any mixing tees.
13. Installer shall obtain written authorization from the design team for "Or Equal" substitutions on heating system components.
14. Where applicable, swing check valves shall be mounted in an upright position.
15. Where applicable, provide a minimum of 8 pipe diameters of straight pipe upstream of all spring check valves.
16. Provide minimum 12 pipe diameters upstream of pump inlet. Provide full port isolation shutoff ball valves or iso-flanges at all pumps.
17. If standard pumps are substituted for pumps shown with integral check valve, a spring or flow check valve shall be installed.
18. Condensate removal per UMC and local codes. Optional PH neutralizer may be installed. Never drain condensate that has not been neutralized to cast iron waste piping.

PRIMARY/SECONDARY PIPING

19. See floor plan for manifold locations. Unless noted, all branches to manifolds shall be ¾".
20. Secondary piping in a primary/secondary system shall have tees plumbed 4 pipe diameters center to center, and shall have a minimum of 8 pipe diameters of straight pipe upstream of first tee.
21. Where not shown, provide ball valves and hose bibs for isolation and purging of primary and/or secondary piping. A purging valve may be used as a substitute for a ball valve/hose bib combination.
22. Where applicable, Pressure/Temperature ports shall be installed on each secondary piping circuit supply and return.
23. Unless practicality does not permit, all secondary piping shall be plumbed such that the risers go down from an overhead primary circuit.

CONTROLS

24. Control system shall be complete, tested and fully operational prior to system balancing.
25. Thermostats shall be programmable setback type from Daikin.
26. Optional outdoor sensors should be placed in free air away from direct sunlight or other heat sources (preferably the north side of the building)
27. Indoor air sensors shall be placed at approximately the 5' level on an interior wall out of direct sunlight unless otherwise specified by the manufacturer.

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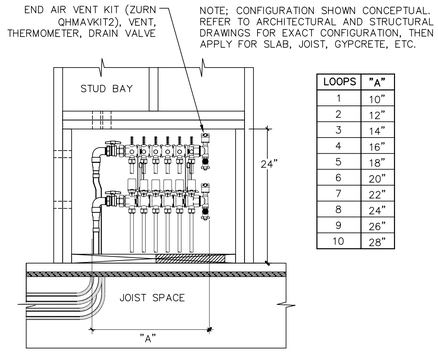
PRELIMINARY - NOT FOR CONSTRUCTION

SAMPLE HOUSE

DETAILS

DATE:
SCALE: AS NOTED
DRAWN: MEG
CHECKED:
CHECKED:
FILE NAME:

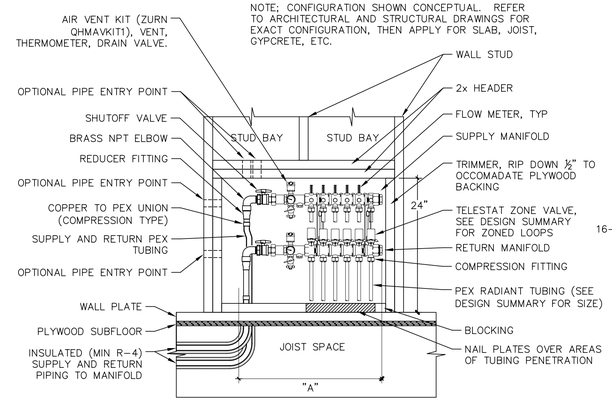
SHEET: M6.1
SHEET OF SHEETS



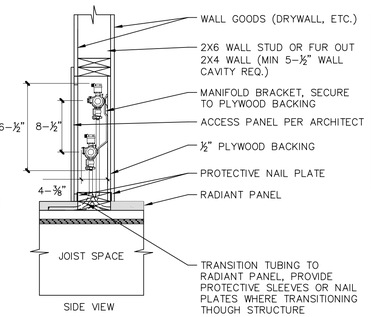
LOOPS	"A"
1	10"
2	12"
3	14"
4	16"
5	18"
6	20"
7	22"
8	24"
9	26"
10	28"

ALTERNATE CONFIGURATION

2 MANIFOLD INSTALLATION
SCALE: NONE



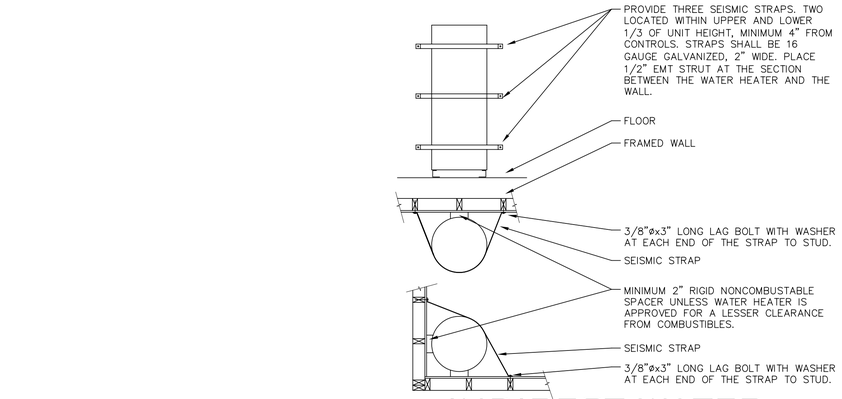
NOTES:
1. SEE DESIGN SUMMARY FOR LOOP TOTALS AND FLOW REQUIREMENTS
2. WHERE APPLICABLE, INSULATE INTERIOR WALL CAVITY W/½" BUBBLE FOIL BUBBLE RADIANT BARRIER INSULATION (PANTRIES, ETC.)
3. ALL SUPPLY AND RETURN MAINS ARE ASSUMED TO BE BARRIER PEX TYPE MATERIAL
4. LABEL EACH SUPPLY AND RETURN PEX PIPE CIRCUIT DESIGNATING AREA THEY ARE SERVING



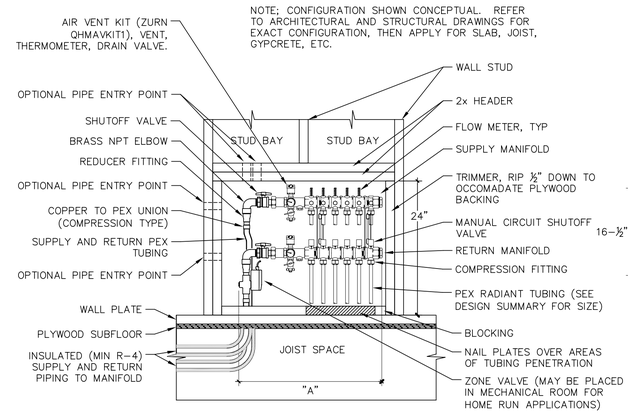
LOOPS	"A"
1	14"
2	16"
3	18"
4	20"
5	22"
6	24"
7	26"
8	28"
9	30"
10	32"

SIDE VIEW

1 MANIFOLD INSTALLATION- MULTI ZONE MANIFOLD
SCALE: NONE



4 INDIRECT WATER HEATER BRACING
SCALE: NONE



NOTES:
1. SEE DESIGN SUMMARY FOR LOOP TOTALS AND FLOW REQUIREMENTS
2. WHERE APPLICABLE, INSULATE INTERIOR WALL CAVITY W/½" BUBBLE FOIL BUBBLE RADIANT BARRIER INSULATION (PANTRIES, ETC.)
3. ALL SUPPLY AND RETURN MAINS ARE ASSUMED TO BE BARRIER PEX TYPE MATERIAL
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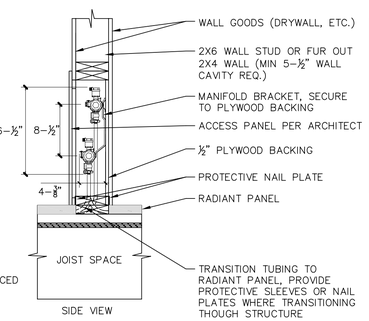
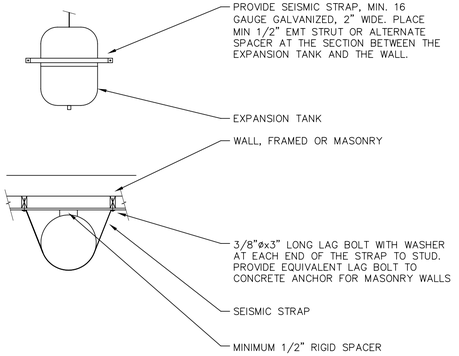


LOOPS	"A"
1	14"
2	16"
3	18"
4	20"
5	22"
6	24"
7	26"
8	28"
9	30"
10	32"

SIDE VIEW

3 MANIFOLD INSTALLATION- SINGLE ZONE MANIFOLD
SCALE: NONE



7 EXPANSION TANK BRACING
SCALE: NONE

CAUTION

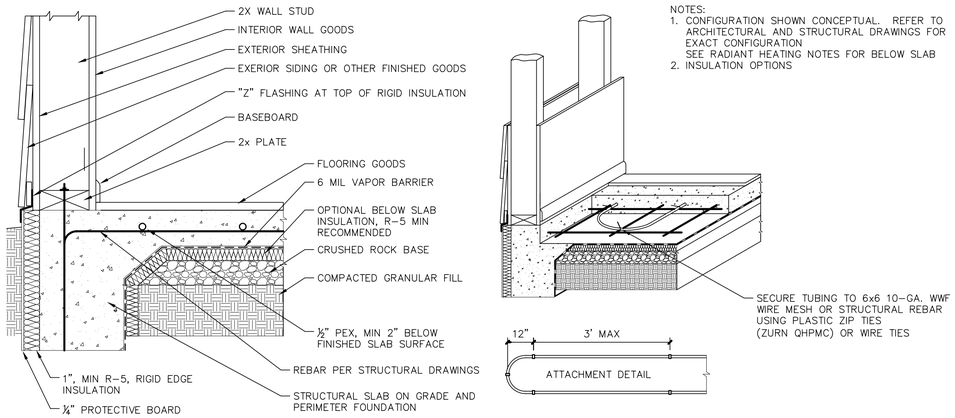
A. THE HEAT-TRANSFER MEDIUM MUST BE WATER OR OTHER NONTOXIC FLUID HAVING TOXIC RATING OR CLASS OF 1 AS LISTED IN CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 5TH EDITION.
B. THE PRESSURE OF THE HEAT-TRANSFER MEDIUM MUST BE LIMITED TO A MAXIMUM OF 30PSIG BY AN APPROVED SAFETY OR RELIEF VALVE.

LABEL SHALL BE LAMINATED OR RESISTANT TO DAMAGE BY WATER.

LABEL SHALL BE AFFIXED TO INDIRECT WATER HEATER IN A CLEAR VISIBLE LOCATION.

NOTE: THE WORD "CAUTION" AND THE STATEMENTS IN LETTERS HAVING A MINIMUM UPPERCASE HEIGHT OF 0.120 INCH (3.05MM). THE MINIMUM VERTICAL SPACING BETWEEN LINES OF TYPE SHALL BE 0.046 INCH (1.17MM). LOWER CASE LETTERS SHALL BE COMPATIBLE WITH THE UPPER CASE LETTER SIZE SPECIFICATIONS.

6 INDIRECT WATER HEATER LABEL
SCALE: NONE



NOTES:
1. CONFIGURATION SHOWN CONCEPTUAL. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR EXACT CONFIGURATION
   SEE RADIANT HEATING NOTES FOR BELOW SLAB
2. INSULATION OPTIONS

5 RADIANT APPLICATION-Tubing in Structrural Slab
SCALE: NONE

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PRELIMINARY - NOT FOR CONSTRUCTION

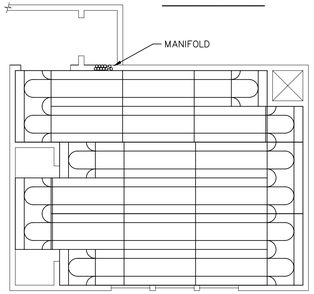
SAMPLE HOUSE

DETAILS

DATE:
SCALE: AS NOTED
DRAWN: MEG
CHECKED:
CHECKED:
FILE NAME:

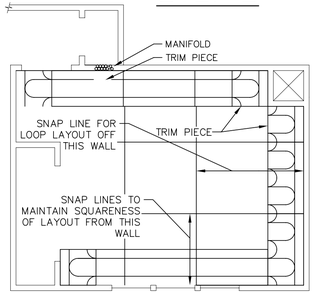
SHEET: M6.2
SHEET OF SHEETS

STEP 1



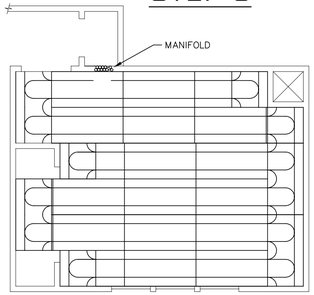
STEP 1: FROM PANEL LAYOUT, DETERMINE PANELS NEEDED (SEE MATERIAL TAKEOFF) AND TUBING LENGTHS REQUIRED. BE SURE TO ALWAYS USE GOOD JUDGMENT IN ALLOWING ENOUGH TUBING AT ENDS FOR LEADERS UP TO MANIFOLDS.

STEP 2



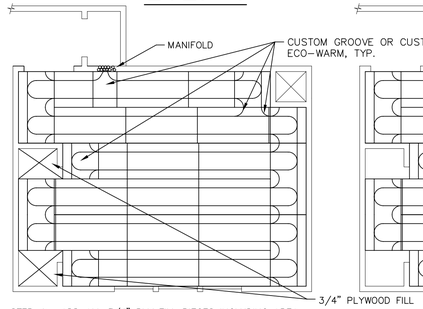
STEP 2: SNAP LINES ON FLOOR TO AID IN LAYOUT. BEGIN THE ECO-WARM LAYOUT BY STARTING AT THE BEGINNING OF THE LOOP 1 SUPPLY RUN AND RUNNING BOARDS ALONG THE PERIMETER OF THE HEATED SPACE TO THE AREA OF THE HIGHEST HEAT LOSS.

STEP 3



STEP 3: ADD END PIECES AND STRAIGHT PIECES WORKING YOUR WAY BACK AWAY FROM THE AREA OF HEAT LOSS MAKING SURE TO LINE UP ALL GROOVES AS YOU GO. ONCE ALL BOARDS ARE IN PLACE, DRILL HOLES FOR SUPPLY AND RETURN LEADERS TO MANIFOLDS (RAISED FLOOR APPLICATION).

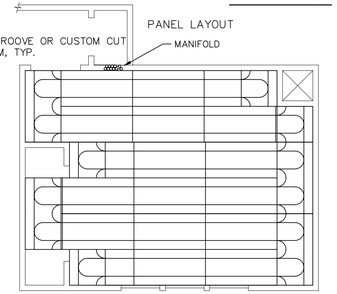
STEP 4

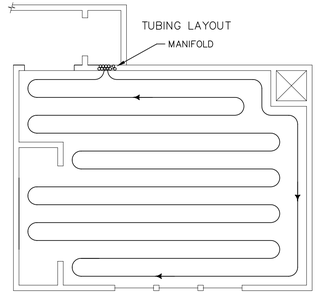


STEP 4: ADD ALL 3/4" PLY FILL PIECES INCLUDING AREA OF LEADERS TO MANIFOLD. ROUTE ALL CUSTOM GROOVES AS NECESSARY CLEAR ALL DEPRIS FROM GROOVES IN PREPARATION OF LAYING THE TUBING IN PLACE

NOTE: PRIOR INSTALLATION, BE SURE TO THOUROUGHLY READ THE APPLICATION AND INSTALLATION MANUAL FOR ADDITIONAL GUIDLINES TO THE STEPS ABOVE

STEP 5



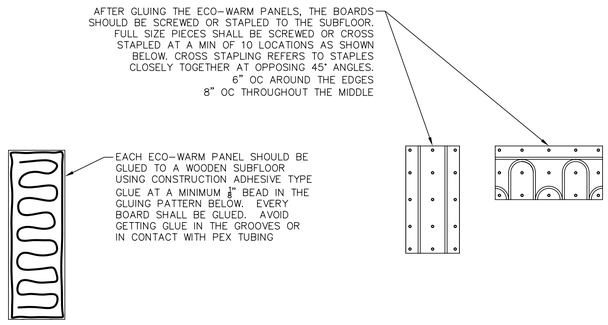


STEP 4: FEED SUPPLY TUBING (ENOUGH TO ROUTE UP WALL TO MANIFOLD). PROCEED BY "WALKING" THE TUBING INTO THE GROOVE. OCCASIONALLY TUBING MAY REQUIRE THE USE OF A RUBBER OR HIDE MALLET TO FORCE THE TUBING IN PLACE. ONCE FULLY INSTALLED, WALK THE LOOP TO MAKE SURE THE ENTIRE LENGTH OF TUBING IS FULLY SEATED IN THE GROOVE.

OPTIONAL: IN CHALLENGING AREAS WHERE CUSTOM ROUTING MAY BECOME EXCESSIVE, TUBING MAY BE ROUTED BELOW THE SUBLFOOR AND POPPED UP THROUGH DRILLED HOLES INTO THE GROOVES FROM BELOW. THIS MAY BE PARTICULLARY USEFULL NEAR A MANIFOLD WITH SEVERAL LOOPS.

1 ECO-WARM LAYOUT AND INSTALLATION

SCALE: NONE

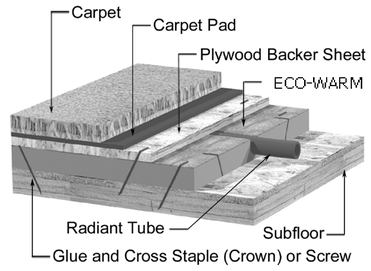


2 ATTACHMENT

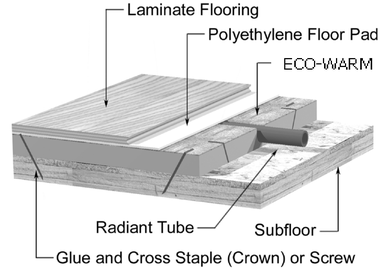
SCALE: NONE

NOTE: TYPICAL INSTALLATIONS ARE DETAILED BELOW. EXACT CONFIGURATIONS MAY DIFFER BASED ON ARCHITECTURAL DESIGN. SOME FLOOR COVERINGS SHOWN MAY NOT BE APPLICABLE TO THIS DESIGN. SEE DETAILED DESIGN SUMMARY ON M0.1 FOR FLOOR COVERINGS ASSUMED.

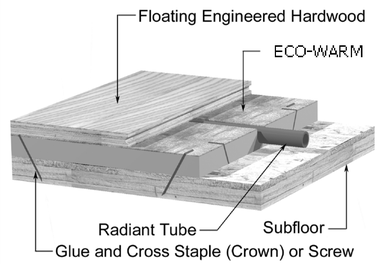
CARPET



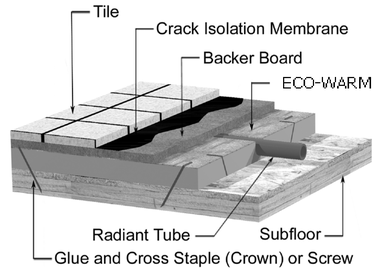
LAMINATE



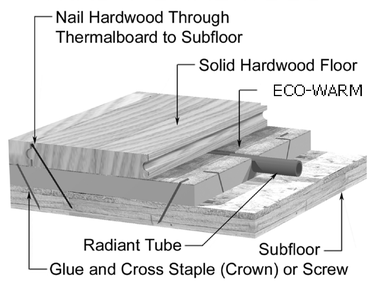
ENGINEERED WOOD



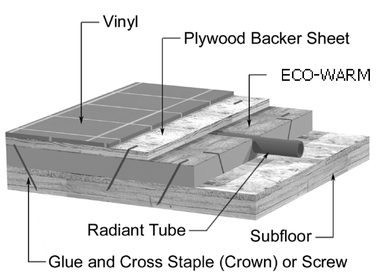
TILE



TRADITIONAL WOOD



VINYL

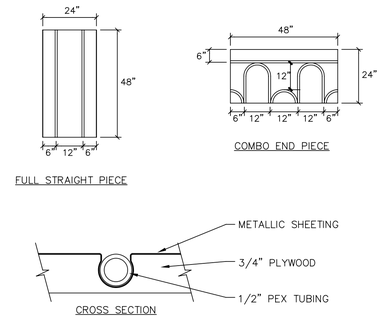


3 INSTALLATION METHODS

SCALE: NONE

GENERAL NOTES

1. THIS SHEET IS PROVIDED AS A SUPPLEMENT ONLY, TO THE INSTALLATION METHODS OF THE ECO-WARM PRODUCT AND DOES NOT CONSTITUTE A COMPLETE INSTALLATION GUIDE. PLEASE REFER TO THE ECO-WARM APPLICATION AND INSTALLATION MANUAL FOR COMPLETE INSTALLATION GUIDELINES.
2. IT IS THE INSTALLERS RESPONSIBILITY TO INSTALL ACCORDING TO THE MOST CURRENT APPLICATION GUIDE. THIS SHEET DOES NOT PURPORT TO ADDRESS ALL RELEVANT ISSUES: IT ASSUMES A KNOWLEDGE OF GOOD PRACTICE IN BOTH HYDRONICS AND CONSTRUCTION METHODS.
3. INSTALLERS SHOULD ALWAYS CONSULT ALL RELEVANT LOCAL, REGIONAL AND NATIONAL CODES, AND ADHERE TO GOOD CONSTRUCTION PRACTICE.
4. ECO-WARM SHOULD ONLY BE INSTALLED BY KNOWLEDGEABLE QUALIFIED INSTALLERS.
5. ECO-WARM INSTALLATIONS FREQUENTLY REQUIRE THE COORDINATION OF TRADES. THESE ARE, MOST TYPICALLY, MECHANICAL AND FLOORING TRADES. ANY ISSUES REGARDING THIS COORDINATION SHOULD BE WORKED OUT IN ADVANCE.
6. FAILURE TO FOLLOW THE INSTRUCTIONS OF THIS SHEET AND MANUAL, FAILURE TO ADHERE TO RELEVANT LOCAL , REGIONAL AND NATIONAL CODES, FAILURE TO COORDINATE TRADES AND FAILURE TO FOLLOW GOOD CONSTRUCTION PRACTICE MAY CAUSE AN UNSATISFACTORY RESULT. SEE ALSO "LIMITATIONS OF USE" IN THE INSTALLATION MANUAL.
7. THE LIMITATIONS AND INSTRUCTIONS OF USE FOR PEX PIPE AND OTHER HYDRONIC COMPONENTS PROVIDED BY THE MANUFACTURES SHALL ALSO BE REFERENCED AND FOLLOWED DURING INSTALLATION; THIS SHEET DOES NOT ADDRESS MANY ASPECTS OF A HYDRONIC INSTALLATION



4 PANEL COMPONENTS

SCALE: NONE

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REVISIONS:	BY:

PRELIMINARY - NOT FOR CONSTRUCTION

SAMPLE HOUSE

ECO-WARM INSTALLATION DETAILS

DATE:
SCALE: AS NOTED
DRAWN: MEG
CHECKED:
CHECKED:
FILE NAME:

SHEET: M6.3
SHEET OF SHEETS

2. ALTHERMA. TECHNICALLY

1 - THE AIR TO WATER HEAT PUMP

> reversible air/water heat pump ERHQ

1.1 - THE OUTDOOR UNIT

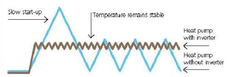
> compact, weather-resistant and easy to install
> contains a inverter controlled compressor for energy efficiency and precise temperature regulation
> heat pump operation range: heating and domestic hot water to -20C° outside temperature

HEAT EXCHANGER ANTI-CORROSION TREATMENT

As a standard, the heat exchanger in the outdoor group is provided with an anti-corrosion treatment. This treatment guarantees and noticeable increase in resistance against acid rain and salt corrosion.

SUPER PERFORMANCE THANKS TO THE INVERTER PRINCIPLE

The coefficient of performance (COP) of the Altherma heat pump is also largely attributable to the Daikin inverter principle. An integrated frequency-convertor adjusts the rotational speed of the compressor to suit the heating demand. Therefore the system seldom operates at full capacity and your customer only pays for the energy which he actually needs.

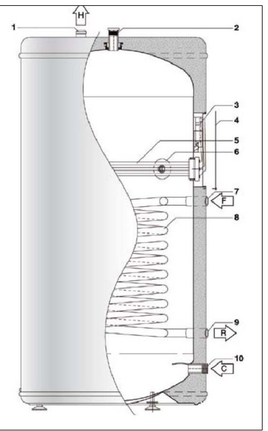


HIGH EFFICIENCY COMPRESSORS:

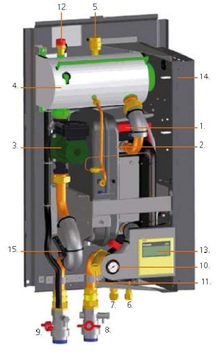
Altherma models 6, 7 and 8 are equipped with a **swing-compressor**. Swing-compressors have been setting trends in the area of energy efficient performance for the past 10 years (leaks and friction are basically non-existent).

The **scroll-compressors** provided in the Althermamodels 11,14and 16 aredesigned as compact, robust, low-noise device to guarantee optimal operational reliability (no valves and built-in swing-link coupling) and efficiency (through a low initial flow and a constant compression ratio).

1. Domestic hot water outlet
2. Pressure safety valve connection
3. Switch box
4. Switch box cover
5. Booster heater
6. Thermistor opening
7. Indoor unit water inlet
8. Heat exchanger
9. Indoor unit hot water outlet
10. Cold water inlet



1. Heat exchanger
2. Expansion tank (10 litres)
3. Circulator
4. Tank with back-up heating
5. Air purge valve
6. Refrigerant fluid connection
7. Refrigerant gas connection
8. Water inlet connection
9. Water outlet connection
10. Pressure gauge (water circuit)
11. Water filter
12. Pressure relief valve
13. User interface
14. Switch box
15. Flow switch



INDOOR UNIT

		EKHBH008AA***	EKHBX008AA***	EKHBH016AB***	EKHBX016AB***
Function		Heating only	Reversible	Heating only	Reversible
Dimensions	HxWxD	36.3x59.8x42	36.3x59.8x42	36.3x59.8x42	36.3x59.8x42
Leaving water temperature range	heating	25-55		25-55	
	cooling	5-22		5-22	
Drain valve		yes			
Material		Epoxy polyester painted galvanised steel			
Colour		Neutral white (RAL 9010)			

FACTORY MOUNTED HEATER	kW	capacity steps	power supply
EKBBH9008AA3V3 / EKBBH9016AB3V3	3	1	1~/230V
EKBBH9008AA6V3 / EKBBH9016AB6V3	6	2	1~/230V
EKBBH9008AA9W1 / EKBBH9016AB9W1	6	2	3~/400V
EKBBH9008AA3T1 / EKBBH9016AB3T1	6	2	3~/230V
EKBBH9008AA9W1 / EKBBH9016AB9W1	9	2	3~/400V
EKBBH9008AA3T1 / EKBBH9016AB3T1	9	2	3~/230V

OUTDOOR UNIT

			ERHQ004AD	ERHQ007AD	ERHQ008AD
Dimensions	HxWxD		28.6X20.1X11.8		
Nominal capacity	heating	kW	5.75	6.84	8.43
	cooling	kW	7.20	8.16	8.37
Nominal input	heating	kW	1.26	1.58	2.08
	cooling	kW	2.27	2.78	2.97
COP			4.56	4.34	4.05
EER			3.17	2.94	2.82
Operation range	heating	°F	-4~77		
	cooling	°F	50~109.4		
	domestic water	°F	4~109.4		
Sound power level	heating	dBA	61	61	62
	cooling	dBA	63	63	63
Sound pressure level	heating	dBA	48	48	49
	cooling	dBA	48	48	50
Weight		kg	56		
Refrigerant charge	R-410A	kg	1.7		
Power supply			1~/230V/50Hz		
Recommended fuses		A	20		

Measuring conditions: Heating Ta DB/WB 7°C/6°C - LWC 35°C (DT=5°C) - Cooling Ta 35°C - LWE 18°C (DT=5°C)

			ERHQ011A	ERHQ014A	ERHQ016A	ERHQ011AW1	ERHQ014AW1	ERHQ016AW1
Dimensions	HxWxD		46.3x38.4x12.6			57x85.4x32.6		
Nominal capacity	heating	kW	11.2	14.0	16.0	11.32	14.50	16.05
	cooling	kW	13.9	17.3	17.8	15.65	16.06	16.76
Nominal input	heating	kW	2.46	3.17	3.83	2.54	3.33	3.73
	cooling	kW	3.79	5.78	6.77	4.44	5.33	6.06
COP			4.55	4.42	4.18	4.46	4.35	4.30
EER			3.67	2.99	2.63	3.39	3.01	2.76
Operation range	heating	°F	-4~86				-4~86	
	cooling	°F	50~114.8				50~114.8	
	domestic water	°F	4~109.4				4~109.4	
Sound power level	heating	dBA	64	64	66	64	64	64
	cooling	dBA	64	66	69	64	66	69
Sound pressure level	heating	dBA	49	51	53	51	51	52
	cooling	dBA	50	52	54	50	52	54
Weight		kg	103			108 / 110*		
Refrigerant charge	R-410A	kg	3.7			2.95		
Power supply			1~/230V/50Hz			3N~/400V/50Hz		
Recommended fuses		A	32			20		

Measuring conditions: Heating Ta DB/WB 7°C/6°C - LWC 35°C (DT=5°C) - Cooling Ta 35°C - LWE 18°C (DT=5°C)
*Specific models with additional protection against freezing are available and are designated with the suffix "B" (example ERHQ011AW1B)

DOMESTIC HOT WATER TANK

		EKHWS150B3V3	EKHWS200B3V3	EKHWS300B3V3	EKHWS200B3Z2	EKHWS300B3Z2
Water volume	l	150	200	300	200	300
Max.water temperature	°F	185				
Height	IN	35.4	45.3	63	45.3	63
Diameter	IN	22.8				
Booster heater	kW	3				
Power supply		1~/230V/50Hz			2~/400V/50Hz	
Material inside tank		Stainless steel (DIN 1.4521)				
Material outside casing		Epoxy-coated mild steel				
Colour		Neutral white				
Empty weight	kg	37	45	59	45	59

		EKHWET150A3V3	EKHWED200A3V3	EKHWEB300A3V3	EKHWED200A3Z2	EKHWEB300A3Z2	EKHWET150A3V3
Mounting		Floor					Wall
Water volume	l	150	200	300	200	300	150
Max.water temperature	°F	162					
Height	IN	47.4	62.2	61.9	62.2	61.9	47.4
Diameter	IN	21.5	21.5	28	21.5	28	21.5
Booster heater	kW	3					
Power supply		1~/230V/50Hz			2~/400V/50Hz		1~/230V/50Hz
Material inside tank		Enamel coated steel acc. (DIN4753PL2)					
Material outside casing		Epoxy-coated steel					
Colour		Natural white (RAL 9010)					
Empty weight	kg	88	104	140	104	140	82

SOLAR KIT

			EKSOLHMAV1
Dimensions	HxWxD	mm	770x390x270
Heat exchanger	pressure drop	kPA	21.5
	max.in.let temp	°F	220
	heat exchange capacity	W/K	1,400
Ambient temperature	max.	°F	95
	min.	°F	32.8
Power supply			1~/220-240V/50Hz
Power supply intake			indoor unit

ROOM THERMOSTAT

			EKRTW	EKRTR		EKRTETS
				Thermostat	Receiver	(option)
Dimensions	HxWxD	mm	87x125x34	87x125x34	170x50x20	3m wire length
Weight	Net weight	g	215	210	125	65
Ambient temperature	Storage	°F	4-140	4-140	4-120	4-140
	Operation	°F	32-122	32-122	32-122	32-122
Temperature setpoint range	Heating	°F	39Q-86.6	39Q-86.6	-	-
	Cooling	°F	59Q-96.6	59Q-96.6	-	-
Clock			yes	yes	-	-
Regulation function			proportional band	proportional band	-	-

REVISIONS:	BY:

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PRELIMINARY - NOT FOR CONSTRUCTION

SAMPLE HOUSE

DETAILS

DATE:	
SCALE:	AS NOTED
DRAWN:	MEG
CHECKED:	
CHECKED:	
FILE NAME:	
SHEET:	M6.4
	SHEET OF SHEETS