

## Transport refrigeration with CTS (Cryo Trans Snow) – Air Liquide and TKT develop highly efficient refrigeration process

Long transport times often represent a challenge where refrigerated foods are concerned. The process for transport refrigeration developed jointly by Air Liquide and TKT secures constant temperatures in refrigerated containers for up to 24 hours. CO<sub>2</sub>-snow is provided in the isotainers and dosed as required. As an option, the method can also be used gas-tight to the space occupied by the product. Consequently, it is ideally suited for sensitive foods and convenience products too.

### Energy-efficient and cost-efficient transport

The cooling of foods during transport can become a crucial cost factor. In order to avoid this, the gas producer Air Liquide and the leading manufacturer of thermal containers TKT have developed a particularly efficient method under the name Carbofresh. Here dry ice snow is used for cooling in refrigerated containers (isotainers) and dosed in line with needs. CO<sub>2</sub>-snow offers critical advantages by comparison with the dry ice often used conventionally. The maximum surface area of the snow particles ensures fast sublimation and a swift transfer of the cooling energy.



Using the Carbofresh filling system, the cooling agent reaches the slide-in cooling module within a few seconds.

## A plus for convenience products

By carriage in the TKT thermal containers with an integrated dry ice compartment, constant cooling of the products from the time of goods dispatch through to the point of sale is ensured when the Carbofresh-CTS-system is used. The system can also be used optionally gas-tight against the cargo area. Accordingly, it is also suitable for unpackaged, fragile foods such as for example salad or fresh fast food (e.g. wraps). By contrast with the use of conventional systems, a major advantage for conveying convenience products is that the shelf life is prolonged by up to 48 hours.

## Uniform cold gas circulation

The transport system is broken down into four components. The core element is the TKT-thermal container (isotainer) with a firmly mounted slide-in cooling module. It offers ideal protection against any heat infiltrating and against mechanical influences. Further components are the filling station and the steering/control. They ensure optimal dosing of the cooling agent as well as fast and safe filling.

In order to fill the isotainer, the filling head is connected using a quick connection. The liquid CO<sub>2</sub> is converted into dry ice snow in the slide-in cooling module. The cold gas enters the thermal container through a stainless steel gauze. A plastic insulating barrier on the bottom side of the slide-in cooling module prevents the cold from dropping directly onto the goods being transported and directs it towards the walls of the thermal container. The cold gas circulates uniformly in the interior of the container. Both excessive warming and freezing of the goods are prevented. The sublimation of the dry ice snow is influenced by the amount of heat entering from the exterior. Together with the slide-in cooling module, the isotainer forms a passively self-regulating system.



The filling head has a quick connection with which it is easy to dock onto the filling nozzles of the slide-in cooling module. To increase safety at work, the connection is locked during the filling operation.

## Safe filling

The CO<sub>2</sub> connection of the Carbofresh-CTS-system is located on the rear side of the isotainer, passing through the rear wall. By contrast with conventional systems, it is not necessary to open the door of the thermal unit here in order to connect the filling unit. This is a major plus point as regards security and energy efficiency. Any CO<sub>2</sub> gas developing is exhausted precisely via the connection. Contact between staff members and CO<sub>2</sub> is prevented completely. No clouds of gas or fog develop and condensation on surrounding systems and installations is avoided.

## Constant cooling with fluctuating outdoor temperatures

In conventional systems, the liquid CO<sub>2</sub> is injected in a kind of cassette. The resulting CO<sub>2</sub> gas is passed on to the surroundings. In working and production rooms therefore, an expensive room air exhausting system generally has to be installed for safety reasons. In the Carbofresh-CTS-system, the point of erection can be chosen freely. Costs and outlay for expensive room air exhausting systems are not incurred, as no CO<sub>2</sub> is passed on to the surroundings. A further advantage – as the door remains closed during the filling process, is that the cooling agent does not have to be added in a cooled room. The surrounding temperature has no direct influence on the cooling chain and the quality of the product. Even during 24-hour transport operations, the product measuring data at various points in the isotainer display a constant cooling temperature of the goods – even in the case of fluctuating outdoor temperatures.

## Interface as a decisive component

One decisive element in the Carbofresh-CTS-system is the standardized interface via which the filling unit communicates with the customer's merchandise management system. The specific data for each individual isotainer and its transport are collected via a corresponding syntax and the exact quantity of dry ice necessary for this tour is calculated. Parameters for the calculation include the target temperature of the merchandise (frozen, fresh, dairy products, meat, convenience products), the outdoor temperature (including predictions for the next 24 hours), transport and waiting times, the degree of filling and the size of the isotainer.

## Operating errors largely impossible

Optional tools ensure that operating errors can be largely ruled out. For example, the recognition of the operator or commissioner can be integrated by scanning his batch. It is also possible to allocate a tour to the isotainer in order to avoid double-fillings. After successful filling, information such as filling time and quantity and the isotainer number are fed back into the merchandise management system via the interface. This ensures optimal traceability and transparency regarding any deviations in the transport chain. All requirements in connection with HACCP (Hazard Analysis and Critical Control Point) are satisfied.

With CTS, cooling chains can be maintained safely, efficiently, at optimized cost and in an environmentally friendly manner – and the data management of the system developed by Air Liquide and TKT is also in line with present-day systems and the future.

### Further information and contact

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