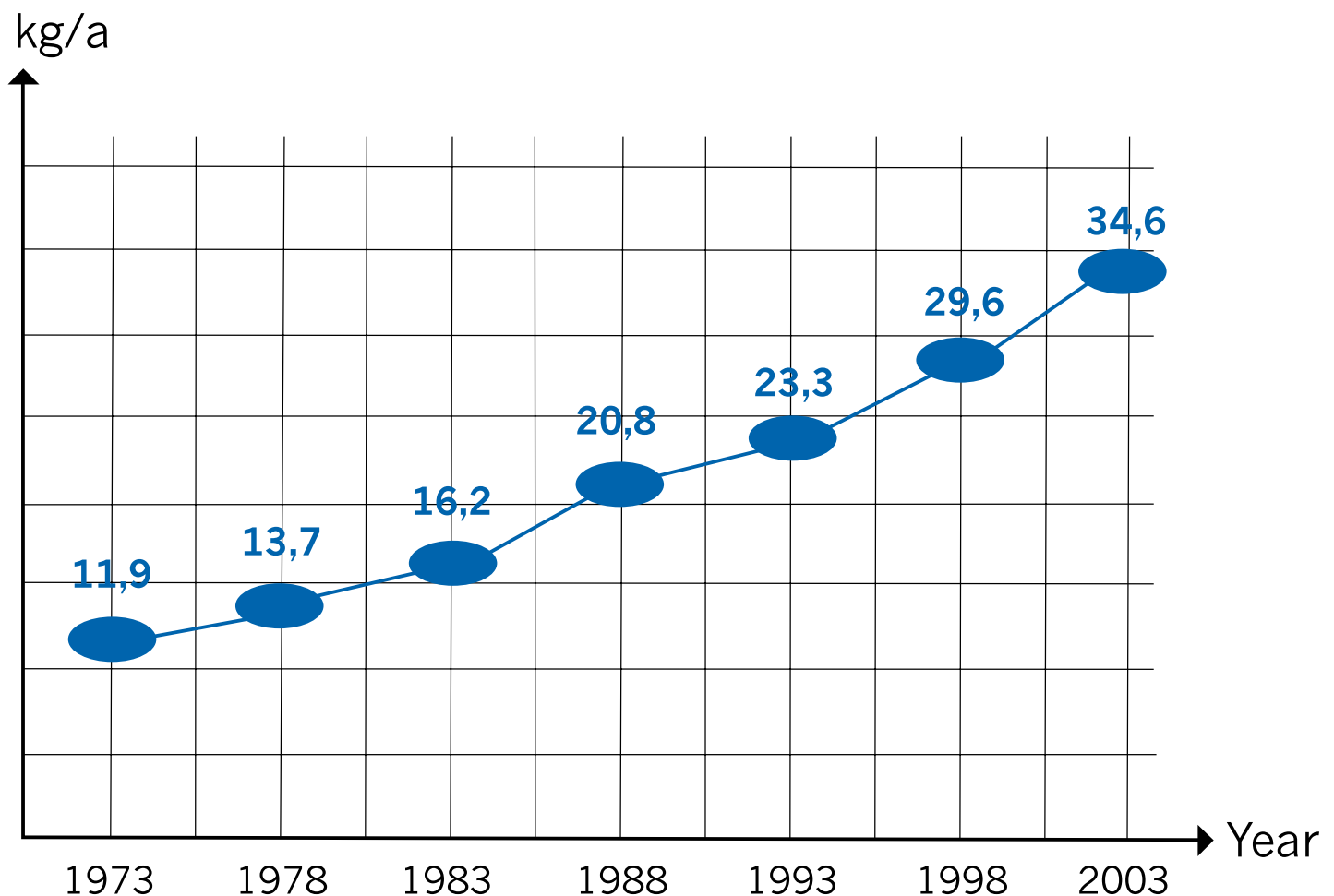


Optimum temperature distribution in the deep-freeze room: Güntner storage coolers



Consumption of deep-frozen food per head of the population in Germany in kilograms, not including ice-cream (Source: dti e.V.)

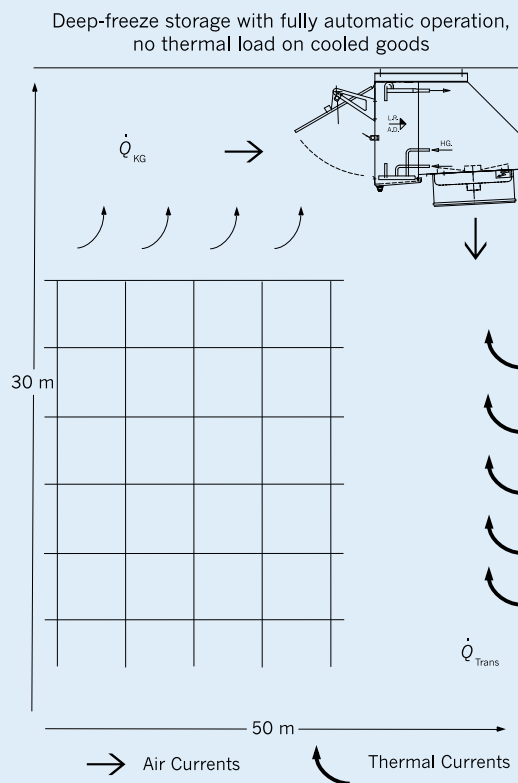
Deep-frozen food is becoming more and more popular. In Germany alone, according to the Deutsche Tiefkühlinstitut e.V., the annual consumption of deep-freeze food products per head of the population has increased by 34.4 % in the last 30 years, from 11.9 kg to 34.6 kg. And the demands on the quality of the stored goods have increased with the consumption. It is therefore essential to maintain a constant distribution of temperature in the store. The

Güntner storage cooler not only achieves optimum distribution of temperature in the store-room, but at the same time offers an extremely energy-saving solution for this purpose.

To make the best use of the space in deep-freeze storage, more and more high-rise storage shelves up to 30 metres in height are being used. In these rooms, the height alone causes thermal currents that lead to a vertical temperature stratification. It is also very difficult to distribute the cold air over the entire area in

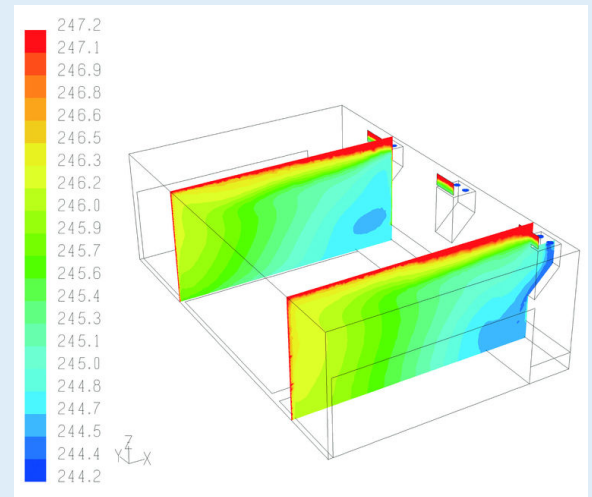
these large rooms, which can be up to 80 metres long. The result is an uneven distribution of temperature, and a loss of quality in the goods. Using conventional air-cooler technology, this can be prevented only by using very high-powered fans.

calculations and measurements it has been possible to show that the temperature stabilises with a variation of not more than 2 K over the entire storage area.



Deep-freeze evaporator from Guntner: Efficient power at half revs and low current consumption

The Guntner storage cooler, unlike conventional coolers, does not work against the natural thermal currents – it utilises them. The cold air is blown downwards at low speed. It gathers at floor level, and forms a pool of cold air. The warmth that is introduced through the walls warms the air, and the warm air rises and is sucked into the cooler again right at ceiling level. The warming in a deep-freeze store does not occur everywhere, being mostly near the outer walls, so contrary to what one might expect, there is no linear stratification of temperature over the entire height of the room. On the contrary: The local warm air rises quickly, and forms a comparatively thin layer of warm air under the ceiling. On the basis of simulation



Deep-freeze store with 3 downward-blowing evaporators – Calculation of the temperature distribution using finite-element calculation

Energy-saving operation

Because the Guntner storage cooler does not work against the natural thermal currents, but instead supports them, significantly lower air-speeds can be used than with conventional air coolers. This allows slowturning fans to be used. To compensate for the resulting lower k-factor, the coolers must be dimensioned with a somewhat larger area, but on the other hand the fans need significantly less drive power.

Flooded Evaporator 3 x S-GHS 081E/212/20P

Power	50.0 kW	Refrigerant	NH ₃ (1)
Surface reserve	16.1 %	Evaporation temp.	-36 °C
Air volume flow	37160 m ³ /hr Pumping rate	2.5	
Condensation	3.75 kg/hr		
Air intake	-26.4 °C 95 %		

Air outlet	-29.6 °C 100 %		
K-factor	20.48 W/ (m ² ·K)	Mass flow	327 kg/ hr
Fans	2 pieces 3 - 400 V 50 Hz	Noise lev- el	71 dB(A) (2)
Data per motor		At dis- tance	1.0 m
Speed	890 min ⁻¹	Noise power	89 dB(A)
Power	1.40 kW		
Current con- sump.	2.7 (A)(3)	Frost	0.5 mm
Housing	Gal- vanised steel	HE pipes	Hot-gal- vanised
Exchang- er sur- face	386.9 m ²	Fins	Hot-gal- vanised
Distribu- tor pipe	43.3 * 2.60 mm	Collector pipe	76.1 * 3.60 mm
Pipe vol- ume	211 l	Inlet manifold	26.9 * 2.30 mm
Fin spac- ing	12.00 mm	Suction manifold	76.1 * 3.60 mm
Weight empty	1.600 kg	Passes	20
Length of unit	3.896 mm	Circuits	1 N
Width of unit	1.260 mm	Strings	10
Height of unit	1.290 mm		
No. of bearers	4		

Dimensioning data of the installed evaporators