

September 2014 | Volume 32, Number 7

# PM

PLUMBING & MECHANICAL

- ▶ Hydronics technology and air-source heat pumps
- ▶ Become your community's green plumbing expert

## Radiant heat for turf conditioning

SCAN WITH YOUR SMARTPHONE  
TO SUBSCRIBE TO PM.



Technicians dispense tubing from uncoilers for pro soccer team New York Red Bulls' turf-conditioned practice field.



## Red Bulls' radiant turf

*This New York pro soccer club adds turf conditioning to a new practice facility.*



The radiant tubing layout of the New York Red Bulls' new turf-conditioned soccer practice field is accomplished with a motorized sled, developed by Althoff Industries, to keep PEX tube spacing uniform.

When energy drink maker Red Bull began construction of a new training and practice facility for its namesake, the New York Red Bulls professional soccer team, it opted to radiantly heat one of the big playing fields for use in the winter.

The new facility in Hanover, N.J., has three different playing fields. The Red Bulls' First and Reserve Teams use the 47-acre property for practice and training sessions and occasional matches. Artificial turf covers one of the fields while the other two fields have thick, carpet-like turf. One of the turf fields goes dormant during the winter months while the other stays green through the influence of a warm glycol solution circulated in tubing embedded about 6 in. below.

Several facilities also were constructed as the Red Bulls site was developed:

- The First Team building is an 8,000-sq.-ft. multipurpose facility used for indoor physical fitness. It includes a locker room, gym, dining room and lounge.
- The 3,000-sq.-ft. administration building contains office space for team officials, a guest locker area and media space.
- The 1,600-sq.-ft. operations building is used by groundskeeping and facility maintenance personnel, also offering plenty of storage.
- The 800-sq.-ft. mechanical plant is the nerve center of the radiant turf-conditioning system.

The engineering and installation contract for the field went to Amityville, N.Y.-based LandTek Group, which

specializes in sports facility design and construction, as well natural and synthetic turf placement and maintenance.

"The radiant heat in a natural-turf playing field is often confused with snow melting," explains **Brad Davidson**, LandTek's project manager. "The two methods of installation have similarities, though for our purposes the use of radiant heat within the layers of pea stone, sand and soil is to keep the root zone healthy and active during the winter season."

By carefully controlling circulation and the temperature of fluid dictated by an outdoor reset control, the turf's root zone is maintained at temperatures ideal

Photo credit: Watts Radiant/Ken Jones



LandTek Group field personnel make tubing connections to headers at one end of the practice field. More than 50 20-ft. manifolds were heat-fused together to field-fabricate the large manifolds needed.



## Red Bulls' radiant turf



The field tubing is back-filled to hold it in place during the installation of the turf-conditioning system. The practice field has 135,300 lineal ft. of 3/4 in. Watts Radiant PEX tubing.

for growth and repair. “Natural turf takes a beating during rugged soccer games and practice sessions — it’s got to recover from the punishment,” he says. “Root repair and growth is the No. 1 purpose for turf that’s radiantly heated.”

Irrigation and drainage comprise other critical functions that take place in the layers of soil and stone beneath the natural turf.

“Many people are surprised to learn at least 20 in. — and up to 2 ft. for the edges — of compacted pea gravel are in the layers of material that go into the preparation for a real turf athletic field,” Davidson says.

Radiant heat tubing is placed on top of the stone, then attached to a rail system that’s spiked into the stone. Once the system is operational, heat penetrates into about 10 in. of sand before it reaches the grass root zone.

### Miles of pipe

Professionals from Clifton, N.J.-based Thermco, a manufacturers rep firm, designed and specified materials for the extensive root warming system for the practice field. **Tom Loder**, Thermco’s manager of wholesale sales; **Paul Babcock**, sales engineer; and **Chris Phelan**, manager

of the engineering sales group, were actively involved early-on.

“We sized the field at 8 million Btu, which created the need for miles of buried PEX tubing,” Phelan says.

Although LandTek excavated the soccer field, it hired plumbing, mechanical and building automation contractor Althoff Industries of Crystal Lake, Ill., to oversee installation of the 135,300 lineal ft. of 3/4 in. Watts Radiant PEX pipe in a Thermco-specified reverse-return layout. The system was chosen to achieve self-balancing of circulated fluids and to reduce head pressure.

Althoff Executive Vice President **Chris Bennett**, the project supervisor, and **Jay Althoff**, the project manager, managed the tubing installation. The company typically ships equipment to the jobsite and uses the local labor force when working on out-of-town projects. In this case, LandTek provided the necessary manpower to install the PEX tubing.

“One facet of the job we’re especially proud of is the sled we’ve developed for large field installations of tubing,” Bennett explains. “We arrive with a truck full of tools and a sled designed specifically for the purpose of placing tubing over deep beds

of carefully prepared, laser-graded layers, ready to serve as the perfect subsoil for vigorous, durable turf growth.”

Althoff Industries works on turf-conditioning projects all over, including Soldier Field (football) and Toyota Field (soccer) in Chicago, BMO Field (soccer) in Toronto and Citi Field (baseball) in New York. Placing PEX tubing by hand on a large field is time-consuming — and uncomfortable. Bennett knew there had to be a faster, safer way to install tubing.

He and his team tried out several options before coming up with the sled. A motorized pulley system is connected to the sled, allowing for adjustments to be made from either end of the field. “We developed the rail system to attach the tubing and help keep it straight,” Bennett explains. “And we have a tool the installers can use to push the tubing in so they don’t have to bend down. It’s a good way to alleviate back problems in the field.”



LandTek technicians install PEX tubing in the rail system — which is spiked into the stone layer — to keep it evenly spaced.



## Red Bulls' radiant turf



Field installers take some of the slack out of the tubing layout. Manufacturers rep firm Thermco, which designed the reverse-return layout, sized the field at 8 million Btu.

The remotely controlled sled enables faster radiant tubing installation over huge field areas and minimizes the need to send people across the layers of stone.

"Prepping the field is important," Bennett says. "Foot traffic creates dimples and inconsistency to the layers, so the sled eliminates most of that. It floats across the layers without disturbing them, while laying the tubing in symmetrical lines."

The sled reduces the installation crew size to about five or six people and improves precision of the tubing layout, he adds.

"Thermal striping' in a radiant heat system is one thing. For a turf-warming system, however, the implications of inconsistent heat distribution would mean over- or under-heated roots and dead grass," he explains. "That would result in a very unhappy customer."

### Field-fabricated manifolds

What differentiates the Red Bulls turf project from other radiant heat systems is the manifolds used to distribute the warmed fluids into the many buried loops.

To evenly distribute heat through the high volume of warmed 50/50 glycol mix sent to the field from a remote mechanical room, Thermco specified three, 360-ft. long, 6-in. Watts polyethylene manifolds.

More than 50 20-ft. manifold pieces were heat-fused together to field-fabricate the enormous manifolds — two of which had T's for loop connections. The third, 6-in. wide polyethylene pipe (also formed by heat-fusing 20-ft. sections) became the header, transporting system fluids from the heat plant to the far end of the field in order to achieve reverse-return system function.

As soon as the manifolds were fabricated, installers began the process of laying out the PEX loops and connecting them to the manifold T's with copper crimp ring connections.

"The layout was very simple," Phelan says. "The loops went 260 ft. out and 260 ft. back in dead-straight lines. It's one giant heating zone, yet we specified dozens of sensors within the field to be sure that heat was distributed evenly."

Fluid delivery temperatures vary from 85° F to 120° based on ambient temperatures. The normal inlet temperature is a prescribed range of 85° to 105°.

Two 4 million Btu condensing boilers, installed by F&G Mechanical of Secaucus, N.J., provide heat for the field. When the system was ready for fluid action, the F&G team — led by **Frana Kalebota** — stirred the glycol mix into the distribution system. System fluids received heat on one side of a 9 million Btu Taco plate-and-frame heat exchanger. On the other side, water from the boilers conveyed heat for the primary loop.

A 6-in. Taco 4900 air separator with pall rings was placed on the outlet side of the boiler and a 5-in. 4900 was installed on the outlet side of the heat exchanger. A 7 1/2 hp Taco in-line pump circulates water between the boiler and the heat exchanger, and a 30 hp Taco in-line pump circulates the glycol mix throughout the field and back. Two 211-gal. Taco expansion tanks also were installed.

The pipe and all key system components were sourced through **Evan Yudell**, director of HVAC sales at Ferguson Enterprises in Lakewood, N.J.

### World-class turf

"For the soccer-specific turf, we used a fescue mix out of south Jersey, and the specific blend is chosen by Red Bull," LandTek's Davidson says.

LandTek experts prefer to give the turf at least a month or two to "knit" together before practice or playing on the field. "We also cut it a few times before it was ready for the sort of impact it will be subject to when played on," he adds.

As planned, sod was rolled onto the bed of soil in the late spring of 2013. Many sensors for soil moisture and temperature were installed; these feed information to the sophisticated control systems.

Several weeks later, with the grass cut to the ideal length, the 30 Red Bulls players moved across the surface for the first time.

"It doesn't get better than this," midfielder Dax McCarty told MLSsoccer.com after the official opening. "As far as I'm concerned, it's right on par with the Arsenals of the world because we trained at Arsenal and it's certainly similar to something like that. The fields are amazing, they're top notch as you can see, it's like carpet."

**PM**