uponor

RADIANT COOLING

BROCHURE

Radiant Cooling — The Ultimate Comfort and Efficiency for Commercial Applications

We are the Radiant Cooling Experts

Since the 1990s, Uponor has provided more hydronic radiant cooling systems in more structures around the globe than all other hydronic radiant providers combined. With hundreds of systems in service worldwide, we are the experts at designing an effective, energy-efficient solution for any application.

Experienced Team of Commercial Cooling Specialists

Uponor has an experienced team of dedicated professionals to assist the engineering and architecture community from concept to commissioning.

- Commercial sales representatives provide onsite training and education
- Design engineers provide concept and design support
- Project managers provide project coordination from concept to commissioning
- Inside technical support provides CAD drawings, specifications and submittals

Radiant Cooling Fundamentals

Hydronic radiant cooling uses passive or active surfaces to absorb and remove heat. The system takes advantage of the considerably higher heat capacity of water over air. In a hydronic radiant cooling system, chilled water circulates through embedded PEX-a tubing to control the slab temperature and manage a portion of the sensible load, thereby reducing the air-system load. In addition, the same tubing used for radiant cooling can also be used for radiant heating.

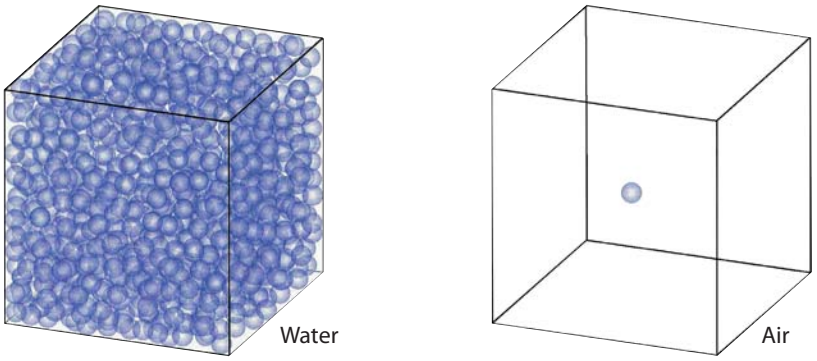
Benefits and Advantages — Reducing Energy Use While Improving IEQ

- Radiant cooling is especially effective in high-glazing areas where solar gain can be up to 80% of the load.
- Radiant systems reduce problems with mold and allergens (which are easily spread by forced-air systems), making it an ideal choice for hospital and healthcare environments.
- System designers can achieve LEED® credits in energy efficiency, renewable energy, indoor air quality (IAQ) and indoor environmental quality (IEQ) through radiant cooling applications and integration with related design strategies.
- Effective space conditioning with moderate cooling water temperatures enables optimization of mechanical equipment.
- Operative temperature control provides improved thermal comfort and allows designers to more readily comply with ASHRAE 55 standards.
- Radiant cooling can be used in passive systems enabling the use of reduced-cost, off-peak energy and thermal-storage strategies.
- Radiant cooling can be effective in meeting 50% energy savings over the baseline ASHRAE 90.1-2004 Standard.*

* Pacific Northwest National Laboratory, Technical Support Document: 50% Energy Savings Design Technology Packages for Medium Office Buildings, Sept. 2009

Water is 832 times denser than air.

That means water can capture and channel more energy per unit volume than air.



Source: Thermally Active Surfaces in Architecture, K.Moe, Princeton Architectural Press © 2010

Radiant Cooling Applications

Uponor Radiant Floor Heating and Cooling

Comfortable heating and cooling solution for both residential and commercial buildings, with a cooling capacity of up to 13 Btu/h/ft² (32 Btu/h/ft² in areas with high solar gain).

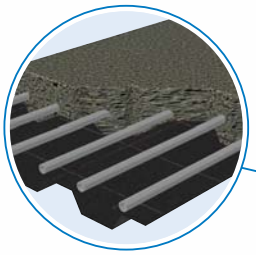
- Suitable for buildings requiring individual room temperature control
- Compatible with renewable energy sources, including geothermal, solar and biomass
- Suitable for various floor constructions

Uponor Thermally Activated Structures

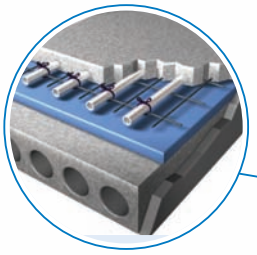
Cost-efficient cooling for office and public buildings, with a cooling capacity of up to 13 Btu/h/ft² (32 Btu/h/ft² in areas with high solar gain).

- Low investment cost
- Compatible with renewable energy sources, including geothermal, solar and biomass
- Architecturally and visually appealing solution, since pipes are embedded in structural elements of the building (walls or floors and ceilings)

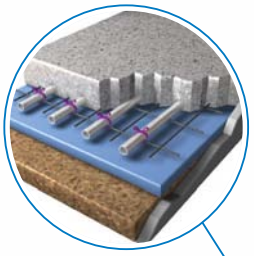
Installation Methods



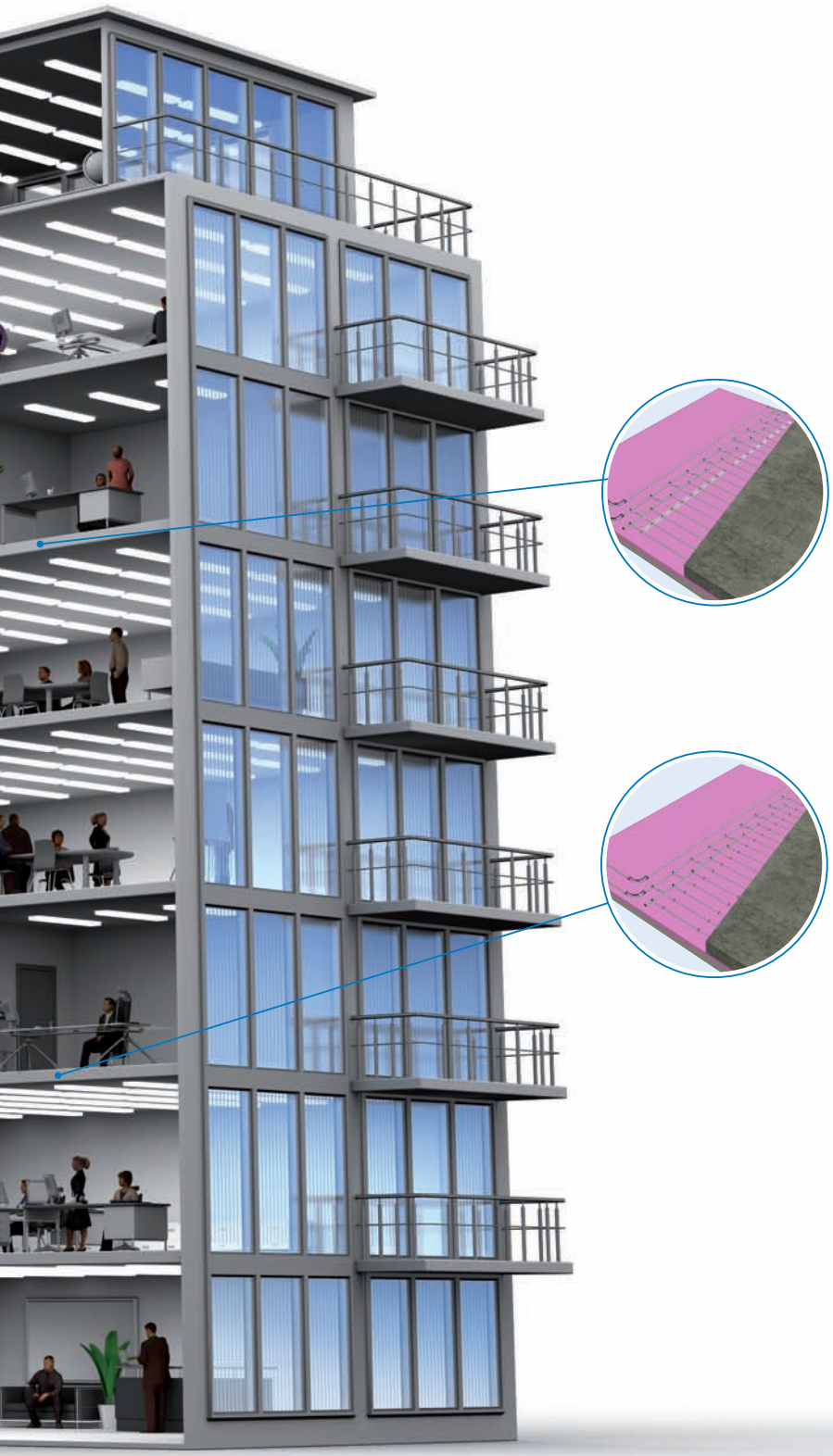
Concrete on metal decking



Concrete on pre-stressed decking



Slab on grade with insulation



Radiant Rollout™ Mat

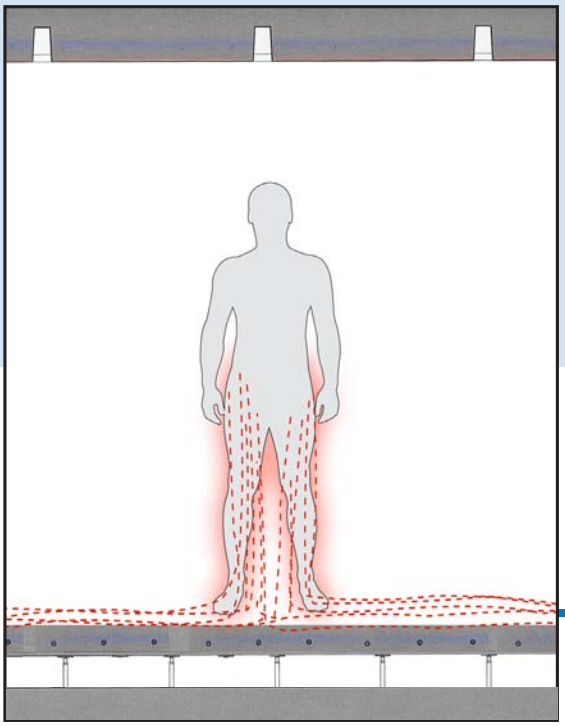
Custom-designed mats provide a fast, efficient and consistent method for installing radiant heating and cooling systems in large commercial applications.

- 85% reduction in installation time
- Minimizes potential installation errors
- Enables fast commissioning and easy start-up
- Helps projects meet schedules
- Promotes worker safety

Tichelmann Design Method

Large-diameter, in-slab distribution piping for radiant loops prevents crowded manifold-approach zones and helps simplify the design process.

- Uses in-slab, reverse-return header for radiant distribution piping
- Distribution headers feed radiant loop modules
- Reduces or eliminates required wall manifolds
- Minimizes leaders to prevent crowded manifold-approach zones
- Simplifies design process for hard-to-reach radiant zones



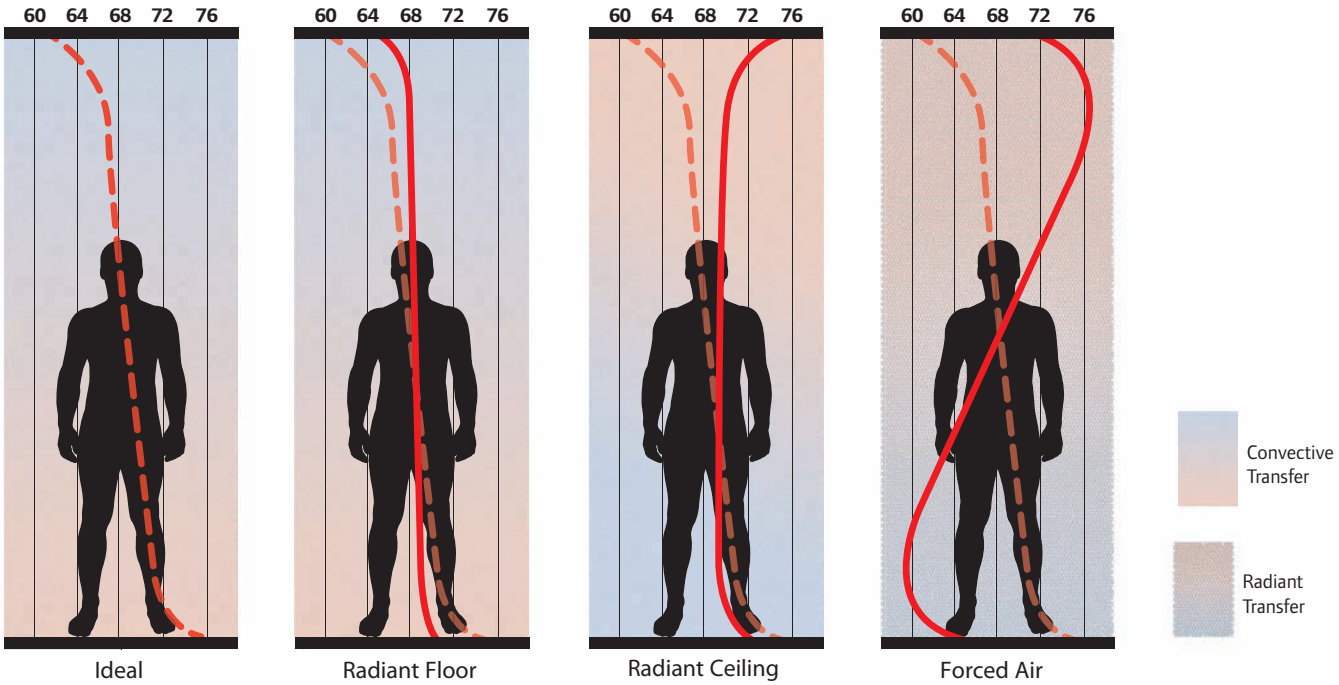
Radiant Floor Cooling and Heat Absorption

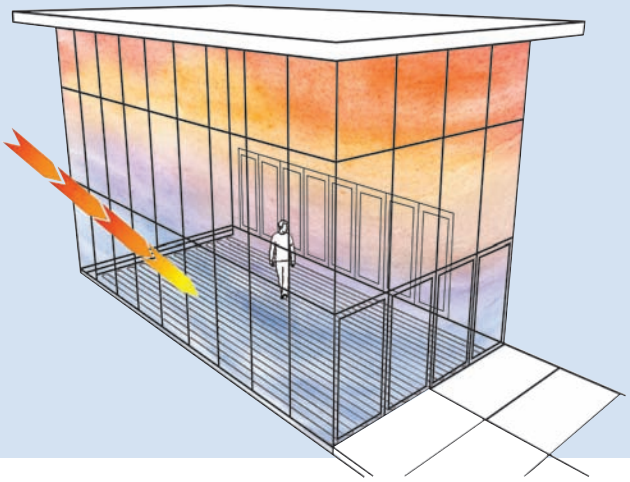
Thermally-active surfaces cool by continuously removing heat energy. If a surface is cooler than the bodies and objects in the space, the surface actually removes the heat from those bodies and objects, providing a cooling effect.

Source: Thermally Active Surfaces in Architecture, K.Moe, Princeton Architectural Press © 2010

Ideal Human Comfort Temperatures

Radiant Floor or Radiant Ceiling strategies more closely align with the ideal heating and cooling curve of the human body when compared to forced air.





Basic Design Parameters

- Typical radiant cooling design parameters:
- 12 to 14 Btu/h/ft^2 of sensible cooling
- Up to 18 additional Btu/h/ft^2 of direct solar absorption for a total of 32 Btu/h/ft^2
- 66°F minimum floor surface temperature
- 76°F to 78°F room set point temperature
- 55°F to 58°F average fluid temperature

For specific project design information, contact Uponor Technical Services at 888.594.7726 or technical.services@uponor.com.

Radiant Heating and Cooling Design Criteria

	Total Heat Exchange Coefficient Btu/h/ft^2	Acceptable Surface Temperature (°F)	Maximum Capacity Btu/h/ft^2
	Heating/Cooling	Maximum/Minimum Heating/Cooling	Heating/Cooling
Floor Perimeter Area	1.9/1.2	95/66	52/13
Floor Occupied Area	1.9/1.2	84/66	31/13
Wall	1.4/1.4	104/63	51/23
Ceiling	1.1/1.9	80/63	13/31

Based on REHVA Low-temperature Heating and High-temperature Cooling Guidebook and ASHRAE Standard 55 Thermal Comfort

Climate Cŏntrol™ Network System — Complete System Integration

When it comes to alternative energy sources, if they're not communicating, they're not operating to their full, energy-efficient potential. That's why Uponor offers the Climate Cŏntrol™ Network System — an integrated hardware and software package that controls and monitors a structure's hydronic radiant system. The Climate Cŏntrol Network System communicates over BACnet and can be integrated into BACnet-compatible Building Management Systems.

Project:	Hunter Museum of American Art
Location:	Chattanooga, Tenn.
System:	Uponor Radiant Heating and Cooling
Radiant Square Feet:	6,000
Tubing:	½" Wirsbo hePEX™
Chief Architect:	Randall Stout, FAIA
Associate Architects:	Derthick, Henley & Wilkerson
General Contractor:	EMJ Corporation
Mechanical Engineer:	March Adams & Associates
Mechanical Contractor:	ACS Services
Outside Design Dewpoint:	73°F
Completed:	2006

LEED Rating:	Platinum
Project:	David Brower Center
Location:	Berkeley, Calif.
System:	Uponor Radiant Heating and Cooling
Radiant Square Feet:	50,000
Tubing:	Wirsbo hePEX
Sustainability and Energy Consulting:	Loisos and Ubbelohde
MEP Engineer:	Rumsey Engineers
General Contractor:	Cahill Contractors
Outside Design Dewpoint:	57°F
Completed:	2009

LEED Rating:	Gold
Project:	MGM City Center – Crystals
Location:	Las Vegas, Nev.
System:	Uponor Radiant Heating and Cooling
Radiant Square Feet:	60,000
Tubing:	Wirsbo hePEX
Architect:	Studio Daniel Libeskind
MEP Engineer:	Flack + Kurtz
Contractor:	Perini Building Company
Outside Design Dewpoint:	60°F
Completed:	2009

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