DOHMEYER

CRYOGENIC • FREEZING • PRECISION

Cabinet Freezer

The Dohmeyer Cryogenic Cabinet Freezer is specially-designed to meet the most demanding requirements for the freezing, crust freezing or chilling of food products. Dohmeyer Cryogenic Cabinet Freezers are the most versatile freezers Dohmeyer has to offer, with special designed models for the Pharmaceutical and the Automotive Industries

Dohmeyers Cabinet Freezer offers a solution for every freezing problem

In the food industry cryogenic cabinet freezers are typically used for the crust freezing of specialities, processed meat and fish products prior to slicing, along with quick freezing of seafood (sushi & sashimi), bakery products and ready meals, such as pizzas and pasta entrees.

Every Dohmeyer Cabinet Freezer is equipped with either liquid nitrogen or liquid carbon dioxide (CO_2) injection, depending upon the product and process requirements. The freezing, crust freezing or chilling action happens right inside the cabinet where the cryogenic gases are injected inside an insulated cold chamber, in direct contact with the food products that have to be loaded manually onto removable trays and trolleys.

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Liquid Nitrogen and CO2 deliver the ultimate freezing solution yet available on the market. Cryogenic freezing offers minimal degradation in aroma, flavour and dehydration for the frozen food product. Because these cryogenic gases are inert, they also provide a protective atmosphere inside the cold zone, which prevents any further oxidation or degradation of the products. As a result, the quality attributes of cryogenically frozen or chilled food products are far superior to those same products frozen in a mechanical system, in terms of colour, flavour and texture upon thawing.

zThe power of cryogenics is also due to the extremely low operating temperatures of the freezing equipment which can freeze, crust freeze or chill the food products much faster than traditional cabinets freezers can achieve. Furthermore, cryogenic freezers offer a higher freezing power size to size compared to traditional freezing systems. Dohmeyer cabinet freezers are designed to operate at temperatures as low as -60°C with liquid CO2 injection and to -110°C with liquid nitrogen injection. Dohmeyer cabinet freezers are ideal for batch food processing operations and for those manufacturers that need to increase their productivity throughput with a minima capital investment and total cost of ownership footprint.
There is therefor a cabinet freezer model for every budget and processing need.

Each dohmeyer cabinet is standard equipped with a standard, operator-friendly HMI touch screen and Siemens PLC software, with recipe storage capabilities to ensure a consistent freezing or cooling result every time. The freezers control system can be programmed to either chill or freeze food products over a defined period of time, or to reach a desired core temperature in the product.

Dohmeyer builds each of its cryogenic cabinet freezers with care and in compliance with the CE directive 2006/42/CE and EN 1935/2004

There is a Cabinet Freezer model for every budget and processing need:

DOH-BOX Model	Model 400	Model 1500	Model 2700	Model 4300	Model 4800
Nickname	Gastro Tray	Double Gastro	Culinar	Europallet	Smoke
Internal (WxDxH) [mm]	700x810x700	1050x970x1150	1150x1120x2050	1350x1520x2050	1550x1520x2050
Volume Inside [litres]	397	1171	2640	4207	4830
Door opening (WxH)	550x700	750x1100	850x2000	1050x2000	1250x2000
Outer (WxDxH)	1280x1090x980	1695x1250x1318	1795x1400x2218	1995x1800x2218	2195x1800x2218
Max Trolley Clearance (WxDxH) [mm]	Not for trolley, Trays only	<600x650x1300	<800x900x2000	<1000x1280x2000	<1250x1320x2000
Advised Trolley Size	3 trays	527x650x1300	600x800x1800	800x1200x1800	1000x1000x1800
Model Of trolley	Trays Double Gastro	Double Gastro	Half Europallet	Europallet	Trolley for meat
Coolant supply [kg/h]	Peek flow 300kg/h	Peek flow 700kg/h	Peek flow 1800kg/h	Peek flow 1800kg/h	Peek flow 1800kg/h

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Bottom Drop Tunnel

Dohmeyer's in-line cryogenic freezing Tunnels are commonly used to freeze all kinds of foods ranging from small diced products to larger whole muscle meat or packaged products.

The Dohmeyer Bottom Drop Tunnel are easily adapted for every kind of inline freezing

When the ceiling height in the production facility is limited, Dohmeyer provides a Bottom Drop Tunnel that is opened by lowering the bottom section of the tunnel using pneumatic bellows while the top part of the freezer stays in place. This type of tunnel provides easy access for cleaning and maintenance with an opening clearance of ca. 350 mm.

Every Dohmeyer Tunnel is equipped with either liquid nitrogen or liquid carbon dioxide (CO2) injection, depending upon the product and process requirements. The freezing action happens right inside the tunnel where the cryogenic gases are injected into an insulated cold zone as the food product passes through it.

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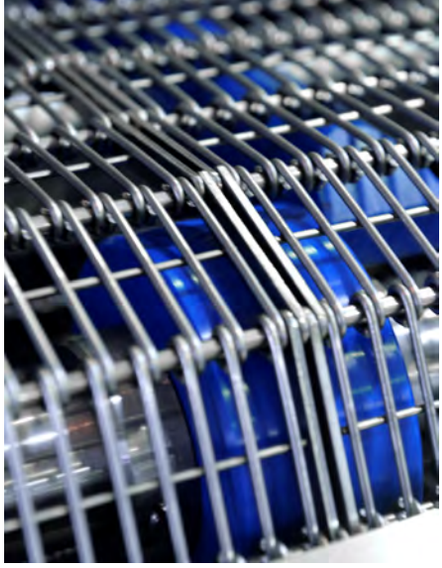

Liquid nitrogen and CO2 deliver the ultimate in cryogenic freezing power by minimizing any aroma, flavor and dehydration losses to the food product. Because these cryogenic gases are inert, they also provide a protective atmosphere inside the freezing zone which prevents any oxidation of the food. As a result, the quality attributes of cryogenically-frozen food products are far superior to those same products frozen in a mechanical system.

The power of cryogenics is also due to the extremely low operating temperatures of the freezing equipment which freezes the food products much faster than with traditional methods. Dohmeyer Tunnels are designed to operate at temperatures as low as -65°C for liquid CO2 injection or -120°C for liquid nitrogen injection. At these low temperatures, the food product is preserved under the best possible frozen conditions to ensure that microbial activity is reduced to a minimum.

Dohmeyer can recommend the best cryogen and injection set-up for various types of food products or processing constraints. There are two injection set-ups to choose from depending upon the temperature profile that is needed to freeze the food product: Isothermal or Counter-Current. Isothermal tunnels provide a uniform operating temperature throughout the cold zone while counter-current tunnels create a temperature gradient inside the tunnel by guiding the cold gases in the opposite direction to the product flow.

In addition, Dohmeyer is able to provide specially-designed fan blades, based on its on-going research efforts, for different convection set-ups in order to increase the freezing rate of many types of food products while optimizing the operational efficiency of the cryogenic gases.

Dohmeyer builds every one of its cryogenic Tunnels in compliance with CE Directive 2006/42/CE, EN 1935/2004 and to the latest standards in food equipment hygiene design. Any components that are in direct contact with the food product are made using AISI 316 stainless steel in order to eliminate any food safety hazard. All other components and the main freezer structure are constructed with AISI 304 fully welded stainless steel materials or, as an option, AISI 316. Dohmeyer uses the best materials of construction to ensure the life-long durability of the equipment with easier, faster cleaning operations and minimal requirements for on-going maintenance.

All Dohmeyer Tunnels are equipped with a standard, operator-friendly HMI touch screen and Siemens PLC software with recipe storage capabilities to ensure a consistent freezing result every time.

There is a Bottom Drop Tunnel model for every budget and processing need:

Usable Belt Width		28"	38"	50"	60"
Overall Tunnel Width (mm)		1570	1822	2130	2383
Name	Freezing Length	Belt Freezing Surface (m^2)			
DOH-TUN-5200	4000	2,84	3,86	5,08	6,10
DOH-TUN-6200	5000	3,56	4,83	6,35	7,62
DOH-TUN-8200	7000	4,98	6,76	8,89	10,67
DOH-TUN-9200	8000	5,68	7,72	10,16	12,19
DOH-TUN-10200	9000	6,40	8,69	11,43	13,72
DOH-TUN-11200	10000	7,11	9,65	12,70	15,24
DOH-TUN-13200	12000	8,53	11,58	15,24	18,29
DOH-TUN-14200	13000	9,25	12,55	16,51	19,81
DOH-TUN-16200	15000	10,67	14,48	19,05	22,86
DOH-TUN-17200	16000	11,38	15,44	20,32	24,38
DOH-TUN-18200	17000	12,09	16,41	21,59	25,91
DOH-TUN-21200	20000	14,22	19,30	25,40	30,48

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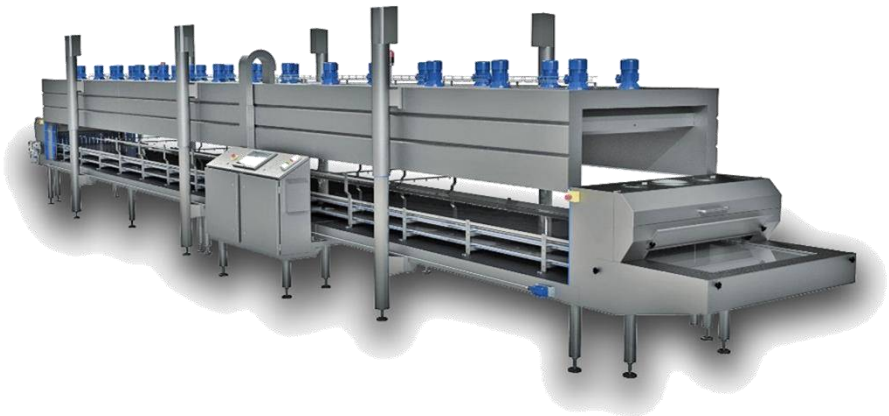
Top Lifting Tunnel

Dohmeyer's in-line cryogenic freezing Tunnels are commonly used to freeze all kinds of foods ranging fromsmall diced products to larger whole muscle meat or packaged products

The Dohmeyer Top Lifting Tunnel combines inline freezing power together with good ergonomics and easy cleanability

Top Lifting Tunnels are opened by raising the top section of the freezer using screw jacks in the support legs. A clearance of ca. 700m is available when the tunnel is in the open position which provides an excellent access for clearing and maintenance operations inside the tunnel. Every Dohmeyer Tunnel Dohmeyer Tunnel is equipped with either liquid nitrogen or liquid carbon dioxide (CO_2) injection, depending upon the product and process requirements. The freezing actionhappens right inside the tunnel where thecryogenic gases are injected into an insulated cold zone as the food product passes through it.



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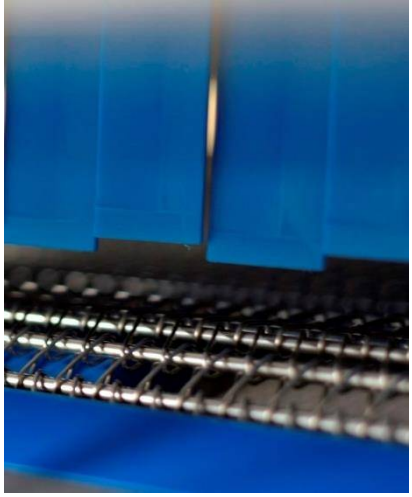

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The power of cryogenics is also due to the extremely low operating temperatures of the freezing equipment which freezes the food products much faster than with traditional methods. Dohmeyer tunnels are designed to operate at temperatures as low as -65°C for liquid CO2 injection and -120°C for liquid nitrogen injection. At these low temperature, the food product is preserved under the best possible frozen conditions to ensure that microbial activity is reduced to a minimum

Dohmeyer can recommend the best cryogen and injection set-up for various types of food products or processing constraints. There are two injection set-ups to choose from depending upon the temperature profile that is needed to freeze the food product: Isothermal or counter-current. Isothermal tunnels provide a uniform operating temperature throughout the cold zone, while counter-current tunnels create a temperature gradient inside the tunnel by guiding the cold gases in the opposite direction to the product flow. In addition, Dohmeyer is able to provide specially-designed fan blades, based on its on-going research efforts, for different convection set-ups in order to increase the freezing rate of many types of food products, while optimizin the operational efficiency of the cryogenic gases.

Dohmeyer builds every of its cryogenic tunnels in compliance with the CE Directive 2006/42/CE, EN 1935/2004 and to the latest standards in food equipment hygiene design. Any components that are in direct contact with the food products are made using AISI 316 stainless steel in order to eliminate any food safety hazard. All other components and the main freezing structure are constructed aith AISI 304 fully welded stainless steel or, as an option, AISI 316 stainless steel. Dohmeyer only uses the best materials for construction to ensure the life-long durability of the equipment with easier, faster cleaning operations and minimal requirements for on-going maintenance.

All Dohmeyer Tunnels are equipped with a standard, operator friendly HMI touch screen and Siemens PLC with recipe storage capabilities to ensure a consistent freezing result every time.

There is a Top Lifting Tunnel model for every budget and processing need

Usable Belt Width		28"	38"	50"	60"
Overall Tunnel Width (mm)		1570	1822	2130	2383
Name	Freezing Length	Belt Freezing Surface (m²)			
DOH-TLT-5000	4000	2,84	3,86	5,08	6,10
DOH-TLT-6000	5000	3,56	4,83	6,36	7,63
DOH-TLT-8000	7000	4,98	6,76	8,90	10,68
DOH-TLT-9000	8000	5,68	7,73	10,17	12,20
DOH-TLT-10000	9000	6,40	8,69	11,44	13,73
DOH-TLT-11000	10000	7,11	9,66	12,71	15,25
DOH-TLT-13000	12000	8,53	11,59	15,25	18,30
DOH-TLT-14000	13000	9,25	12,56	16,52	19,83
DOH-TLT-16000	15000	10,67	14,49	19,07	22,88
DOH-TLT-17000	16000	11,38	15,46	20,34	24,40
DOH-TLT-18000	17000	12,09	16,42	21,61	25,93
DOH-TLT-21000	20000	14,22	19,32	25,42	30,50

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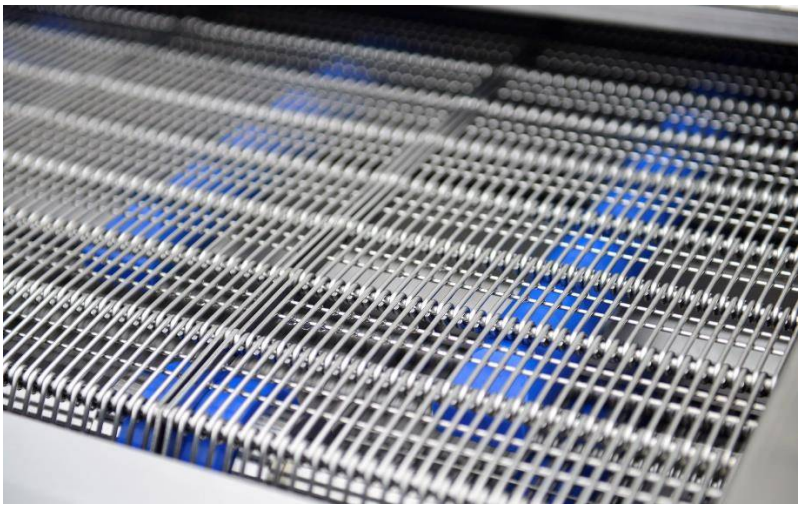
Multi Deck Freezers

The Dohmeyer Multi Deck Freezer is developed as a versatile cooling device for a wide range of applications. Multi Deck Freezers offers highly effective solutions for inline and continuous individual quick freezing (IQF) of small parts, pieces and products. Dohmeyer Multi Deck Freezers are therefor a versatile solution to qualitatively freeze a wide range of products

Dohmeyer Multi Deck Freezers offer a versatile solution for IQF freezing a wide range of products

Dohmeyer Multi-deck freezers are the right answer for a wide range of high quality freezing processes. Our multi-deck freezers are frequently used in the food industry to offer the ultimate cryogenic freezing power for individual quick freezing (IQF), of a wide range of small to medium sized products or product parts in the shortest possible time. Next to that, multi-deck freezers offer a highly efficient freezing surface to floor surface ratio, allowing you to achieve the maximal results on a limited area of production space.



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Every Dohmeyer **Multi-Deck freezer** is equipped with either liquid nitrogen or liquid carbon dioxide (CO2) injection, depending on the product and process requirements. The freezing action happens right inside the tunnel as the cryogenic gases are injected into an insulated cold zone as the product passes through it.

Liquid nitrogen and liquid CO2 deliver the ultimate in cryogenic freezing power by minimizing any aroma, flavor and dehydration losses to the food product. Because these cryogenic gases are inert, they also provide a **protective atmosphere** inside the cryogenic freezing zone which guards the food products against any oxidative reactions. As a result, the quality attributes, of many food products that are cryogenically frozen, are **far superior** to those same products frozen in a mechanical system.

Dohmeyer Multi deck freezers are designed according to the requirements of your production process. The Dohmeyer multi-deck offer is diversified accordingly. Dohmeyer Multi-deck freezers come in 5 **different belt widths**, ranging from 660mm to 1500mm. Depending on the process, several lengths starting from 5 meter.
Depending on the process and positioning of the production line, the Dohmeyer multi-deck freezer normally have 3 have reversing belts, but any uneven number of belts can be adapted into the machine, on each level offering a longer residence time, increased freezing contact and therefor an ever more compact solution for your freezing process.
Dohmeyer put a strong effort on quality, therefor all the critical components, which come into contact with the products are made out of **AISI 316 stainless steel**, thus making the Dohmeyer multi-deck freezer compliant with the latest and most stringent hygienic design and food contact directives in the industry.

> Dohmeyer Multi-deck freezers offer a highly efficient freezing surface to floor surface ratio

To further increase the **hygienic design** of our machines, Dohmeyer put extra attention to design of the assembled parts and provide wherever needed **rounded corners** to avoid any dead corners to allow a better cleanability of the machine.
Furthermore, all surfaces on the inside and outside of our freezers have well developed inclinations for the self-drainage of the cleaning water.
To ease maintenance on the different belt levels, all multi-deck freezers are **top lifting** constructions and can be lifted by means of servomotors which are connected to the spindles covered in legs of the tunnel. Dohmeyer Multi-deck freezers can optionally be equipped with a **CIP system** for even better cleaning performance. To further improve the access to all components, our multi-deck freezers are provided with doors on all major parts, like the loading table, drive block and exhaust hoods, which reduces the maintenance and cleaning time on these parts of the machine.

In addition to the continuous research efforts we make at Dohmeyer to improve the efficiency, Dohmeyer also offers optionally extra adaptations to even further increase the performance of our machines.
The freezing power is, due to **fans on the top and the side** of the belts, divided equally to the whole product surface within the freezer. Dohmeyer offers as an option **high efficiency** fans, allowing an even more focused airflow on the product, improving the cold air circulation and therefor the cold-transfer onto the product surface.

Combining quality and freezing power, Dohmeyer multi-deck freezers can be used as **multi-purpose freezing equipment** providing high quality freezing power for a wide range of products. Dohmeyer offers with its Multi Deck Freezers a competitive, versatile and multi-purpose solution for your freezing process based on years of experience and extensive research in our research and development facility.

DOHMEYER
cryogenic equipment

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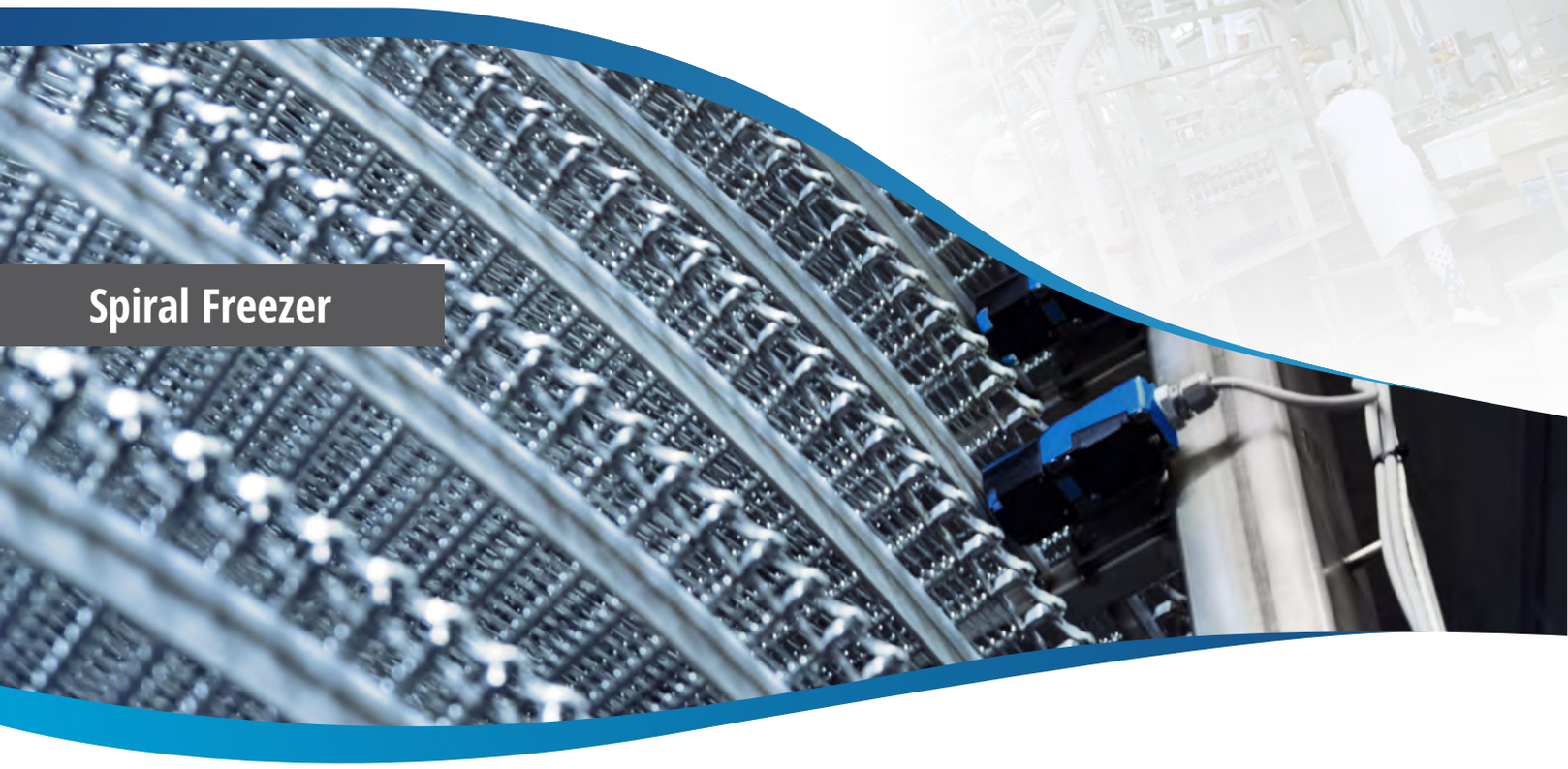
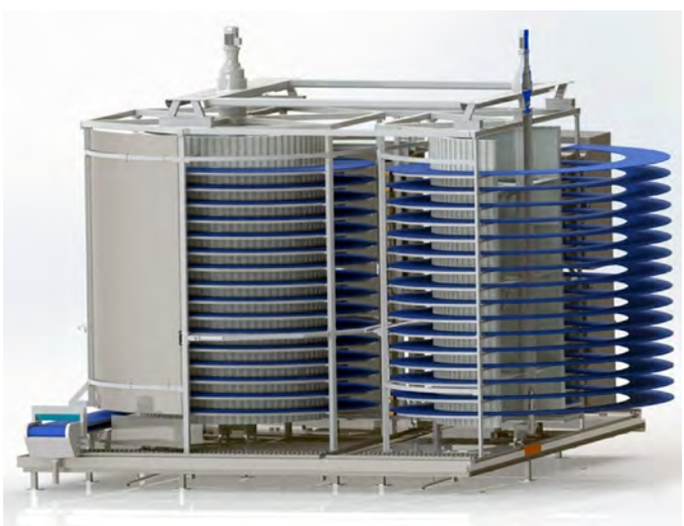


Spiral Freezer

Dohmeyer's in-line Spiral freezers are commonly used to cool down or freeze large volumes of different food products ranging from pies, breads or even packaged, ready prepared meals.

Spiral Freezers are ideal solutions when freezing power is required for large production volumes



Every Dohmeyer Spiral Freezer is custom made, according to the requires of our clients we offer single spirals, or double spirals in single or double housings. Dohmeyer Spirals can be equipped with either traditional coolants like Freon or Ammonia. For really high performance spiral freezers we offer our clients liquid carbon dioxide (CO2) or even liquid nitrogen (N2) injection, depending on the product and process requirements. In double spirals it is also possible to combine traditional as well as Cryogenic freezing power. The freezing action happens right inside the spiral as the cryogenic gases are injected into an insulated cold zone and forced with ventilation through the different levels of the central drums as the product passes through it.
Spiral freezers are often a preferred choice, when large quantities of products need to be cooled or frozen and the space to do this is limited. On other occasions we see spiral freezers in production areas when a serious height difference and cooling is done at the same time.

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Liquid nitrogen and liquid CO2 deliver the ultimate in cryogenic freezing power by minimizing any aroma, flavor and dehydration losses to the food product. Because these cryogenic gases are inert, they also provide a protective atmosphere inside the cryogenic freezing zone which guards the food products against any oxidative reactions. As a result, the quality attributes, of many food products that are cryogenically frozen, are far superior to those same products frozen in a mechanical system.

The power of spiral freezer is also due to the extreme versatility of the freezing equipment. Dohmeyer Spiral Freezers are designed to operate at temperatures ranging from -28°C (Freon) to -38°C (Ammonia) to as low as -55°C for liquid CO2 injection and -70°C for liquid nitrogen injection system. There are several possible set-ups varying from different hights in input and output, bigger or smaller drums inside the spiral, several possible spacings in between two belts or even several drums.

The Dohmeyer OptiFreeze™ Spiralfreezer has a unique horizontal airflow design that maintains the same air temperature and air speed throughout all levels, minimizing residence time for the food products and reducing weight loss to obtain a higher yield. The horizontal airflow design generates flows up to 6m/s. The result is that every

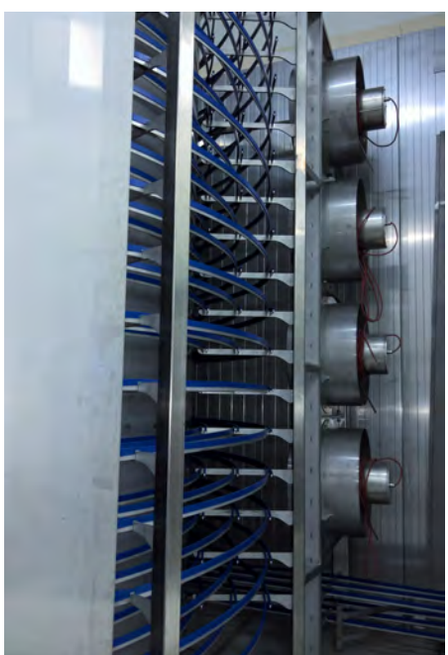
product, no matter of its location, is subject to the exact same airflow and therefore exits the freezer with a uniform temperature.

In addition, Dohmeyer is able to provide different kinds of convection set-ups, due to its ongoing research efforts, in order to optimize the operational efficiency of the cryogenic gases in each of its Spirals by using specially-designed fan blades to increase the freezing rate of most food products.

Dohmeyer put a strong effort on quality, all the parts are accessable by carefully engineered and positioned doors and made out of easily cleanable AISI 304 stainless steel. All food critical parts of the Dohmeyer spirals are made out of AISI 316 stainless steel.

Dohmeyer Spirals come in different forms and shapes. Depending on the needs of the client single or double spirals are offered. If spiral freezers become too large for transport in one piece, Dohmeyer gladly construct easy dismantable units that can be put on a transport and rearranged at the production facility of our customer.

Dohmeyer Spirals are mostly used when large belt surface area's are needed on a limited surface, with a large volume of product that has to be cooled down. But for this limitating situation, Dohmeyer provides the perfect solution.



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Cryo Roll

The Dohmeyer Cryo Roll is designed to distribute cryogenic freezing power equally all around the designated products. These machines are especially well suited for Individual Quick Freezing (IQF) and embrittling processes in a continuous production process

The Dohmeyer Cry Roll offers the best solution for individual quick freezing of small food products

The Cryo Roll™ is a continuous, rotating tumbler freezer designed for the individual quick freezing (IQF) of thinly sliced, diced or cut foor products such as diced ham, sliced salami, diced/sliced chicken products, pizza toppings, shredded cheese, diced cheese, sliced/diced vegetables, cut fruits and whole berries.

Dohmeyer offers the Cryo Roll™ freezer in three different drum sizes in order to meet its customers' needs: Every Dohmeyer Cryo Roll™ is equipped with either liquid nitrogen or liquid carbon dioxide (CO_2)injection, depending upon the product and productivity requirements. Te freezing action happens right inside the drum whhere the cryogenic gases are injected as the food products pass through.

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Liquid nitrogen and CO_2 deliver the ultimate in cryogenic freezing power by minimizing any aroma, flavour and dehydration losses to the food product. Because the cryogenic gases are inert, they also provide a protective atmosphere inside the rotating drum which prevents any oxidation of the food. As a result, the quality attributes of cryogenically-frozen food products are far superior to those same products frozen in a mechanical system.

The power of cryogenics is also due to the extremely low operating temperatures of the freezing equipment which freezes the food products much faster than with traditional methods. The Dohmeyer Cryo Roll™ is designed to operate at temperatures as low as -60°C for liquid CO_2 injection or -110°C for liquid nitrogen injection.

Each Dohmeyer Cryo Roll™ is equipped with a standard, operator friendly HMI touch screen and Siemens PLC software with recipe storage capabilities to ensure a consistent freezing result every time. The freezer's production capacity based on the freezing time of the product, can be established by simply adjusting the drums speed of rotation and the slope of the drum, in conjunction wit hthe operating temperature. As an option, produc guides can be added in order to further optimize the freezing time.

Ideally, the Cryo Roll™ should be continuously fed with food product in order to ensure its operation at the best efficiency. However, an optional hopper wit ha nintegrated conveyor belt can be installed just before the entry to the Cryo Roll™ is in order to adress any issues witg inconsistent feeding.

TM Dohmeyer builds every one of its Cryo Roll freezers in compliance with CE Directive 2006/42/CE and EN 1935/2004.

There is a Cryo Roll™ model for every budget and processing need

Model	Internal Drum Diameter (mm)	Usable Drum Length (mm)	Refrigeration Power (kW)	Production capacity (kg/h)
DOH-CRR-3000 x 26"	660	3000	19	250
DOH-CRR-4000 x 26"	660	4000	26	340
DOH-CRR-5000 x 26"	660	5000	32	420
DOH-CRR-6000 x 26"	660	6000	39	510
DOH-CRR-4000 x 42"	1070	4000	52	680
DOH-CRR-5000 x 42"	1070	5000	65	860
DOH-CRR-6000 x 42"	1070	6000	78	1030
DOH-CRR-7000 x 42"	1070	7000	91	1200
DOH-CRR-6000 x 58"	1470	6000	149	1960
DOH-CRR-8000 x 58"	1470	8000	199	2610

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Cryo Coating Tumbler

The **Dohmeyer Coating Tumbler**™ is the ideal solution for freezing small products by the individual quick freezing (IQF) processes in a batch production system. Like thinly sliced, diced or cut food products such as diced ham, sliced salami, diced/sliced chicken products, pizza toppings, shredded cheese, shrimps, diced cheese, sliced/diced vegetables, cut fruits and whole berries.

Dohmeyer offers with seven different drum sizes of the **Dohmeyer Coating Tumbler** a solution that meet the processing needs of every customer's production process.

Every **Dohmeyer Coating Tumbler**™ is equipped with either liquid nitrogen or liquid carbon dioxide (CO_2) injection, depending upon the requirements of the product and the requested freezing capacity of the process.

The coating and freezing action happens at the same time, right inside the drum. The efficiency of the process lies in the fact that the cryogenic gases are injected in the Coating Tumbler and mixed with the coating and the food as

the products are tumbling around in the drum.

Liquid nitrogen and CO_2 deliver the ultimate in cryogenic freezing power by minimizing any aroma, flavor and dehydration losses to the food product. Because these cryogenic gases are inert, they also provide a protective and dry atmosphere inside the rotating drum, which prevents any oxidation of the food while the coating process takes place. As a result, the quality properties of

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cryogenically-coated food products are far more superior and the coating process more efficient compared to those same products frozen in a mechanical system.

The power of cryogenics is also due to the extremely low operating temperatures of the freezing equipment which individually quick freezes the food products much faster than is possible with traditional methods. The **Dohmeyer Coating Tumbler™** is designed to operate at temperatures as low as -60°C for liquid CO_2 injection or -110°C for liquid nitrogen injection.

Each **Dohmeyer Coating Tumbler™** is equipped with a standard, operator-friendly HMI touch screen and Siemens PLC software with recipe storage capabilities to ensure a monitored and consistent freezing result every time.

The **Coating Tumbler™** production capacity, based on the freezing time and requested volume of the product and sauce, can be established by simply adjusting the tumblers rotation speed and the addition of sauce, in conjunction with the operating temperature. As an option, product guides can be added in order to further optimize the freezing time and the coating and tumbling of the product.

Ideally, the **Coating Tumbler™** should be used in a batch processes, where it is fed with food products and liquid sauce or coating in order to ensure the best operating efficiency. However, to guarantee an optimal use of the available resources, we advise to use several **Coating Tumblers™** in one production unit, in order to address any issues with inconsistent feeding prior to the final production process and to have the optimal freezing rates for every product, frozen by the Dohmeyer Coating Tumbler.

The most common use of the **Dohmeyer Coating Tumbler™** is to coat small food products with a crusty coating. Coating Tumbler simultaneously achieves to coat and freeze products, while tumbling around inside the body of the tumbler. Coating Tumblers are therefor perfectly suited to coat a 100 procent of the product with the most efficient product/coating ratio in the market. The Dohmeyer

Dohmeyer builds every one of its **Coating Tumbler™** freezers conform the most demanding requirements of the food industry and in compliance with CE Directive 2006/42/CE and EN 1935/2004.

Dohmeyer offers, with seven different drum sizes a solution that meets the processing requirements of every customer's production process:

DOH-CCT-Model	DOH-CCT-C0	DOH-CCT-C1	DOH-CCT-C2	DOH-CCT-C3	DOH-CCT-C4	DOH-CCT-C5	DOH-CCT-C6
Diameter of drum (inch)	59	63	70	80	80	91	91
Depth of drum (inch)	35	47	47	47	70	70	91
Width of machine (inch)	85	90	95	105	105	115	115
Depth of machine (inch)	130	140	140	140	165	165	190
Volume (ft^3)	62,5	100	130	160	230	310	400
Production Capacity (lb)	330	550	770	1000	1300	1750	2200

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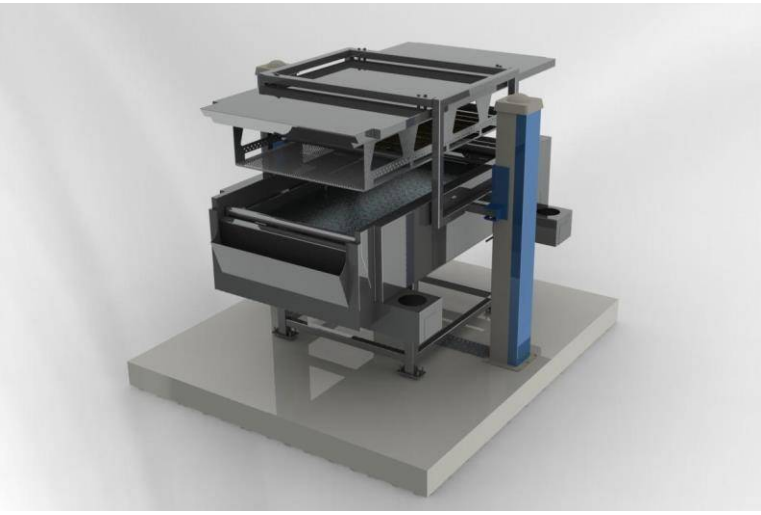
Liquid Nitrogen Bath

The Dohmeyer immersion baths offer the ultimate freezing power for a variety of applications. Liquid nitrogen baths offer extremely low temperatures only reachable with cryogenic gasses, which allow specialized alloy treatments and special processes, where instant ultra-low cooling is required. As the products are plunged into the liquid, heat transfer takes place, thus altering or fixating the crystal grain structures of the treated metals into the desired constellations. Next to this effect, plunging put the products under stress, as they come into direct contact with the extreme cold of the cryogenic liquid nitrogen.

Dohmeyer immersion baths reduce the grain size and fixate the properties of the alloys plunged in them.

Liquid nitrogen offers with its -195,8°C (-321°F) far more cooling power compared to traditional cooling media, like water or thermal oils. Due to the contact with liquid nitrogen, metal alloy configurations are fixed on the spot, therefor capturing the properties of that formation as the kinetic energy is drained out of the atoms as they are cooled down. As metal for high demanding industries, like the aviation and aeronautic industry require this kind of treatments. Dohmeyer can provide the technology needed to achieve their standards.



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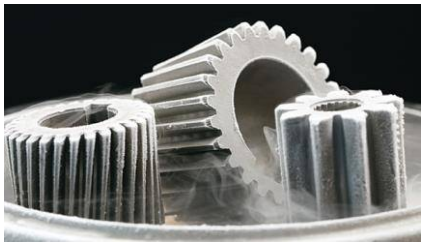
Dohmeyer liquid nitrogen immersion baths are widely used for a variety of processes, from metal treatment to recycling processes to several applications in the food industry. Dohmeyer offers immersion baths in several executions. Ranging from a static bath where the product is immersed in the cryogenic liquid up to full continuous belts with in line baths following up previous steps in the production process. The mechanical equipment needed to immerse the product into the liquid nitrogen must be adapted to the specific application; we choose the best solution from a range of conveyor belts, loading/unloading robots, lifting systems, shovels, etc.

As stand-alone units, for freezing and/or crust freezing. We adapt the design to both continuous and batch processing. Many of these applications are in the food industry, where bulk, liquid food and small products are immersed directly into the bath of liquid nitrogen. Other applications use liquid nitrogen to make metals or plastics extremely brittle for subsequent cryofracture, deburring or grinding. Demilitarization of ammunition and recycling of solid waste are important applications.

As pre-cooling units, for removing excess surface heat before further processing in the main section of an installation (e.g. mechanical freezing, coating, shaping…).

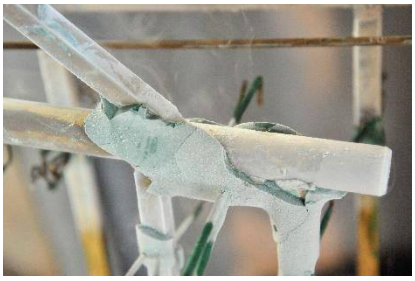
Metal Treatment

Both ferrous and non-ferrous metals can benefit from deep cryogenic treatment, as it relieves the stress built up by the heat treatment process, as well as any residual stresses caused by the manufacturing and/or machining process. To conserve the crystal grain structure of metal after heat treatment, rapid cooling is required. This can be achieved by plunging metal components into a liquid nitrogen bath during the treatment process. As liquid nitrogen offers cooling temperatures of –321°F at atmospheric pressures, almost instant fixation of the crystal grain structure occurs, cementing the properties of the metal allow for further use and applications.



Recycling

Products and materials can be embrittled by exposing them to cryogenic temperatures. Subsequent application of mechanical force breaks them up into smaller pieces, complex substrates can be easily separated into their constituting components which simplifies separation and recycling further in the recycling process. Liquid nitrogen baths can thus be used as a medium to efficiently and safely separate components within a recycling plant. Harnessing even harmful components that would otherwise be hazardous to human and machine alike and would otherwise be destroyed during the process. Even volatile and explosive elements can be stabilized and recuperated at cryogenic temperatures, offering this previously “lost” materials a second life.



The recycling principle is based on the differences in shrinkage factor in between different components. As products are shock-frozen by the liquid nitrogen, stress built up in between on the material edges as shrinkage factors physically differ. Cracks start to form and the product become brittle under the cryogenic temperatures. Therefor parts will crumble more easily as under atmospheric conditions, known as cryofracturing. After this production step, separation can be initialized by simply impacting the objects or by abrasive methods with other cryogenic particles.

Custom Design

Dohmeyer immersion baths are custom made according to the needs of our clients. Dohmeyer offers - as an acknowledged research institute – consulting, test facilities and solutions fitted to your process needs. Dohmeyer Immersion baths are completely constructed out of stainless steel and are compliant with the most stringent safety and health regulations and standards of the corresponding industries.

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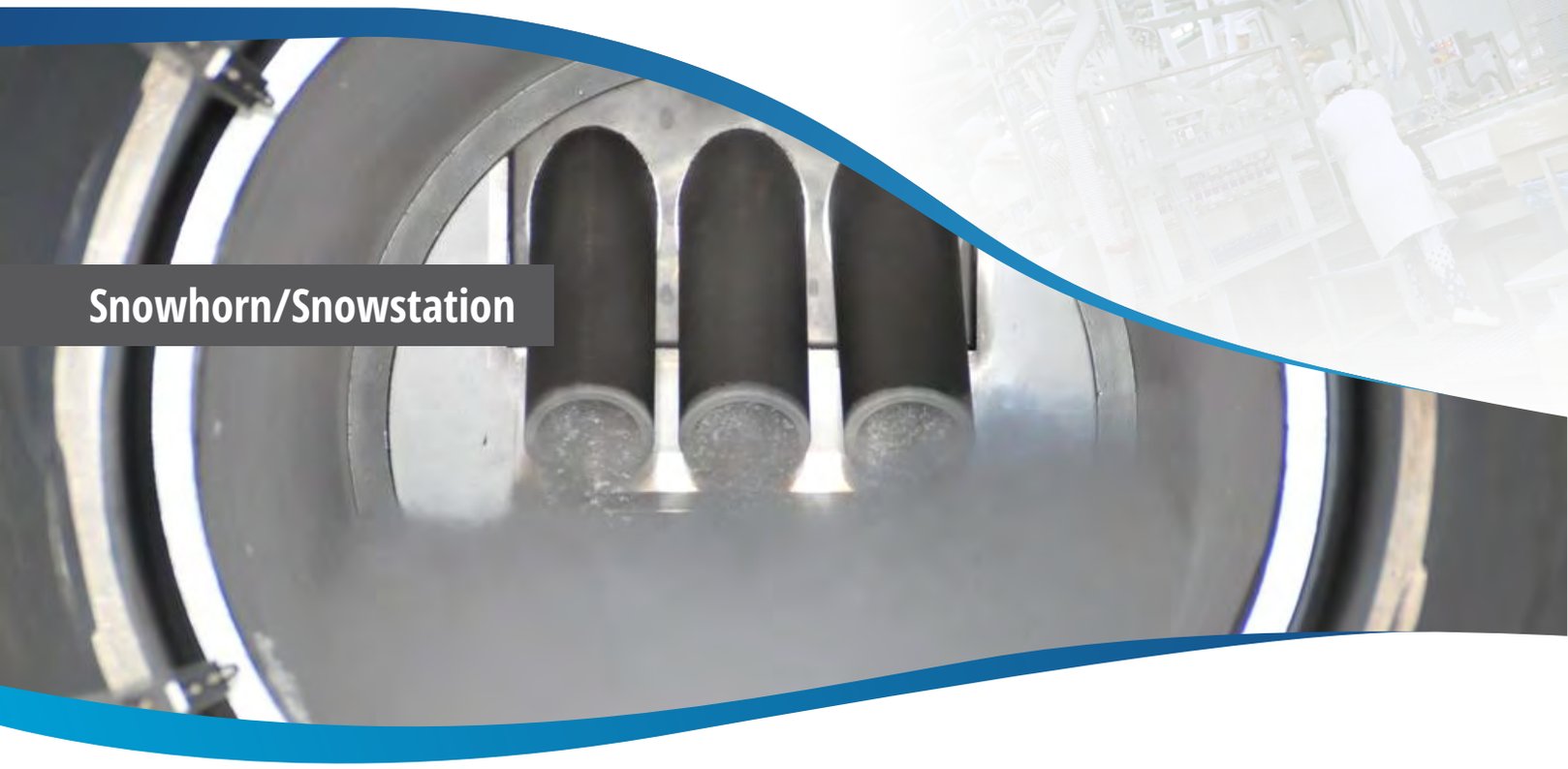

Snowhorn/Snowstation

The Dohmeyer Snowhorn is developed as a versatile cooling device for a wide range of applications. Ranging from use in the cheese industry, the chocolate industry, the meat industry, among a wide variety of other sectors. The Dohmeyer Snowhorns are liquid CO2 only equipment systems, as if liquid CO2 tend to split in a gas and a solid (snow) fraction when it comes in contact with ambient atmospheric conditions.

The Dohmeyer Snowhorn offers freezing power on every existing productionprocess

The main use of the Dohmeyer Snowhorn is within a system that needs to be cooled down from an excessive amount of heat, within a short time. This is especially the case for bulk products, or products which are used within mixing systems, where product or process heat are threatening the end-quality of the product.

The Dohmeyer Snowhorn can be used in a static system, in a mobile system or within a snow station.

We advise snowhorns to our customers in stationary as well as in mobile set-ups. Therefor the Snowhorn is one of Dohmeyers most versatile equipment pieces.

Dohmeyer SnowHorns can be equipped with one of the following nozzles (see list with snowhorn models). These nozzles are sold separately and can be installed easily. Depending on the chosen nozzle, de snowhorn will have in different capacities, depending on the demands of the customer and the proces

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Stationary Systems – Dohmeyer SnowStation

The standard double envelope SnowHorn is mostly used in stationary systems, often integrated in a SnowStation. The SnowHorn itself is vacuum insulated and is equipped with an integrated heat exchanger for better performance.

The Dohmeyer SnowStation is made of stainless steel AISI 304, designed for hanging on a wall. The construction contains the connections to the gas exhaust ducting, the connections for the LCO2 supply line and the connections for the pneumatic and electric control.

Sensors on the filling station of the SnowHorn detect the presence or the absence of the bin. After detecting the bin, and before starting of the filling operation, the hood of the equipment lowers onto the bin, in order to close the internal space. The movement of the hood is driven by a pneumatic cylinderThe filling with CO2 snow starts after pushing a button. The connection for installation of the waste gas exhaust ducting is located centrally on the equipment.

Mobile Systems

The mobile SnowHorn is designed to be suspended on a stainless steel rope and balancer. Thereby, the equipment can be moved by hand. Two handles are fixed to the SnowHorn. All parts that can be cold are covered with a protective cap, in order to remove risk of freezing burns. A rotating swiveling coupling allows flexibility towards the supply flexible. To support the weight of the SnowHorn during manipulation, it is mostly suspended on a spring balancer.

Depending on the use of the mobile SnowHorn, Dohmeyer can also ad rotating couplings so the supply of Liquid CO2 can rotate without any mechanical stress. Dohmeyer also can provide protective stainless steel coverings for mobile SnowHorns, whenever the risk exists of touching cryogenic parts of the SnowHorn.

There is a Snowhorn & Snowstation model for every budget and processing need:

DOH-Nozzle Model	Capacities
DOH-NOZ-HD110	0,9 kg/min
DOH-NOZ-HD115	1,3 kg/min
DOH-NOZ-HD120	2,2 kg/min
DOH-NOZ-HD130	3,9 kg/min
DOH-NOZ-HD160	6,0 kg/min
DOH-NOZ-HD320-90	7,7 kg/min
DOH-NOZ-HD330-90	9,0 kg/min

DOH-SNS 2Horns	DOH-SNS 3Horns	DOH-SNS 4Horns
1,8 kg/min	2,7 kg/min	3,6 kg/min
2,6 kg/min	3,9 kg/min	5,2 kg/min
4,4 kg/min	6,6 kg/min	8,8 kg/min
7,8 kg/min	11,7 kg/min	15,6 kg/min
12,0 kg/min	18,0 kg/min	24,0 kg/min
15,4 kg/min	23,1 kg/min	30,8 kg/min
18,0 kg/min	27,0 kg/min	36,0 kg/min

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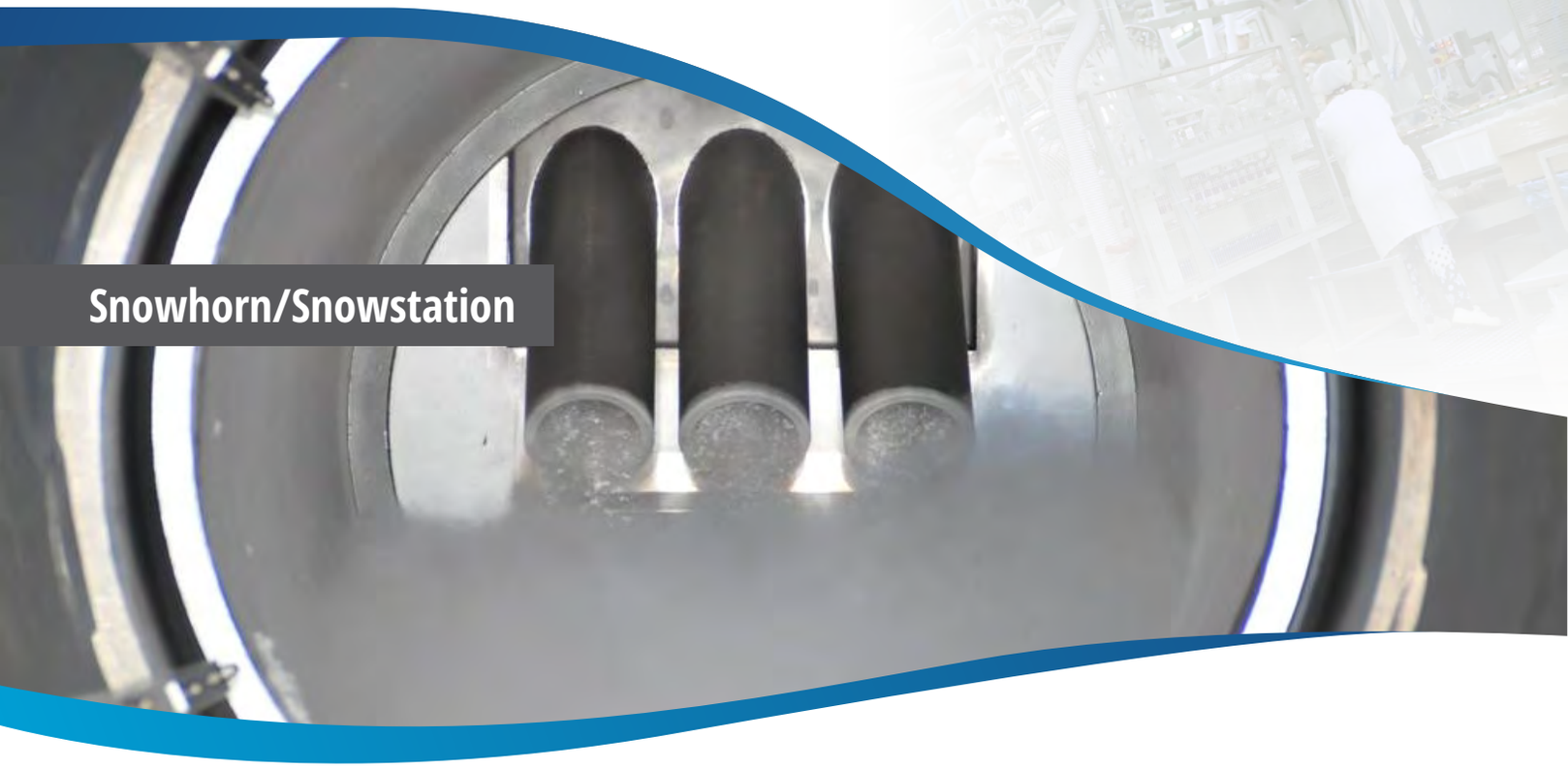

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Poultry tunnel freezer

Dohmeyer combines research, development and in depth expertise to offer you the most efficient poultry freezer in the market. Our poultry freezer is capable of cooling down 4000 broilers an hour, allowing the outer skin to be averagely cooled down to -12°C on a depth of 3 mm. Scientific tests have also shown that liquid nitrogen reduces the CFU count of Campylobacter on the surface of the broilers offering a reduced microbiological activity on the exposed parts.

Dohmeyers poultry tunnel freezers offer consistent campylobacter reductions

Dohmeyer has developed a special high speed surface freezing tunnel for broilers. Dohmeyer poultry freezing tunnels can crust freeze up to 4000 broilers an hour by using liquid nitrogen injection into the tunnel. The crust freezing action happens right inside the tunnel freezer where the cryogenic gases are injected inside an insulated cold chamber, in direct contact with the broilers passing through the tunnel. By dosing the liquid nitrogen carefully, Dohmeyer is able to prevent cryogenic burning marks while at the same time significantly reducing the presence of Campylobacter on the surface of the broilers, thus increasing the quality of the carcasses and prolonging the final shelf-life. Dohmeyer poultry freezing tunnels ure used inline your slaughter line and can be dimensioned to the requirements of your production.

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Dohmeyer poultry tunnel freezers have shown to be capable of handling up to 4000 broilers of 950g-1100g an hour in a fully continuous slaughter line. The advantages of the Dohmeyer poultry tunnel are based on the instant freezing properties of liquid nitrogen and the reduction of the bacteria populations that naturally reside on the surface if the freshly slaughtered carcasses.

The Dohmeyer Cryogenic Poultry tunnel freezer is developed by using advanced flow design technology. This results in a highly efficient laminar gas flow in the tunnel. Counter flows that initiate turbulence, and thus decrease the cooling efficiency are suppressed as much as possible.
The newly injected cold gas is blown several times back and forth, while optimising the cold transfer to the broiler surface. Due to the continuous expansion and influx of new gas, the gasses inside the tunnel are pushed outwards. Due to our ingenius design and tunnel construction, the average residence time of the cold air is prolonged, which results in a more homogeneous and more efficient overall cold transfer on the products.

In this peculiar application, where only the outer skin of the broiler will be frozen, the Biot number is of exceptional importance as the resistance against cold transfer is mostly predominant on the surface. To overcome this resistance, the control of the air velocity in combination with a laminar flow over the surface is of the utmost importance. Dohmeyer designed its freezers in such a way that most of the air current is perpendicular on the moving product allowing an optimal heat transfer from the broiler to the moving cold air inside the tunnel.

Dohmeyer tunnel freezers are slightly overpressured by the continuous cryogenic gas addition and natural expansion of warm gasses. By achieving this overpressure, Dohmeyer prevents the external air to enter the internal environment of the freezer this prevents moisture and aerosols to mix with the air inside the tunnel. This also prevents icing by the solidification of vaporised moist.

Dohmeyer tunnels extracts the excess gas at the product inlet and at the outlet of the poultry tunnel. The evacuation of the gas out of the machine is done passively. This means the gas is pushed outside by overpressure, and then extracted once they escape spontaneously out of the tunnel freezer.

Additionally, a thermal insulated lock is installed at the inlet and outlet of the tunnel. This allows the evacuated gasses from the tunnel to be extracted in this area. Our exhaust systems are designed conform hygienic standards and prevent any condensate to re-enter on the product.

During operations, many parts will be extremely cold. On this parts water will condensate and crystallise. Therefore, water will arise after operations. Several methods exist to reduce condensation, but none will completely eliminate this.
The moisture that comes from the environment and from the broilers is a bacteriological treat. The tunnel is designed in such a way to prevent the transfer of this treat as much as possible.

To further improve the hygienic design, the tunnel is equipped with a drain gully on the roof located at the hooks. Also the bottom of the tunnel is tilted in both directions to collect the run-off water during de-icing and collect it in a drain.
The tunnel can be opened easily through doors on the side to allow cleaning on the inside.

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Ultra Low Temperature Cabinet Freezer
Residual Austenite Cabinet Freezer

Dohmeyer Ultra Low Temperature (ULT) Cryogenic Cabinets are specially developed to fulfil the most demanding needs for freezing and shock freezing industry. Depending on the options, the Ultra-Low Temperature cabinet can be upgraded for treatment of Residual Austenite in metal components, becoming a Residual Austenite Cabinet (RAC) freezer, for rapid treatments of quenching applications and tempering of components, upgrading the possible application solutions, such as recycling and the production of photovoltaic panels.

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Dohmeyer Ultra Low Temperature and Residual Austenite Cabinets offers a solution for every metal treatment process

Dohmeyer developed an ultra-low temperature (ULT) version of its standard cryogenic cabinets, especially to **offer an answer to immersion baths with a lower operational cost**, without compromising on the quality for the final product. As such, the Dohmeyer ULT freezer, which is capable of reaching temperature of -185°C, is the solution to cryogenic quenching processes and fixate crystal grain sizes that otherwise would need

plunging into a nitrogen immersion bath. Cryogenic quenching offers a wide variety of advantages to your heavy duty components, as temperature is monitored, additional metallurgical transformations take place to relieve residual stresses, normalize and stabilize the metal alloy, increase resistance to wear, and create a modified and uniform crystal grain structure. The benefits of this process are increased part life, less wear, and improved performance.

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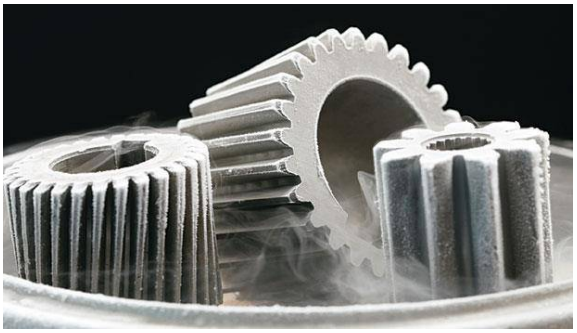

Dohmeyer cabinet freezers are completely made out of stainless steel, are well insulated and can resist temperature changes ranging from -200°C to +300°C. Dohmeyer can integrate heating elements into each freezing cabinet, therefor providing additional possibilities for your treatment. When a **heating system** is included, your cabinet is upgraded to a **Residual Austenite Cabinet (RAC)**. This offers you the possibility to promote additional metallurgical transformations to relieve residual stresses, normalize and stabilize metal, increase resistance to wear, and create a modified and uniform crystal grain structure over your components or welded connections. The biggest benefits of this sequential quenching and tempering process are **increased part life, less wear, and improved overall performance**.

Cryogenic quenching processes of materials such as steel are often done in liquid nitrogen baths. Although advantageous for the final product, liquid nitrogen baths are nonetheless energy consuming and tend to evaporate without fully using the cold capacity of the liquid. By quenching and tempering the material, steel goes through a phase change that first transforms the molecular structure and then fix that structure, guarding the requested properties, resulting in a stronger and more durable material. The **Dohmeyer ULT freezers offer these quenching temperatures, without using huge amounts of liquid gas**, but by simply dosing liquid gas in a controlled way in the quenching chamber. Therefor Dohmeyer Ultra-Low Temperature freezers are more cost efficient, have a lower operating cost with the same results as offered by expensive nitrogen immersion baths.

As time and temperature are defining factors in the metallurgic transformation process, standardised heating and cooling cycles are preferred in your treatment. Dohmeyer anticipated on this requirements as all our cabinets are always provided with **PLC controlled steering**, offering you a wide range of pre-programmed heating and cooling cycles, allowing you to standardise your whole process, optimising the performance of your cabinet and giving you near limitless possibilities for your treatment process. Dohmeyer Cabinets also come standard with a touch screen for convenient handling and giving you and your operators a good overview on the process.

Dohmeyer is a recognised research and development organisation. Therefor we can offer you a broad range of consulting services, a hands-on approach and testing equipment to do your own tests and convince you of the benefits of the proposed technologies.

DOH-BOX model	Model 400 ULT	Model 1300 ULT	Model 2500 ULT	Model 4000 ULT	Model 4500 ULT
Internal (WxDxH) [mm]	700x810x700	1150x1120x1030	1150x1120x1930	1350x1520x1930	1550x1520x1930
Volume inside [litres]	397	1327	2486	3960	4547
Door opening (WxH) [mm]	550x700	850x1100	850x2000	1050x2000	1250x2000
Outer (WxDxH) [mm]	1280x1090x980	1795x1400x1318	1795x1400x2218	1995x1800x2218	2195x1800x2218
Max trolley clearance (WxDxH)[mm]	Rack for grills	< 600x650x1000	<800x900x1900	<1000x1280x1900	<1250x1320x1900
Advised trolley size (WxDxH) [mm]	Rack for grills	527 x 650 x 1300	600x800x1800	800x1200x1800	1000x1000x1800