

Service Memo

To: Service Personnel

Re: Ice cream

Problem: Ice cream melting in freezers.

Cause: As far as ice cream is concerned, it is, essentially, a solution of milk (which contains water, lipids, proteins, and lactose) and refined sugar. With so many solid substances dissolved in water, we would expect the freezing point of ice cream to be below that of water. But, it's slightly more complicated than that. Cow's milk naturally freezes at a temperature of approximately -0.5 degrees centigrade, or 30 F which is not much lower than the freezing point of water, so how is it possible that ice cream can still feel "unfrozen" at temperatures far below -0.5 degrees or 30 F? The reason is that as the water component of the ice cream solution begins to freeze, it isolates itself from the rest of the solution by forming pure ice crystals (which are readily observable in ice cream). As a consequence, the relative concentration of the solid substances dissolved in the remaining liquid solution increases, simply because there is less liquid water left available for the solutes to dissolve in. The left-over water can then only freeze at a much lower temperature; when it does get cold enough to do so, the concentration of the solutes goes up even higher, again, because there is less liquid water left. You can imagine that, as the ice cream gets colder and colder, the concentration of the solutes continues to increase as water is progressively removed from the liquid solution as it freezes, thereby greatly depressing the freezing point of whatever amount of liquid is left. The ice cream eventually becomes a mixture of frozen crystals and a relatively smaller amount of unfrozen, liquid solution which gives it a soft feel. Below about -25°C , or -14 F ice cream is stable for indefinite periods without danger of ice crystal growth; however, above this temperature, ice crystal growth is possible and the rate of crystal growth is dependant upon the temperature of storage. This limits the shelf life of the ice cream. Nova kool freezers are design to keep frozen ice cream for short period of time at temperature 10 to 20F or -12 to -7C .

For more information contact Nova Kool @604-523-6515 pacific standard time