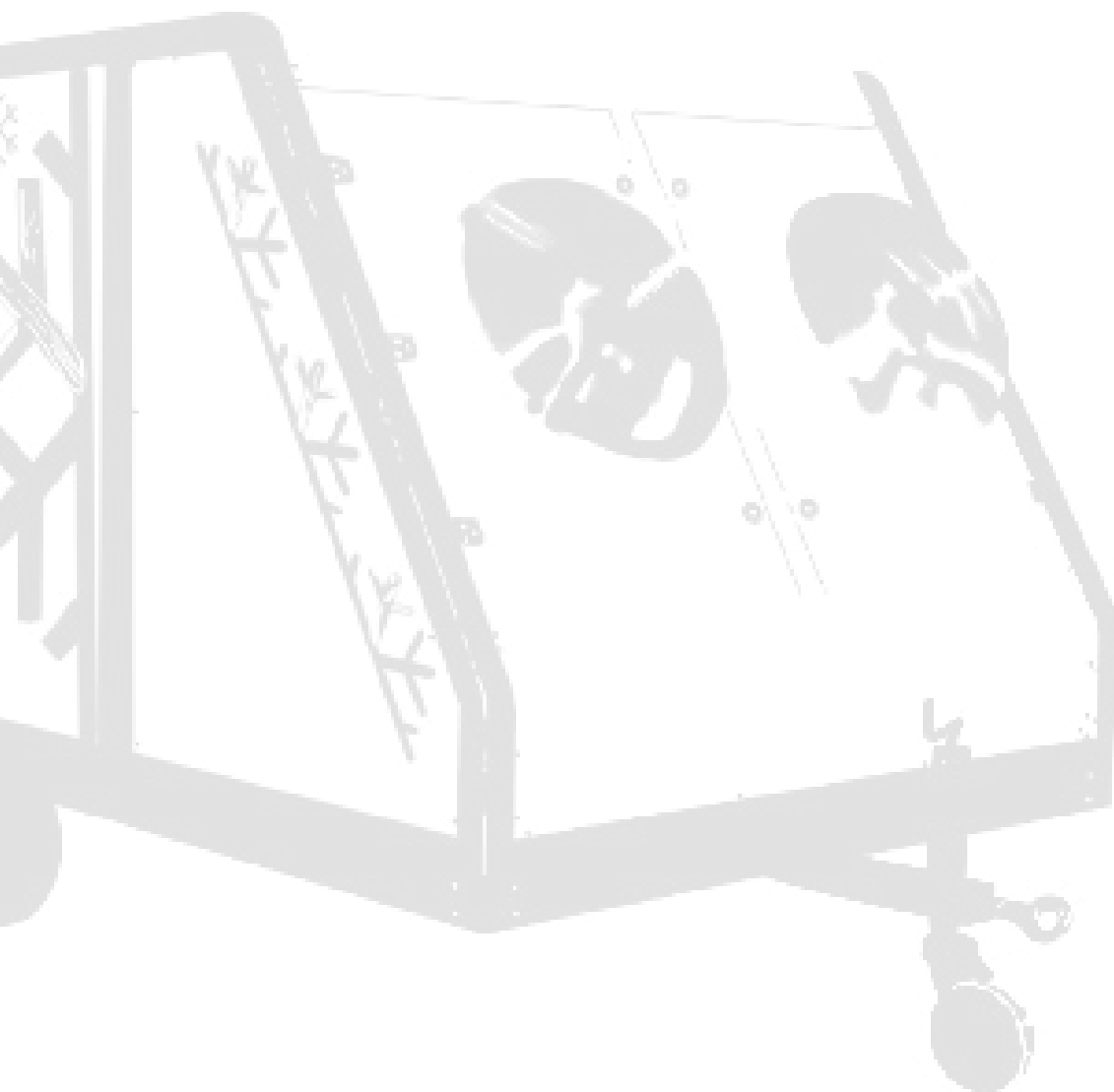


Torum Grain Cooler

by Marcoold



SOLUTIONS FOR
THE WORLD'S
MOST IMPORTANT
BUSINESS



Optimizes grain
quality control
Eliminates the need
for insecticides
Always safe storage
conditions



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Heat – grain’s mortal enemy

Grain is a living material and has to be handled accordingly. As grain breathes it loses both weight and value. Mould, fungi and insects can develop quickly if the grain is not stored under the correct conditions. A Tornum Grain Cooler accomplishes what nature cannot always provide – a safe storage temperature regardless of the ambient conditions. Controlling the temperature in your grain storage is the natural way of preserving the grain and optimizing its quality.

WITHOUT GRAIN COOLER



WITH GRAIN COOLER



The easy solution

Tornum has a very long experience of handling grain and has previously manufactured our own grain coolers that are installed all over the world. Now Tornum has started to cooperate with Marcold and together we have a very solid experience of grain cooling.

Thanks to this collaboration, Tornum can now offer one of the market’s largest ranges of grain coolers, which also provides very great value for money. Marcold Grain Coolers are the result of many years of experience and improvement in the field of industrial refrigeration in general and grain cooling in particular. Over the years have Marcold developed the refrigeration system that is the fastest, most environmentally-friendly and most economical answer to grain storage problems. This constant development has, among other things, obtained the recognition of the European Community for an innovative product for the treatment of seeds for obtaining breeding seeds. The range extends from small grain coolers of 20kW, suitable for small and medium-sized farms, up to large industrial machines with 356kW of cooling capacity.

WHY YOU SHOULD BY A GRAIN COOLER:

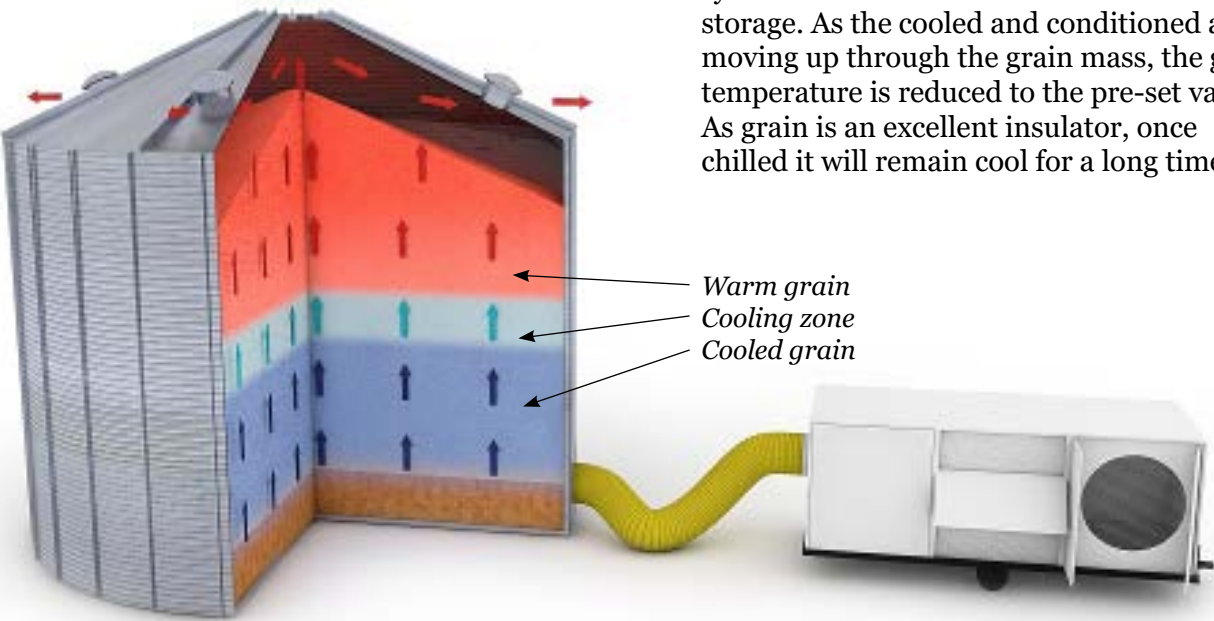
- ELIMINATE THE NEED FOR INSECTICIDES
- ADDS TO DRYING EFFECT - EVERY 10 °C/18 °F OF TEMPERATURE REDUCTION EQUALS UP TO 0.75 PERCENT DRYING
- GUARANTEE SAFE STORAGE CONDITIONS
- HAVE LOW COST OF OPERATION

WHY YOU SHOULD BY IT FROM US:

- FAST AND EASY INSTILLATION
- POWERFUL FANS WHICH PROVIDES STRONG AIR FLOW
- FULLY AUTOMATIC OPERATIONAL LOGIC
- WORKS FAST NO MATTER OUTSIDE CONDITIONS
- WE OFFER CUSTOMIZE SOLUTIONS AND CAN COMPLEMENT WITH AERATION SYSTEMS

Cooling in a silo

The cooled air is distributed through a duct system in the bottom of the silo or flat storage. As the cooled and conditioned air is moving up through the grain mass, the grain temperature is reduced to the pre-set value. As grain is an excellent insulator, once chilled it will remain cool for a long time.



Reliability

Tornum offers more than just products. We offers solutions and we will help you during the whole process, from design to finished project. Tornum assist with consulative sales and can calculate cooling capacity and pressure drop to offer the optimal and most cost-effective solution for your specific needs. Our wide range of products guarantees that we have a close to perfect fit for every facility. Several of the grain coolers are available with either a standard fan or a special high-pressure variant that can push air through very high silos. Tornum also offers different types of aeration system, that can be combined with the grain cooler, both for new builds and also those that can be retrofitted into existing silos.



Quality & sustainability

Our grain cooler are an investment for the future. The sturdy frame is completely weatherproof and highly durable. Our refrigerating fluid has a GWP of 1.37 which causes more than a 100 times lower greenhouse gas impact than some of our competitors'. The grain coolers also come with multiple energy saving functions.





Equipped with a touch screen to control the refrigeration process. Moreover, different automatic programs allow to satisfy every need of conservation of grains.

Powerfull fans that provide large air flows, thus optimizing the refrigeration process times.



Washable and reusable filters

Our refrigerating fluid (R1234ze) has a GWP (Global Warming Potential) among the lowest on the market and at the same time guarantees the highest performances.



All coolers are equipped with Bitzer compressors, the world's leading brand for reliability, performance and power

Built in function automaticly removes frost and ice from the coil

A modern, industrial looking design with a completely weatherproof, strong frame and housing

VENTILATION ONLY FUNKTION:

This funktion allows to use the cooler as a normal ventilation fan with the following parameters:

- Minimum difference between air temperature and product temperature
- Minimum temperature of external air
- Maximum temperature of external air
- Maximum humidity of external air

ENERGY SAVING FUNKTION:

Based on the target temperature of the product and the outside climate conditions, the cooler will automaticly run at low power consumption or enter standby. This saves energy making it economical and enviromentally friendly

REMOTEASSISTANCEFUNKTION(OPTIONAL):

Through a dedicated modem with either Ethernet or Wi-Fi connection mode fitted to the electric switchboard, this funktion allows to control the grain cooler's operation, unlock any funktion blocking and reset the operating parameters.

DATA RECORDING FUNKTION:

The grain cooler during its operation is able to record the following parameters and their variations for a time period up to 20 days or a maximum of 265 samplings:

- External air temperature
- External air humidity
- Air temperature blown into the silo
- Stored product temperature
- Evaporating temperature
- Compressor high pressure
- Compressor low pressure
- Number of defrost cycles carried out
- Hours of operation



COMPRESSION / CONDENSING SECTION

General for the compressors:

- Shut-off valve on the inlet
- Check valve
- Electric motor with a PTC sensor for temperature control
- KRIWAN Module for the control of: phase failure, phase sequence, thermistors, discharge gas temperature and compressor start delay
- Condensing coil made with copper pipes and aluminium fins, equipped with axial fans (diameter 630 mm), complete with cowls and protection grids; electric power 2.96 kW each
- Liquid receiver with safety valve
- Suction accumulator with safety valve
- Check valve
- Hot gas defrost system by heat pump
- Automatic shut-off valves for refrigerant and hot gas
- Sight glass
- Electronic expansion valve
- Filter drier with replaceable solid core cartridge
- Manual shut off valves for the main components of the circuit

USE YOUR COOLING MACHINE AND GAIN - CAPACITY INCREASE WITH LESS DRYING AND SAVE ENERGY

When the grain leaves the dryer at a temperature of, for example, 40 °C and is then cooled down to approximately 14 °C, an additional drying effect occurs during the cooling process, which can reduce the moisture content by up to 2 percentage points. This means that you can dry the grain to around 16% moisture content in the dryer instead of 14%, since the final reduction takes place during cooling. In this way, the drying capacity can increase by approximately 60%.

At the same time, you can use a funktion in the grain cooler that makes it possible to dry and cool simultaneously. This provides a more energy-efficient process and can reduce energy consumption by up to 30 kWh per ton of grain, corresponding to approximately EUR1,7 per ton, based on today's oil energy value.

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The compressors are from Bitzer and are available in three different types depending on the cooling capacity of the machine

A : equipped with reciprocating (piston) compressor

V : equipped with screw compressor

VE : equipped with screw compressor and economizer (the economizer being an additional plate heat exchanger that enhances the cooling performance of the compressor)

AIR TREATMENT SECTION:

- All models are equipped with 1-2-speed-controlled supply air fans.
- Many models are available with an extra high-pressure version.
- Evaporating coil built with copper pipes and aluminium fins
- Post-heating coil built with copper pipes and aluminium fins
- Filter section, classification EN 779 class G4 Am 95%, operating up to 80° C UR 90% consisting of reconditioned synthetic fibre corrugated filter cells mounted on a steel frame with electrowelded galvanized steel wire mesh protection. Micro-grid in plastic with electrostatic effect
- Condensate collection tray in galvanized steel sheet
- Flexible air hose for the connection to the silo/warehouse (5 meters long)

ELECTRIC SECTION:

- Treated air flow control system by inverter
- Condensing pressure (condenser fans) control system by inverter
- Humidity and temperature probe of the treated air
- Humidity and temperature probe of the external air
- Temperature probe for refrigerant suction
- Temperature probe for stored product
- High pressure transducer
- Low pressure transducer
- Air treatment centrifugal fan transducer
- PLC – Siemens
- Touch screen control panel – Siemens



The grain coolers are dimensionally adapted for shipping in standard containers

Why you need a Grain Cooler

1. Secure the moisture content and the grain quality of the crop and save money.

- The grain cooler ensures a homogeneous and precise moisture content so that there is no risk of incorrect moisture content in parts of the batch.
- Respiratory losses that lead to weight loss can be avoided entirely. Reduced weight otherwise leads to less payment.
- No risk of invasion by insects that have to be gassed away, which is expensive.
- Prevents the oxidation process of oil plants.

2. By not drying the crop to such a low moisture content with the hot air dryer, the following advantages are obtained.

- Greatly increased drying capacity when drying to 16% instead of 14%. It can increase capacity up to 50%.
- It saves energy.
- Marcold has functions for finishing drying with the cooling machine.

3. Future-proof and environmentally friendly solution.

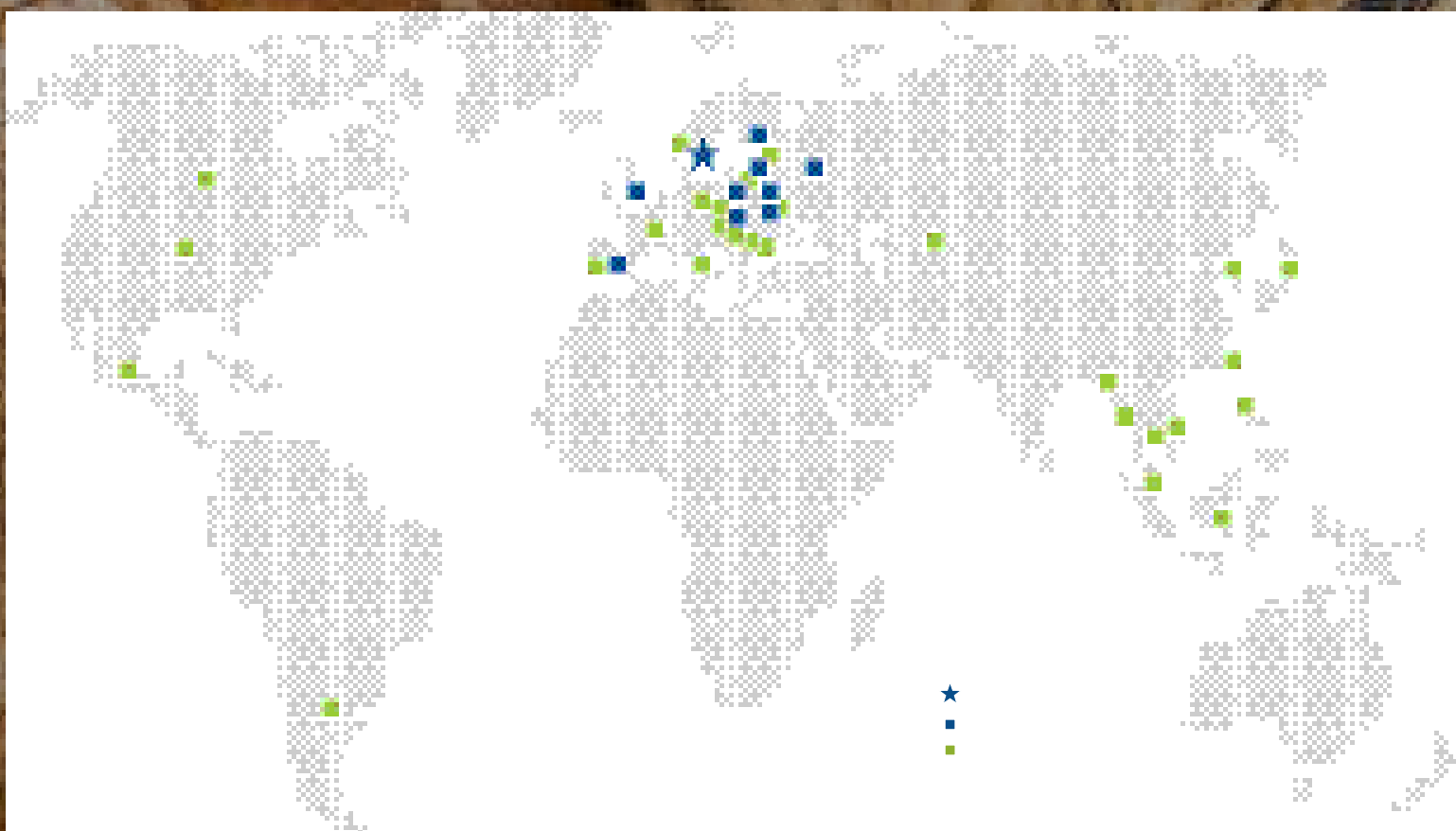
- The grain cooler is powered by fossil-free electricity, which is an advantage when fossil fuels are to be phased out.
- Marcold uses the climate-smart refrigerant R1234ze

4. Energy-efficient cooling.

- Marcold has features to save energy if the user accepts a slightly lower maximum capacity.
- The machine adapts to the surrounding conditions instead of constantly running at maximum.



Your Global Partner



YOUR TORNUM REPRESENTATIVE:

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