

Be smart and  
stay cool



**FAFCO**

Ice storage  
systems

# The ice store



## The Smart Alternative

Cooling requirements in a building can vary considerably over a 24 hour period and from season to season. Whilst little or no cooling may be required at night or in winter, substantial peaks of consumption will occur during the day in summer. A conventional cooling installation must be sized to meet these peaks resulting in a chiller plant much too large for most other times. This leads to poor plant utilisation and a low overall operating efficiency resulting in high cooling production costs. In addition, higher capital investment may also be needed.

### Avoid production peaks thanks to the ice store

With the use of an ice store, cold energy can be produced at night usually at a lower cost. During the daytime this energy can be redistributed to the cooling system as required. In periods of high demand direct cooling production peaks can be avoided and chiller capacity can be reduced by 50% or more. In addition, the ice store only can be used during period of low demand avoiding operation of the chiller plant altogether! Plant utilisation is greatly improved and, with better control of cooling output, production costs can be lowered even further.

# The right price for cooling



**B**uildings with widely varying cooling needs such as shopping malls, cinemas and theatres, office buildings together with some industrial processes will in particular benefit from cold energy storage. Ice storage will in such cases be more economical in operation than a conventional system. In addition, substantial savings in connection charges may be available. The greater the peak demand the higher the pay-back achieved.

## Reduce cooling production costs

Cooling production peaks can be avoided with the use of an ice storage. High demand is met with cooling from both the chiller and the ice store which has been charged using lower cost electricity from the off-peak tariff. FAFCO ice banks are durable for a long life and require little maintenance. Amortisation of their cost is rapid – increasing the benefit of savings achieved.

## Use less to give more

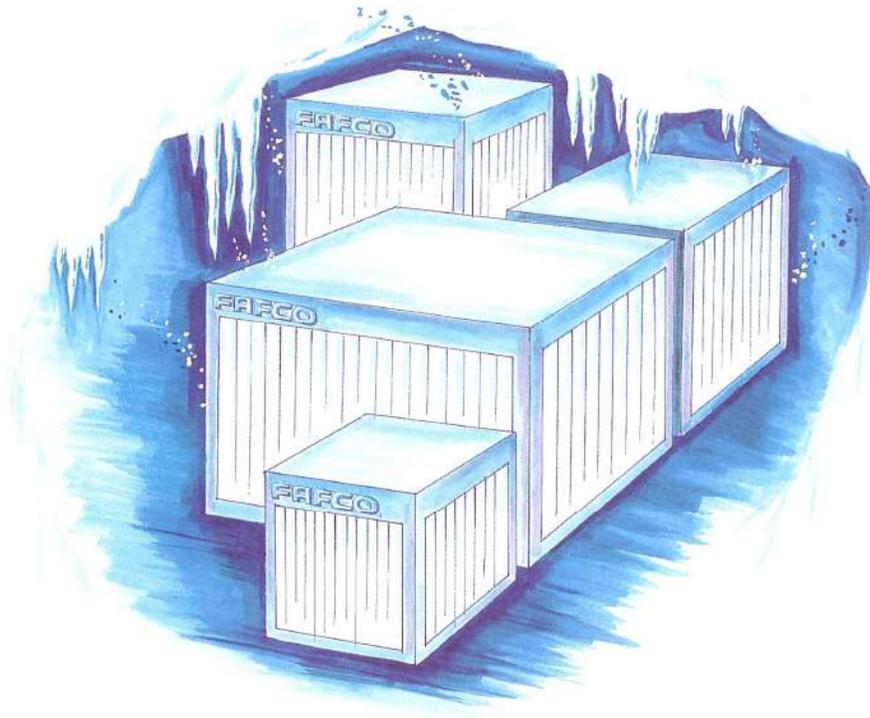
Compared with a conventional installation, FAFCO ice banks allow many system components in addi-

tion to the chiller itself to be reduced by up to 50% in size. Heat rejection capacity whether by air-cooled condensers or cooling towers will be down-sized as will the electrical supply and its associated switch gear and transformer capacity often saving space in critical areas. Capital cost savings will be higher than expected!

## How to save with FAFCO ice banks – a brief review

- Eliminate production peaks and reduce connection charges
- Produce cold energy with low cost off-peak electricity
- Reduce size of chiller plant, associated equipment and electrical supply
- Improve plant utilisation and increase operating life
- Better control of cooling output

# Ice banks



**F**AFCO ice banks can be incorporated into almost any system using liquid as the cold energy carrier. A rectangular tank with internal insulation and a completely water tight inner liner enclosing a unique heat exchanger assembly make up a FAFCO ice bank. The tank is filled with water; cooling is stored as latent energy within the ice.

## High efficiency heat exchange for cost effective operation

The heat exchanger assembly made of specially formulated stabilized polypropylene tubing is suspended within the ice/water tank. This method of construction provides a very extensive heat exchange surface for high transfer rates under all normal operating conditions. This construction also means that hydraulic pressure losses are low even when flow rates are high.

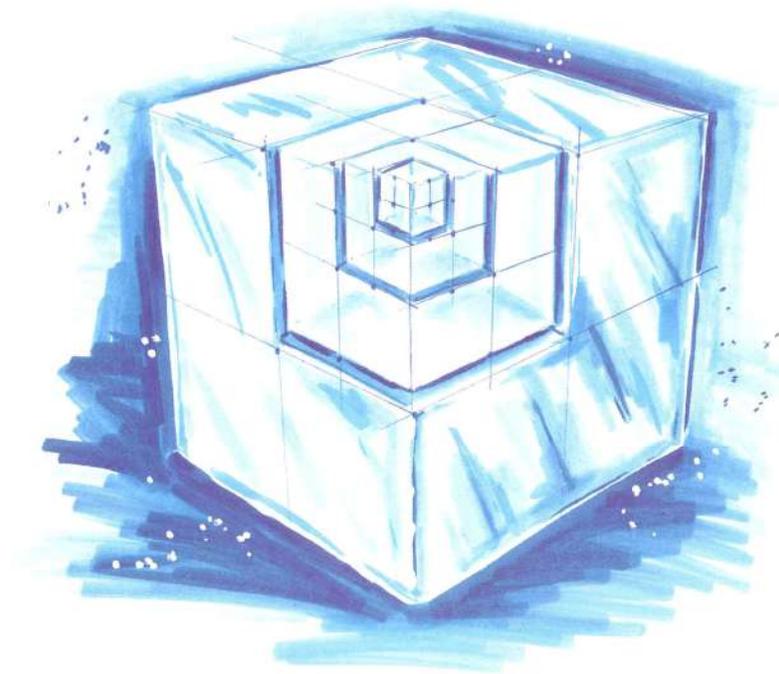
## Turbo effect with air injection

Air agitation greatly improves the cooling discharge rate as required in some installations. FAFCO can supply a special air injection system for this purpose as an option on all its ice banks at a moderate extra cost.

## FAFCO construction – a brief review

- Main components 100% corrosion-proof
- Extensive heat transfer surface
- Excellent operating temperature conditions for charge and discharge
- Available with high performance tank for rapid release rates
- Low pressure drops

# Ice Storage made to measure – no problem for FAFCO!



**F**AFCO ice banks offer a made to measure solution for most cooling requirement and for practically any size of building. 24 standard models are available with latent cooling capacities ranging from 289 to 3000 kWh but special size units can be supplied for particular applications. FAFCO ice banks can be installed external to the building where necessary.

## Ice storage for all occasions

Because of their method of construction and the modular nature of the heat exchanger assemblies, FAFCO ice banks can be supplied in component form. All component items can be passed through a single doorway for assembly at the ice bank's final location – an ideal solution for both new and refurbishment projects.

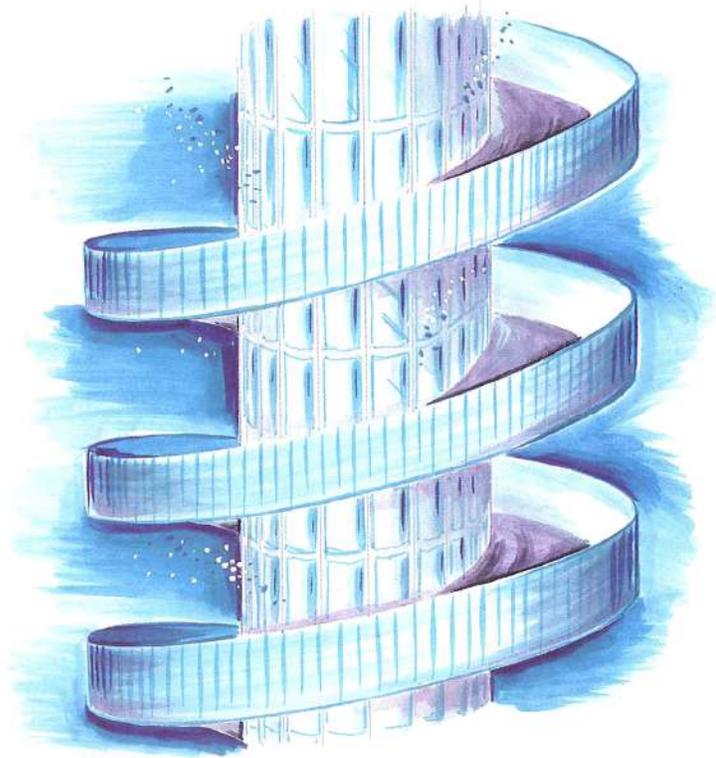
## Count on FAFCO

FAFCO engineers can provide estimates of saving which will result from the use of ice storage as part of its customer service. This includes also full expert advice on all aspects of ice storage and the application of FAFCO equipment.

## Made to measure technique – a brief review

- Wide range of standard units
- Special sizes supplied if required
- Internal or external location
- Supply in component form for site assembly
- Ice banks in steel or concrete tanks
- Full advice and estimating service
- Turn key installation for larger projects

# Ice storage within concrete tanks. Cool and save space



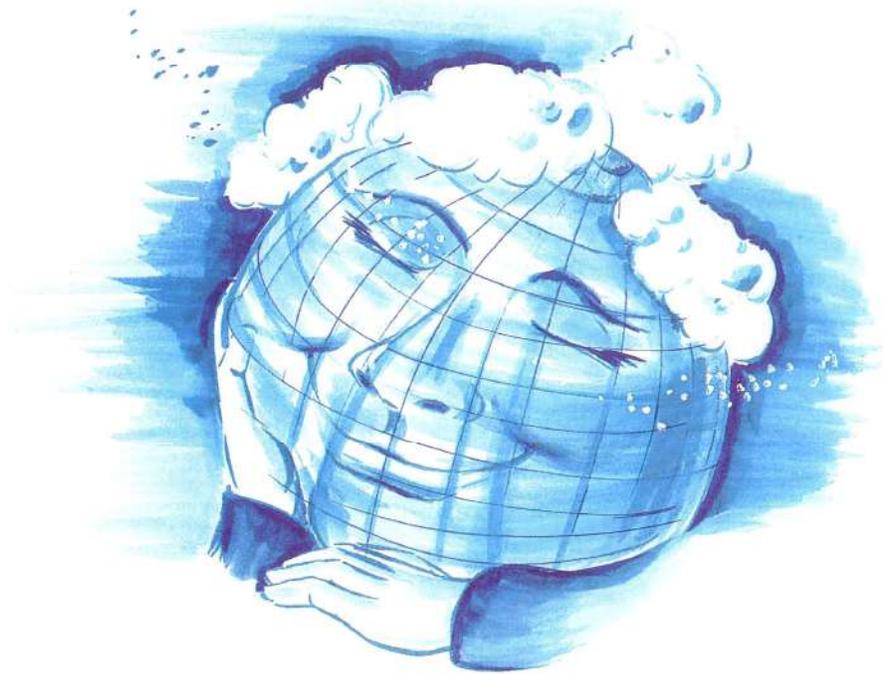
As an alternative to their conventional units, FAFCO can supply ice banks assembled within builderswork concrete tanks. This solution provides an exceptionally solid construction and is particularly suited to large projects. Generally they require less floor area and can be easily integrated into the building structure. Irregular plan areas can be accommodated – almost any shape is possible!



**An installation to prove it!**

The installation at the Linden-Center in Berlin belonging to ECE Projektmanagement of Hamburg provides an interesting technical and architectural solution. The core of the spiral ramp leading to the covered parking serves as a concrete tank for the FAFCO ice bank.

# Progress with cooling



Most refrigerants are harmful to the environment from a number of aspects. CFC's are the principal cause of damage to the ozone layer. HFC's, because of their lower volumetric efficiency, consume more energy leading to greater CO<sup>2</sup> emissions and global warming. In addition to problems of toxicity natural refrigerants, such as ammonia and propane, are inflammable or even explosive.

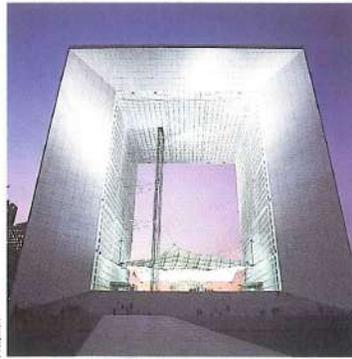
## Reduction in refrigerant

No matter what refrigerant is used, ice storage used in conjunction with a chiller will reduce the refrigerant inventory of the cooling installation – often by as much as a half. Implications of an accidental loss of refrigerant are less serious and where the number of machines is reduced actual risk of leakage is diminished.

# References

**FAFCO – a partner for custom-made solutions**

FAFCO clients include some of the best known organisations in their field. Such enterprises do not compromise in matters such as quality of materials and the built environment, operating costs or ecological concerns. FAFCO's products meet these high demands and their engineering staff can advise with competence on all questions of their correct application.



La Défense, Paris  
Several FAFCO Ice Banks  
Storage capacity:  
100 000 kWh



Neue Messe, Munich  
FAFCO Ice Bank  
Storage capacity: 100 000 kWh



Bayrische Vereinsbank, Frankfurt  
FAFCO Ice Bank  
Storage capacity: 8000 kWh



Rolex, Bienne  
FAFCO Ice Bank  
Storage capacity: 1750 kWh



Geneva Airport  
FAFCO Ice Bank  
Storage capacity: 17 700 kWh



Renault Technical Centre  
Guyancourt, Paris  
FAFCO Ice Bank  
Storage capacity: 46 000 kWh

**FAFCO**  
Ice Banks

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