PITTSBURGH CORNING

FOAMGLAS®

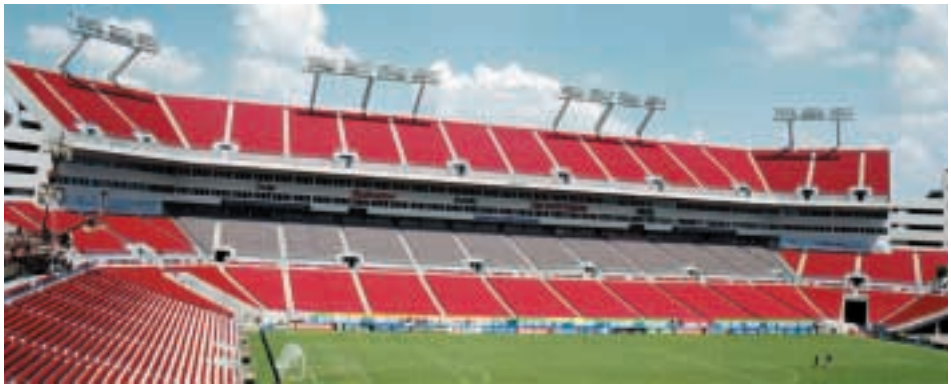
INSULATION

Standing the Test of Time™

Customer:
Tampa Sports Authority

Location:
Tampa, Florida

Situation:
Chilled Water Distribution



With 12,000 extra-wide, padded club seats and a luxurious, air-conditioned club level that houses restaurants, sports bars, video walls, additional seating and great views of the field, Raymond James Stadium is one of the finest stadiums in the NFL.

Even When the Action Heats Up, Sports Fans Stay Cool

When Tampa hosts Super Bowl XXXV in January 2001, it will do so in the place that many locals look upon as one of the city's treasures, Raymond James Stadium. A luxurious, air-conditioned club level houses restaurants, sports bars, video walls, additional seating and great views of the field.

Built at a cost to taxpayers of $168.5 million, the stadium opened in 1998 and is owned by the Tampa Sports Authority (TSA). It hosts a number of local, national and international events each year, including home games for the Tampa Bay Buccaneers (NFL), Tampa Bay Mutiny (Major League Soccer) and the University of South Florida Bulls (NCAA Football).

Increased Chilled Air Requirements

The total requirement for the amount of air-conditioned space alone is almost 2,000 tons. Much of the additional consumption is accounted for in the new stadium's 167 private luxury suites, up from the old stadium's number of just 59 suites.

The stadium also has two air-conditioned lounges spanning end zone to end zone on each side of the field, rising from the second level all the way to the sixth level. Cooling all of that space requires a massive amount of air – 140,000 cfm per club. Each quadrant of the stadium is served by an outside air unit which pre-cools the air.

"We condition the air as soon as possible as it comes into the stadium, so you're not running a lot of hot, humid air throughout the building," says Robert Tintera, who was formerly a vice president and project manager at HOK Tampa, the firm that designed the stadium. "The outside air can be in the mid-90s, with extremely high humidity. We need to run the temperature down to about 55° F before it goes into the air handling units for distribution," says Tintera, who is now with Tampa-based Pyramid Engineering.

Two chillers produce water at 45° F, according to Tintera. The chillers provide about 2,000 tons of total cooling capacity. Four variable-air-volume air-handling units (AHUs), each located in a mechanical room in a quadrant of the stadium, distribute the air to the club areas.

In addition, each of the 167 luxury suites is cooled with a fan coil unit. Each unit provides four tons of air conditioning per suite. Another 50 units cool administrative offices, kitchens and other areas.

Controlling Condensation

A major climatic concern at the new stadium is not how to keep the place cool, but rather how to control condensation, Tintera says. If the chilled water pipe comes in contact with Tampa's hot, humid air, the potential is for a lot of moisture to form on the outside of the pipe.

"Any spot that's not insulated will result in a constant drip off the pipe," says Tintera. "It will damage whatever is beneath it, the carpet, ceiling, drywall, and anything else. There is also a potential for mold and mildew to form. Left unattended, that can develop into more serious problems, such as what you have with 'sick building syndrome'."

Tintera specified FOAMGLAS® insulation for the chilled water pipe at Raymond James Stadium. In any application where temperature and humidity are factors, it's the insulation he prefers to use.

There are more than 22,000 lineal feet of chilled water lines at the stadium protected with FOAMGLAS® insulation. All of the pipe joints are sealed with PITTSEAL® 444N joint sealer, and PITTCOTE® 404 mastic was applied to all fittings and valves. All of the FOAMGLAS® insulation was covered with a white all-service jacketing, which was applied in the fabricator's shop.

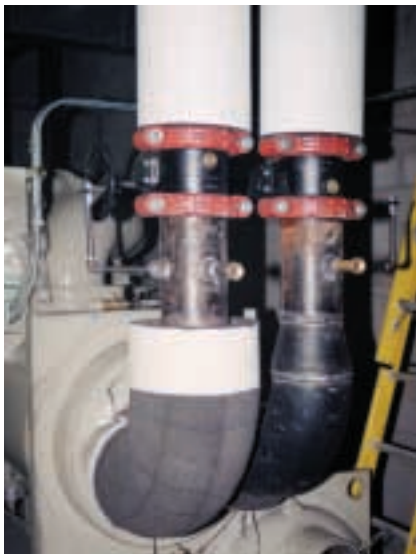
Pipes larger than 12 inches in diameter are covered with 2 ½ inches of insulation. Five to 10-inch size is covered with two inches of FOAMGLAS® insulation. One and one-half-inch to 4-inch pipe is covered with 1½ inches of insulation. And pipes ranging from ½-inch to an inch are covered with an inch of FOAMGLAS® insulation.

"I could've used something else, fibrous glass in this case," Tintera says. "But if it gets nicked, it acts like a wick and will move water into other fiberglass," he says. "Once water gets in, there is a loss in thermal efficiency."

Because FOAMGLAS® insulation consists of an all-glass, closed-cell material, it eliminates moisture intrusion. It remains impermeable to moisture, even if it becomes cut or nicked.

A cooler jacket temperature also will increase the possibility of water condensation forming on the jacket, which will inevitably lead to:

- Water dripping off the pipe and causing damage to the building and its contents;
- The enhanced possibility of mold and mildew buildup;
- Increased weight, which will lead to increased compression of insulation at pipe supports; and
- Corrosion of the pipe itself.



To protect thermal efficiency, chilled water supply and return lines are covered with 2½ inches of FOAMGLAS® insulation.

"From my perspective, the biggest problem caused by water intrusion to insulation is damage to the building," Tintera says. "It's the first problem that will make itself evident, and it may cause a damage loss much greater than any costs the building owner will experience due to loss of energy."

A high humidity climate does place severe demands on the insulation protecting chilled water lines. The strong vapor pressure associated with high temperature and humidity causes water vapor to penetrate permeable insulations and condense within them. With low-temperature equipment, such as chilled water lines, water vapor migrates to the cold substrate behind the insulation system. Here, the vapor condenses to a liquid. It's a problem especially common to all chilled water projects throughout Gulf Coast and South Atlantic coastal areas.

For that reason, ASHRAE (the American Society of Heating, Refrigeration and Air-Conditioning Engineers) recommends using an impermeable insulation in these areas. But the same problem can also occur in northern and inland states, given the right climatic conditions. Any time the dew point temperature is above the chilled water temperature of between 40° F to 45° F, the potential for penetrating moisture is present. Some U.S. cities that fall within this category are Baltimore, Cincinnati, Philadelphia, St. Louis and Washington, D.C. In fact, ASHRAE classifies parts of only about 10 states – aligned on either side of the Rocky Mountains from western Montana to north central New Mexico – as having climates where humidity typically is not a concern.

Damage to the building caused by water dripping off the pipes may be the most immediate and visible indication that the insulation system has failed, but loss of thermal performance also will make itself quickly known in the form of higher energy bills. Water itself is a moderately good thermal conductor. It conducts heat at least 10 times better than most insulation materials. The increase in thermal conductivity translates into higher operating costs. Just four percent moisture, by volume, can reduce thermal efficiency by as much as 70 percent.

Wayne E. Smith, project manager for the firm that fabricated and installed all of the insulation on the chilled water lines at Raymond James Stadium, Smith & Casady Inc., of Brandon, Fla., offers yet another reason for selecting the proper insulation for an application such as the stadium. His concerns also involve the usual considerations of temperature and humidity, but specifically focus on the probability of "construction damage" to insulation during or after it is installed.

"We were on an extremely tight schedule for this installation, as was everyone else involved in the construction," he says. "Normally, I would look for at least 24 months to be able to handle a job of this size. In this case, we had less than 18 months before the Buccaneers opened their season. And, there were extra suites built out at the last minute, which expanded the scope of the job by increasing the number of air-handling units and fan coils. As a result, we had people all over the site and everywhere around us during the installation."

Smith & Casady doesn't fabricate insulation for other subcontractors, preferring to do the work only for jobs where they have contracted the installation. In the stadium project, that proved to be an excellent business strategy, since much of the work on that project involved just-in-time scheduling. As soon as the mechanical contractor began installing the main loop around the stadium, Smith & Casady began applying insulation to the pipe.

On-site Damage Was a Concern

"We got on the job as early as possible, because we knew the schedule was tight, and we knew the site was going to be very crowded," Smith says. "There was always the potential for someone to hit the insulation with a ladder or do something else to cut it. We did our best to keep that from happening. Another type of insulation would have been a real problem. With fiberglass, for example, if you break the vapor barrier, the insulation is going to fail. Even a tiny hole in a vapor barrier can ruin an ordinary insulation system."

Smith says he has worked on a number of jobs, calling for the replacement of fibrous glass with FOAMGLAS® insulation, for that very reason. The fibrous glass in almost every case was completely saturated with water.

"There's nothing wrong with fibrous glass insulation, if you use it on the right applications," he says. "But you simply cannot use it on a chilled water system where you're dealing with any kind of humidity," he says. "If we get a spec calling for it in that kind of application, we go back to the design engineer and try to demonstrate why it needs to be changed. We'll upgrade to FOAMGLAS® insulation every time, even at our own cost. We're not willing to stake our reputation on a job where the wrong insulation has been specified. And, we know that sooner or later, in an application where humidity is a factor, we're going to have to replace fibrous glass, and the cost to retrofit will far exceed any savings incurred by not installing the proper insulation in the first place."

Additionally, another 28 luxury suites were added to Raymond James Stadium. And, another 1,000 linear feet of chilled water pipe, another chiller, one more pump and more FOAMGLAS® insulation were installed in the stadium's chilled water system.

Pittsburgh Corning Corporation
800 Presque Isle Drive, Pittsburgh, PA 15239
Tel: (724) 327-6100 Fax: (724) 327-5890
(800) 359-8433
www.foamglasinsulation.com

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