



REHAU RADIANT HEATING SYSTEMS INSTALLATION GUIDE

Construction Automotive Industry Table of Contents

1.	Scope
2.	Installation Considerations
3.	Installation Overview
4.	System Component Overview
5.	Preparing for Installation 7
6.	Installing Manifolds 11
7.	Connecting Pipes to Manifolds
8.	Handling Pipe
9.	Installing Pipe in Floor, Wall or Ceiling
10.	Testing the System
11.	Pouring Slab or Overpour 28
12.	Completing the Finished Covering
13.	Starting the System



A This symbol and the signal words DANGER, WARNING or CAUTION alert you to personal injury hazards. If you don't avoid the hazardous situation:

- DANGER! Will result in death or serious injury
- WARNING! Could result in death or serious injury
- CAUTION! Can result in minor or moderate injury

The signal word NOTICE is used to help you avoid property damage. We cannot warn of all hazards; you must also use your own good judgment.

For updates to this publication and the most current REHAU technical guidelines, safety information and manufacturer's recommendations, visit

na.rehau.com/resourcecenter

1. SCOPE

This technical information applies to the installation, testing and operation of REHAU radiant heating systems using PEXa crosslinked polyethylene pipe.

Persons using this guide must be experienced and appropriately licensed hydronic heating system installers, who have an understanding of the principles and practices for hydronic installations.

The information presented in this guide is intended to demonstrate general methods and is not specific to your project conditions. It is the responsibility of the installer to check the prevailing local codes and to verify that technical information presented in this guide is appropriate for a particular installation. This guide does not supersede the recommendations of other manufacturers. If there is conflicting information, the installer must consult with the other manufacturer or manufacturer's representative prior to installing, connecting and operating the REHAU radiant heating system.

After reading this guide, the installer should attend the appropriate REHAU Academy seminar, where installation techniques for radiant heating systems are more fully explored.

This guide assumes the installer has already been provided with a REHAU radiant heating system design or approved equivalent in accordance to the REHAU *Radiant Heating Systems Design Guide*. This guide should be used in conjunction with the REHAU *Sustainable Building Technology Product Catalog* which provides a detailed description of each system component. The installer should also review the REHAU *PEXa Limited Warranty* and pertinent supplemental REHAU *Technical Bulletins* before beginning to install a radiant heating system. Installers should also periodically check the REHAU Resource Center for the latest updates.

If you do not have prior experience with hydronic heating systems or require additional assistance, please contact your regional REHAU sales representative.

2. INSTALLATION CONSIDERATIONS

The following points should be considered when installing a radiant heating system:

- Do not proceed with the installation without a radiant heating design. Failure to install in accordance to a well-planned design may result in poor system performance.
- Do not proceed with the installation without a piping layout. The pipe layout drawing shows the manifold location(s) and the location and length of each radiant heating circuit. Without a well-planned layout, you can waste significant time and money.
- Verify the manifold location(s) are agreed to by the designer, general contractor and building owner, and comply with local codes.
- Follow other manufacturers' recommendations and guidelines. Failure to do so may result in noise and finished covering damage.
- Do not store pipe outdoors or where exposed to sunlight. Keep pipe in original protective packaging until ready to install. Minimize UV exposure during installation.
- Do not install pipe outdoors above the ground unless permanently and properly protected from exposure to sunlight.
- Do not hang manifolds crooked or without brackets.
- Do not mix up supply and return tails when connecting to the manifold. Do not lose track of which pipe corresponds to each circuit. Use the REHAU PRO-BALANCE[®] Manifold Circuit Chart.
- Do not cut pipe with a saw blade or pocket knife.
- Do not let pipe float close to the surface when pouring a slab or overpour. Do not let nylon ties float to the surface. Clip and remove excess tie ends.
- Do not install pipe with spacing between pipes greater than shown in the design, as this could result in cold spots.
- Do not nail, staple or screw through the pipe.
- Do not exceed temperature limits of finished covering, slab, overpour or subfloor.
 Floor, wall and ceiling coverings can be damaged by excessive temperatures leading to discoloring, noise, delaminating, warping, cracking and deterioration of the finished coverings.
- Wear safety shoes, gloves, glasses and hearing protection when appropriate.
 Wear suitable clothes and follow all safety regulations.

3. INSTALLATION OVERVIEW

The following sequence is the most efficient way to install the REHAU radiant heating system:

- 1. Gather and review documents
- 2. Prepare and inspect job site
- 3. Install manifold
- 4. Install pipe and connect to manifold
- 5. Perform system air pressure test
- 6. Pour slab or overpour if required
- 7. Insulate below subfloor or suspended slab if required
- 8. Install finished coverings
- 9. Connect manifold to distribution piping and heat source
- 9. Flush, fill and purge the system with heating fluid
- 10. Adjust the system flow rates



Fig. 3.1: Typical REHAU radiant heating system installation. RAUPEX® pipe (1); PRO-BALANCE manifold (2)

4. SYSTEM COMPONENTS OVERVIEW

REHAU offers pipes, fittings, manifolds, heat transfer panels and plates, controls, and a variety of installation accessories and tools. For a detailed description of our system components, refer to the REHAU *Sustainable Building Technology Product Catalog.*

- RAUPEX 0, Barrier and RAUPEX SPEED™ Pipe
- PRO-BALANCE Manifolds, Connectors and Accessories and Copper Manifolds
- RAUPANEL[™] and RAUBOARD[™] Heat Transfer Panels
- RAUPEX SPEED Mat
- RAUPLATE[™] and Heavy Gauge Heat Transfer Plates
- REHAU Smart Controls
- Zone Controls, Thermostats and Other Controls
- EVERLOC+[™] Compression-sleeve Fittings, F2080 Compression-sleeve Fittings and Other RAUPEX Fittings and Valves
- EVERLOC+ Compression-sleeve Tools, F2080 Compression-sleeve Tools and Other Installation Tools
- Installation Accessories and Other Hydronic Accessories

5. PREPARING FOR INSTALLATION

If there are potential problems with the design and/or job site construction that could affect the quality of the radiant heating installation or system performance, notify the appropriate designer, contractor(s) or owner immediately.

5.1 Reviewing Local Codes

The installer is responsible for checking with applicable code authorities to determine specific local code requirements.

5.2 Gathering Documents

The radiant heating system design should be complete before attempting installation. You should have the details for the floor, wall and ceiling construction and the schedule outlining manifold size(s) and pipe size, spacing and circuit lengths for each heated area. Building drawings may also be necessary before proceeding with your installation.

5.3 Inspecting the Job Site

Before beginning the installation, you should perform a site inspection.

 Familiarize yourself with the installation sequence and scheduling for the construction of the building.

Changes in the construction schedule may be required to ensure the integrity of your installation. REHAU recommendeds that other construction that might interfere with the pipe installation (e.g., drywall, plumbing) is not scheduled during your installation. Make sure that any other work that is to follow the installation of the radiant heating system will not damage the system components.

2. Confirm that the job site as-built matches your building plans or drawings.

Check for anything that might interfere with pipe installation such as changes to concrete walls or footings and changes to the layout of walls or floors. Note any changes; a redesign of the pipe layout might be required.

If pipes are to pass into rooms through doorways or follow along walls that are not yet installed, we recommend that you use the building plans to measure and mark their planned locations with paint or wood studs. These "virtual" walls will act as a guide when installing pipe. 3. Inspect the condition of the building site.

Inspect the site for possible hazards that could damage RAUPEX pipe, such as nails, staples, materials or tools from other trades, or chemicals that could spill and damage the pipe. Eliminate potential hazards before installing pipe.

Confirm that the additional floor height for overpour and heat transfer panel construction has been taken into account. Door moldings, base plates and electrical outlets may need to be raised. Doors, thresholds and stairs may need to be modified.

Confirm the sub-grade for the heated areas has been properly prepared. It should be level, compacted and drained. If required, ensure the vapor barrier and insulation are installed and per local code.

Ensure the existing subfloor or slab for heated areas is flat, level, structurally sound, free of noise and debris before installing pipe.

A typical overpour thickness adds 13 to 17 lb/ft (63 to 80 kg/m) "dead load" to a suspended floor structure. Confirm the floor structure has been approved to carry this weight by an architect or engineer.

Correct any discrepancies before installing pipe.

5.4 Checking the Design

It is the full responsibility of the installer to thoroughly review the design documents and determine the suitability of the plans for the installer's intended use prior to ordering materials and installing the system.

- 1. Check the manifold locations are correct (see Section 6.1)
- 2. Check the orientation of the pipes in the layout is correct (see Section 9.2)
- 3. Check the circuit lengths are not too long (see Section 9.4)
- 4. Check the finished floor coverings are per the design (see Section 12.1)

5.5 Organizing the Tools

Typical construction tools are required to complete a radiant heating system installation.

REHAU uncoilers speed the RAUPEX pipe installation.



Fig. 5.1: RAUPEX horizontal uncoiler



Fig. 5.2: RAUPEX universal uncoiler

REHAU tools provide fast, easy, professional installations and are required to assemble REHAU compression-sleeve fittings to RAUPEX pipes. It is important to use a proper cutter when cutting RAUPEX pipes. A clean, square cut is required.

Refer to the REHAU *F2080 Compression Sleeve Product Instructions* for the F2080 compression-sleeve tools.

Refer to the REHAU *EVERLOC+* Assembly Product Instructions for EVERLOC+ compression-sleeve tools.

5.6 Storing and Delivering System Components

RAUPEX pipe is shipped in a cardboard box or opaque plastic bag that offers extra protection from sunlight, rain, dirt and other hazards. Keep pipe in the box or bag until it is required for installation, and return unused pipe to the protective packaging. REHAU's PEXa pipes must not be stored outdoors and are not designed for permanent outdoor installation (with the exception of non-exposed buried applications). Refer to REHAU *Technical Bulletin 218* for the accumulated maximum UV exposure periods. Failure to follow recommendations for maximum UV exposure could result in premature pipe failure and will negate the REHAU *PEXa Limited Warranty*.

REHAU fittings, manifolds, accessories and tools should be stored in a dry location. To avoid denting and damage, store in a location with minimal traffic. Do not stack heavy materials on top of REHAU components.

To improve the ease of installation in cold weather below 40°F (5°C), REHAU recommends storing pipe at room temperature for a few hours before installation. Extra care should be taken when bending cold pipe to avoid kinking.

Normal methods of packaging and protection should be exercised when shipping and handling to prevent damage from dents, dings, abrasion, crushing and other hazards.

6. INSTALLING MANIFOLDS

Refer to the REHAU *PRO-BALANCE Manifold Product Instructions* for the installation and operation of this manifold.

REHAU recommends installing the manifold before installing the pipe. Connect each circuit as it is installed to avoid mixing up circuits or supply and return tails.

6.1 Best Practice for Manifold Locations

The pipe layout drawing should show the manifold location and the layout and length of each pipe circuit to the heated areas.

Verify that manifold location is agreed to by the builder and owner. Location should be easily accessible to facilitate installation of the RAUPEX pipe, the distribution supply and return pipes from the heat source, wiring from thermostats to connect to circuit actuators (if used), and for any future servicing requirements.

Manifolds should be centrally located within the heated areas for easier pipe routing. Common locations include mechanical rooms, closets, cabinets or crawl spaces. We recommend that manifolds be located in a heated space, but not within an outside wall or building panel. Manifolds must be installed in a non-corrosive environment.

Manifolds can be mounted within a stud wall and may require installation of an access panel for later servicing.

Carefully choose the location for the manifold. Performing system pressure tests, filling the system with fluid and purging air can sometimes result in fluids being spilled in the area near the manifold.



Fig. 6.1: 1 in. PRO-BALANCE manifold

6.2 PRO-BALANCE Manifold Installation

REHAU recommends when using an air test to slightly wet the flat gaskets with water during assembly of the manifold. Install the manifold in the location indicated on the plans or pipe layout drawing.

REHAU steel manifold cabinets are typically used in industrial, institutional and commercial installations, or where required.





Fig. 6.2: PRO-BALANCE flush cabinet for brass manifolds

Fig. 6.3: PRO-BALANCE surface cabinet for brass manifolds

The manifold should be securely mounted, either horizontally or vertically, in its final position. If the permanent structure does not exist (common in slab-on-grade installations), you may have to build a temporary manifold support from wood studs or rebar driven into the sub-grade.

Position the manifold a minimum of 16 in (40 cm) above finished floor level. A height of 36 in (90 cm) to the top of the manifold will usually allow for convenient pipe connections and future servicing. Make sure that the manifold is level.

Protect the manifold from damage and vandalism during and after construction. For temporary placements, an empty RAUPEX pipe box, placed over the installed manifold, provides some protection against weather and dirt.

The manifold should remain accessible for service after completion of the project.

6.3 Installing Protective Bend Guides Between Manifold and Slab or Overpour

REHAU recommends the use of pipe protection where RAUPEX pipe enters the slab or overpour at the base of a manifold. PVC bend guides hold the pipe in a 90° bend and protect the pipe from damage by the concrete contractors and floor finishers.



Fig. 6.4: PVC bend guides transition pipes 90° from manifold to horizontal slab

To install PVC bend guides, simply insert RAUPEX pipe through the guide to the appropriate length, usually 20-30 in (50 -75 cm) of pipe on the other side. The guide should be positioned so that the pipe rises straight to the manifold and so that half the guide will be within the thermal mass.

7. CONNECTING PIPES TO MANIFOLDS

After the manifold is securely mounted in its final position, you can begin connecting the RAUPEX pipe. Connect each pipe to the manifold as it is being installed. Attach the pipe to the upper supply header first, passing it behind the lower return header.



Fig. 7.1: R-20 compression fitting for connecting RAUPEX to PRO-BALANCE manifold



Fig. 7.2: Installing pipe to manifold with R-20 connector

- Cut the pipe to length so there will be no stress on the manifold connection. Make sure that the pipe is cut squarely. Attach the manifold connector to the end of the RAUPEX pipe. When using 3/4 in. RAUPEX manifold connectors, attach the manifold connector bushing to the manifold outlet with the hex end of the bushing closest to the header. Thread sealant is not required.
- 2. Place the pipe end with attached connector up to the appropriate manifold outlet.
- Hand-tighten the manifold compression nut connection. If the fitting is aligned properly, it will go on smoothly. Thread sealant is not required.
- 4. Once the compression nut connection is hand tight, use a 1 1/4 in (32 mm) wrench on the compression nut and do not turn more than one-half turn. (Use a 1 1/2 in [38 mm] wrench for 3/4 in. RAUPEX manifold connectors.) Do not over tighten, as this may destroy the integral O-ring. You may wish to tighten all fittings at the same time once all pipes are connected.
- 5. All compression nut connections must be inspected for leakage after several hours of operation. Compression nuts may need to be tightened. Do not turn more than one-half turn. (Use a 1 1/2 in [38 mm] wrench for 3/4 in. RAUPEX manifold connectors.) Do not over tighten, as this may destroy the integral O-ring.

Note: After tightening, if the compression nut does not seal, remove connection and pipe from the manifold, cut off the small section of pipe where the split ring was and remake the connection. Before cutting the pipe, ensure there is adequate slack in the pipe to allow for the new connection.

8. HANDLING PIPE

When handling RAUPEX pipe, it is important to avoid:

- Dragging it over rough objects such as gravel or concrete
- Crushing it by driving overtop with wheelbarrow or power equipment
- Contact with oil or oily products (e.g., gasoline, paint thinner)
- Soldering operations or any open flame
- Excessive exposure to sunlight as per the allowable exposure time

8.1 Uncoiling Pipe

The uncoiler should be located in an area that will not interfere with the installation.

First, carefully cut the outer binding strings of the coiled pipe. When working with 1,000 ft (305 m) coils, cut only the outer binding strings at first. This will release approximately half the pipe for uncoiling.

An uncoiling device such as the RAUPEX uncoiler makes it easy to unwind a pipe coil. If you don't have an uncoiler, have one person hold the pipe coil off the ground between their arms while another person pulls pipe from the top or the bottom of the coil. RAUPEX should not be pulled off of a coil that is lying flat on the ground.

Occasional twisting in the pipe may occur during installation, particularly when installing without the benefit of an uncoiler. This must be corrected before installing additional pipe. If the pipe becomes twisted, simply rotate the coil 90° or more, in the direction of the twist, until the pipe lays flat.

8.2 Bending Pipe

RAUPEX pipe may be bent, even when cold. The minimum bend radius is 5X the OD for cold bends. For an even smaller bend radius, the pipe may be heated with a hot air gun and bent to no less than 3X the OD.

REHAU support bends make it fast and easy to create tight bends without kinking, such as where the pipe rises out of a slab or overpour straight up to the manifold.

Pipe Size				
Nominal	Cold Bend		Heated	d Bend
in	in	(mm)	in	(mm)
3/8	2.5	(64)	1.5	(38)
1/2	3.125	(79)	1.875	(48)
5/8	3.75	(95)	2.25	(57)
3/4	4.375	(111)	2.625	(67)
1	5.625	(143)	3.375	(86)

Table 8.1: Minimum 90° Bend Radius of RAUPEX Pipe

When pipes are laid out in parallel, the minimum pipe spacing is determined by the minimum bend radius shown in Table 8.1.

Pipe Size	Minimu	Minimum Loop Diameter = Minimum Pipe Spacing				
Nominal Cold Lo		op Heated		Loop		
in.	in.	(mm)	in.	(mm)		
3/8	5.0	(128)	3.0	(72)		
1/2	6.25	(158)	3.75	(56)		
5/8	7.5	(190)	4.5	(114)		
3/4	8.75	(222)	5.25	(134)		
1	11.25	(246)	6.75	(172)		

Table 8.2: Minimum Parallel Pipe Spacing

Bend Diameter = 2X Bend Radius = 180° Loop

8.3 Connecting Two Pipes

REHAU compression-sleeve fittings are designed for use with RAUPEX pipe and should only be assembled with REHAU tools.

Refer to the REHAU *F2080 Compression-sleeve Product Instructions* for the assembly of F2080 compression-sleeve fittings.

Refer to the REHAU *EVERLOC+ Assembly Product Instructions* for the assembly of EVERLOC+ compression-sleeve fittings.

8.4 Burying Pipe Connections in a Slab or Overpour

REHAU permits the use of REHAU compression-sleeve joints to be buried in a concrete slab or gypsum cement overpour or buried underground in soil.

Compression nut and threaded adapter fittings are intended to transition RAUPEX pipe to the building service piping and should be accessible for periodic inspection.

NOTICE: REHAU recommends that threaded connections should not be buried. Operational failure or expensive repair costs can result if a leak develops from a buried threaded connection.





Fig. 8.3: OK to bury compression sleeve connections

Fig. 8.4: Do not bury threaded connections

Burial of a compression-sleeve joint requires that:

- Joint must be encased in RAUCROSS[™] Heat Shrink sleeving or a waterproof rubber tape.
- The location of each joint should be marked on the "as-built" drawings.
- The installer should visually inspect each joint prior to burial.
- A system pressure test must be performed prior to and during the pour.
- Verify that these instructions comply with local codes.

Applying RAUCROSS Heat Shrink

- 1. Use the appropriate size of RAUCROSS from the REHAU Sustainable Building Technology Product Catalog.
- Cut RAUCROSS to length. There should be at least 1 in (25 mm) of overlap past the fitting.
- 3. Slide RAUCROSS over the end of the pipe.
- 4. Connect pipes with compression-sleeve joint.
- 5. Slide RAUCROSS back over the fitting, ensuring that there is adequate overlap.
- 6. Using a hot air gun, apply heat to RAUCROSS. Rotate heat gun around the fitting while moving along its length to ensure even shrinkage. As soon as RAUCROSS has shrunk evenly along its entire length, remove heat.

Applying Waterproof Rubber Tape

- 1. Use the waterproof rubber tape from the REHAU *Sustainable Building Technology Product Catalog* or an approved equivalent.
- 2. Apply two layers of tape. There should be at least 1 in (25 mm) of overlap past the fitting.



Fig. 8.5: F2080 compression-sleeve joint protected by RAUCROSS heat shrink

8.5 Repairing Kinked Pipe

RAUPEX pipe is flexible and resists kinking even at temperatures well below freezing. If the pipe becomes kinked due to excessive bending, flow may be obstructed or reduced. Kinked pipe must be repaired.

You can straighten the pipe by simply heating the area with a hot air gun. Rotate the heat gun around the pipe to evenly heat the surface. Always use caution when operating a heat gun and never use a torch or open flame to heat the pipe.

When fully heated, the pipe will get soft. When the kink is gone, turn off the heat gun and let the area cool. (It is normal for small bubbles or wrinkles to appear on red or blue pipe.) This type of heating will anneal or stiffen the pipe, making it stronger but also less flexible in the heated area. Therefore, do not try to bend the pipe in the same spot. This may require a slight adjustment of fasteners so that the previously kinked section of pipe is installed without being bent.

8.6 Replacing Damaged Pipe

If the pipe is damaged, it might need to be replaced. Cut out the damaged area and connect the pipes with REHAU compression-sleeve joint. In some cases it may be necessary to use two couplings and additional pipe to replace the damaged area. Follow the instructions in Section 8.3 Connecting Two Pipes.

A scrape in the oxygen diffusion barrier of RAUPEX O_2 Barrier does not necessitate repair with a coupling. However, when the pipe wall is gouged, the damaged section of pipe must be removed and replaced.

8.7 Disassembling of REHAU Compression-sleeve Joints

Refer to the REHAU *F2080 Compression-sleeve Product Instructions* for the disassembly of F2080 compression-sleeve fittings.

Refer to the REHAU *EVERLOC+ Assembly Product Instructions* for the disassembly of EVERLOC+ fittings.

9. INSTALLING PIPE IN FLOOR, WALL OR CEILING

9.1 Planning Paths of Supply and Return Pipe Tails to Manifold

Review the planned paths for the pipe circuit tails to the heated area they will serve.

It may be helpful to mark the floor where the tails will be installed.

Mark all penetrations in the floor, joists and base plates for the supply and return tails according to the design, making necessary corrections for the as-built site conditions. Coordinate with other trades so that any floor penetrations and obstructions are clearly identified prior to installing the pipe.

▲ WARNING! Building codes require installation of an approved firestop system where pipes penetrate a fire-rated assembly. Fire or smoke that is not contained may lead to death or serious injury. The installer must determine suitability of the intended firestop system and the installer must seek out his own licensed professional advice for any particular project. The Authority Having Jurisdiction should review and approve the firestop system prior to installation.

Ensure joist penetrations are in the correct locations. Normally, the center 1/3 of a standard wood joist is the best place for drilled holes, as this is the least stressed part of this joist type.

Note: Must check with building owner, architect, joist manufacturer and local code officials before drilling or notching a joist to ensure the size, shape and location of penetrations, are acceptable.

Recommend the use of PE protection sleeves or PVC bend guides in locations where pipe enters or leaves a slab or overpour and in places where pipe might rub against an abrasive object. Always protect pipe in steel studs.

9.2 Designing and Best Practice for Pipe Layouts

Install the pipe along exterior walls first, so that the hottest (supply) water goes to the coldest areas.

Keep pipe at least 6 in (15 cm) from the edges of slabs, walls or other permanent objects such as bathtubs or cabinets. This will help to prevent damage to the pipe when these items or flooring materials are being installed. Keep pipe 6 in (15 cm) from wax seals on toilets to prevent softening and overheating of the seals.

Pipe must not overlap when it will be embedded in a slab or overpour, as this reduces the slab or overpour thickness and can lead to damage of the thermal mass or "hot spots." Overlapping can be avoided by careful planning of the circuit paths, ensuring that pipes can connect to manifolds without crossing each other. Pipe should not be installed in areas under cabinets used for food storage or under appliances such as freezers. It is acceptable to install pipe under bathtubs and shower stalls to warm the bases. Pipe may be installed under cupboards on exterior walls and under stairs.

When one circuit of pipe passes through areas with different finish coverings, the higher R-value area will require higher water temperatures. Install pipe first under the high R-value areas, such as carpet, then under the low R-value areas such as tile. Alternatively, this case can be avoided by installing separate circuits under different floor coverings.

In areas with high pipe concentrations (closer than 4 in [10 cm]) such as near manifolds, if the thickness of the slab permits, insulate the pipes with closed-cell foam to prevent "hot spots." Careful planning of the pipe layout will usually prevent this.

Pipe should be installed perpendicular to hardwood finished flooring to improve the ease installation of the hardwood flooring and minimize chances of damaging the pipe.

Pipe should be installed in the direction of the longest room dimension to minimize the number of bends required, maximizing the pipe runs and making installation easier.

Pipe circuit lengths (including supply and return tails) should be kept below the typical values in Table 9.1 to help minimize circulator size and attain high system efficiencies.

Pipe	Typical	Typical Total
Size	Application	Circuit Lengths
10.1 mm 3/8 in.	Dry panel systems	up to 250 ft (76 m)
1/2 in.	Joist-space and residential slab and overpour systems	up to 330 ft (101m)
5/8 in.	Large residential and small commercial slab and overpour systems	up to 400 ft (122 m)
3/4 in.	Commercial and industrial slab systems	up to 500 ft (152 m)
1 in.	Large commercial and industrial slab systems	greater than 500 ft (152 m)

Table 9.1: Pipe Sizes

9.3 Constructing Heated Areas

9.3.1 Heat Transfer Plate Floor Installation (below the subfloor in the joist space) Plates hold the RAUPEX pipe and are installed below the structural subfloor in the joist space of a wood framed structure. Refer to the REHAU *RAUPLATE[™] Product Instructions* for installation instructions.







Fig. 9.1: RAUPLATE

Fig. 9.2: HG plates

Fig. 9.3: LG plates

For RAUPLATE and Heavy Gauge (HG) plates, secure plates to subfloor, then snap in pipe. For Light Gauge (LG) plates, snap pipe into plates, then secure plate to subfloor. We recommend a 1 in (25 mm) gap between consecutive plates or a minimum gap of 0.25 in (6 mm).

Thread pipe through holes in joists first and then connect tail to PRO-BALANCE manifold outlet. Pull RAUPEX pipe down the length of each joist cavity before installing into heat transfer plates. Start at the last joist cavity farthest from the manifold. See Figure 9.4.

Leave a minimum 6 in (150 mm) space between the end of the pipe loop and the end of the joist bay.

The joist space must be insulated. See Section 12.4 Insulating Suspended Floors.



Fig. 9.4: Pulling pipe circuit below subfloor in joist space

9.3.2 Heat Transfer Panel Floor Installation (above the subfloor)

Panels hold RAUPEX pipe and are installed above the structural wood subfloor or over top the structural slab in the case of RAUPANEL. Refer to the REHAU RAU-PANEL and RAUBOARD Product Instructions for installation instructions.



Fig. 9.5: RAUPANEL



Fig. 9.6: RAUBOARD

9.3.3 Heat Transfer Panel Wall or Ceiling Installation (in front of the studs and joists)

Panels hold RAUPEX pipe and are attached to wood wall studs or wood ceiling joists. Refer to the REHAU *RAUPANEL* and *RAUBOARD Product Instructions* for installation instructions.

Insulate the wall or ceiling if appropriate before installing pipe. Always follow local codes to ensure compliance with insulation minimums.

9.3.4 Structural Slab Installation

A heated structural slab consists of poured concrete surrounding the RAUPEX pipe. The presence of pipe usually does not require re-engineering of the slab, but a structural engineer or architect must verify this.

When using wire mesh, we recommend ordering in flat sheets instead of rolls.



Fig. 9.7: Nylon ties (1), Foam staples (2), RAILFIX[™] (3), Screw clips (4), Mounting clips (5), Universal fixing rails (6)

Fasteners keep pipe flat and level and prevent pipes from floating to the surface.

Foam staples or screw clips secure pipe to foam board insulation every 18 to 24 in (45 to 60 cm).

Fixing rails are spaced at intervals of approximately 3 ft (0.91 m) and pipes snap into the rails.

Nylon ties and mounting clips secure pipe to wire mesh. Nylon ties are used to secure pipe to rebar. Secure pipe every 24 to 36 in (600 to 900 mm). Pipe must be fastened at the beginning, midpoint and end of each bend. When using nylon ties, pull them snug, but not tight. Make sure tie ends are pointed down so they will not be exposed when the slab is poured, or cut the ends and discard.

When using steel wire ties, either use looped wire ties or ensure the ends of the wire ties are not sharp. Additionally, the ends of the ties should be pointed down and away from the pipe to minimize the risk of puncture. Once the pipe is tied down, the pipe should be inspected to ensure that it is not crushed or damaged.

Subgrade should be compacted, flat and smooth to prevent damage to pipe or insulation. Approved vapor barrier material should be installed per local code. Edge and under slab insulation of the correct type and thickness should be installed. Reinforcing wire mesh, if required by structural design, must be flat and level, with all sharp ends pointing down to prevent touching the pipe.

Pipe circuits must be planned and installed to minimize passes through construction or expansion joints or other "movement" joints in the slab. With proper planning, only the supply and return pipes will pass through these areas.

Pipe circuits must also be planned and installed to minimize passes through "saw cut" control joints in the thermal mass. Ensure that any pipes passing directly through a control joint are installed low enough that they are below the blade of the saw when the cut is made.



Fig. 9.8: Pipe layout in structural slab installation

Install REHAU PE protection sleeves or equivalent around pipes that pass through expansion, movement or control joints. Most sleeve sizes are slit for easier installation. We recommend protecting the pipe 15 in (38 cm) on both sides of the joint. When passing the pipe below the joint, sleeving is recommended but not required.



Fig. 9.9: Pipe passing through and below movement joints in structural slabs

9.3.5 Overpour Floor Installation

An overpour consists of lightweight concrete or gypsum cement poured over an existing structural wood subfloor or structural slab that covers the RAUPEX pipe.

Ensure the wood subfloor has been properly prepared before installing pipe to the heated areas. For gypsum cement mixtures, apply a liquid sealant per the manufacturer's instructions to the wood subfloor. For lightweight concrete, cover the entire wood subfloor and edges of base plates with PE vapor barrier to allow for expansion and contraction of the curing concrete.

Install sleepers prior to the pour if so desired. Sleepers provide a nailing surface for nail-down hardwood strips or planks and provide a leveling surface during the pour. Sleepers are installed perpendicular to the direction of the hardwood flooring.



Steel staples, plastic staples or talons secure pipe to the wood subfloor every 18 to 24 in (45 to 60 cm) to keep pipes flat and level.

Fixing rails are spaced at intervals of approximately 2.5 ft (0.76 m) and pipes snap into the rails.

REHAU recommends a minimum 3/4 in (19 mm) coverage over top of the pipe to avoid striping and cracking.

Typically the base plates need to be doubled to provide a nailing surface for the wall covering after the pour is completed.

9.4 Installing Pipe to Heated Areas

Follow the pipe layout as closely as possible. If the layout cannot be followed, for example due to changes in the structure, the installation should follow the designed pipe spacing and circuit lengths (within 10%).

Label pipes as they are installed. Record actual circuit lengths along with circuit numbers. There are footage markings every three feet on RAUPEX pipe. You should record this information on the *PRO-BALANCE Manifold Circuit Chart*, on or near the manifold, tabs on the pipe, or on the plans (i.e., Circuit A-1, first circuit on Manifold A).

A general installation is described below. Skilled installers will adapt these instructions for the specific project.

- Drill penetrations and notch base plates for supply and return tails. Subfloor and joist penetrations should be large enough to accommodate the pipe and isolating clamp, protection sleeving, bend guide or bushing.
- 2. Before installing the pipe, make sure the heated area is free of debris and obstructions. For heat transfer plate constructions, protrusions through the subfloor such as nails or screws need to be cut flush to the bottom side of the subfloor before beginning the installation. For heat transfer panel constructions (above the subfloor), debris in the grooves needs to be removed using a vacuum or a magnet.
- 3. Position the pipe on the uncoiler in the room where the circuit is being installed. From this heated area, route the supply tail of pipe through the floor, joist and wall penetrations to the manifold. Protect pipe at floor and joist penetrations with isolating clamps, protection sleeving, bushings or support bends. Secure pipe under the subfloor with clamps or clips. Connect supply tail to the PRO-BALANCE manifold supply outlet according to the radiant heating design. See Section 7 Connecting Pipe to Manifolds.
- 4. Install the pipe in the heated area according to the construction methods below. Bends should be carefully formed to prevent kinking.

Note: Kinked pipe may result in flow restrictions. Should a pipe become kinked, see Section 8.5 Repairing Kinked Pipe.

- 5. Once the circuit is completed, route the return tail back to the PRO-BALANCE manifold. Secure pipe under the subfloor or in the wall/ceiling with clamps or clips where applicable to prevent noise. Protect pipe at floor and joist penetrations with isolating clamps, protection sleeving or support bends. Connect return tail to the manifold return inlet that corresponds to the supply outlet you started from.
- 6. Fill in the PRO-BALANCE Manifold Circuit Chart with the circuit starting and ending footage and calculate the circuit length. Check that actual length is nearly equal to design circuit length.

9.5 Installing Floor Sensors

For slab and overpour construction, install floor sensors before the pour.

We recommend installing floor sensors in a sleeve to make them easy to service and replace. Ensure the sleeve end is capped. The sensor should be buried in the slab or overpour and positioned halfway between two heating pipes.



Fig. 9.11: Floor sensor installed in sleeve of PEX pipe

10. TESTING THE SYSTEM

A pressure test ensures the radiant heating system is leak free. The pressure test must be performed prior to and during the installation of the slab/overpour and the floor/wall/ceiling coverings. Tests of hydronic heating systems shall comply with local codes and where required, shall be witnessed by the code official.

Pressure tests must be done with all circuit valves on the manifold fully open. Pressure gauges should show pressure increments of 2 psig (20 kPa) and should be located at or near the lowest points in the distribution system. Do not exceed the pressure and temperature ratings of the pipe. Never exceed 150 psig (10 bar) test pressure.

Pressure testing should be performed periodically throughout the construction of the building. If any leak is detected during the construction phase, the leak must be found and repaired immediately. Retest before covering the repair.

Complete inspection and test reports as required.

10.1 Air Pressure Testing

Use an air compressor that is capable of achieving the pressure test requirements. The air supply should have an adjustable regulator to ensure the maximum pressure requirements are not exceeded.

Do not perform compressed air tests on plastic fittings, plastic valves or plastic manifolds.

Air temperature will affect the gauge pressure, so perform pressure test at a constant temperature.



Fig. 10.1: Air pressure tester with 1 in. MPT to connect to PRO-BALANCE 1 in. brass manifold

- Verify maximum pressure requirements for all system components prior to performing the test.
- Install REHAU air pressure tester into the PRO-BALANCE 1 in. brass manifold supply isolation ball valve. A transition fitting is needed to adapt the air pressure tester to the PRO-BALANCE 1 1/4 in brass manifold. A standard air chuck will connect to the Schrader valve on the end of tester.
- Make sure all flow meters and balancing valves are completely open by turning the vent key counter clockwise. Make sure the return isolation valve and the drain valves are completely closed.

- 4. Perform a preliminary pressure test pressurizing the system to the greater of 1.5 times the maximum operating pressure or 100 psig (6.9 bar) for 30 minutes. As the pipe expands, restore pressure, first at 10 minutes and again at 20 minutes. At the end of the 30 minute preliminary test, pressure must not fall by more than 5 psig (0.3 bar) from the maximum.
- 5. After performing the preliminary test, perform the main pressure test immediately. The main pressure test shall last at least 2 hours. The test pressure should be restored and must not fall more than 3 psig (0.2 bar) after 2 hours. No leakage should be detected.

10.2 Water Pressure Test

The municipal or well water supply may be used as long as the pressure test requirements are met, a pressure gauge is used, and the water quality is acceptable. Or use a liquid test pump that is capable of achieving the pressure test requirements.

If there is a chance that water could freeze in the radiant heating system after the pressure test and before the commissioning of the heating system, then use a well mixed water/glycol solution when filling the system or perform an air test. Frozen pipes might burst resulting in leaks and operational failures.



Fig. 10.2: Typical liquid test pump with in-line pressure gauge (not provided by REHAU)

- Flush, fill and purge the system according to Section 13 Starting the System. Take necessary precautions to prevent water from freezing in the radiant heating system.
- Make sure all flow meters and balancing valves are completely open by turning the vent key counter clockwise. Make sure the isolation valves and the drain valves are completely closed.
- 3. Connect the hose from either the test pump or water supply to the drain valve 3/4 in. garden hose thread (GHT) connection on the supply header.
- 4. Apply pressure to the system, then open this drain valve by turning the handle 90° to be aligned with the valve body.
- 5. Check for air through the PRO-BALANCE air vents.
- 6. Perform a preliminary pressure test pressurizing the system to the greater of 1.5 times the maximum operating pressure or 100 psig (690 kPa) for 30 minutes.
- 7. As the pipe expands, restore pressure, first at 10 minutes and again at 20 minutes.
- 8. At the end of the 30 minute preliminary test, pressure must not fall by more than 5 psig (34 kPa) from the maximum.
- 9. After performing the preliminary test, perform the main pressure test immediately. The main pressure test shall last 2 hours. The test pressure should be restored and must not fall more than 3 psig (20 kPa) after 2 hours. Use a liquid leak detector or soap solution to check for leakage at manifold connections.

11. POURING SLAB OR OVERPOUR

Slabs and overpours must be installed according to the manufacturer's instructions, recommendations and best practices.

The pressure test should be repeated during the installation of the slab or overpour. Pipe should be under pressure with no loss during the pour. Keep REHAU compression-sleeve couplings, sleeves and tools on the job site in case repair is necessary. If the pipe is damaged and these items are not available, isolate the damaged area (at least 12 in [300 mm] in length) by building a dam or bond-out so that a coupling can be installed later.

Before installation of the slab or overpour, the pipe must be inspected to ensure that:

- The pipe is free of kinks and punctures.
- The pipe is fastened as described in this guide to prevent floating too close to the top of the thermal mass. If pipe has moved due to expansion, install additional fasteners.
- Compression-sleeve joints are sleeved in heat shrink or wrapped with two layers of waterproof rubber tape and the buried locations are noted on plans.
- PE Protection sleeves are installed at expansion or movement joints, and anywhere that the pipe could rub against an abrasive surface.
- Nailing plates are installed above the pipe where required.

In a structural slab, the pipe must be embedded in the concrete with a minimum of 2 in (50 mm) of coverage. In a non-structural slab or overpour, the pipe must be embedded in the gypsum or lightweight concrete with a minimum of 3/4 in (2 cm) of coverage.

Before the pour, notify the contractor that pipes have been installed. This will help the contractor choose the most appropriate equipment for the project. Instruct the contractor to make wooden "bridges" for transporting wheelbarrows over pipe and warn that pipe could be cut or gouged by rakes or other tools used during the pour.



Fig. 11.1: Wooden bridges to protect pipe during pour

Ensure edge and under-slab insulation have been installed according to the design. If insulation is less than specified or missing, then the design must be recalculated and the installation adjusted prior to the pour.

When using nylon ties to fasten the pipe, make sure the ends are pointed down so they will not be exposed after the slab/overpour is completed. If ties are not pointed down, then cut the ends and pickup all the pieces before the pour.

Seal or dam all cracks and holes in the suspended subfloor to prevent the pour from damaging the floor below.

12. COMPLETING THE FINISHED COVERING

Finished floor, wall and ceiling coverings must be installed according to the manufacturer's instructions, recommendations and best practices.

The pressure test should be repeated during the installation of the finished floor coverings.

NOTICE: Do not nail, staple or screw into the pipe. Fasteners that contact or penetrate the pipe may damage the pipe resulting in leaks and operational failure. Should pipe become damaged, the section of damaged pipe must be replaced.

12.1 Design and Best Practices for Finished Coverings

Most finished coverings have a specific temperature limit. Verify products are approved for use with radiant heating systems. Confirm that the temperature limits set by the manufacturer of the finished coverings and associated underlayment, adhesives, compounds and grouts have been taken into account. Refer to the REHAU *Radiant Heating Systems Design Guide* for additional design assistance.

NOTICE: Floor, wall and ceiling coverings can be damaged by excessive temperatures leading to discoloring, noise, delaminating, warping, cracking and deterioration of the finished coverings.

12.2 Floor Coverings Over Different Construction Methods

Heat Transfer Plate Installations (below the subfloor in the joist space)

- Make sure that the flooring installer is notified of the pipe locations. The flooring
 installer should not use nails/screws that could pass through the subfloor and
 damage or come into contact with the pipe below.
- Refer to the REHAU RAUPLATE Product Instructions for the installation of RAUPLATE heat transfer plates.

Heat Transfer Panel Installations (above the subfloor)

 If using adhesives, apply adhesives directly to the heat transfer panels, avoiding the pipe. Select adhesives based on the manufacturer's instructions, materials being bonded and the applied temperatures.

NOTICE: Do not allow adhesives to come in contact with the exterior or the interior of the RAUPEX pipe. Chemicals may damage the pipe resulting in leaks and operational failures.

 Basic thinset with water is acceptable in contact with the pipe as these are comparable to the materials used in concrete and overpour installation methods. If using a modified thinset, additives need to be checked with REHAU to maintain the application-specific warranty.

NOTICE: Check compatibility before allowing chemicals to come in contact with the exterior or interior of the pipe. Chemicals may damage the pipe resulting in leaks and operational failures.

- Refer to the REHAU RAUBOARD or RAUPANEL Product Instructions for the installation of heat transfer panels.
- When installing an underlayment over the heat transfer panels, such as plywood, luan or cement board, transfer the location of the pipe to the top of the underlayment with a pencil or marker before securing the underlayment.

Slab and Overpour Installations

— Most solid hardwood flooring manufacturers recommend that hardwood flooring should be installed at a moisture content close to the midpoint between the high and low values that are expected in use. In poured (wet) radiant installations, it can take 28 days or more for the thermal mass to cure and release the majority of its moisture.

NOTICE: Do not deliver to the job site or install solid hardwood flooring until the thermal mass is cured. It can absorb moisture that may cause shrinking, warping and cupping when the heating system is activated.

12.3 Wall and Ceiling Coverings

We recommend installing stud guard steel protectors where pipes cross studs.

12.4 Insulating Suspended Floors

To ensure thermal comfort of the occupants, proper operation of the system, sound abatement and efficient use of energy, joist spaces and suspended slabs should be insulated after completing the pressure testing of the system.

For heat transfer panel, slab and overpour constructions, install insulation on the underside of the subfloor with no air gap between the insulation and the subfloor/slab.

For heat transfer plate construction, the joist space must be insulated after completing the installation and pressure testing of the system. Install insulation with a 1 to 2 in (25 to 50 mm) air gap between the pipe and the top of the insulation. Ensure there is no air infiltration into this air gap where heat would escape by sealing leaks and insulating ends of joist bays.

When applying polyurethane spray foam to the joist bay the pipe must be protected from the excessive temperatures. This is typically accomplished by first stapling bubble foil insulation at the correct height before spraying.

Always follow local codes to ensure compliance with insulation minimums. Typical is insulation of R-19 above heated spaces and R-30 above unheated spaces to direct heat upward.

12.5 Insulating Walls and Ceilings and Other Areas

Installers need to follow the manufacturer's instructions when applying polyurethane spray foams to walls, ceiling and subfloors that also embed the supply and return tails in the foam. This application may generate heat in excess of 300°F (149°C) which exceeds the temperature rating of the RAUPEX pipe. Polyurethane spray foams may be used over RAUPEX pipe for radiant heating applications as long as the short-term application conditions do not exceed 210°F (99°C). REHAU recommends applying multiple 1 in (25 mm) lifts and waiting 15 to 30 minutes between applications until the desired thickness is achieved. Temperatures should be monitored with a thermometer.

NOTICE: Follow all manufacturers' instructions when applying spray foam to RAUPEX pipe. Temperatures which exceed the rating of the pipe may damage the pipe leading to leaks and operational failures.

13. STARTING THE SYSTEM

Refer to the REHAU *PRO-BALANCE Brass Manifold Product Instructions* for details on starting and operating the radiant heating system.

All air must be removed from the radiant heating system and the heating fluid must be properly selected to ensure proper operation.

13.1 Impact of Heating Fluid on Manifold and System Components

The installer must have an understanding of local water conditions and how the heating fluid can impact the lifetime and performance of the system components. The makeup of the heating fluid has a major impact on the potential for corrosion within the complete system. The likelihood of corrosion and failure of system components can be greatly reduced by using suitable water quality, ensuring that the additives to the system including antifreeze, corrosion inhibitors and system flushing chemicals do not lead to corrosion of the system components and ensuring proper system operation. Measures to reduce the risk of corrosion damage are:

- Completely seal and operate system with heating water that does not contain additives. If heating water treatment is necessary, the contractor should ensure that additives to the system including antifreeze, corrosion inhibitors and system flushing chemicals do not lead to corrosion of the system components. Propylene glycol and ethylene-based glycol additives at maximum 50% concentration are recommended where freeze protection is needed. Alcohol-based glycols are not permitted because they can lead to system failure.
- Petroleum products such as mineral oils, threading oils or incompatible air compressor oils must not be introduced into the system. Chemicals may damage the RAUPEX pipe resulting in leaks and operational failures.
- Foreign materials such as sand, dirt, wax and debris should not be introduced into the system. Foreign materials may cause flow restrictions or system component failure.
- Installer must review the complete list of water-contact materials in the REHAU PRO-BALANCE Brass Manifold Product Instructions to ensure compatibility with the flushing fluid, heating fluid and additional make-up water.
- Heating fluid should comply with RPA Guidelines for fluids for hydronic radiant heating systems.
- If there are known local conditions that could lead to corrosion of the system components, the installer must consult with a water quality expert experienced in corrosion control of piping systems. If there are no known standards for ensuring proper water quality, then the German engineering standard, *VDI 2035 Prevention of Damage in Water Heating Installations*, should be referenced (English version of VDI 2035 available for purchase at www.beuth.de or contact REHAU for assistance).

13.2 Flushing, Filling and Purging the System

Use the air vent drain valves on the PRO-BALANCE manifold to fill, purge and bleed the system. Threaded connection is for 3/4 in. garden hose thread (GHT). System must be filled through the supply header and drained through the return header.

- 1. Close the isolation ball valves on the manifold supply and return headers.
- 2. Make sure all flow meters on the supply header are completely open by turning the vent key counter clockwise (available on 1 in. manifold only).
- 3. Close all balancing valves on the return header by turning the blue cap clockwise.
- 4. Open both drain valves by turning the handle 90° degrees to be aligned with the valve body.
- 5. Attach fill/drain garden hoses to each drain valve.
- 6. Turn on supply of clean heating water and begin filling manifold. Each circuit should be individually purged using the circuit isolation features of the PRO-BALANCE manifold (available on 1 in. manifold only). Use the manual air vent on the top of each drain valve to bleed trapped air from the system. These manual air vents may be replaced with the automatic air vent (sold separately) for automatic venting of trapped air.
- Open the first circuit balancing valve and circulate heating fluid until no more air comes out.
- 8. When this circuit is purged, close the valve and repeat this process for the remaining circuits.
- 9. When purging is complete, close the return drain valve first, then close the supply drain valve.
- 10. Remove hoses and install the protective caps to the drain valves.



Fig. 13.1: Flushing, filling and purging PRO-BALANCE brass manifold with water

Filling Systems With Antifreeze

Certain radiant floor heating system designs require the addition of antifreeze to the heating water for freeze and burst protection of the pipes.

Propylene glycol or ethylene-based glycol are acceptable freeze protection solutions; alcohol-based glycols are not permitted because they can lead to system failure. Propylene glycol with corrosion inhibitors is recommended for safety reasons. Verify the antifreeze complies with local codes and environmental regulations.

The amount of antifreeze must be calculated based on the freeze protection offered by that product, and the total volume of the system. Typical applications require 20-50% antifreeze. Do not exceed 50% unless approved by the manufacturer.

It is not effective to add undiluted antifreeze into heating water that is already in the system, as proper mixing will not occur in the relatively small system pipes. Typically the antifreeze is pre-mixed with the heating water in a barrel or bucket. Then this heating fluid is pumped into the system.

- 1. Pipe system as shown above. Drop fill/drain hoses into the common bucket or barrel.
- 3. Fill the barrel with the correct ratio of antifreeze and water as required.
- 4. Turn on submersible pump to begin pumping the heating fluid into the system.
- 5. Refill bucket/barrel as required to ensure no air is drawn into the submersible pump.

13.3 Adjusting the System

After air has been eliminated and the hydronic circulation, mixing and distribution systems are verified to be operational, this is the time to balance individual radiant heating circuits for flow, as per the design. Balancing is necessary to ensure that each circuit gets correct flow. Too much flow into a circuit will cause an area to overheat. Too little flow will cause an area not to be warm enough.

Balancing does not mean that all circuits get the same flow. Flow requirements are determined by the heat loss from the heated area. Adjust each circuit balancing valve using the circuit flow requirements from the manifold circuit chart or the pipe layout.

- Remove blue protector cap of the circuit balancing valve. Close the valve with the vent key by turning the control spindle clockwise until it stops. This should shut off the circuit 100%.
- 2. Set the circuit flow (GPM) by turning the control spindle counter clockwise. Note: The flow meter isolation feature should not be used for adjusting flow.
 - Start with the circuit valve with the lowest flow requirement and set to the required flow plus approximately 50%.
 - Read the actual value from the corresponding flow meter on the supply header.
- 3. Proceed by adjusting the remaining circuit balancing valves.

NOTICE: The valve is fully opened with 2 1/2 to 3 counter clockwise turns. Do not allow the fine thread of the control spindle to project above the hexagon nut or leakage will occur.



Fig. 13.2: Adjusting circuit balancing valves on PRO-BALANCE brass manifold

- After setting all circuit valves, check the flow values on the flow meter of all circuits. Readjust as necessary.
 - To reduce flow, turn the circuit valve clockwise.
 - To increase flow, turn the valve counter clockwise.
 - Turn the valve slowly to see the change in flow on the flow gauge.

After balancing the manifold is complete, either install REHAU actuators or thread the blue protective caps back on to the balancing valves by half a turn.

The cap prevents the valve from accidental adjustment and from getting dirty. Threading the cap completely on will close the valve, but it will not change the initial balancing adjustment of the valve.

Install the actuator hand-tight onto the manifold balancing valve. Remove the red tab after installing the actuator. The gray position indicator on top of the actuator allows for visual verification of the actuator's position. When the actuator is on, the gray indicator will rise out of the top of the actuator and be visible from the side, and the balancing valve will open. When the actuator is off, the balancing valve will close and the gray indicator will be flush. Refer to the REHAU *4-Wire Manifold Valve Actuator Product Instructions* for details on mounting the actuators to the PRO-BALANCE brass manifold.

6. Update the *PRO-BALANCE Manifold Circuit Chart* and post it next to the manifold.



Fig. 13.3: 4-wire valve actuator for PRO-BALANCE brass manifolds

13.4 Heating the System

For pipes embedded in a slab or an overpour, the following should be applied:

- Do not operate the heating system until the slab/overpour has cured a minimum of 28 days, unless otherwise specified and approved by the thermal mass supplier. If it is necessary to operate the heating system to prevent freezing of the thermal mass during curing, a maximum heating fluid temperature of 72°F (22°C) must not be exceeded. After curing, gradually increase the heating water temperature as described above.
- After curing of the slab/overpour and during the initial heating of the system, increase the heating fluid temperature gradually by no more than 10°F (6°C) each day until system reaches the required operating temperature.
- Verify allowable operating temperatures with supplier and/or installer of the slab or overpour to ensure there are no special circumstances to consider.

Take precautions to prevent damage such as thermal shock or condensation to the boiler from cold return water temperatures.

Monitor flows and temperatures throughout the heating system to check for air pockets that will prevent flow. If you suspect that air is still in the system, you may operate the manual air vents to eliminate the air. As air is eliminated, you might need to add heating fluid. Automatic air vents can be helpful in eliminating air in the system. Excessive air might require re-purging of the system.

13.5 Maintaining the System

The radiant heating system should be inspected periodically during operation to ensure none of the threaded connections have loosened or are leaking. A visible leak check of all radiant heating system manifolds and pipe connections should be conducted during every scheduled maintenance check of the heating source.

Prevent water from freezing in pipes during extended periods of power loss. Consider freeze protection of the heating fluid.

Proper chemical maintenance should be followed for the heating fluid. Follow manufacturers' instructions for periodic testing, replenishment and replacement of additives like antifreeze and corrosion inhibitors.

Adapter fittings may leak if not properly maintained. Periodically check and retighten adapter fittings to reduce risk of leaks.

For updates to this publication, visit na.rehau.com/resourcecenter

The information contained herein is believed to be reliable, but no representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications or the results to be obtained therefrom.