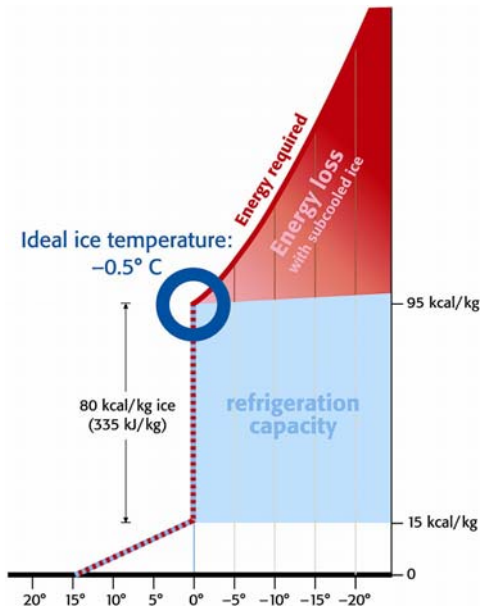


Flake ice comparison



The physics of freezing water into ice

Does sub-cooled ice contain more energy than ice at 0°C ?

Referring to the graph at left, it can clearly be seen following the temperature along the bottom, that until 0°C almost all of the electrical energy put into freezing the water is stored in the ice and can be recovered as cooling energy. However as the temperature of the ice drops below this figure, the electrical energy consumption (red line) climbs steeply the colder the ice gets, while the stored energy in the ice (black line) hardly alters.

As the graph clearly shows, the ideal temperature for ice from an energy efficiency point of view is 0°C

Why then is some ice sub-cooled down to -10°C ?

Some ice machines, due to the way that they work, must sub-cool the ice. Scale ice for example is harvested by cracking it from the surface of the drum. In order to do this the ice must be hard and brittle, so the ice is sub-cooled to facilitate the machine operation, not for any gains in cooling energy.

Chip ice vs scale ice

There are two ice types commonly referred to as 'flake ice'.

1. Chip ice: Temp. -0.5°C
2. Scale ice: Temp. -7°C

Scale ice: Scale ice is produced by freezing ice onto the inner wall of a large vertical drum. A rotating knife then goes around the surface, cracking the ice from the walls. The ice then falls through the open bottom of the drum into an ice store or container placed for that purpose. To ensure the ice releases cleanly from the freezing surface, it must be cold and hard enough, this means the ice must be cooled down to at least -7°C.

As scale ice is sub-cooled, it is cold enough to condense moisture from ambient air and freeze it onto the surface of the ice, rapidly forming a thin crust. It is also cold enough to re-freeze its own meltwater, so if stored in conditions that allow it to begin melting it can turn into large, unusable pieces that must be broken apart before use. However if stored correctly in properly insulated and refrigerated store, it will handle fairly well.

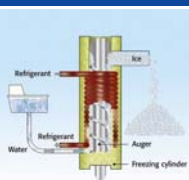
Disadvantage: not suitable for use in warm environments.

Advantage: can be stored below zero in freezers for extended periods.

Chip ice: Chip ice is produced in a narrow, vertical cylinder with an auger running up through the centre. Ice is formed on the cylinder walls and is constantly removed by the scraping action of the auger. As the ice passes up through the cylinder, the ice is further frozen and compressed by the auger, then broken into chips and ejected from the top of the cylinder. This process does not require the ice to be sub-cooled so it can be made as close as possible to the ideal temperature of zero.

Disadvantage: not suitable for storage below zero in freezers

Advantage: suitable for use in warm environments, wide range of chip sizes to suit different applications, efficient to produce. No additional cooling of the storage needed (a simple insulated store is sufficient).



Ziegra Ice Machines (UK) Ltd

Unit 2, Phoenix Court, Hammond Avenue, Stockport, Cheshire, SK4 1PQ

Tel: 0161 429 0525 Fax: 0161 480 7927

Email: ice@ziegra.co.uk

www.ziegra.co.uk



Flake ice comparison



Fine chip ice in hand

Fine/micro chip ice: Small pieces of ice, specially developed for use in applications where the ice must be mixed into products such as meat and dough. The small particle size ensures the ice melts into the product quickly for rapid and even cooling with no risk of post mix ice residue.

Also useful for packing delicate products such as high value fish fillets and herbs.

Standard chip ice: medium sized pieces of ice, widely used for the retail display of fish, salads, refrigerated snacks. Also used in the growing industry for removing field heat and packing vegetables. A compromise between the rapid cooling of fine ice and the longevity of large ice.



Standard chip ice



Large chip ice in hand

Large/Makro chip ice: large sized ice chips designed to last as long as possible.

Widely used in the fishing industry for packing whole fish and shellfish in fish markets, processors and aboard trawlers.

Scale ice: irregular shaped shards of cold flat ice.

Widely used in the fishing industry for packing whole fish and fillets. Also used for concrete cooling projects and in the poultry industry in spin chillers.



Large chip ice in hand

