

## Tips on ice

### What is the ideal ice temperature?

#### *Cooling power of ice:*

Melting 1 kilo of ice at 0°C releases 80 kcal of cooling power. The greatest cooling capacity of ice is at the melting point.

#### *Energy consumption for ice production:*

The energy to be used later in the form of cooling capacity must first be used for the production of ice. For the production of supercooled ice (ice below 0°C), proportionally too much energy must be used because the ice itself has an insulating effect that must be overcome for supercooling.

#### *Ideal ice temperature:*

The optimum ice temperature under energy criteria is directly below the freezing point at -0.5°C. Here we already have the maximum cooling capacity of the ice without having to use too much energy for its production.

### When does ice become caked?

Ice is always exposed to a certain humidity in the air, i.e. it releases moisture when it melts. When this moisture freezes, the ice clumps. The colder the ice is, the easier it is for the moisture to freeze. This effect increases with the resting time of the ice and with increasing humidity.

Therefore, flake ice at -7°C tends to become clumpy after a couple of hours; this tendency can be reduced if the ice is additionally stored in a chamber cooled to -5°C.

Flake ice at -0.5°C does not allow moisture to freeze since the temperature difference with moisture is too low. Therefore, chip ice can be stored for several days at temperatures above 0°C (ideal temperature is 4°C) without forming lumps. Only on the surface does it form a hard layer, but underneath the ice remains loose and granular.

### Bulk weight of ice:

To calculate the volume of the store the bulk weight must be considered:

- t / m<sup>3</sup> for water
- 0.92 t / m<sup>3</sup> for ice bars
- 0.50 t / m<sup>3</sup> for chip or flake ice.

This means that for the storage of 1,000 kg of chip ice, a storage volume of 2 m<sup>3</sup> plus the reserve for the tipping cone is required = 2.5 - 3 m<sup>3</sup>

### **How fast does ice melt?**

The larger the surface area of the ice in relation to its volume, the faster the melting will be.

In other words, flake ice (small thickness of about 2 mm) melts faster than macro ice (larger thickness of about 9.5 mm).

When rapid thawing, i.e. rapid cooling, is required, smaller ice thicknesses should be used.

When durability is required (e.g. transport of fish in a warm environment), the thicker ice should be used.