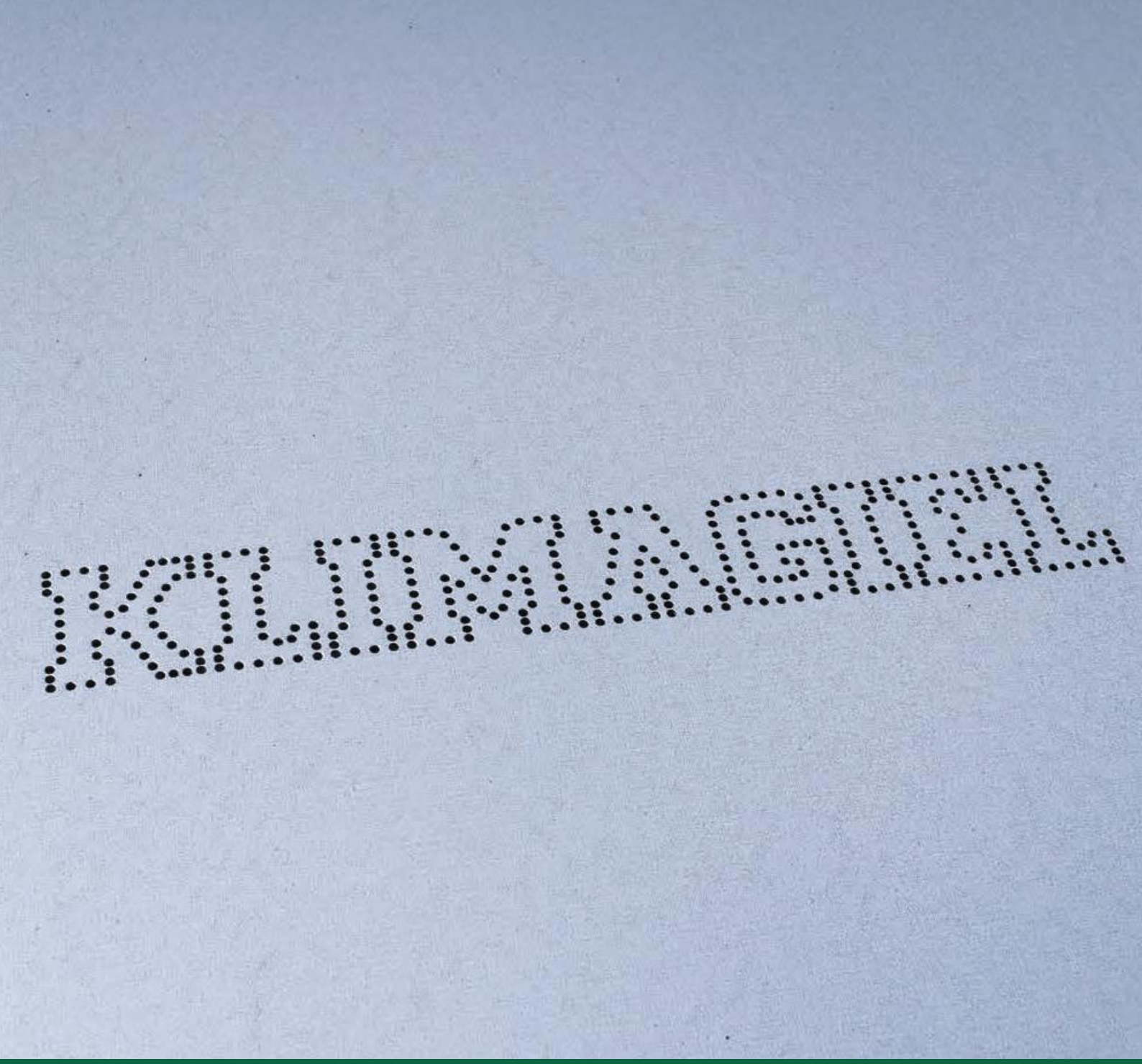


MADE IN ITALY

TECHNOLOGY
PRODUCTS
SERVICES

KLIMAGIEL®

L'ARIA CHE TI RISPETTA.

KLIMAGIELmanufactures and markets solutions to correctly distribute air in rooms.

The result of continuous technological research and the development of innovative concepts, high-quality **KLIMAGIEL** products are also highly reliable.

Constant evolution has enabled **KLIMAGIEL** to enter into important scientific collaborations with universities and professional groups to develop new solutions and test the validity of our proposals.

This approach has led to multiple awards and numerous international patents.

Our flexibility, attention to detail, and ability to deal with any environment or customer need have enabled us to become a trusted partner in the field of air conditioning and refrigeration for the commercial, industrial, and service sectors.

At **KLIMAGIEL** we offer a wide range of solutions in both metal and fabric, all certified and produced to high quality standards.

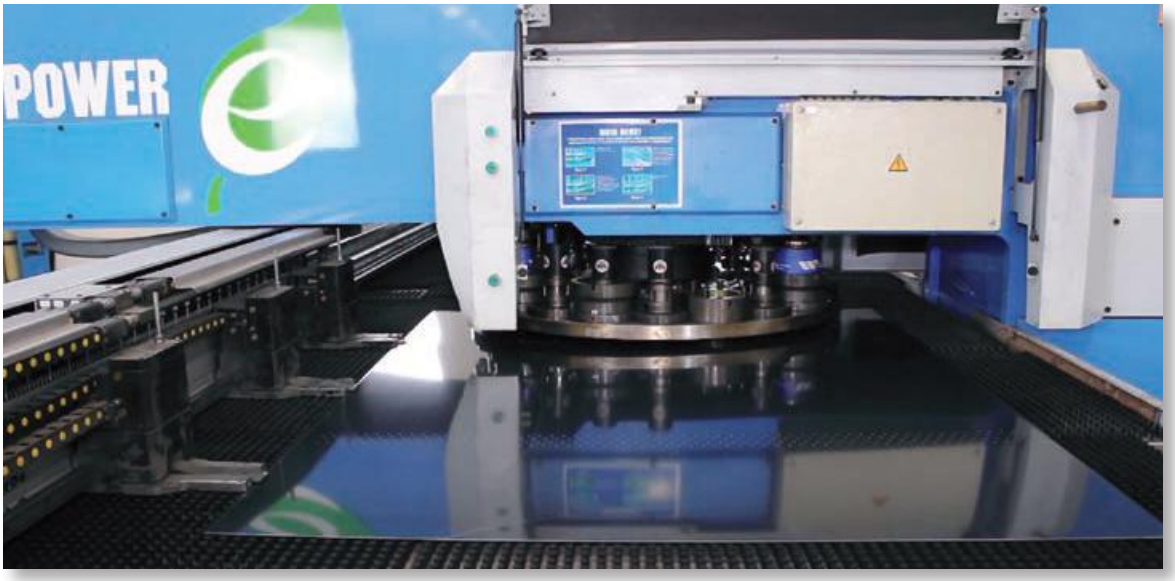
Given the great flexibility of the **KLIMAGIEL** range in terms of shape, diameter, and fastening system, consultations are essential. This is why, with our professional network of agents and distributors to support designers when making conceptual choices and to assist installers in the execution phase, **KLIMAGIEL** is your ideal partner in any situation.

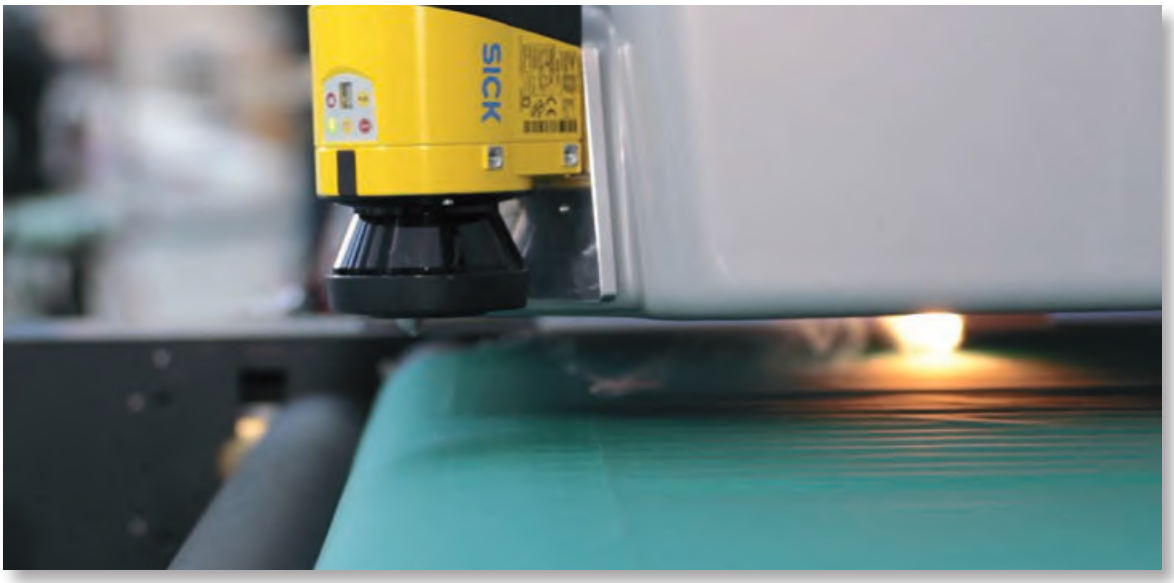
The quality of **KLIMAGIEL** high-induction diffusers is now even highly appreciated outside of Italy.

Our many years of consolidated international experience have provided further ideas for company growth in the name of efficient industrial development and services, with a renewed focus on environmental and energy issues.

KLIMAGIEL®

L'ARIA CHE TI RISPETTA.





All KLIMAGIEL products, whether metal or fabric, are entirely MADE IN ITALY.

Raw materials and semi-finished products are purchased in Italy,
and are subject to strict selection and control.

SOME EXAMPLES:
Polyester fabrics processed by KLIMAGIEL are certified according to STANDARD 100 OEKO-TEX® .
This is one of the best known labels in the world for textiles tested for harmful substances. It is synonymous with consumer confidence and high product safety.

Our polyester fabrics are also spot checked in the lab to determine their suitability for use in the food industry.

All fabric diffusers are approved according to the corresponding Fire Reaction Class (Euroclass A1 for mineral fibres and Euroclass B s1, d0 for polyester).

For all galvanized steel and stainless steel diffusers, the respective chemical composition is available, certified by the steel mill.

All metal diffusers are painted exclusively in powder-coating booths, an environmentally friendly technique because it is free of solvents and thinners, eliminates paint waste, and is reliable over time.

Principle of operation

The **high-induction diffusion system** makes use of the flow of the air from the calibrated holes for optimal blending with the environment, achieving **high environmental comfort**.

In particular, KLIMAGIEL 'S **JET-IN** system guarantees a very high exchange and mixing area with the ambient air, which is moved due to friction, depressions, and vortices created by the movement of the air itself.

This phenomenon is due to the principle of conservation of momentum:

$$Q_{IN} \times \rho \times V_{IN} = COST = K$$

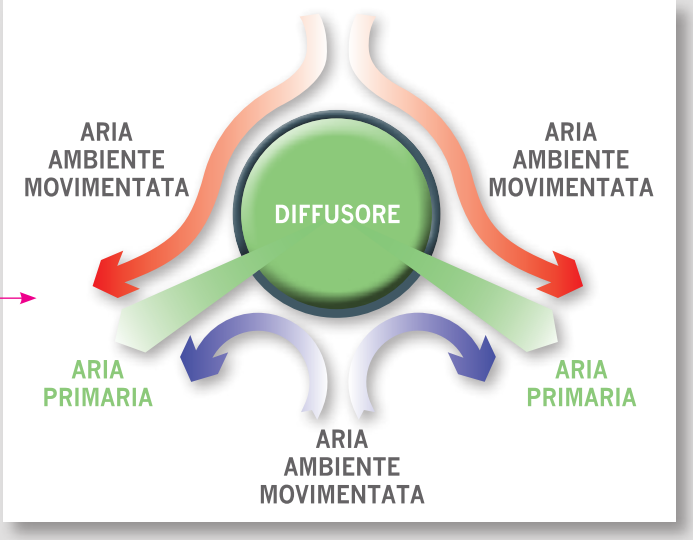
With a given **initial impulse**, this inductive effect enables the movement of a volume of air much greater than what entered the environment. Depending on the shape and diameter of the holes and the static pressure, values even 50 times higher than the primary air input can be achieved.

The ratio between the volume of air moved and the volume of input air is called the **INDUCTION RATIO**.

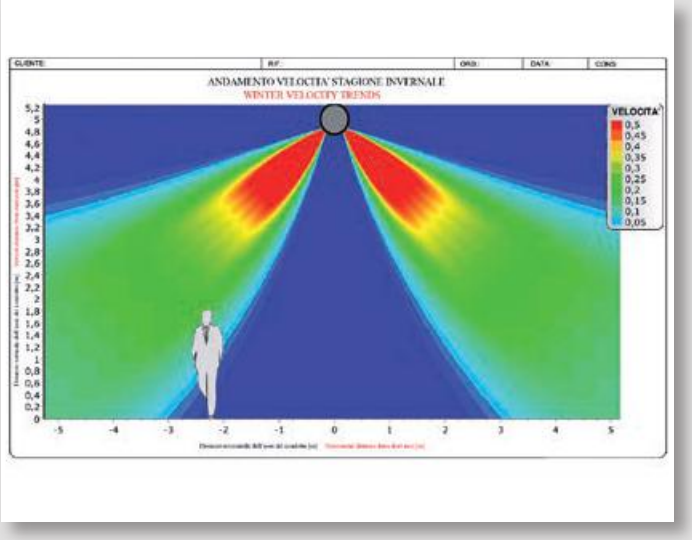
With the JET-IN induction system, typical issues related to traditional air distribution systems can be avoided; characterized by localized input points, such systems do not lead to uniform thermal fluid-dynamic properties of the air in the environment.

MANCA TRADUZIONE

THE PRINCIPLE OF INDUCTION



EXAMPLE AIR VELOCITY DIAGRAM



The high degree of mixing guaranteed by KLIMAGIEL diffusers allows winter air stratification to be eliminated since the entire volume of air is treated, improving comfort and reducing energy consumption.

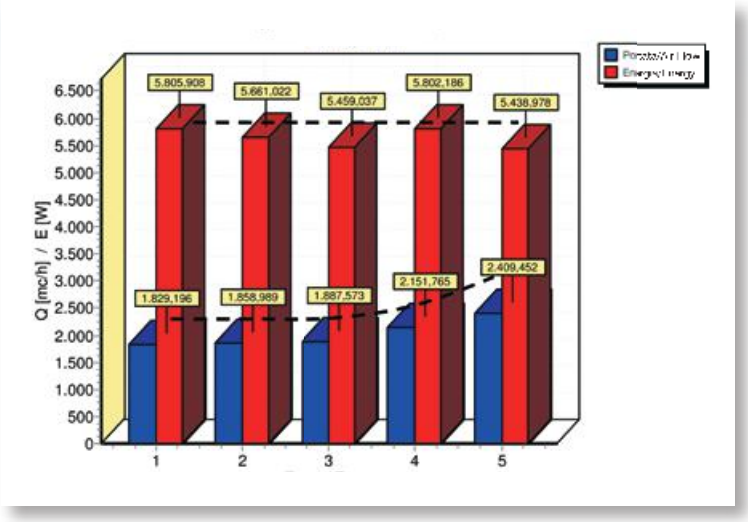
With use of a specific program developed by the KLIMAGIEL research and development department, the optimal boring (size, number, and arrangement of holes on the diffuser) can be defined for each project, thereby guaranteeing high efficiency for every system. At the same time, it ensures compliance with air velocities in accordance with UNI 10339 and EN 13182 standards.

Through the use of this proprietary software, it is possible to determine air velocities and graphically visualize the trend for both summer and winter air conditioning.

The software program evaluates the heat loss in the air flowing through the duct. Indeed, the air exchanges heat with the environment, which, particularly in the case of long pipes, results in a temperature change within the diffuser.

In some cases it may therefore be necessary to balance this temperature difference by increasing the specific flow rate into the environment (flow per linear meter). This ensures an optimal distribution of energy throughout the length of the diffuser.

Diagram of a diffuser designed with constant energy distribution



Another feature of the JET-IN high-induction system, which is particularly useful with metal diffusers, is its use of induction phenomena created around the diffuser to eliminate condensation on the exterior of the duct in summer when the temperature of the input air is lower than the dew point.

SUMMARY: STRENGTHS COMPARED TO TRADITIONAL SYSTEMS

- High comfort and uniform thermodynamic characteristics of the air in the environment.
- Elimination of stratification of warm air in winter.
- Quick to assemble and easy to maintain.
- Maximum energy efficiency.
- Use of induction to eliminate condensation.
- Attractive appearance adaptable to the context.

Induction TEX jet

Textile diffusers

FEATURES

Designed with fabrics made of inorganic fibre, these diffusers guarantee maximum hygiene and offer the great advantage of being light, weighing on the load-bearing structures of the building less than any other air-distribution system.

The use of high induction to optimally distribute and circulate the air is ensured by the careful design, which allows the primary air to be mixed with the air in the environment, yielding the highest level of comfort.

With laser technology, the optimal boring can be defined for each solution.

Constant research and development of fabrics and their technical characteristics have enabled microperforated textile diffusers to serve as an ideal solution for many applications.

The fastening systems have been designed in detail, offering great ease of assembly, reliability, and flexibility.

MATERIALS

TYPE	MATERIAL	COATING	SPECIFIC WEIGHT	FIRE RATING
FEATHER	100% Polyester	Acrylic PU	70 g/m² ± 5%	Euroclass B s1, d0
PREMIUM	100% Polyester	Acrylic PU	160 g/m2 ± 5%	Euroclass B s1, d0
FIBRA	100% Glass Fibre	Fireproof PU	450 g/m2 ± 5%	Euroclass A1

COLOURS

Depending on the requested type, the following colours are available (RAL numbers are purely indicative):

FEATHER

WHITE **RAL 9010** | GREY **RAL 7040** | BLACK **RAL 9005** | BLUE **RAL 5010**

PREMIUM

WHITE **RAL 9010** | GREY **RAL 7040** | GREEN **RAL 6032** | BLUE **RAL 5010** | YELLOW **RAL 1018** | RED **RAL 3000** | BLACK **RAL 9005** | ORANGE **RAL 2012**

FIBRA

WHITE **RAL 9010** | GREY **RAL 9006** | GREEN **RAL 6032** | BLUE **RAL 5022** | YELLOW **RAL 1012** | RED **RAL 3017** | BLACK **RAL 9005**

Induction TEX jet

THE ADVANTAGES OF FABRIC DIFFUSERS AT A GLANCE

An extremely lightweight solution that does not weigh on the load-bearing structures of the building.

Quick installation and easy maintenance.

The most inexpensive solution for uniform air conditioning of the environment.

AVAILABLE CROSS SECTIONS

Strongly oriented around customer satisfaction, KLIMAGIEL seeks out and offers our partners the best possible solutions, carefully evaluating every technical, functional, economic, and architectural aspect.
Textile diffusers are available in circular, semicircular, quarter turn, or even lenticular cross sections.
By request, we also design and provide customized solutions with special cross sections.

CIRCULAR | SEMICIRCULAR | QUARTER | LENTICULAR

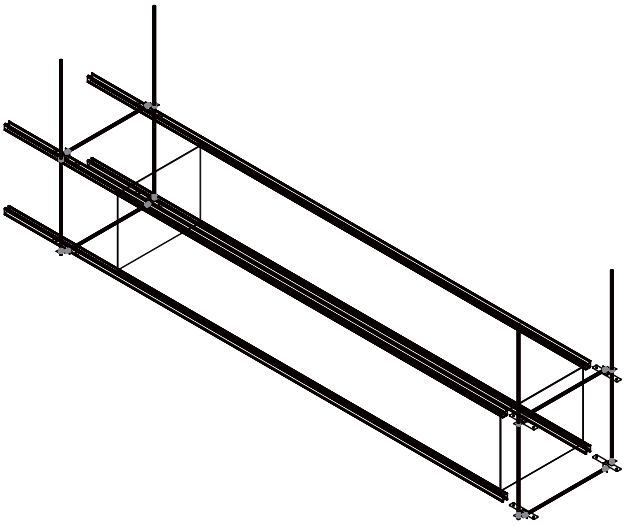
AirBox TEX jet

Textile diffusers

FABRIC AIR RETURN DUCTS

For applications where it is also necessary for the air return elements to be lightweight, or where the ducts need to be sanitized easily, Klimagiel also offers a fabric option for air return. Our extraction ducts consist of an exo-skeleton to support the guides that allow the fabric to maintain a rectangular cross section.

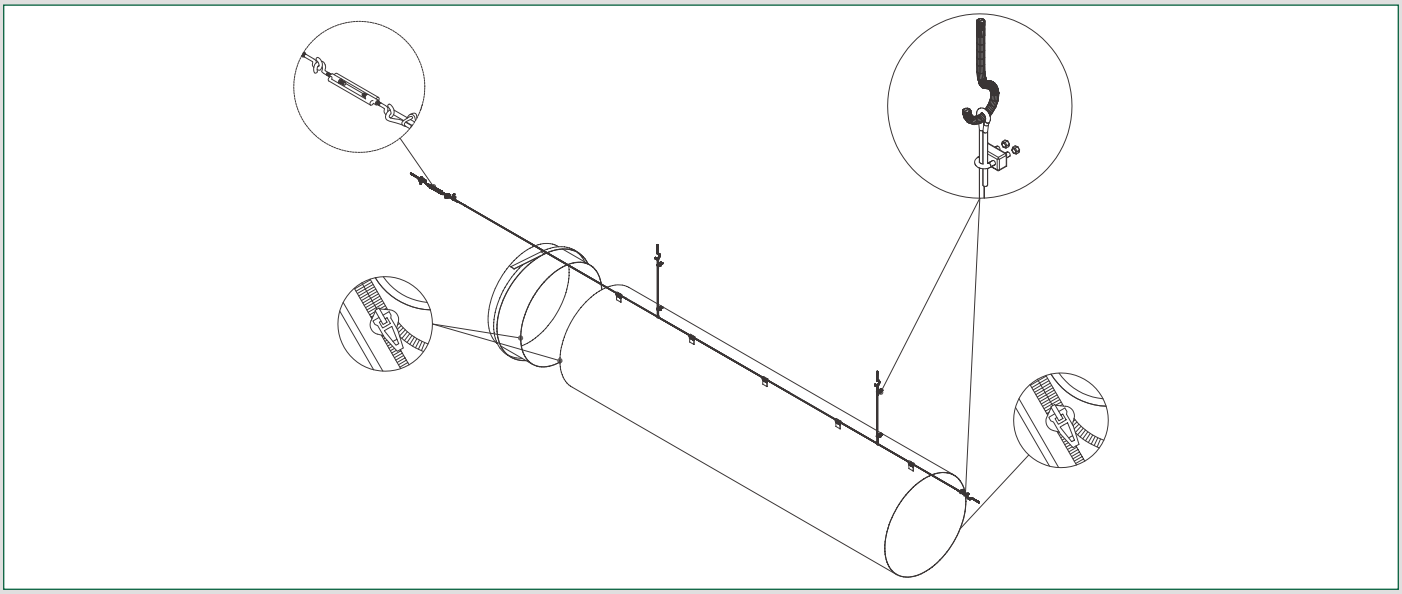
AirBox TEX jet is available for cross sections from 200 mm x 400 mm to 500 mm x 1000 mm.



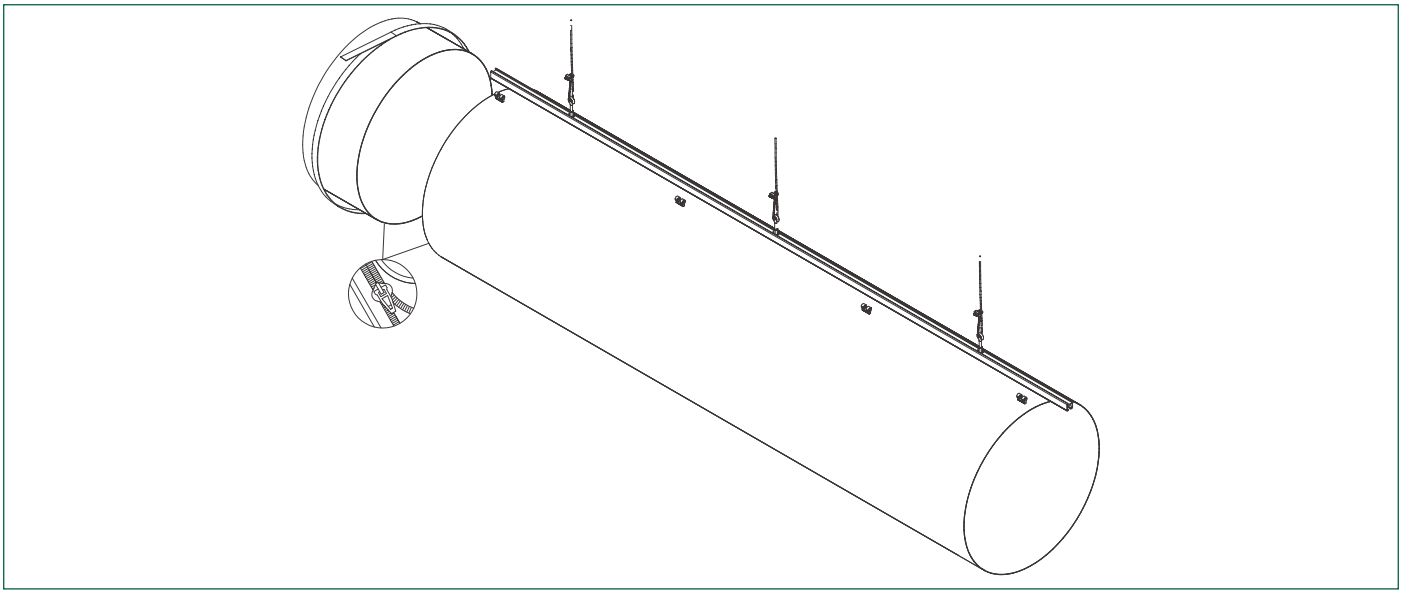
TEXTILE DIFFUSER FASTENING SYSTEMS

All our textile diffusers come with the necessary assembly parts. The fastening system may consist of cables or aluminium profiles depending on the cross section or customer preference. The necessary clamps with clips, tie rods, and cable glands are calculated for each job and provided for quick and easy installation. Textile diffusers can be supplied with single or double suspension cables (depending on diameter or design requirements). The semicircular duct, which is ideal for rooms with low, flat ceilings, is supplied standard with aluminium profiles for ceiling installation.

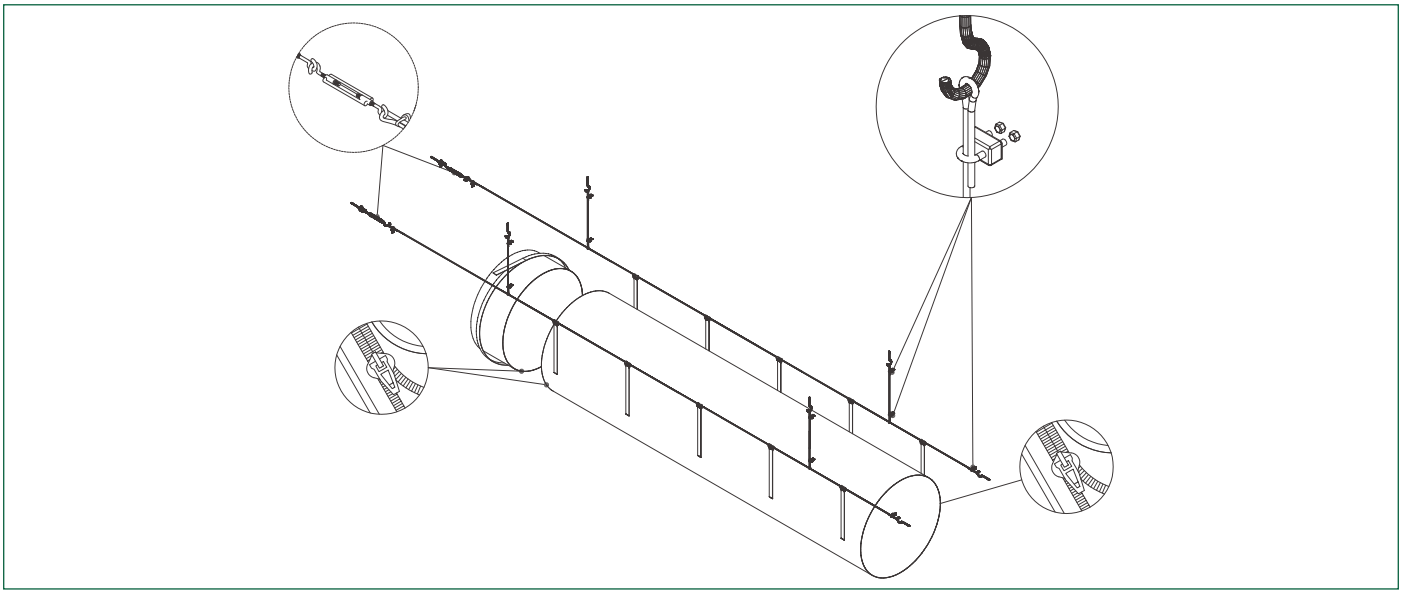
CIRCULAR DIFFUSER WITH SINGLE SUSPENSION



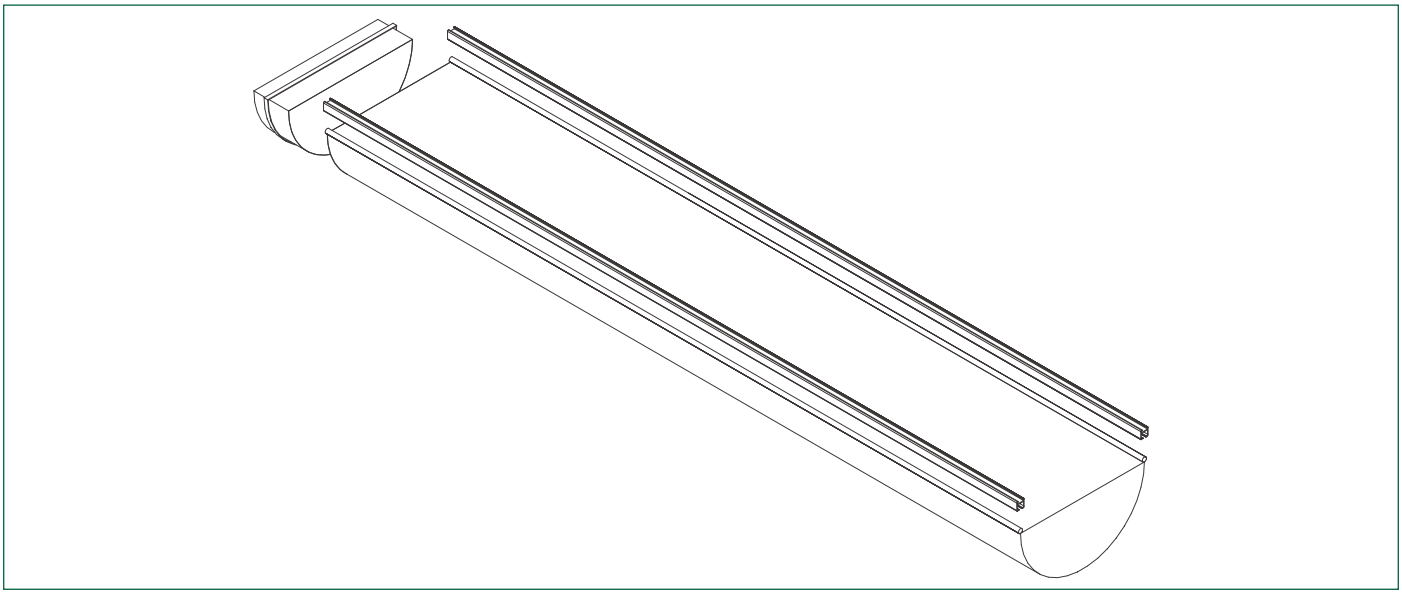
CIRCULAR DIFFUSER WITH ALUMINIUM PROFILE



CIRCULAR DIFFUSER WITH DOUBLE SUSPENSION



SEMICIRCULAR DIFFUSER WITH ALUMINIUM PROFILE



Induction METAL jet

Metal diffusers

FEATURES

Our Induction METAL jet metal diffusers present a wide range of solutions. They can be made of different materials depending on the environmental characteristics and application, guaranteeing long-lasting, reliable service. Relying on the principle of high induction, they enable the treated air to be optimally distributed and circulated. The flow generated by the air leaving the calibrated holes, whose distribution through the duct is carefully studied, yields optimal mixing of the primary and ambient air for maximum comfort. The perfect calibration and distribution of holes, together with the correct sizing to control the internal velocity, will ensure a quiet environment suitable for all applications.

At KLIMAGIEL, our microperforated metal diffusers are available in the following materials:

MATERIAL	STANDARD	STRUCTURE	SURFACE APPEARANCE
GALVANIZED STEEL	EN 10349	Carbon steel + galvanizing 200 g/m2	MICROPERFORATED
PRE-PAINTED STEEL	EN 10349	Carbon steel + galvanizing 150 g/m2	Anticorrosive PRIMER base + polyester paint
PAINTED STEEL	EN 10349	Carbon steel + galvanizing 200 g/m2	Hot-coated with powder
AISI 304 STAINLESS STEEL	EN 10088 ALLOY 1.4301	Austenitic	2B, 2D, BA, satin or Scotch-Brite
STAINLESS STEEL AISI 316 L	EN 10088 ALLOY 1.4404	Austenitic	2B, 2D, BA, satin or Scotch-Brite
AISI 430 STAINLESS STEEL	EN 10088 ALLOY 1.4016	Ferritic	2B, 2D, BA, satin or Scotch-Brite

By request, KLIMAGIEL also offers solutions in non-ferrous materials such as COPPER or ALUMINIUM.

COLOURS

For pre-painted steel, 5 colours are available:

WHITE **RAL 9010**

GREY ALUMINIUM **RAL 9006**

ANTHRACITE GREY **RAL 7016**

BLACK **RAL 9005**

BLUE **RAL 5010**

With the choice of powder-coated steel, design and architecture studios will have access to all colours in the RAL CLASSIC range.
A special COPPER EFFECT paint is also available, with great cost advantages and stability over time compared to true copper.
A wide range of available fittings means duct paths can be designed for any environment.
The diffusers are designed to facilitate quick and safe assembly with just a few tools.

Induction METAL *jet*

AVAILABLE CROSS SECTIONS

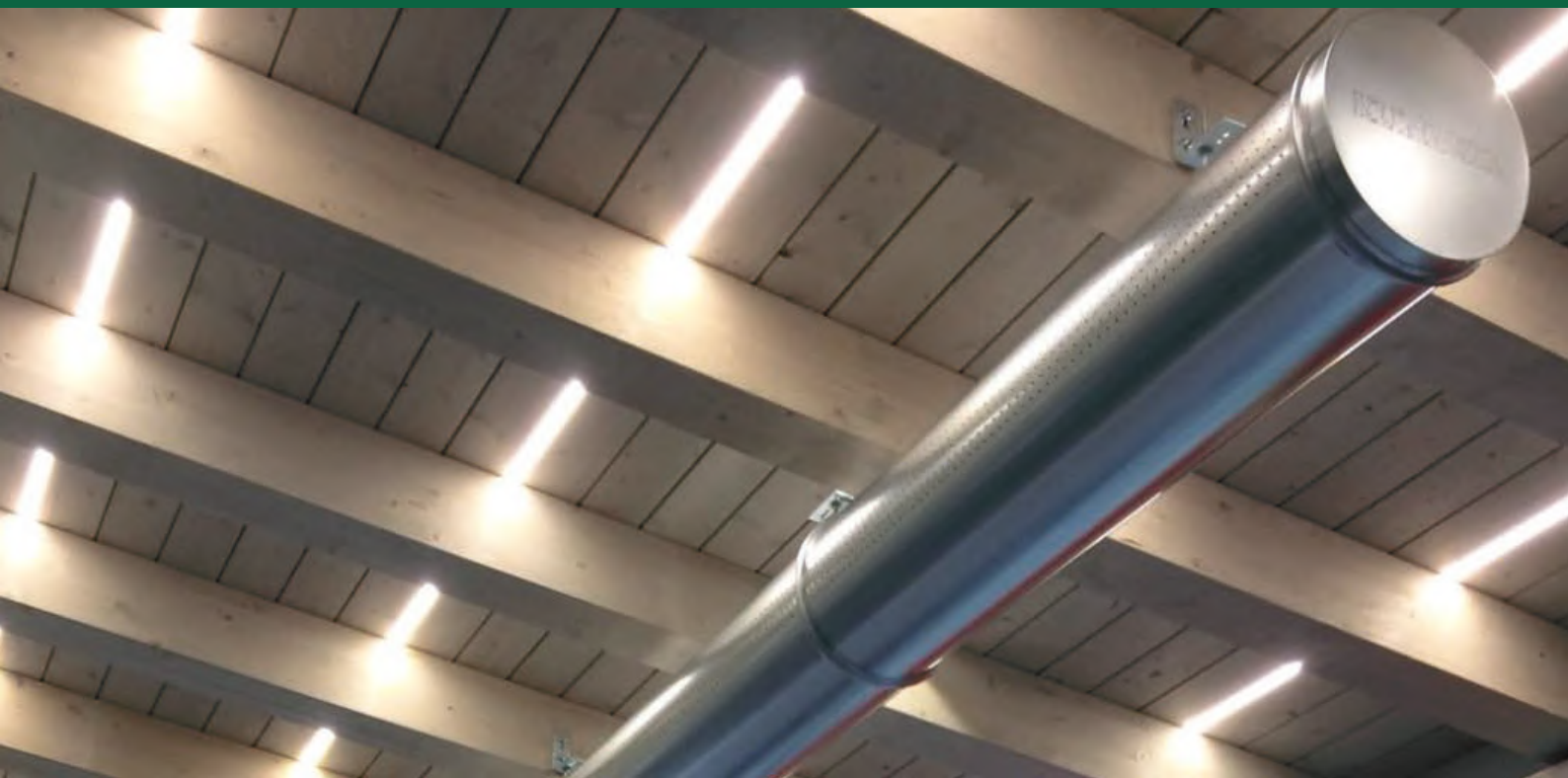
METALjet metal diffusers are available in a circular cross section with diameters from 200 to 1500 mm and a semicircular cross section with diameters from 200 to 1000 mm.
Each size and shape is available in all variations of established material and colour.

At KLIMAGIEL, we seek out and offer our partners the best possible solution, carefully evaluating every technical, functional, economic, and architectural aspect.

The fastening systems are based on criteria of absolute reliability and speed of assembly.

THE ADVANTAGES OF METAL DIFFUSERS AT A GLANCE

- High environmental comfort due to uniform treatment of air in the room.
- Easy assembly with the bayonet mount and connection clamps.
- Anti-condensation effect on duct surfaces.



Induction METAL jet

Metal diffusers

ASSEMBLY SOLUTIONS

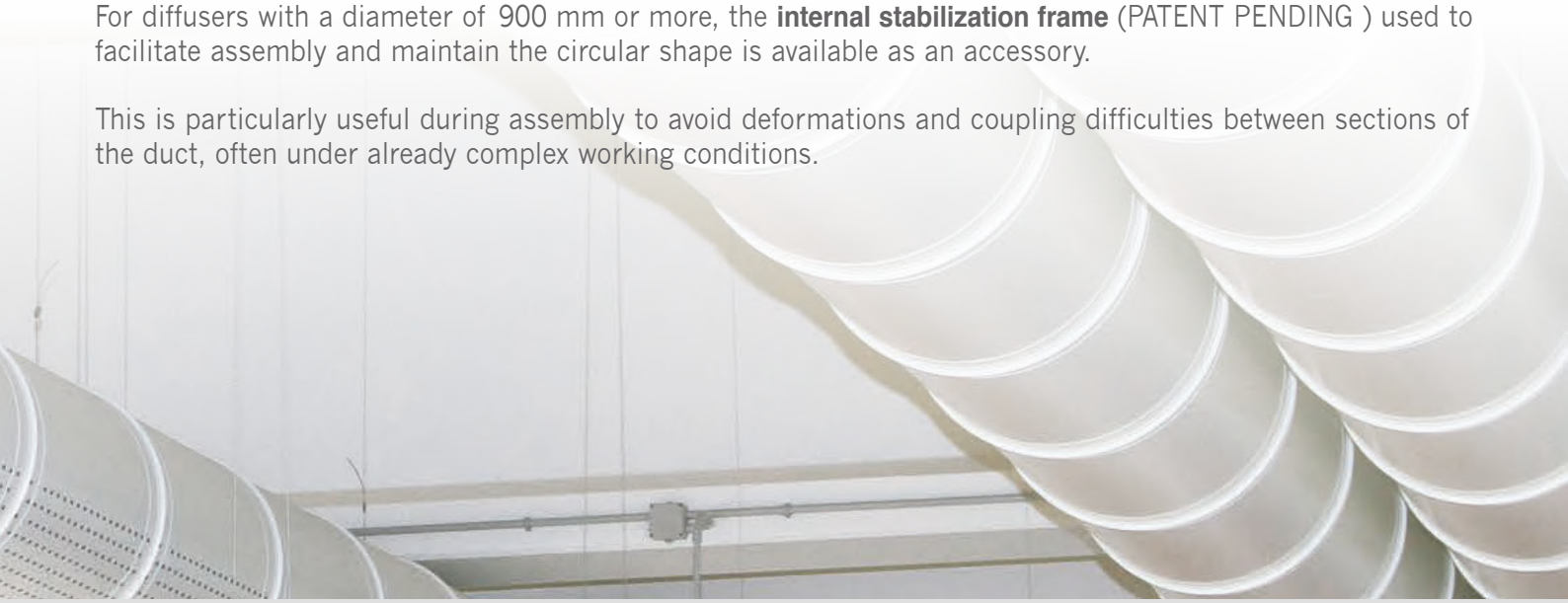
With particular regard to the ease of assembly and quality of the final result, our experience at KLIMAGIEL has led to the study and implementation of unique solutions to benefit our partners.

Our **FAST-FIX** circular ducts , 1250 mm long, are normally supplied with a longitudinal bayonet mount for closure on site (resulting in reduced transportation costs), without the need for riveting.

The flaps are suitably shaped with a **patented folder system** to release tension from the material.

For diffusers with a diameter of 900 mm or more, the **internal stabilization frame** (PATENT PENDING) used to facilitate assembly and maintain the circular shape is available as an accessory.

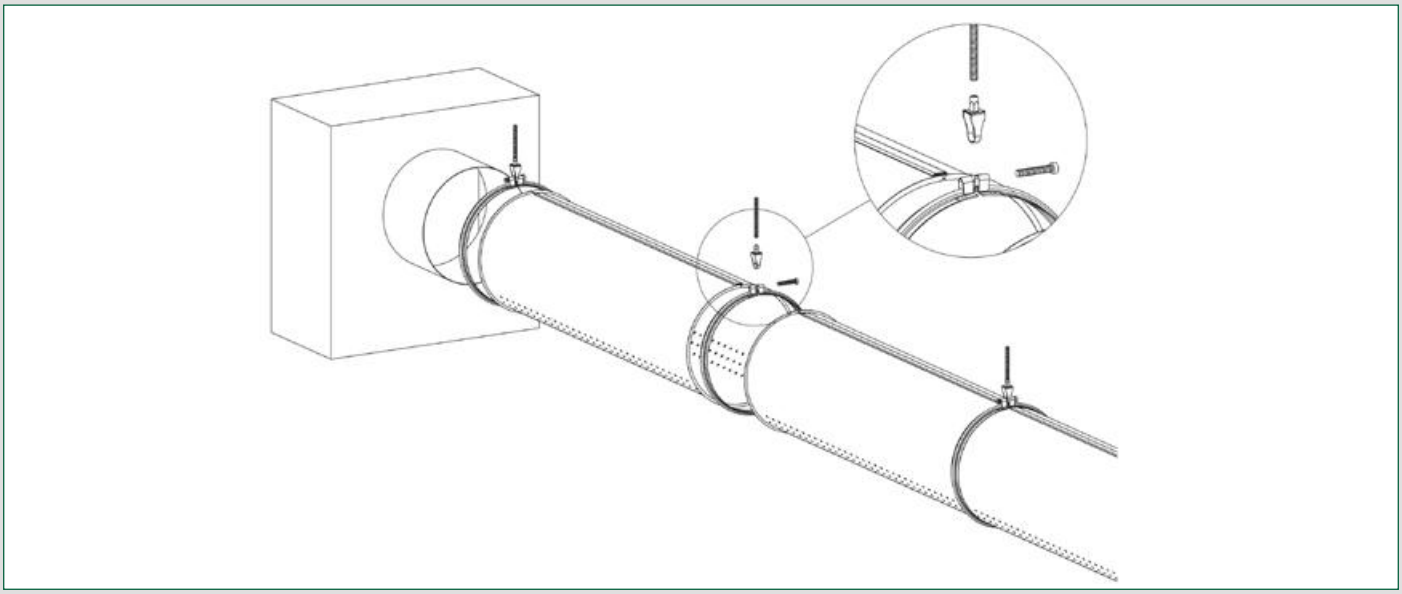
This is particularly useful during assembly to avoid deformations and coupling difficulties between sections of the duct, often under already complex working conditions.



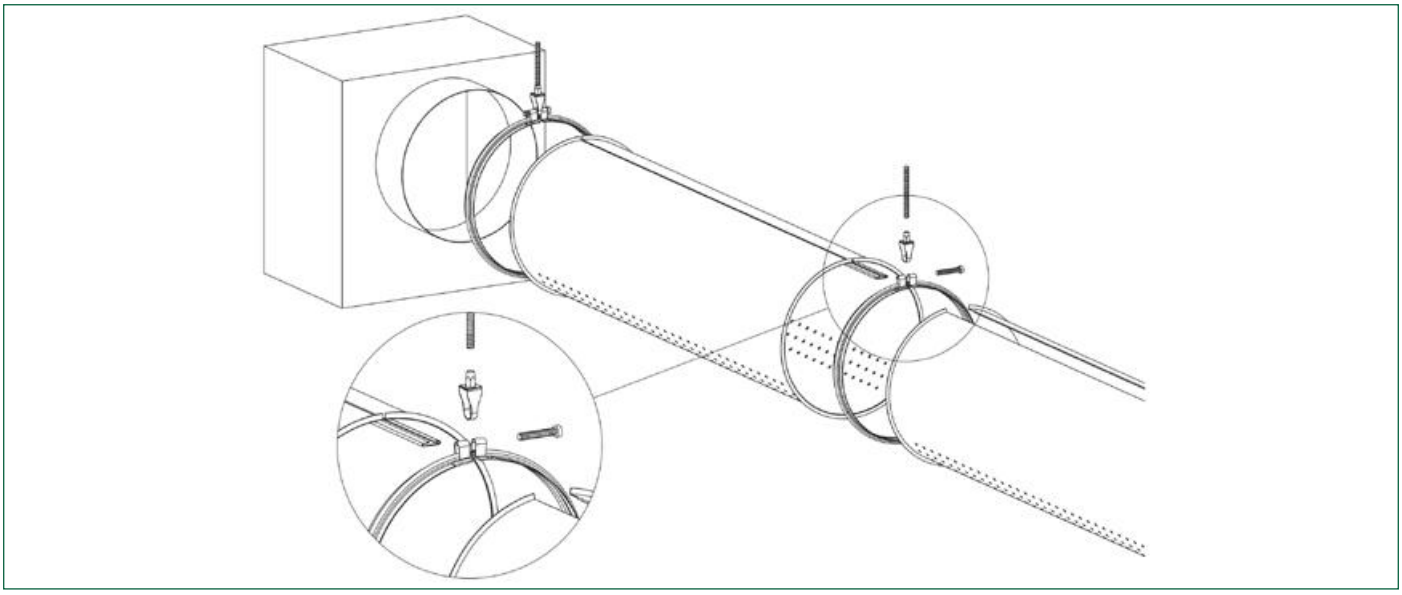
FASTENING SYSTEMS FOR METAL DIFFUSERS

MetalJet diffusers are available in 1 m or 1.25 m sizes.
They are supplied with a complete series of connection clamps and a special adaptor plate with M8 nut for fastening to the ceiling (via threaded bars or ring bolts with cables or chains).

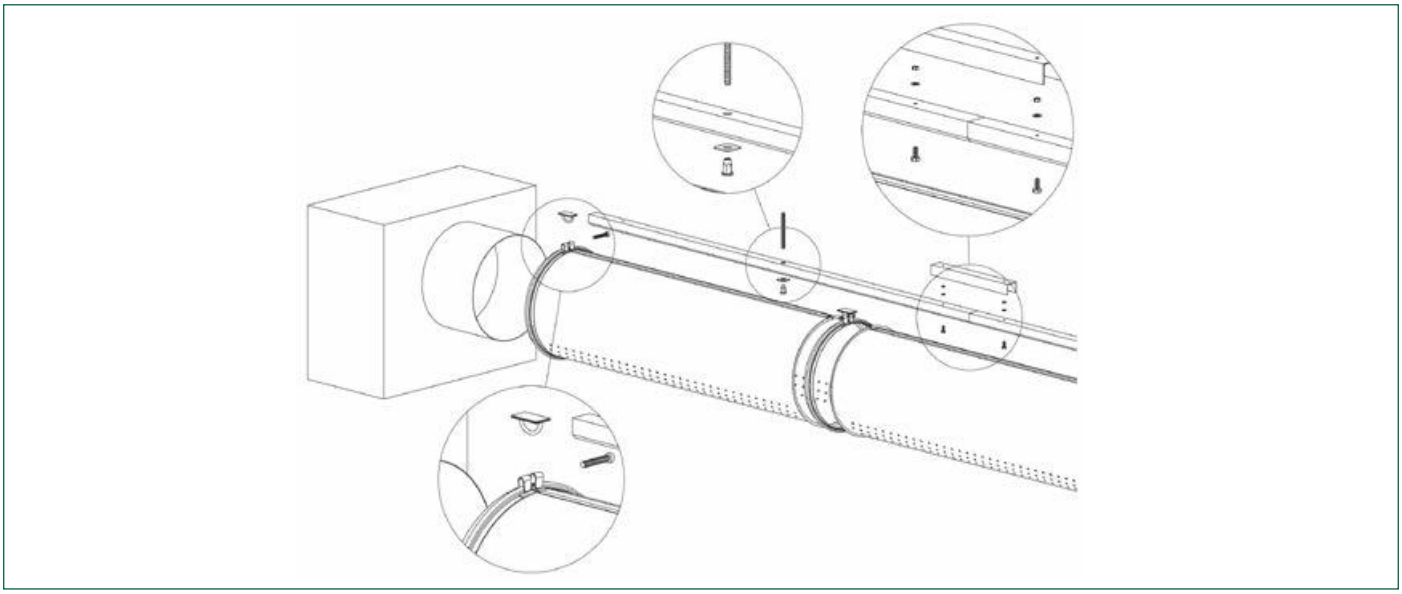
CIRCULAR DIFFUSER WITH CLOSED MODULES (1 m to 1.25 m)



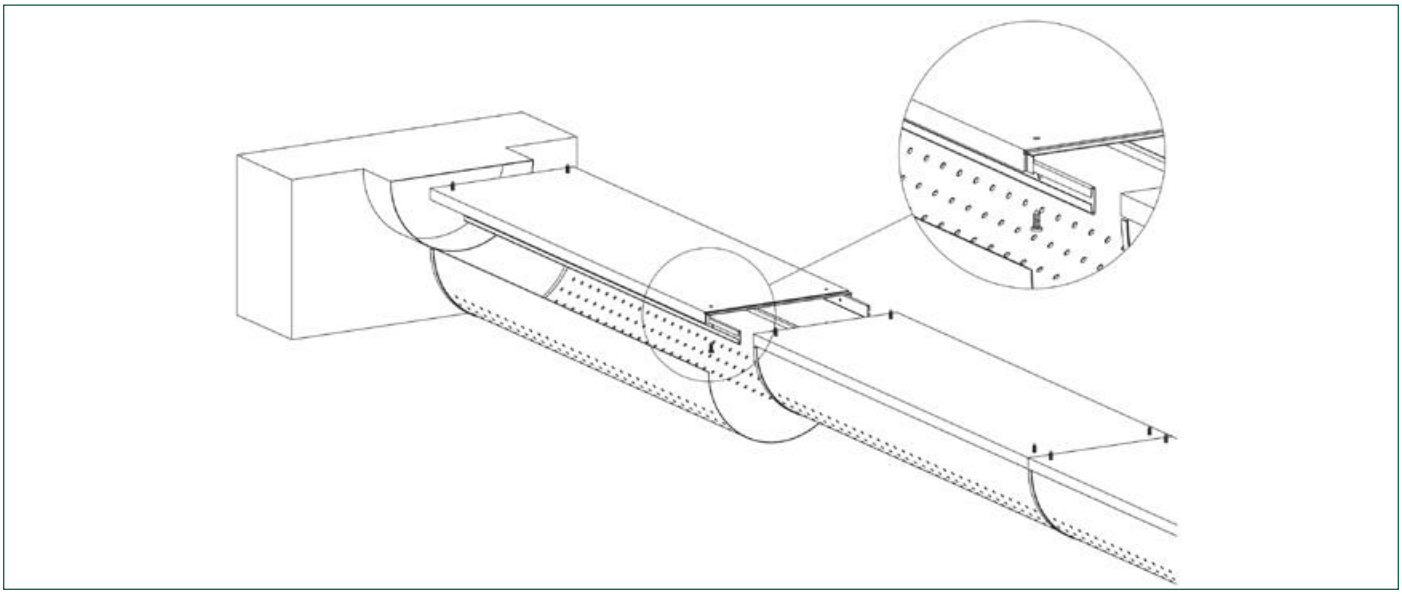
CIRCULAR DIFFUSER WITH OPEN MODULES (FAST-FIX 1.25 m)



CIRCULAR DIFFUSER WITH GALVANIZED STEEL PROFILE



SEMICIRCULAR DIFFUSER



Induction OVAL *jet* Metal diffusers

The result of constant research and innovation at KLIMAGIEL, our new **OVAL *jet*** diffuser, with its oval shape, represents an elegant solution for metal applications where a smaller height is required compared to classic circular ducts.

STRENGTHS

SAVINGS IN HEIGHT
The unique oval shape enables up to 50% of space to be recovered compared to circular ducts.

EASY INSTALLATION
Use of the new **KLIMA-PLUG®** interlocking system® allows for quick and easy installation.

ATTRACTIVE SOLUTION
The diffuser is modern, pleasing to the eye, and it can be easily integrated into any structure.

These diffusers naturally also have the advantages of high-induction circular ducts, that is:

ANTI-CONDENSATION EFFECT
Micrometric control of the output air velocity (which generates the 'high induction' effect) ensures the airflow is maintained over the entire duct surface, preventing stagnant air and the formation of condensation.

QUIET ENVIRONMENT
The calibration and distribution of the holes and strict velocity control ensure a quiet environment suitable for all applications.

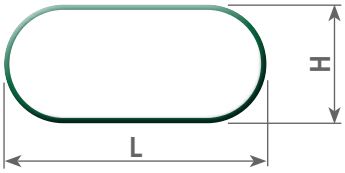
The new OVAL cross section is available in steel:

> galvanized
> painted (in any RAL classic scale colour)
> stainless steel, in AISI 430, AISI 304, AISI 316 stainless steel

Induction OVAL *jet*

As far as air distribution is concerned, the diffusion is always determined by an appropriate number of rows of holes calculated in relation to the air flow of the ventilating unit and the pressure available at the entrance to the diffuser itself.
Oval ducts are supplied in 1-metre-long modules, with connection via a male/female coupling that needs to be riveted.
The flaps are suitably shaped to facilitate coupling and ensure the release of tension from the material.
Each module is supplied with a clamp for fastening to the ceiling, complete with M8 nuts for use with a threaded bar or other coupling system.

AVAILABLE SIZES



H	200	250	300	350	400	450	500
L	400	500	600	700	800	900	1000

Air is distributed in the environment in full compliance with UNI 10339 – EN 13182 (air velocity at human height).

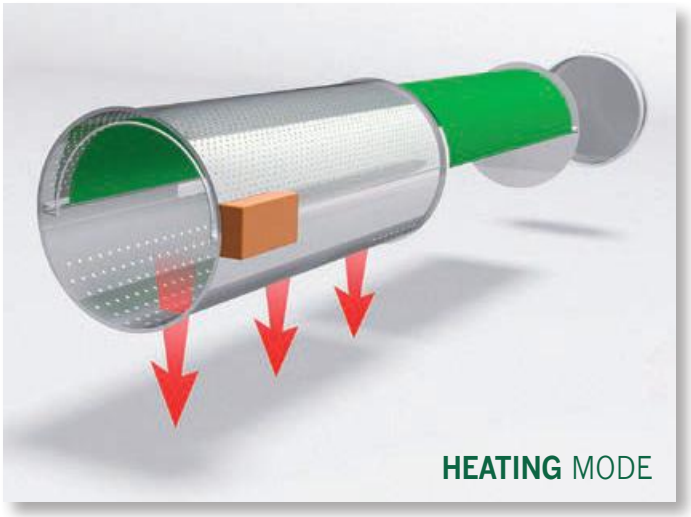
Induction DOUBLE *jet* Membrane diffusers

SEASONAL OPTIMIZATION WITH SWITCHING KITS

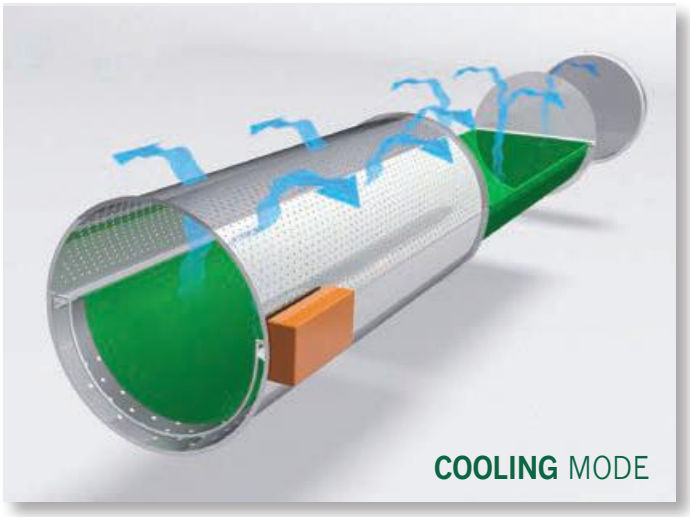
KLIMAGIEL high-induction diffusers are available with a membrane system for optimal management of summer/winter conditions.
We strongly recommend this system in all applications where there is not enough useful static pressure at the entrance to the duct, also with regard to the height of the installation.

The system is composed of an internal polyester membrane placed along the entire length of the diffuser. The movement is controlled by a servomotor, allowing either the upper or lower holes of the diffuser to be selected.
In the cooling mode, the membrane adheres to the bottom of the duct, allowing air to flow over the top. Conversely, when the system is set to the heating mode, the system covers the upper holes and the flow is conveyed directly downwards.
This optimizes the system operation, ensuring more uniform temperatures and environmental comfort.

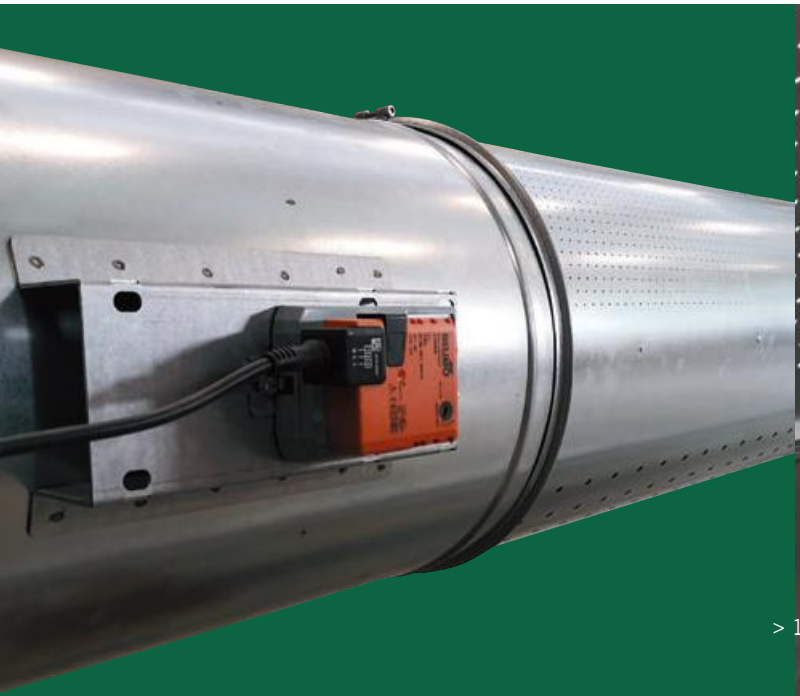
The membrane solution is available for both fabric and **metal** ducts (patent pending).



HEATING MODE



COOLING MODE



Inspection METAL *jet* Stainless steel diffusers

Our **INSPECTION METAL *jet*** diffusers were created in response to the specific need for maintenance and maximum hygiene in large food-production chains.
With a specific, innovative project, KLIMAGIEL has responded to the need to reduce the time required for maintenance, cleaning, and sanitization of air conditioning systems in highly productive industrial environments.

Air ducts are normally cleaned inside by specialized companies, who are only able to reach and adequately clean the internal surfaces of the ducts with the use of specific equipment and particular methods.

Our new SEMICIRCULAR CROSS SECTION metal diffusers can be INSPECTED along every metre, thereby enabling quick and effective interventions at every point of the system, greatly facilitating eventual inspections.

The semicircular structure, made entirely of STAINLESS STEEL, can be opened on one side by means of a quick-release system.

Bacteria on the surfaces can be reduced by up to 99%.

ADVANTAGES AT A GLANCE

- Cuts maintenance and cleaning costs and reduces production downtime.
- Easy to monitor technical and hygienic conditions of the air-handling system.
- Nearly total elimination of bacteria.

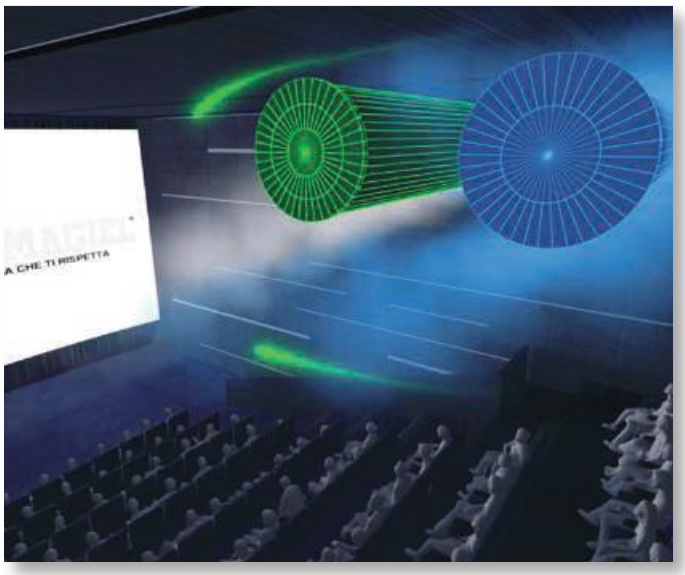
DYNAMIC *jet*

Variable flow system

The **DYNAMIC *jet*** circulation SYSTEM permits air handling in environments where it is necessary to vary the flow rate through the system.
Such is the case anywhere the ENDOGENOUS LOAD - due to crowding, production start-up processes, or other causes - IS NOT CONSTANT over time.
High-induction diffuser technology (also called induced movement) is normally applied in situations requiring sufficiently stable flow and pressure in order to work properly.

DYNAMIC *jet* is a VARIABLE FLOW SYSTEM, composed of one or two primary induction diffusers and a secondary diffuser (displacer), installed on a plenum with a system of dampers, actuators, and probes to control the flow and internal pressure.

The system is designed to MAINTAIN OPTIMAL CONDITIONS in the primary diffuser to treat the environment correctly by effectively mixing the air. The secondary diffuser is instead used for additional air that is emitted more gently, which, also recalling the induction effect of the primary diffuser, enters the area to be treated.



ADVANTAGES AT A GLANCE

Possibility to modulate the flow
from 30% to 100%
for greater comfort.

Optimal heat distribution,
uniform environmental conditions,
and maximum system performance.

System accessories

ABS High-Induction Destratification Fan

THE PROBLEM

Forced-air heating systems for large, high rooms present the need to reduce the thermal gradient between the occupied zone and the highest area close to the ceiling.
In cases where the system is designed for both winter and summer, the air flow ensures that the difference between the delivery temperature and the environment is reduced sufficiently.
When the system is instead created for heating with direct-exchange hot air generators or aerothermal heat pumps, the ΔT's as designed lead to stratification.
This is typically true of industrial warehouses, exhibition displays, sports centres, and anywhere forced-air heating is deemed to be the most effective.

THE SOLUTION

The ideal solution is to install one or more systems consisting of an axial fan that inputs an amount of air into a microperforated duct, which manages the velocity and orientation to achieve high induction of the air in the room, yielding uniform temperatures.
Depending on the characteristics of the environment and desired use, the installation can be equipped with a multi-step speed regulator, inverter, or appropriately sized silencers.

ADVANTAGES OF THE SYSTEM AT A GLANCE

- Increased comfort due to the uniform temperature throughout the environment.
- Quick, inexpensive solution without modifying existing systems.
- Energy savings due to the elimination of stratification.
- Perfect integration of the appearance.

ABS

INDICATIONS FOR OPERATION

Depending on the room volume involved, and for installations with average heights (from 5 to 10 metres approx.), an initial evaluation can be made by dividing up the air flow rate (roughly 2 changes/hour) using the table, which shows the air flow rate for each system for the various diameters.

A wide range of diameters, from 300 to 900 mm, and air flow rates, from 1850 to 16,000 m^3/h, are available.

Fan diameter		300	350	400	450	500	550	630	710	800	900
Polarity	Poles	2	2	2	2	2	4	4	4	4	4
Absorption	kW	0.35	0.35	0.55	0.75	1.1	1.1	1.5	2.2	3	4
m3/h with 250 Pa	m3/h	1850	2490	3250	3950	5070	6030	7230	9620	12800	16200

I-STOP to reduce defrost times

THE PROBLEM

In food cold stores, the defrost time is a key element that affects the increase in temperature, and therefore energy consumption, in the standby phase.
Inefficient defrosting can also lead to water vapor emission into the store, resulting in the formation of ice on surfaces in the store.

THE SOLUTION

KLIMAGIEL's **I-STOP** system is composed of a sleeve made of waterproof fabric specifically designed to be installed on the evaporator openings to accelerate the defrosting process.
The fabric part of **I-STOP** is made of 100% high-tenacity polyester with a special hygroscopic treatment.
Available in different colours and easy to wash and sanitize, it is the ideal low-cost solution.

ADVANTAGES AT A GLANCE

Energy savings due to the reduction of defrost times.

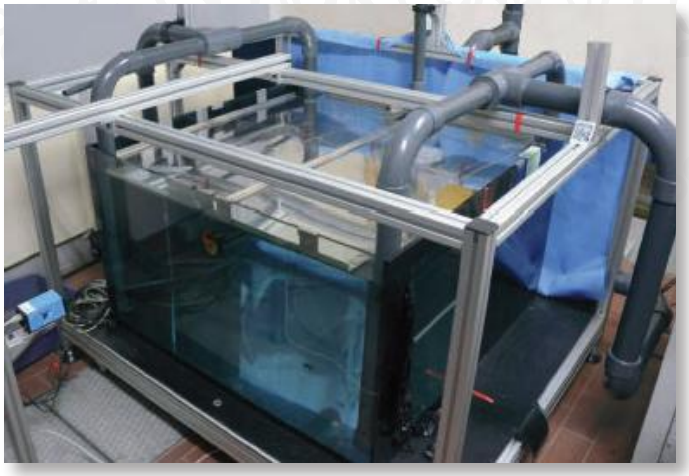
Prevents the formation of ice on surfaces in the store.

Can be easily washed and sanitized.

Research and Development

CONSTANTLY AIMED AT IMPROVING PERFORMANCE

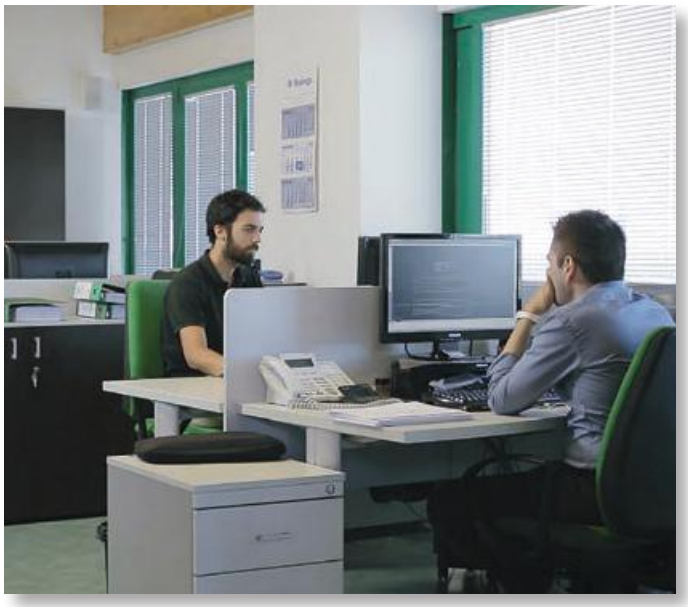
Our collaboration with the University POLITECNICO di MILANO and the use of two separate experimental devices has led to the development of an analysis and verification process for technical and developmental data that has profitably characterized KLIMAGIEL products.
With the BIG TUBE it was possible to study air flow inside the ducts in detail, with a procedure to refine the size and specific boring of each duct and its main operating characteristics, such as load losses, outflow coefficients, and conducted and circulated flow rates.
With AQUARIUM, a water circuit with kinematic similarity equipped with PIV (particle image velocimetry) visualization, the movement of water was characterized and velocity data collected at all points in a section lit by a laser sheet. The behaviour of the air entering the environment could therefore be studied in detail.



Services and Added Value

DESIGN CONSULTATIONS - INSPECTIONS - QUALIFIED PERSONNEL

Klimagiel's consolidated know-how in air-distribution services means we provide professional integrated consultations, assisting and guiding you in the search and use of the best solution for your specific goals. These are therefore indispensable results: assessment of performance in terms of time, budget constraints, agreed quality, and return on investment, sharing responsibility for the results. An additional service, which is no less important, entails an inspection and surveys of the location where the work will be performed and the system installed.
At Klimagiel, we also have a broad organization capable of responding to any request for assistance. Professionalism, competence, and closeness to our customers have always been distinctive elements of our quality service, which is carried forward from year to year.



Completed Projects

At KLIMAGIEL, we have extensive experience in a large variety of applications. A wide range of areas are suitable for the use of high-induction technology, both in the civil sector - particularly for commercial and service areas - and in industry, production, and logistics.

CIVIL APPLICATIONS

> Shopping centres
> Shops
> Supermarkets
> Food service
> Tensile structures
> Pools
> Gyms
> Offices
> Airports & Terminals
> Showrooms

> FOOD SERVICE

> OLYMPIC-SIZED SWIMMING POOL

> MUSEUM - EXHIBITION

> RESTAURANT PIZZERIA

> FOOD COURT - SHOPPING CENTRE

> CLASSROOM - UNIVERSITY

> FITNESS AREA

> THERMAL BATHS

INDUSTRIAL AND PROCESS APPLICATIONS

At KLIMAGIEL, we have developed projects for many applications, from air conditioning for production areas (food, pharmaceuticals, industry) to logistics (food, industrial warehouses, cold stores).
Process applications play a specific role, where the aspect of consultation and product customization reach the highest levels.
With our extensive experience, KLIMAGIEL is your ideal partner when addressing new market challenges.

> Food production lines
> Finished product warehouses
> Cold stores
> Greenhouses
> Breeding farms
> Wineries
> Glassworks
> Furnace cooling lines
> Logistics centres
> Precision machining areas

> INDUSTRIAL FACILITIES

> WAREHOUSE AND LOGISTICS

> FOOD PROCESSING UNITS

> CONFECTIONERY INDUSTRY

www.klimagiel.it

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L'ARIA CHE TI RISPETTA.

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