HEAT TRANSFER PLATE AND PANEL SYSTEMS
THE BEST SELECTION OF RADIANT HEATING DRY PLATE AND PANEL SYSTEMS
FOR BELOW THE FLOOR AND ABOVE THE FLOOR

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HEAT TRANSFER PLATE AND PANEL SYSTEMS

OUTLINE

1. Radiant heat transfer plates for below-the-floor joist space systems
2. Heat transfer plate installation techniques
3. Heat transfer plate performance
4. Radiant heat transfer panels for above-the-floor systems
5. RAUBOARD heat transfer panel and installation techniques
6. RAUPANEL heat transfer panel and installation techniques
7. Heat transfer panel performance
8. Review of REHAU sales literature and product instructions
9. New online Radiant Calculator tool
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- Despite the fact that we regularly revise the content of the seminars, we cannot accept any liability as regards the completeness and quality of the information we provide.
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HEAT TRANSFER PLATES AND PANELS
REHAU OFFERS THE BEST SELECTION OF PLATE AND PANEL SYSTEMS

1. Below-the-floor joist space heat transfer plates
   i. Good: Heavy gauge plate
   ii. Best: RAUPLATE™

2. Above-the-floor heat transfer panels
   i. Good: RAUBOARD™
   ii. Best: RAUPANEL™
HEAT TRANSFER PLATES AND PANELS

REHAU OFFERS THE BEST SELECTION OF PLATE AND PANEL SYSTEMS

1. Below-the-floor joist space heat transfer plates
   i. Good: Heavy gauge plates
   ii. Best: RAUPLATE™

2. Above-the-floor heat transfer panels
   i. Good: RAUBOARD™
   ii. Best: RAUPANEL™

The REHAU signature systems are the best in each of their categories

Display from 2015 ASHRAE show
1. HEAT TRANSFER PLATES

REHAU OFFERS TWO TYPES OF PLATE SYSTEMS

REASONS TO SELECT A JOIST SPACE PLATE SYSTEM

No poured screed is involved - therefore it is a “dry” installation
- Unlike overpours, no moisture is added to the project, avoiding drying delays
- Joist space systems usually require far fewer changes to construction of the building
  - Suitable for new construction and retrofit
- Aluminum heat transfer plates are very important for thermal comfort and response time and improve thermal efficiency vs. plateless systems
- Pipes, the aluminum heat transfer plates, the air cavity in the joist space and the subfloor (plywood or OSB and finished flooring) make up the thermal mass
HEAT TRANSFER PLATES

REHAU OFFERS TWO TYPES OF PLATE SYSTEMS

REASONS TO SELECT A JOIST SPACE PLATE SYSTEM

So-called “Staple-up” systems without heat transfer plates are not recommended, due to lower efficiency, slower response time and reduced thermal comfort.

- Aluminum heat transfer plates are very important for comfort and response.
- Plates can increase thermal efficiency by 20% to 40% and reduce the required fluid temperature by 20°F or more.
HEAT TRANSFER PLATES
ALUMINUM HEAT TRANSFER PLATES
ONE-PIPE VERSION

i. Heavy gauge plate (for 3/8” or 1/2” pipes)
   - Plates are 4 ft. long, 3.5” wide
   - Plates are installed before the pipes
     - Plates are pre-drilled for screws
     - Plates are screwed below subfloor
     - The pipes are “snapped” in from below
     - It takes a lot of force to insert the pipes
   - Tighter fit of pipe in the groove reduces movement of pipe, thermal expansion

Locking clips and talons may be used with these plates
ii. RAUPLATE double-channel heat transfer plates save time and reduce effort, while improving heat transfer efficiency
- Double plate covers more area
- Plates are pre-drilled for screws
- Pipes snap easily and firmly into grooves without tools
- Plates are easy to cut to length
- Plates are more efficient at transferring heat to the floor above
- The best solution for below floor radiant heating applications
HEAT TRANSFER PLATES
ALUMINUM HEAT TRANSFER PLATES
RAUPLATE™

RAUPLATE is for 1/2” RAUPEX pipes
- Plates are 47 in long x 8.7” wide
  - 119 cm x 22 cm
- Pipes are installed at 8 in. (20 cm) on-center spacing
- Install these plates before the pipe
- Pipes snap into grooves by hand
- U-bend is made within the plates
HEAT TRANSFER PLATES
ALUMINUM HEAT TRANSFER PLATES
RAUPLATE™

RAUPLATE covers more area*:
– 300 heavy gauge plates per 1,000 ft²
– Only 170 pieces of RAUPLATE per 1,000 ft²
*Based on Radiant Heating Materials Estimating Tips

Only 6 screws to fasten one RAUPLATE
- Heavy gauge plates require 20 screws to cover the same floor space as RAUPLATE
- 70% more screws than RAUPLATE
2. HEAT TRANSFER PLATE INSTALLATION

ALUMINUM HEAT TRANSFER PLATES

HEAVY GAUGE INSTALLATION TIPS

Single plate installation
- With heavy gauge plates, install the plates first, then snap in the pipes
  - Alignment of plates is critical
- Use protection sleeving at joist penetrations to prevent chafing and possible noise of rapid thermal expansion
- Feel free to use EVERLOC couplings when in a jam

PE Protection Sleeve
Pipe must be free to move at ends
HEAT TRANSFER PLATE INSTALLATION

ALUMINUM HEAT TRANSFER PLATES

RAUPLATE INSTALLATION TIPS

With RAUPLATE, install the plates first, then snap in the pipes
- Align each plate and center within the joist cavity
- Leave minimum 12 inch gap at end where pipes are passing through joists
- Leave 1 inch gap between plates
- Install plates to within 2 inches of joist cavity ends
  - Make PEX U-bends within plates
- Plates may be cut to length as needed

Note: Install plates to within 2 inches of insulation at exterior joist cavity ends
The perimeter “band board” joists
Keep plates within the heated space

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HEAT TRANSFER PLATE INSTALLATION

ALUMINUM HEAT TRANSFER PLATES

RAUPLATE INSTALLATION TIPS

Pipes snap into grooves by hand
- Use protection sleeving at joist penetrations to prevent chafing and possible noise of rapid thermal expansion
- Make U-bends within the plates
- Feel free to use EVERLOC couplings when in a jam

Note: Uncoiler is useful, making this a one-person job in some installations

Note: With RAUPLATE, the outside wall is heated by plates unlike in single-plate systems
HEAT TRANSFER PLATE INSTALLATION

ALUMINUM HEAT TRANSFER PLATES

INSTALLATION TIPS FOR ALL PLATES

Insulation should be 1” to 2” below bottom of subfloor to leave an air gap for convective heat transfer to the subfloor (in addition to the conductive heat transfer)

- A foil-face insulation may help to reflect some radiant heat upwards
- Fill the joist cavity with additional insulation as required to meet R-value
  - Fiberglass, rock wool, board, blown insulation may be used
HEAT TRANSFER PLATE INSTALLATION

HEAVY GAUGE PLATES

FINISHED PROJECT BEFORE INSULATION
HEAT TRANSFER PLATE INSTALLATION
HEAVY GAUGE PLATES
FINISHED PROJECT BEFORE INSULATION
HEAT TRANSFER PLATE INSTALLATION
RAUPLATE
FINISHED PROJECT BEFORE INSULATION
HEAT TRANSFER PLATE INSTALLATION

RAUPLATE

FINISHED PROJECT BEFORE INSULATION
3. HEAT TRANSFER PLATE PERFORMANCE

ALUMINUM HEAT TRANSFER PLATES

RAUPLATE: COMPARISON WITH OTHER BELOW-THE-FLOOR SYSTEMS

Better Heat Output Performance
- In an independent testing facility in Germany RAUPLATE performed slightly better than aluminum heavy gauge plates and superior to light gauge or plateless techniques
- Testing conducted at same fluid temperature and flow rates, and with similar installation techniques

Data shows higher output in BTU/hr-ft² for RAUPLATE than other systems for each fluid temperature tested

Higher output = better thermal efficiency
HEAT TRANSFER PLATES

SUMMARY
REHAU OFFERS THE BEST SELECTION OF PLATE SYSTEMS

Under-the-floor joist space plates
i. Good: Heavy gauge plates
ii. Best: RAUPLATE™
4. HEAT TRANSFER PANELS

REHAU OFFERS TWO TYPES OF PANEL SYSTEMS

REASONS TO SELECT AN ABOVE-THE-FLOOR DRY PANEL SYSTEM

Dry panel systems are lightweight, efficient alternatives to overpour installations
- They usually require far fewer changes to construction of the building
  - Suitable for both new construction and retrofit
- Unlike overpours, no moisture is added to the project, avoiding drying delays
- Panel systems can offer better efficiency and faster response time than other options

i. RAUBOARD plywood system
ii. RAUPANEL extruded aluminum system
5. RAUBOARD HEAT TRANSFER PANELS

i. RAUBOARD INTRODUCTION

SYSTEM COMPONENTS

RAUBOARD system utilizes:

- Single groove plywood panel
  - 6” wide x 4’ long
- Double groove plywood panel
  - 12” wide x 4’ long
- Plywood return bends
  - 6” deep x 4’ long
  - 6” pipe spacing
- 10 mm RAUPEX O₂ Barrier tubing
- Products are sold as pieces and shipped in cartons
RAUBOARD HEAT TRANSFER PANELS

RAUBOARD INTRODUCTION

CHARACTERISTICS OF THE PLYWOOD SYSTEM

RAUBOARD’s components have a groove to hold 10 mm RAUPEX O₂ Barrier pipes
- Plywood panels are only 1/2 in. (13 mm) thick, minimizing need to change construction techniques
- Plywood panels are lightweight, with an installed weight of just 1.3 lb/ft², reducing the need for any structural reinforcements of the subfloor and increasing response time
- The plywood system also uses factory-machined plywood return bends for a complete flooring layer
- System provides consistent 6” pipe spacing for better heat transfer
PRACTICAL ADVANTAGES OF THE PLYWOOD SYSTEM

1. Plywood system is less expensive than the extruded aluminum panels
2. May eliminate double base plates due to reduced floor thickness
3. No special equipment necessary (no “wet” thermal mass)
4. No moisture added, which then must be dried
5. Suitable for both retrofit and new construction
6. No complicated scheduling and preparation
7. Fewer changes to overall construction
8. Eliminates other trade (thermal mass)
9. Design flexibility, easier to zone
10. Available when you want it
11. Everything is boxed
12. A complete system
13. Easy to carry
14. Low profile
15. Economical
RAUBOARD HEAT TRANSFER PANEL INSTALLATION

RAUBOARD INSTALLATION

COMPONENTS FIT TOGETHER AS A SYSTEM (STEPS 1-2-3-4)

1. Lay out return bends at circuit edges
2. Lay straight pieces onto floor
3. Install silicone into all grooves
4. “Step” pipe into the groove
RAUPANEL HEAT TRANSFER PANELS

ii. RAUPANEL INTRODUCTION

CHARACTERISTICS OF THE EXTRUDED ALUMINUM SYSTEM

RAUPANEL’s components have a groove to hold 3/8 in. RAUPEX O2 Barrier pipes
- Omega-shaped groove provides 270-degree contact between the pipe and the panel, delivering higher thermal conductivity
  - This design results in better directional efficiency with reduced downward heat transfer
- Panels are only 5/8 in. (16 mm) thick minimizing need to change construction techniques
- Aluminum panels are lightweight, with an installed weight of just 1.5 lb/ft², reducing the need for any structural reinforcements of the subfloor and increasing response time
  - 90% lighter than a typical overpour
- Combined with machined plywood components, the system allows for 6” or 8” pipe spacing and a variety of shapes and directions in the layout
RAUPANEL HEAT TRANSFER PANELS

RAUPANEL INTRODUCTION

SYSTEM COMPONENTS

RAUPANEL system utilizes:
- Aluminum panels
  - 6” wide x 6’ long
- Plywood return bends (2 sizes)
  - 4’ long (depth varies)
  - 6” and 8” groove spacing
- Plywood furring strips
  - 1 15/16” wide x 4’ long
- Products are sold as pieces and shipped in cartons
RAUPANEL HEAT TRANSFER PANELS

RAUPANEL INTRODUCTION

PRACTICAL ADVANTAGES OF THE EXTRUDED ALUMINUM SYSTEM

1. Higher efficiency thanks to reduced downward heat transfer and aluminum panels
2. May eliminate insulation under subfloors (over heated space below)
3. May eliminate double base plates due to reduced floor thickness
4. No special equipment necessary (no “wet” thermal mass)
5. No moisture added, which then must be dried
6. Suitable for both retrofit and new construction
7. No complicated scheduling and preparation
8. Fewer changes to overall construction
9. Eliminates other trade (thermal mass)
10. Design flexibility, easier to zone
11. Available when you want it
12. Everything is boxed
13. A complete system
14. Easy to carry
15. Low profile
RAUPANEL HEAT TRANSFER PANEL INSTALLATION

1. Lay out Return Bends and outside row of Furring Strips at wall edges

2. Drop Aluminum panels onto floor Align into notches with 8” Bends

Note: Be sure that subfloor is clean before installation of panels
3. “Step” pipe into the groove

A rubber mallet may be needed to set the pipe into the groove
The following flooring types may be installed above this type of system:

i. Nail-down solid hardwood  
ii. Floating hardwood  
iii. Engineered hardwood  
iv. Glue-down wood flooring  
v. Carpet (broadloom or tiles)  
vi. Vinyl (sheet or tiles)  
vii. Ceramic tile
RAUPANEL HEAT TRANSFER PANEL INSTALLATION

FASTENING STEPS:
NAIL-DOWN HARDWOOD FLOORS

1. Install panels and pipes following the first Steps 1-2-3
2. Screw or nail return bends and furring strips to subfloor (use maximum 8” spacing between screws or nails)
3. Let the aluminum panels float between plywood panels – no need to screw these down
4. Install hardwood directly over RAUPANEL system (perpendicular in direction to panels)
5. Nail or staple hardwood boards into plywood components or through aluminum/into subfloor if necessary
   - Fasten boards every 6” - 8”

Note: Panel system may be loose and noisy until all hardwood is properly secured
RAUPANEL HEAT TRANSFER PANEL INSTALLATION

FASTENING STEPS:
FLOATING FLOORS

1. Install panels and pipes following the first Steps 1-2-3
2. Screw or nail return bends and furring strips to subfloor (use maximum 8” spacing between screws or nails)
3. Fasten aluminum panels
4. Install flooring as per manufacturer’s recommendations

- Don’t put screws or nails in the pipes!
- Use 8 screws/nails per Return Bend*
- Use 5 screws/nails per Furring Strip*
- Use 6 screws/nails per Aluminum Panel*

*Per full length components

Note: Always feel free to add extra fasteners if movement or noise is suspected
RAUPANEL HEAT TRANSFER PANEL INSTALLATION

FASTENING STEPS:
GLUE-DOWN FLOORS

1. Install panels and pipes following the first Steps 1-2-3
2. Screw or nail return bends and furring strips to subfloor (use maximum 8” spacing between screws or nails)
3. Fasten aluminum panels
4. Install flooring as per manufacturer’s recommendations
   - Avoid putting glue on pipes
   - Use 8 screws/nails per Return Bend*
   - Use 5 screws/nails per Furring Strip*
   - Use 6 screws/nails per Aluminum Panel*

*Per full length components

Note: Always feel free to add extra fasteners if movement or noise is suspected
RAUPANEL HEAT TRANSFER PANEL INSTALLATION

FASTENING STEPS:
CARPET OR VINYL FLOORS - FIRST MAKE A FLAT SURFACE

1. Install panels and pipes following the first Steps 1-2-3
2. Leave aluminum and plywood panels as “floating” - no screws or nails needed yet
3. Cover panel installation with thin plywood “underlayment” - 1/8” to 1/4” thick
   - Use maximum 8” spacing between screws or nails
4. Mark walls and plywood with pipe locations (to avoid) or furring strip locations (targets)
5. Screw underlayment through plywood or aluminum panels, and into the subfloor
   - This creates a stiff “composite” flooring system

Note: No screws are necessary for the panels unless there is unusual movement during installation

Note: Always feel free to add extra fasteners if movement or noise is suspected
RAUPANEL HEAT TRANSFER PANEL INSTALLATION

FASTENING STEPS

TILE FLOORS - USING MORTAR BOARD AS ALTERNATIVE TO DIRECT PLACEMENT OF THINSET

1. Install panels and pipes following the first Steps 1-2-3
2. Leave aluminum and plywood panels as “floating” - no screws or nails needed yet
3. Cover panel installation with appropriate cement “mortar board” - 1/8” to 1/4” thick - Use maximum 8” spacing between screws or nails
4. Mark walls and plywood with pipe locations (to avoid) or furring strip locations (targets)
5. Screw mortar board through plywood or aluminum panels, and into the subfloor - This creates a stiff “composite” flooring system

Note: A thicker mortar board is allowed if necessary
RAUPANEL HEAT TRANSFER PANEL INSTALLATION
RAUPANEL INSTALLATION
INSTALLATION OVER EXISTING CONCRETE SLABS

RAUPANEL is the perfect solution for over existing concrete floors
- Existing concrete floor should be waterproofed to block moisture permeation
- Low profile reduces added thickness, only a 5/8” reduction in wall height
- Insulation between panels and concrete floor is not practical and is not recommended
- Typical installation as shown:
RAUPANEL HEAT TRANSFER PANEL INSTALLATION

RAUPANEL INSTALLATION

INSTALLATION OVER EXISTING CONCRETE SLABS

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RAUPANEL HEAT TRANSFER PANEL INSTALLATION

FASTENING STEPS:
TYPICAL INSTALLATION OVER EXISTING DRY SLAB, NO MOISTURE ISSUES
RAUPANEL HEAT TRANSFER PANEL INSTALLATION
APPLICATIONS IN WALLS AND CEILINGS

- Use panels for **walls** or **ceilings** where floor space is limited (bathrooms, kitchens, mudrooms)
- May be the same circuit of pipe, same water temperature
- Keep panels within 3 feet of floor to prevent future “pipe punctures”
- Use furring strips on edges of studs above panels to make walls flush for drywall

**Note:** Insulate behind panels at outside walls or ceilings
RAUPANEL HEAT TRANSFER PANEL INSTALLATION
INSTALLED IN A WALL SURROUNDING A SHOWER

Sample cutaway wall:
- 1/4” thick tileboard board installed directly over RAUPANEL at 8” o-c spacing
- Tile is placed on thinset over tileboard
- Furring strips are used on stud edges above panels to flush out the walls before tileboard installation
7. HEAT TRANSFER PANEL PERFORMANCE
RAUPANEL VIRGINIA TECH STUDY
PUBLISHED IN 2006

DETAILED LAYOUT SUPPLY/ RETURN LOOP and RADIANT PANELS
HEAT TRANSFER PANEL PERFORMANCE
RAUPANEL VIRGINIA TECH STUDY
COMPARISON OF FLOOR OUTPUT WITH 110°F INPUT WATER TEMPERATURE

Radiant Floor Heating System Relative Output

Output, BTU/hr per Square Foot with 1/4" thick plywood covering

<table>
<thead>
<tr>
<th>Output, BTU/hr per Square Foot with 1/4&quot; thick plywood covering</th>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>RAUPANEL 6&quot; spacing</td>
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<td>25</td>
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Commercial Radiant Floor Heating Systems Tested, 110°F Water Temperature
HEAT TRANSFER PLATE AND PANEL PERFORMANCE

COMPARISON OF FLOOR OUTPUT WITH 120°F INPUT WATER TEMPERATURE
PLATES AND PANELS COMPARED TOGETHER

Radiant Floor Heating Systems: Relative Output at 120°F Supply Temperature
- Higher outputs mean greater efficiency
HEAT TRANSFER PANELS

SUMMARY
REHAU OFFERS THE BEST SELECTION OF PANEL SYSTEMS

Above-the-floor panel systems
i. RAUBOARD™
ii. RAUPANEL™
8. LITERATURE AND PRODUCT INSTRUCTIONS
AVAILABLE ON OUR WEBSITE

Please read the following documents before use of each system:

i. REHAU Radiant Floor Heating Systems - Installation Guide
ii. RAUPANEL™ Radiant Heating Systems - Installation Guide
iii. RAUBOARD™ Radiant Heating Systems - Product Instruction
iv. RAUPLATE™ Heat Transfer Plates - Product Instruction
Sales literature:

i. **RAUPANEL™** Delivers the Highest Output

ii. **RAUBOARD™** Edges Out the Competition

iii. **RAUPLATE™** Joist Space Heating

iv. Radiant Heating Panel Systems
LITERATURE AND PRODUCT INSTRUCTIONS

DEDICATED WEBPAGES FOR PLATES AND PANELS

Website: New webpage: na.rehau.com/heatingpanels
LITERATURE AND PRODUCT INSTRUCTIONS

NEW ESTIMATING TOOL

<table>
<thead>
<tr>
<th>RAUPANEL</th>
<th>RAUBOARD</th>
<th>RAU-PLATE</th>
<th>Heavy Gauge Plate</th>
<th>Slab</th>
<th>Overpour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heated area w/ 6 in (15 cm) pipe spacing</td>
<td>ft²</td>
<td>Length of walls w/ 6 in (15 cm) pipe sp...</td>
<td>ft</td>
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<tr>
<td>Heated area w/ 8 in (20 cm) pipe spacing</td>
<td>ft²</td>
<td>Heated area total</td>
<td>ft²</td>
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HEAT TRANSFER PLATES AND PANELS

SUMMARY

- Only REHAU offers a selection of plates and panels which address installation challenges from the simplest to the most demanding applications.
HEAT TRANSFER PLATE AND PANEL SYSTEMS

THANK YOU FOR YOUR TIME!

QUESTIONS?

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