Turbu Three &
Direct Three oven solutions

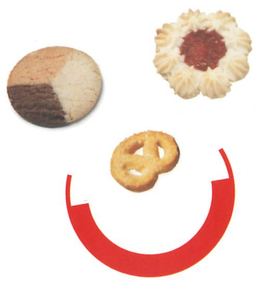
GET YOUR HANDS ON THE PERFECT BAKERY SOLUTION

DFE MEINCKE
INNOVATING BAKING INDUSTRY

Quality is essential

From cakes and cookies to pies and pizzas, - we take delicious products all the way

More than ever before, today's baking industry demands effective production systems which are geared to accuracy, capacity, quality and flexibility.



Meeting your demands
DFE Meincke has built up a significant store of knowledge, gained from our experience in the design and supply of processing plants. When you as a customer choose a DFE Meincke baking solution you will get a tailor-made solution meeting your specific demands.

Oven solutions adjusting to your needs
Today, we offer you everything from single machinery equipment to complete turnkey solutions. You can choose between indirectly fired convection ovens, directly fired ovens, hybrid ovens, high temperature ovens and stone band ovens - depending on your products.

Since the late 1950s, our company has produced tunnel ovens. Up to the mid 1970s, we produced ovens directly fired by gas or electricity. In 1975, we introduced the world's first indirectly heated convection oven - The "Turbu One" oven. For the baker this means improved baking efficiency, controls and flexibility.

Until now DFE Meincke has supplied more than 1000 ovens worldwide - the majority still in operation.

The modular concept - how it works
All ovens are pre-manufactured and supplied in 2-metre modules. This makes it easy for you to make the oven fit into your existing production space and ensures a fast installation time.

Each heating zone has a heating module, giving an accurate control of temperature, air circulation, humidity and heat distribution. The working width ranges from 0.6 to 4.2 metres.

Oven materials
The DFE Meincke ovens are internally manufactured of special corrosion resistant steel and the cladding is either enamelled or fashioned in stainless steel.
As an option, the DFE Meincke oven can be specified entirely in stainless steel, also in a wash-down execution.

Baking room and ducts are as standard made of Cor-Ten steel, which is a corrosion and resistant type of steel with excellent radiation properties. You can also choose to have the interior of the oven in stainless steel.

Easy installation and start-up
All our ovens are pre-assembled and tested prior to dispatch to the customer. This ensures an easy installation and start-up. Incorporated cable ducts also make the installation of the oven easy.

Hygienic and maintenance-friendly ovens
In order to ease the cleaning process of the oven, each oven section is equipped with large cleaning doors to allow easy access to the inner parts of the oven. These doors also make it easy to maintain the different parts of the oven. The oven can be prepared for high-pressure wash-down, both inside and outside.

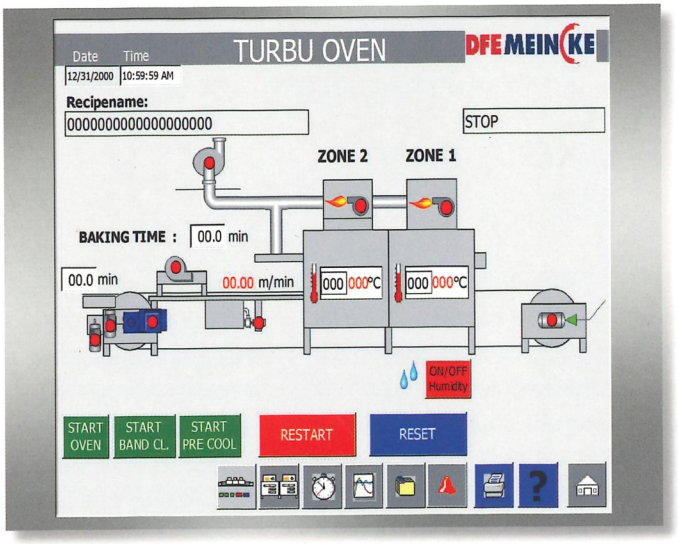
The principles

- Giving priority to your recipes

Turbu Three

Heating principle
As Turbu Three is an indirectly fired convection oven, the heating source can be gas, oil or electricity. The flame from the burner heats up the burner chamber and the tube bundles of the heat exchanger. The flue system removes the combustion gasses. Therefore there is no risk of contact with the products in the oven, ensuring you a clean oven environment. A fan is blowing the air around the heat exchanger room and is circulating the air around the heat exchanger. A temperature sensor controls the burner in order to ensure a constant and correct baking temperature.

Air distribution system
An air distribution system distributes the hot air into a top duct or a lower duct. By a damper system you can adjust the ratio between top



Control panel
Example of DFE Meincke control panel with colour touch screen.
The example shows a colour touch screen of a two zone oven where the functions are recipe controlled.

Direct Three oven baking scones

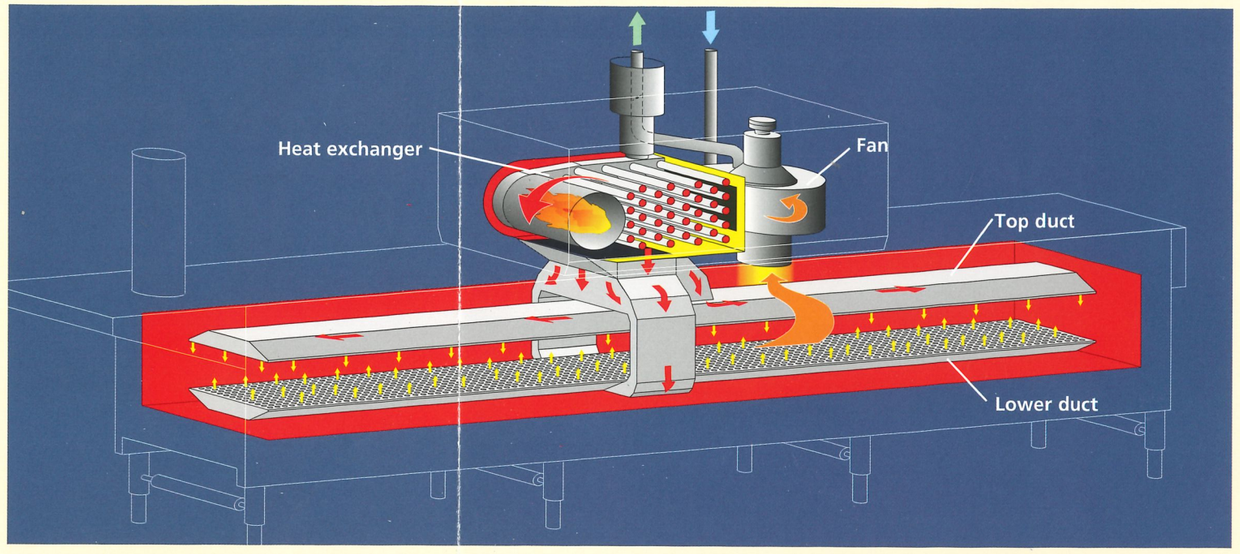
Heating principle
The gas burners are placed inside the oven room over and under the baking band. The flame from the gas burners heats up the baking room. The burners operate at a zero gas

Turbu Three - Indirectly heated oven

- Energy efficiency at your service

and bottom heat. The air is being distributed evenly in the baking room ensuring an accurate temperature and air distribution. A vacuum sucks the process air from the baking room and returns it to the fan of the heat exchanger where it is reheated. A double damper system controls the amount of humid process air which is sent out, and the amount of dry fresh air, which is taken into the airflow. This way it is possible to control the humidity in each heating zone.

Heat transfer
A convection system transfers the majority of the heat to the products. However, a significant amount is also transferred by means of conductive heat from the baking band or the baking pans and by means of radiation from the hot oven muffle and plenums. By adjusting the temperature, top bottom heat and humidity profile in the oven, you can change the heat transfer significantly. If your product for example needs more conductive and radiation heat in the beginning of the baking process, you can increase the amount of bottom heat and only direct a small amount of air volume to the top plenum.

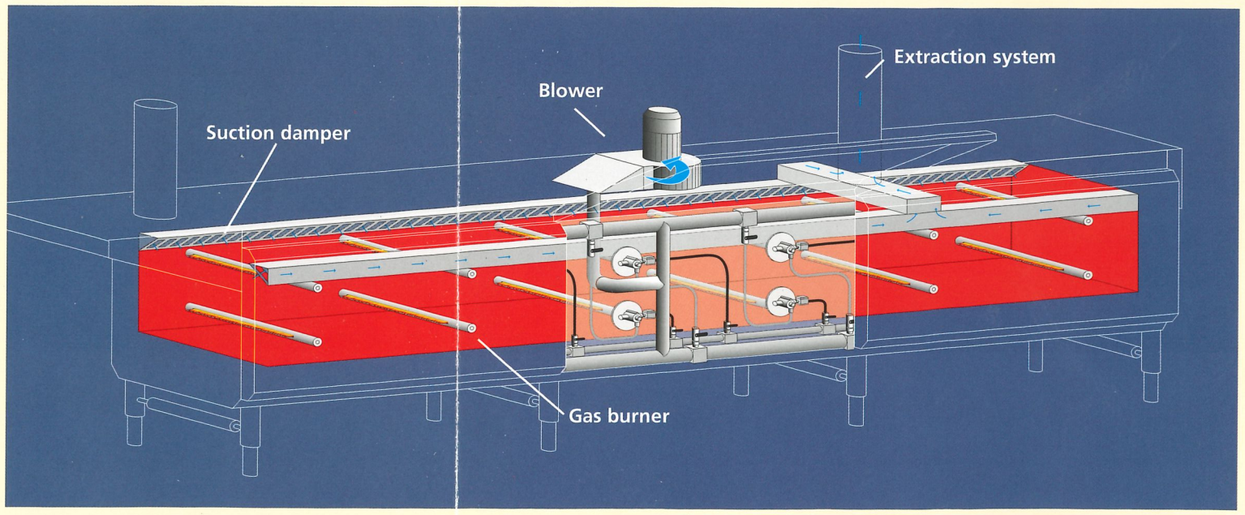


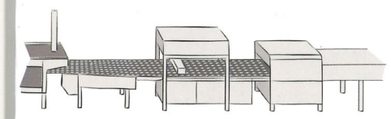
Direct Three - Directly gas fired oven

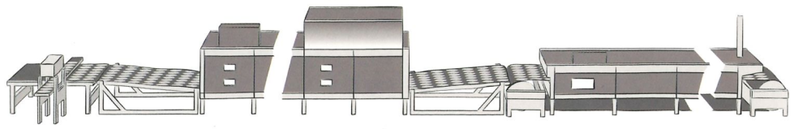
- In control with your products

pressure system. In each zone a blower sends a speed-controlled air-flow through the injectors on each burner. This way the correct amount of gas is drawn to the burners ensuring the correct temperature. Each burner can be selected from the control panel and turned on/off to achieve the correct settings in each zone for every product. A flame detection safety system ensures that there cannot be gas in the burner without a flame.

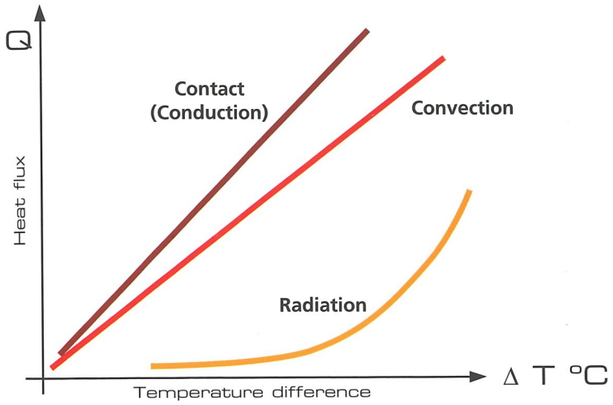
Air extraction system
In all directly fired ovens the air extraction system plays an important role in controlling not only the humidity but also the temperature across the oven band. In the Direct Three oven, there is a suction chamber placed in each side in the full length of the oven. This suction chamber has adjustment dampers so that you can control the air extraction from side to side. There is a separate extraction fan for each heating zone. This enables you to control the humidity individually.







Comparison of different heat transition



The graph shows the heat flux Q as a function of the temperature difference Δ T.
Conduction gives the fastest temperature difference, but the second fastest method is convection where the energy is being transferred to the products very quickly and efficiently.
Radiation represents a slower method of transferring energy to the products.

Insulation

- Mineral wool ensures effective insulation

The ovens from DFE Meincke are designed so there is literally no contact between the hot baking chamber and the outer frame. The baking chamber is floating on 4 isolated plates resting on the oven frame. In this way, there is no thermal stress that can build up in the steel material during heating-up and cooling down and there is virtually no transfer of heat to the outer frame. The distance between the internal baking room and the outside cladding is efficiently insulated with mineral wool. This is done by our specialized fitters to ensure excellent craftsmanship.

Turbu Three

- Indirectly fired convection oven/impingement oven
- The art of achieving flexibility and efficiency

Turbu Three is the third generation of indirectly heated convection tunnel ovens from DFE Meincke.

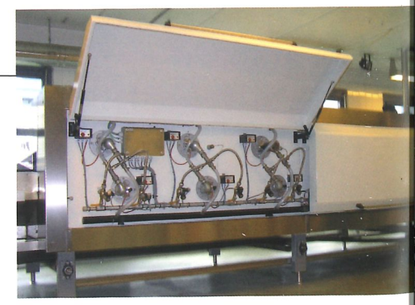
With the Turbu Three you can bake everything from biscuits, cookies and cakes to pizzas and pies and many more products.

Your benefits
When choosing Turbu Three you will not only get a flexible and efficient oven system. You will also get a number of distinct advantages:

- **Fast baking time**
- **Uniform baking process**
- **Fast heating-up and recovery time**
- **Low energy consumption**
- **Easy operation**
- **Hygienic design**
- **USDA approvable**
- **Full moisture control**
- **Modular design**
- **Short installation time**

The most sold oven in the world
The DFE Meincke Turbu oven is the most sold oven on the world market and it has been the market leader since its introduction in 1975.

When choosing Turbu Three you will get an oven from the inventor of the indirectly fired convection oven. This oven represents the distillation of knowledge gained from more than 1,000 oven installations at our customers, baking trials and thermal analyses conducted around the globe.



Direct Three

- Designed for your convenience

A variety of products are best baked in a directly heated oven. This includes hard biscuits and crackers, pita bread, Arab bread and some types of pizzas.

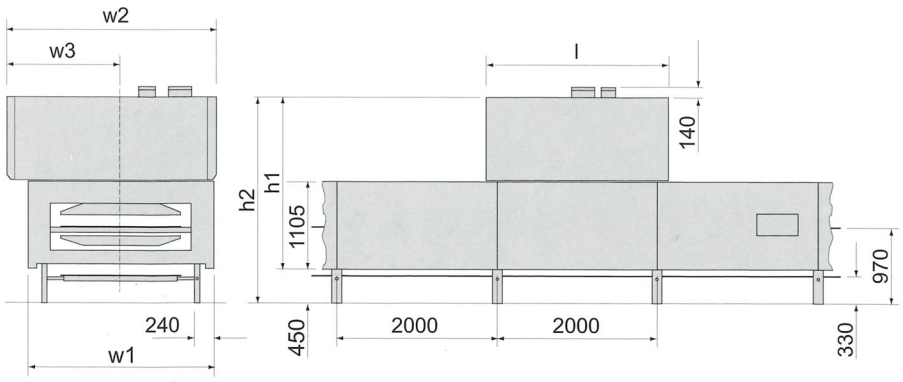
Your benefits
When choosing Direct Three, you will get a number of distinct advantages:

- **Up to 50 kW/m² rated output**
- **Hygienic design***
- **Integrated cable trays**
- **Recipe controlled burner system**
- **Easy access to the inside of the baking chamber through cleaning doors for every two metres**

Hybrid Three
The Direct Three and the Turbu Three ovens are built in the same design and modular system. If needed, you can combine the two systems. This combination, called Hybrid Three, expands the versatility of the oven system.

*Gas installations on the side of the oven are covered by hinged doors.

Indirect oven



Weight and measures

Band width (mm):	*800*	*1000*	*1200*	*1500*	*2000*	*2500*	*3000*	*3500*	*4000*	*4200*

Standard module

w1 (mm):	*1620*	*1820*	*2020*	*2320*	*2820*	*3320*	*3820*	*4320*	*4820*	*5020*
weight (kg):	*750*	*800*	*850*	*950*	*1150*	*1350*	*1800*	*2200*	*2600*	*2800*

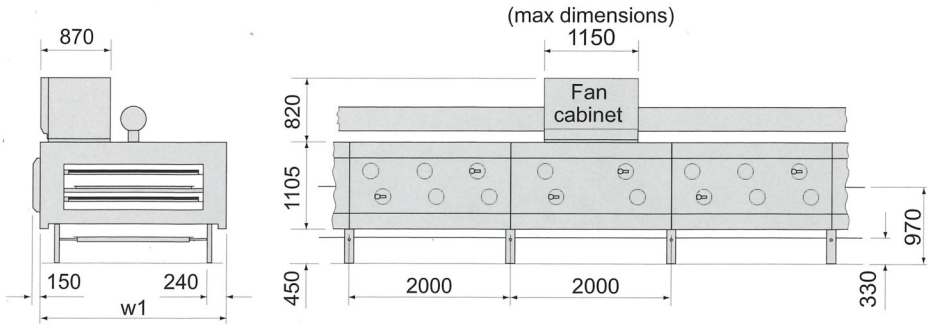
Turbu Three heating module type 150

w1 (mm):	*1620*	*1820*	*2020*	*2320*						
w2 (mm):	*2120*	*2120*	*2120*	*2120*						
w3 (mm):	*1150*	*1150*	*1150*	*1150*						
h1 (mm):	*2020*	*2020*	*2020*	*2020*						
h2 (mm):	*2470*	*2470*	*2470*	*2470*						
l (mm):	*2400*	*2400*	*2400*	*2400*						
weight (kg):	*2050*	*2100*	*2150*	*2250*						

Turbu Three heating module type 300

w1 (mm):		*1820*	*2020*	*2320*	*2820*	*3320*	*3820*	*4320*	*4820*	*5020*
w2 (mm):		*2630*	*2630*	*2630*	*2630*	*2630*	*2630*	*2630*	*2630*	*2630*
w3 (mm):		*1435*	*1435*	*1435*	*1435*	*1435*	*1435*	*1435*	*1435*	*1435*
h1 (mm):		*2140*	*2140*	*2140*	*2140*	*2290*	*2290*	*2290*	*2290*	*2290*
h2 (mm):		*2590*	*2590*	*2590*	*2590*	*2740*	*2740*	*2740*	*2740*	*2740*
l (mm):		*2530*	*2530*	*2530*	*2530*	*2530*	*2530*	*2530*	*2530*	*2530*
weight (kg):		*2500*	*2550*	*2650*	*2850*	*3300*	*3750*	*4150*	*4550*	*4750*

Direct oven

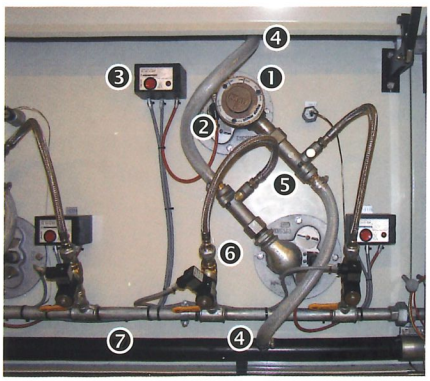


Weight and measures

Direct Three

Band width (mm):	*800*	*1000*	*1200*	*1500*
w1 (mm):	*1620*	*1820*	*2020*	*2320*
weight (kg):	*850*	*900*	*950*	*1050*

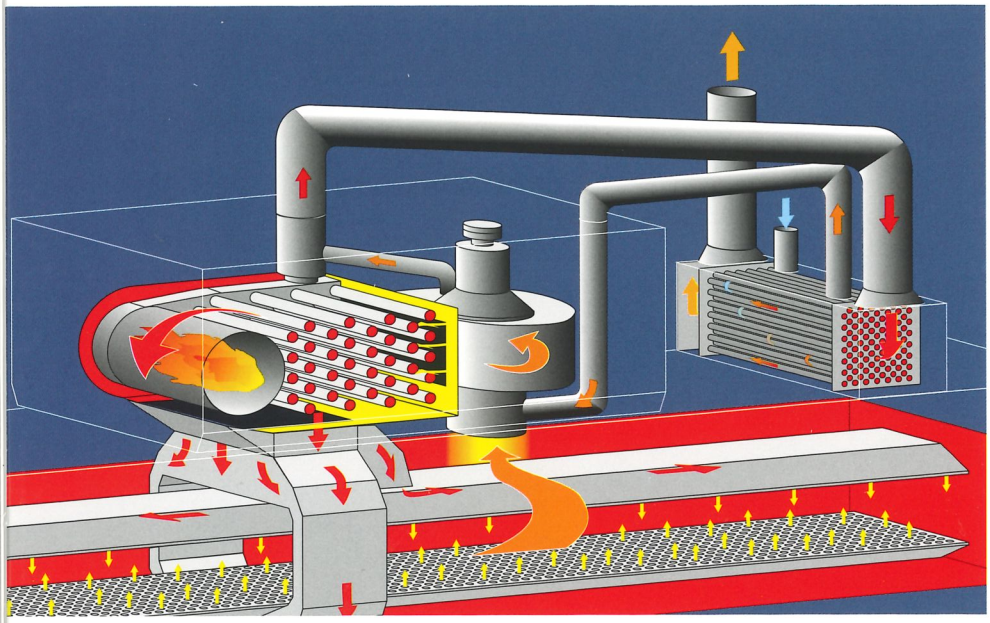
Gas burner ❶
Ignition electrode/ flame rod sensor ❷
Burner control ❸
Air supply ❹
Injector ❺
Gas supply ❻
Air supply distribution between top and bottom burners ❼



The photo shows the gas and air installation on the side of the Direct Three oven.

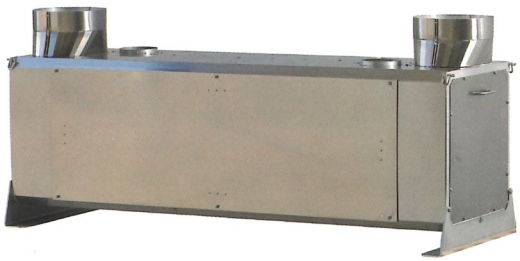
Heat recovery

- Savings of up to 15% of the surplus heat



Concurrently with the price increase of the energy and the focussing of the world on the reduction of CO_2 emissions, the interest in recovery of surplus heat from ovens has increased strongly.

A special option for the DFE Meincke oven is our heat recovery unit which can save up to 15% of the surplus heat from the ovens. The unit can be installed in each zone, but it is not necessary to install it in all zones. The basic requirement is a temperature of at least 150°C per zone and the fresh air intakes must be more than 50% open.



Baking conveyors
The choice of baking conveyor depends on the nature of the product. Choose between solid steel bands, perforated steel bands, solid caterpillar bands, wire-mesh bands, stone bands or special bands with built-in cup forms.

Giving

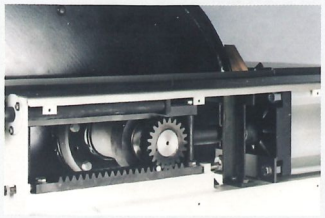
Driving station for steel belt and Z47 wire-mesh belt

Steel

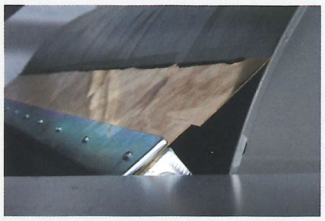
Belt width mm	Driving station weight kg	Tension station weight kg
800	725	550
1000	800	600
1200	875	650
1500	1000	725
2x1200	1500	1200

3.2 m wide Turbu Three oven roasting toast bread

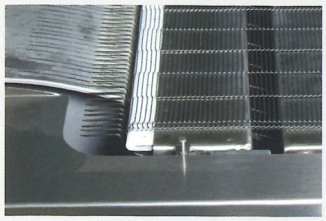
Conveyor details



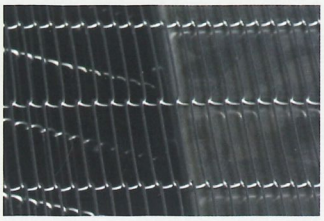
Tension station with pneumatic tensioning of baking band



Scraper on driving station to keep the steel belt clean



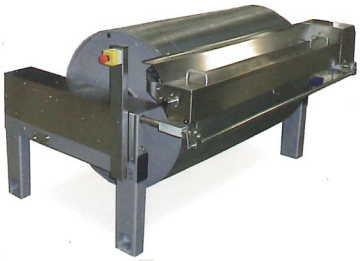
Transfer conveyor with dumping facility



Transfer conveyor with wire-mesh band. Also available with cotton web and other types of wire-mesh bands.

your production a perfect flow

- Accurate transport of your products



Tension station for steel belt and wire-mesh belt

Driving station for OGB band

Turning station for OGB band

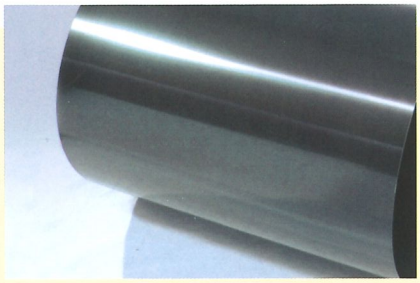
Wire-mesh conveyor with transfer system in 4,200 mm width

OGB belt

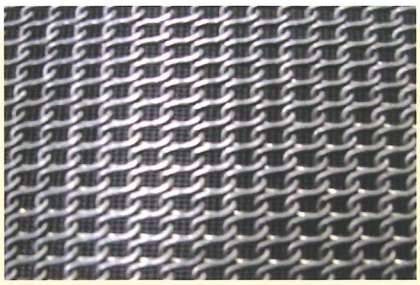
Belt width mm	Driving station weight kg	Tension station weight kg
800	380	310
1000	410	340
1200	450	360
1500	480	390
2000	530	590
2500	640	690
3000	830	790
3500	1020	850
4000	1210	910
4200	1800	930

The right foundation for

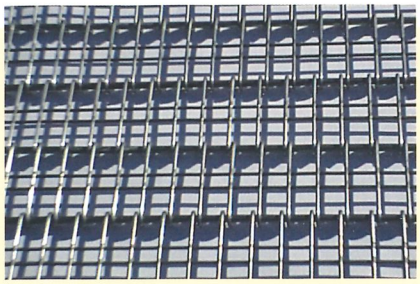
Baking bands



Steel band
For soft products baked on the band. Up to 1,500 mm width in one belt. Double belt 2 x 1,200 mm or longitudinally welded belt up to 2,500 mm.



Z47 band
For biscuits baked directly on the band. Available up to 1,500 mm.



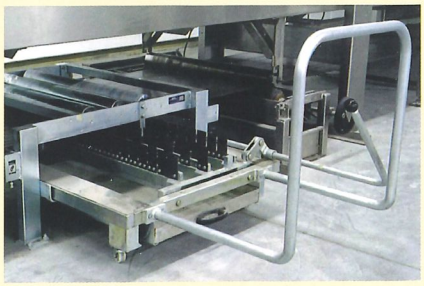
OGB band
For carrying all kinds of baking pans. Available up to 4,200 mm.

The perfect match for

Oven accessories

Greasing unit
For an even application of grease onto the baking band by a rotating brush.

Band tracking
For the control of the position of the baking band.

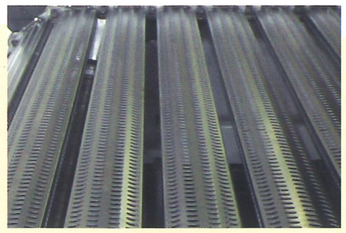


Band scraper
For the cleaning of the baking band.

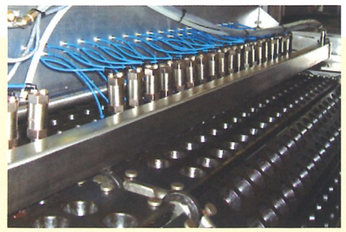
the baking of your products

- Tailoring the line to your individual requirements

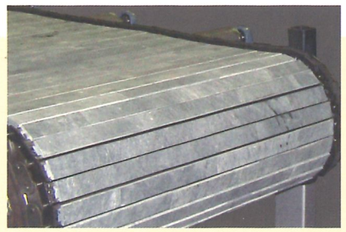
Chain conveyors



Perforated steel plates
For heavy load like tin bread or cup cakes in forms. Standard widths up to 4,200 mm.



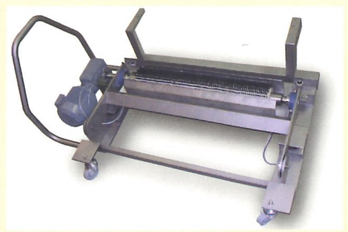
Caterpillar
For cakes and muffins. Standard widths up to 3,000 mm. Caterpillar band for muffins baked directly on the band.



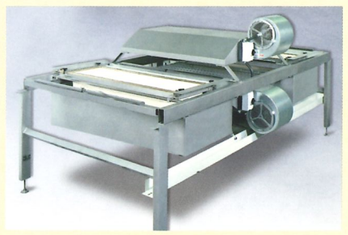
Stones
For pizza and bread baking. Standard widths max 1,500 mm. Stone band for pizzas and bread placed direct on the band.

perfect products

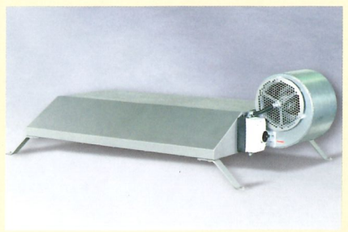
- Building your plant with DFE Meincke baking accessories



Cleaning brush
For the cleaning of the baking band.



Water cooling unit
For optimum efficiency in cooling steel bands and baked products.



Air cooling unit
For quiet and efficient cooling of your products or baking band by means of forced ambient air evenly distributed across the band.

Post-baking cooling system

- Cool your products efficiently

At DFE Meincke, we have different cooling solutions and a vast experience in designing the right cooling application for your product.

Hydro cooling of steel belt
A special option applicable to the DFE Meincke steel band oven is the hydro cooling system. The Hydro Cooler allows you to cool biscuit products almost instantly by means of chilled water, which comes into contact with the underside of the steel belt.

Cooling by means of direct contact with water has a number of advantages:

- **Instant cooling is possible – reduced cooling time down the line.**
- **It is possible to achieve a good release of the product from the belt.**
- **A minimal thermal load on the building from the belt/product as the heat from the steel belt is removed by water.**

To date, the Hydro Cooler has been installed in hundreds of biscuit applications, especially on lines with limitations on building size and/or line length.

Ambient cooling
To increase the efficiency of ambient cooling multi jet fans can be mounted above or under the baking band. The multi jet fans distribute the air stream evenly across the entire width of the baking band.

Cooling tunnels
DFE Meincke supplies two types of cooling tunnels. One takes air in from the outside and circulates it above and under the baking band. Another uses air which is refrigerated and recirculated by a cooling unit. We deliver the cooling units in 2-metre modules of which both sides consist of hinged doors for full cleaning access.

Customer services
- Reliable operation

More than just plants – DFE Meincke supplies performance. By reliable operation we mean providing a range of services to keep plants up and running.

After sales
Our spare parts programme has one focus: Maximum uptime for our customers. We carry a large stock of essential parts and offer service programmes for key components.

Applications Centre
Our Applications Centre at our factory in Copenhagen provides you with the opportunity to test your ideas on our equipment. The Applications Centre has a full-scale production line equipped with forming equipment and ovens where you can develop and test new recipes and test our different types of equipment.

Plant retrofits
Plants operating continuously for many years require more than just maintenance. To keep plants on stream and up-to-date, DFE Meincke has a special task force of experienced engineers who, on request, will evaluate existing systems and quote for their rebuilding as an alternative to investing in a completely new plant.

Finance
- The decision to invest

DFE Meincke offers project-financing assistance to customers planning to invest in our processing plants.

All-round expertise
With in-house project-financing experience as well as industry and technology know-how, DFE Meincke is the unique partner at any stage of the supply of a processing plant.

Accessing funds
We make it possible for customers to implement their projects, especially in markets where access to investment capital is limited. Our financing experts have a network of contacts with various banks and financial institutions.

DFE Meincke
Applications Centre

DFE Meincke is one of the world's leading suppliers of cutting edge solutions for the baking industry. We offer a wide range of solutions, from individual pieces of equipment to complete, integrated processing plants.

With global representation, over 1,000 lines in operation and approx 180 employees out of whom 1 of 10 is working with R&D, DFE Meincke offers innovative machine design backed up by an in-depth industrial experience gained over more than 50 years. All equipment is made in Denmark in order to maintain the high level of craftmanship and quality.

Our head office in Copenhagen houses 8,200 m² production facilities, administration, sales, project management, R&D, engineering, and an applications centre.

Our wholly owned subsidiary 2E Ellgard Equipment situated in Jutland 60 km west of Aarhus is mainly manufacturing ovens and related equipment. The company has 10,500 m² production facilities.

Our sister company DFE Meincke-Vuurslag is situated in The Netherlands with an office for sales, engineering, service and installation of biscuit lines.

The Applications Centre at our factory in Copenhagen provides you with the opportunity to test your ideas on our equipment. The Applications Centre has a full-scale production line where you can develop and test new recipes as well as our different types of equipment.

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INNOVATING BAKING INDUSTRY