



## Refrigeration on demand

**Continuous refrigeration is an absolute necessity for many different types of food. Ensuring that products are kept cool during loading and transport is a challenge - yet one that can be met with Linde's low-emission and low-noise cooling solutions.**

### Keeping cool – from production to consumption

Providing reliable refrigeration for goods such as fresh meat products is not a problem in closed production environments. However, even the briefest rise in temperature is enough to significantly impair the shelf-life and quality of many foods.

Linde offers tailor-made, cost-effective and eco-friendly solutions for maintaining the cold chain while transporting fresh food to consumers, even over long distances.

A system that cools food products without requiring power supply, for example, is particularly useful when foodstuffs are transported by ship. Linde's snowcool system is ideal for such cases. The cooling process here is based on sublimation of dry ice snow (CO<sub>2</sub> snow) that has a temperature of -78°C (sublimation is when a substance directly transforms from a solid to a gaseous state).

The dry ice snow is created using liquid carbonic acid (H<sub>2</sub>CO<sub>2</sub>) directly in the snow gun, which is used to fill a 'snow box' installed inside a special transport container known as an isotainer.

### Safety first

A stationary unit is used to measure the exact amount of liquid carbonic acid and CO<sub>2</sub> snow required for the specific product and the distance it has to be transported. This eliminates the risk of using too much ice and helps control costs. Isotainers guarantee consistent temperature in any vehicle for up to 72 hours. They do not require a power supply and are therefore completely silent.

This solution comes with a sophisticated safety concept. Highlights include a unique, patented CO<sub>2</sub> capture system using the snow gun. Here, an exhaust pipe on the gun captures the carbon dioxide produced when the liquid carbonic acid expands (almost equal amounts of CO<sub>2</sub> gas and snow are produced during this process). If carbon dioxide is left to escape into the atmosphere, concentration levels in the air rise, leading to a risk of asphyxiation for humans. And since CO<sub>2</sub> is invisible and odourless, this happens without warning for those working in the vicinity. Added safety features include gas alarms.

Innovative developments of this kind are always the result of collaboration with our customers. We are currently working together with customers to develop suitable solutions for manufacturing gas-impervious packaging from renewable raw materials.

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