**Dow Industrial Solutions**

# Cleveland Browns Kick Off on Solid Footing

## Case Study


**The new Cleveland Browns Stadium, where DOWTHERM™ SR-1 Ethylene Glycol-based Heat Transfer Fluid helps keep the players on their feet in the winter and visitors to the stadium cool in the summer and fall.**

*Photo courtesy of the Cleveland Browns*

Cleveland Browns Stadium, home of the Cleveland Browns professional football team, is a state-of-the-art athletic facility literally from the ground up.

Completed in time for the 1999 season, and built on the site of the venerable Cleveland Municipal Stadium, the new stadium plays host to more than 73,000 football fans, including the vociferous contingent known as the Dawg Pound. During each game, the fans are constantly entertained and updated by two of the largest and most technically capable video screens, located above the stands behind each endzone, and enhanced by a computer-controlled all-digital sound system.

Down on the playing field, winning consistently may be a bit more of a challenge at this point for the fledgling franchise than it was when Jim Brown, Otto Graham, and Lou Groza were running, passing, and kicking their way to victory after victory. But the new generation of Browns should have much less difficulty keeping their footing in the oft-frigid, windswept conditions characteristic of winters, and home games, off Lake Erie.

An underground hydronic radiant heating system keeps the playing field from freezing while extending the growing season of the natural turf, which consists of Kentucky Bluegrass bolstered by 15 inches of pea gravel, eight inches of sand, and a peat moss mix. The field heating system was installed by Reliance Mechanical Corp., in conjunction with Gorman-Lavelle, both Cleveland contractors.

Hydronic radiant heating comes from 210,000 feet — nearly 40 miles — of 3/4-inch Pex tubing, divided into four zones, each with 189 loops of tubing. The tubing is installed on 6-inch centers, 10 inches below the playing surface at the sand-soil "root zone." A solution of patented 40% DOWTHERM™ SR-1 Inhibited Ethylene Glycol-based Heat Transfer Fluid and water circulates through the underground system to ensure not only that the ground doesn't freeze but that the grass continues to grow for the duration of the football season.

Nine gas-fired Ace boilers feed 7,000 gallons of the solution of DOWTHERM™ SR-1 Heat Transfer Fluid and water to the field through two primary pumps and eight secondary pumps. The boilers heat the glycol solution to 82°C (180°F), and the solution temperature to each of the four zones is 60°C (140°F).

The solution flow rate is control-led to keep the temperature at the root zone between 16 and 18°C (60 and 65°F), to help ensure a playing surface that will help provide the players with better footing during the game.

**Two-Way Protection**

While DOWTHERM™ SR-1 Fluid goes on the offensive to help keep the playing field from freezing, another solution of DOWTHERM™ SR-1 Heat Transfer Fluid and water remains on the defensive throughout the winter months to protect the new stadium's cooling system from suffering the same fate.

During the summer months, cooling is required for a number of enclosed facilities that may serve as venues for a variety of special events such as banquets and receptions, club and association meetings, family parties, fundraisers, and even trade shows. These facilities include two large club facilities, one on each side of the stadium, each capable of seating about 1,600 people. They also include over 147 luxury suites, each large enough to accommodate as many as 14 people. Keeping everyone cool in the summer months is the job of an unconventional system whose main cooling units consist of three 400-ton air-cooled chillers. Chilled water is fed to 50 main air-handling units scattered throughout the stadium to produce the cooling for the various interior facilities.

"The cooling system is not a conventional design, where you have the chiller indoors and a cooling tower outside to enable easy draining," noted Jerry Zelenka, project mechanical engineer for URS, the Cleveland based firm that did the design engineering for all of the stadium's mechanical and electrical systems.

"The life cycle study we conducted indicated that outside air-cooled chillers, combined with electric heat, provided the best cooling and heating combination overall." The chilled water is fed to the air-handling units up to 1,000 feet away from the chillers via an extensive system of 6- to 12-inch steel piping (mostly Schedule 40), which branches out around the stadium on two sides, then up vertical shafts. These shafts have the potential for exposure to freezing conditions during winter. Moreover, the system piping travels within areas that could also be exposed to winter conditions. With the stadium's close proximity to Lake Erie, this could mean "-18 to -9°C (0 to 15°F) for weeks on end," Zelenka noted.

Draining the entire system, or portions of the system, of stagnant water during the winter months when the cooling system is not required to operate would have proved extremely inconvenient, time-consuming and, in the long run, uneconomical. In addition, the cooling system also needed to be available for operation through the late fall, to satisfy any mechanical cooling requirements that might prove necessary for special events held at that time in the large club areas. Leaving stagnant cooling water to freeze in the inoperative system during the winter months and running the risk of burst or leaking pipes was not an option.

With these factors in mind, the customer decided to use an industrially inhibited glycol-based solution year-round as a preventative against freezing, and to have the system available to accommodate event scheduling right through the fall. The fluid URS specified was DOWTHERM™ SR-1 Heat Transfer Fluid.

To help keep things cool in the summer and fall, approximately 15,000 gallons of a solution of 40% DOWTHERM™ SR-1 Heat Transfer Fluid and water are circulated throughout the system according to schedules set by a central building management system, which controls the operation of all components of the cooling system. Chillers are cycled on and off depending on the demand of the facility.

During the winter, the cooling system normally remains shut down, its piping and system components protected from freezing by the glycol-based solution. "The bottom line is that no one wants to have a 10-inch water line burst during a football game, and there's no way to stop the water from causing extensive damage," Zelenka observed. "With the industrially inhibited glycol-based solution in the cooling system all year round, we don't anticipate such problems occurring."

And with DOWTHERM™ SR-1 Fluid also circulating under the playing field, hopefully it won't be long before the new Cleveland Browns put their resurgence as an NFL powerhouse on solid footing as well.


**US, Canada, Mexico**
Toll Free 1-800-447-4369
989 832 1542

**International**
Europe + 800-3-694-6367
Latin America + 55 11-5188-9222
Asia / Pacific + 800 77 76 77 76
+ 60 37 958 3392

**www.dowtherm.com**
**www.dowfrost.com**





Form No. 180-01545-1007 CDP
May 2017