A High-Performance Building at 4 Times Square

New York, New York

Absorption Chillers Part of "Green" Building Approach

When planned construction of the new building at 4 Times Square in New York was announced in 1996, the project was immediately the subject of much discussion. This would be the first major new office building in midtown Manhattan in a decade. Its high-visibility location was also part of it. The building owner, The Durst Organization, identifies the building with the slogan, "At the Intersection of Two Centuries, at the Crossroads of the World."

At the northeast corner of 42nd Street and Broadway, on the south end of Times Square, the project and the completed building are highly visible. And also in keeping with the slogan, the building opened at the turn of the millennium, in December, 1999.

This simplifies service on the chillers and other mechanical equipment, and also permits installation of future state-of-the-art mechanical and electrical equipment as technology becomes available.

The building also features two 200 kW fuel cells which provide electric power to the building grid around the clock. According to property manager Jim West, the Durst group continues to learn ways to further increase the efficiency of the building. "This was a complex project, and some of the 'green' features had never been used on such a large scale, so we had some adjustments to make. But we're definitely pleased with the results, and our occupancy levels suggest that we're providing an atmosphere that tenants appreciate. We have inquiries and visitors from around the world to see what a 'high-performance building' is all about."

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Literature Order Number	CASE-SLX079-EN
Date	January 2003
Supersedes	New
Stocking Location	La Crosse

The Horizon chillers are modular in design, and readily separable into three individual components. This simplified the installation of the units in the penthouse mechanical room.

The units selected were Trane Horizon™ two-stage, direct-fired absorption chillers with Trane UCP2 controls, selected for their high operating efficiency.

Building Continues to Spark Interest
Excitement built with the announced intent to build a high-performance "green" building, with much attention to environmental compatibility and building operating efficiency. Since its completion in 2000, the 4 Times Square Building continues to spark interest and analysis. Many of the building's "green" features are unusual. They range from the basic and practical, such as having separate disposal chutes for recyclable materials, to the exotic, such as the photovoltaic panels embedded in the upper walls of the building.

The building is 52 stories high, of which 47 are rentable space, an amount equal to 1.6 million square feet. The architect for the building was Fox & Fowle of New York, and the builder was Tishman Construction Corporation, also of New York. The Durst Organization operates the building, renting major spaces to the Conde Nast publishing group and to prominent New York law firm Skadden Arps Slate Meagher & Flom. Additional space is leased to a variety of clients, as well as retail space at the street level. The building is fully occupied.

The Durst Organization is a major owner and operator of Manhattan commercial real estate. The principals of the firm have a long-standing interest in environmentally conscious building development. In this building, the owners put dozens of green ideas together to create highly desirable leasable space.

"Green" Design Consistent with Financial Performance
Durst group emphasizes that "green" design elements are not inconsistent with the financial performance of the building, and in many ways actually make the building a better investment. As an example, they cite the energy efficiency of the building shell. Through the use of the newest type of low-e glazing, the admission of daylight for task lighting is optimized, while the passage of heat is significantly reduced, thus building cooling costs are lower and comfort levels are higher.

Unusual Rooftop Structure
Another place where modern design elements were used is in the support structure of the building itself, specifically the use of over-arching "hat trusses" at the top of the structure. These strengthen the building by tying together the vertical structural members and increasing the strength of the building while reducing the tonnage of structural steel needed. The "cage" atop the building, created by the crossing of these trusses, has provided a perfect support for large lighted signs, which can be rented out, and had created bays for a farm of communication equipment, providing a similar rental opportunity. The design contributes to the unique look of the building.

Among the interesting approaches taken in the building design is the comfort system. The Durst Organization asked the architect to find ways of reducing the use of electric energy in the building. This recognizes the environmental impact of central-station electric generation and transmission, and the merits of alternative approaches. As mentioned earlier, the building structure itself, the use of daylighting, and the photovoltaic collectors are all part of this solution.

Gas-Fired Absorption Chosen
Another major step in reducing electric usage was the selection of gas-fired absorption chillers as the primary building cooling units. The design called for the chillers to be located in a large, high-bay mechanical room near the top of the building. The location high in the building reduces the amount of otherwise rentable space needed for exhaust piping, and puts the chillers in proximity to the rooftop cooling towers, thus reducing piping requirements and pumping costs.

The units selected were six Trane Horizon™ two-stage, direct-fired absorption chillers, rated at 620 tons each, for a total of 3,720 tons. According to Jonathan Durst, this absorber model was selected because of its high operating efficiency. "Our strategy was to minimize the use of energy resources, as well as avoiding expense and environmental impact from electric power plant operation."

Units Lifted from Street
The Horizon chillers are modular in design, and readily separable into three individual components. This simplified the installation of the units in the penthouse mechanical room. All of the components were lifted into position from street level by crane while the building was under construction in 1998.

The Horizon units operate delivering chilled water at 44°F (7°C) with a 58°F (14°C) return. The equipment was designed for tower water temperatures of 95°F (35°C) in and 85°F (29°C) returning to the chillers. The units are also used in the heating mode to provide hot water. Each of the units has the Trane UCP2™ control panel, which interfaces with a Siemens chiller plant management package.

Chilled water from the Horizon chillers goes via variable-speed pumps to two custom air-handler units on each floor of the building. Conditioned air is distributed throughout the floor via VAV terminal units.

Chiller Plant Close to Cooling Towers
The mechanical room that houses the chillers and much of the pumping equipment is exceptionally spacious, particularly for a Manhattan location.