



## » Invisible refrigeration plant is cooling the centre of Paris 8 Unitop® refrigeration units in subterranean machine room

### Client

Climespace  
75579 Paris, France

### Climespace

Climespace, a company of the Suez-Group, is partner of the city of Paris since 1992. Climespace is producing 269,000 MWh/a refrigeration energy in five production centres and distributes it to a storage centre for cold water and finally, over a 50 km network running in sewage and energy channels below the Paris roads, to 262 clients in the very heart of the city.

With its centralized management system and delivery stations, Climespace guarantees continuous service under most reliable conditions at all times.

### Refrigeration centre Place du Canada

The commissioning of this plant with a refrigeration capacity of 52 MW took place in May 2002. Remarkable are its invincibility and inaudibility. Below the Place du Canada, a machine room was built on five subterranean levels, the lowest floor at 30 m below street level.

### River water for re-cooling

The 8 refrigeration units are re-cooled with water from the river Seine. A pump station located on the banks of the river with a total supply capacity of 11,200 m<sup>3</sup>/h is feeding the secondary re-cooling cycle of five plate type heat exchangers. The primary cycle of

these heat exchangers is connected with the condensers of the refrigeration units. The re-cooling capacity of each of the heat exchangers amounts to 12.4 MW; or 62 MW for the entire installation.

### Cold water generation

The eight refrigeration units are installed on the lower two levels of the production centre.

The cold water circuits of two of the four refrigeration units per level are connected in series with the heat exchangers of the district cooling system located on the second-upper level.

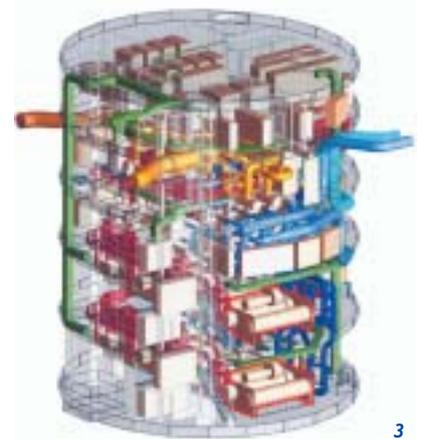
In the first refrigeration unit, the water is cooled from 10°C to 6°C and in the second unit from 6°C to 2°C. The specific refrigeration capacity of each unit amounts to 6.5 MW.

### Electrical supply

The total electrical power absorbed is 1350 kVA. The main electrical installation is located on the first level of the production centre.

Power is provided by three 20 kV cables from two independent supply stations by EDF.

The low voltage station has eight 2000 kW transformers (one per



refrigeration unit) and three 1350 kW transformers for auxiliary equipment (Pumps, fans, etc.).

### Protecting the environment

The water of the river Seine is warmed up by re-cooling with 0.5°C average in temperature. On the other hand, re-cooling with water from the river will cut treatment and use of 500,000 m<sup>3</sup>/a water from the cities fresh water supply. Furthermore, installation of cooling towers in the city centre is not required, therefore eliminating problems like the generation of fog plumes typical for cooling towers, and possible risks regarding bacteria which





### **The future of district cooling systems**

Since district heating systems are common for several decades, the realisation of district cooling systems is relatively new.

Especially in northern Europe, cities like Stockholm are operating district cooling systems for several years now. Often heat pumps, originally used for heating purposes only, are now engaged for the production of refrigeration capacity during summer.

Through this service the clients connected make profit from safe and flexible utilization, significant energy savings and substantial space gains on their premises.

District cooling systems make good economic sense, where the use of independently working small cooling units can be omitted. As direct result, the peak load of domestic electricity supply lines during summer time will be more balanced. In addition, large plants are operated by trained personnel and serviced regularly whereas malfunctions of small domestic cooling units are noticed mainly after loss of the entire refrigeration charge.

thrive in a warm and moist environment.

### **Buildings and architecture**

Since it was commissioned, the production centre serves impressive buildings like the Hotel George V and the Piazza-Athénée as well as the Museum Guimet. Also the Petit Palais and the Grand Palais will, after completion of the renovation work, be connected to the district cooling system.

Tousands of independently working small cooling units can be omitted, thus preserving the architecture of buildings and city.

### **Legend**

- 1 The completed shaft: 30 m deep and 21 m diameter below the Place du Canada.  
© Construction consortium
- 2 The Petit Palais, a Museum, will in future be connected to the district heating system.
- 3 The subterranean machine room. The 8 refrigeration units are place at the lower two levels.
- 4 Some of the eight Unitop® refrigeration units. On the left of each unit, the white endcover of the evaporators and on the right the condensers.
- 5 Uniturbo® 33 compressor with clearly visible guide vanes. They are used for capacity control.
- 6 The Louvre is also connected to the Paris district cooling system.

### **Friotherm AG**

Zürcherstrasse 12 · P.O.Box 414  
CH-8400 Winterthur · Switzerland  
Tel. +41 (0)52 262-8080 · Fax -0003

E-Mail [info@friotherm.com](mailto:info@friotherm.com)  
Internet [www.friotherm.com](http://www.friotherm.com)

