KITCHEN LINE

TPV, TPV-N, TPV-K

for (industrial)kitchens

TPV

Polycarbonate panels, aesthetically designed textile diffuser.

TPV-N

Fully stainless steel design.

TPV-K

Aluminium panels.

Self-extinguishing system

Protects the ventilation system and kitchen appliances.

UV-C filtration

Built-in UV-C filtration with up to 99 % grease removal efficiency.

- closed extraction system
- built-in UV-C technology
- eliminates mould growth
- automatic operation control
- attractive design
- easy maintenance
- easy cleaning
- LED lighting

Selection software

For the detailed selection of ventilated ceilings, kitchen hoods, accessories and control systems we recommend using our specialised selection software.

You will find it on our website **www.atrea.com**.

DESCRIPTION

APPLICATION

Ventilated and air-conditioning ceilings are designed not only for (large) kitchen areas. They are particularly suitable for kitchens with stand-alone appliances located throughout the space, where the installation of individual hoods would be too costly, complicated and, in connection with the ductwork, unsightly. They are also suitable for rooms with low or vaulted ceilings where hoods cannot be fitted.

The ceilings can also be used in other areas with strict requirements for the design and uniformity of extraction and lighting such as open kitchens and food dispensing facilities.

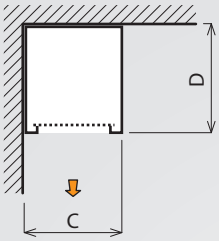
BASIC DIMENSIONS AND SIZING

Closed ventilation systems

Closed ventilation and air conditioning ceiling systems consist of a system of extraction, collection and supply ducts. As standard, they are made up of a transparent false ceiling with fluorescent or LED lighting fitted above the ceiling. The design of ventilated and air-conditioning ceilings complies with the current guidelines for kitchen ventilation EN 16282.

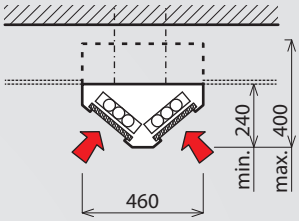
Supply air ducts

The visible ducts are made of stainless steel. The bottom surface is a large-scale micro-perforated fabric diffuser. For TPV-N, the fabric diffuser is covered with an aesthetically pleasing perforated stainless steel cover.



Extraction air ducts

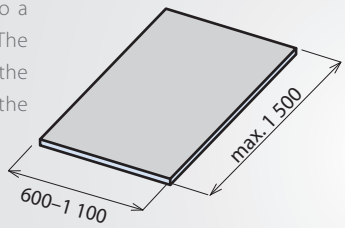
These air ducts are generally triangular. The visible parts are made of 1 mm thick stainless steel sheet. Optionally they include UV-C filtration.



Transparent false ceilings

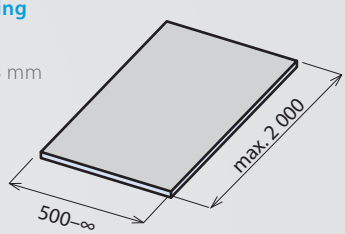
Type TPV – straight

The false ceiling is made up of 8 mm thick thermally-insulating polycarbonate panels inserted into a stainless steel frame with gaskets. The individual modules are placed on the stainless steel grid and the side of the extraction air duct.



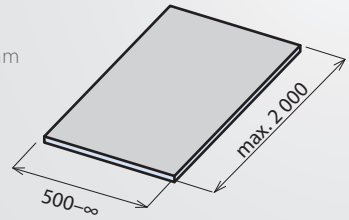
Type TPV-N – stainless steel panelling

Passive panelling option TPV-N = stainless steel panelling, thickness 0,8 mm (glossy stainless steel)



Type TPV-K – aluminium panelling

Passive panelling option TPV-K = aluminium panelling, thickness 0,8 mm (painted – gloss white RAL 9010)

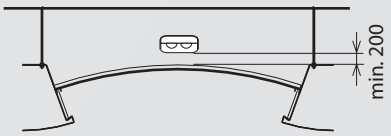


Lighting

Lighting is a standard part of closed ventilation and air conditioning ceiling systems.

ATREA prepares a drawing of the lighting fixture layout and sends it to the client for information on controls (the location and type of switches, cable routing, zoning); lights are installed together with the ceiling according to CSN 360450 for work category class B, C.

The lighting system design calculation is based on the minimum lighting level according to the hygiene requirements for kitchen work areas of 500 lx per work area. The light transmission coefficient of the transparent panelling is assumed to be t = 0.9. As standard fluorescent spot lights without covers or special LED lights without covers are used in the design.



Anchoring

The SKV and TPV ceilings, with extraction and supply air ducts, are suspended from the ceiling grid using suspension brackets made of threaded galvanised rods M8 or M10.

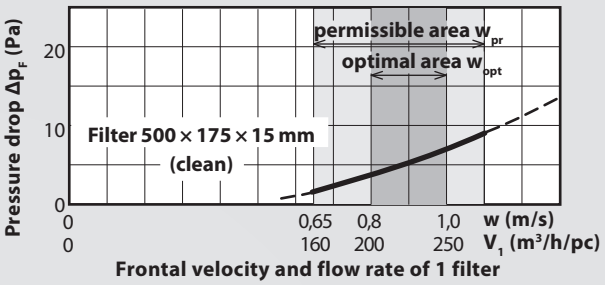
The rods are anchored to the ceiling with anchors (expansion bolts, wall plugs), each with a load capacity of min. P = 1.0 kN.

BASIC DESCRIPTION OF THE SYSTEM

Mechanical filtration – separators

Cartridge separators are fitted laterally into the extraction air ducts. They are made of stainless steel and fitted in a 500 × 175mm stainless frame. The space between the filters is filled with stainless steel plugs. The number of grease filters shall be calculated from the extracted air quantity so that the flow rate through one filter is in the optimum wopt range according to the graph (i.e. V_{opt} = 200 to 250 m³/h). The positioning of the grease filters in the kitchen area should match the location of the kitchen appliances. It might be useful to relocate the filters along the length of the extraction ducts after the layout of the kitchen appliances changes..

Pressure drop of 1 filter – Δp_F



UV-C filtration technology – odourless and grease-free waste air extraction

It is an efficient system for the elimination of grease particles in the waste air produced during cooking. The system is designed on the basis of the specified extraction capacity, appliance types and mechanical filtration efficiency rate, which must not fall below 75 %. When all the conditions are met in the design of the system, the efficiency of residual fat elimination is up to 99 %.

How UV-C technology works

- the waste air passes through a mechanical filtration system (500 x 175 mm grease filters), with approximately 80 % of the grease particles being removed the waste air passes through UV-C lamps
- UV-C lamps create ozone in the ambient air
- the ozone reacts with organic compounds (fats), which are oxidised or destroyed by cold combustion
- after oxidation, only water vapour, CO_2 and traces of fine powder (so-called polymerised wax) remain in the waste air

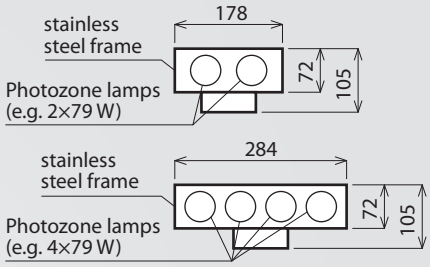
Why use UV-C technology

- the entire system remains completely clean, with its ageing being of no concern
- the waste air is odourless
- significantly lower cleaning and maintenance costs
- minimal risk of fire
- meets the most stringent criteria and requirements for environmental cleanliness

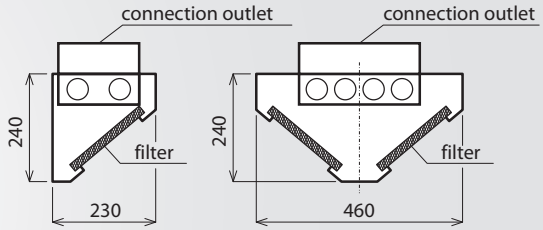
Basis of design

- the floor plan of the plant with the layout of the kitchen appliances
- the parameters of the kitchen appliances
- the layout of the ventilated and air-conditioning ceiling (designed by ATREA)

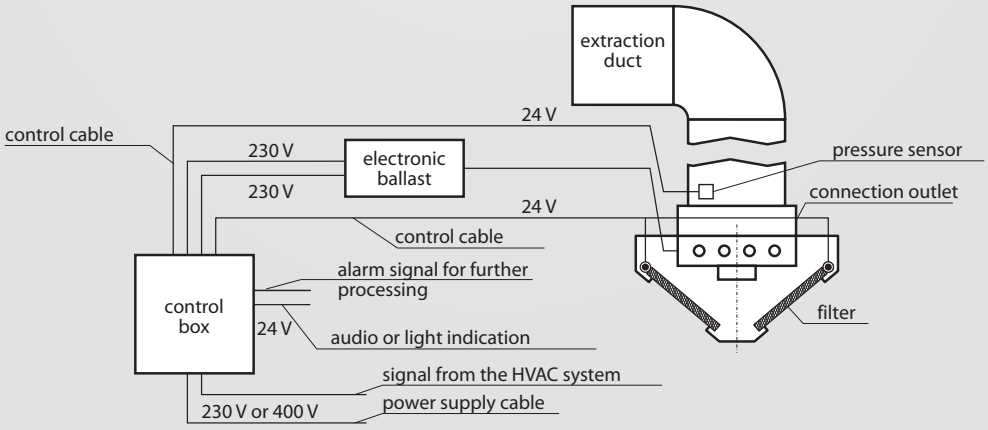
Types of UV-C lamps for SKV and TPV ceilings:



Example of UV-C lamps fitted in the extraction air ducts of a TPV ventilated ceiling:



Sample UV-C filtration technology schematic



TYPES AVAILABLE

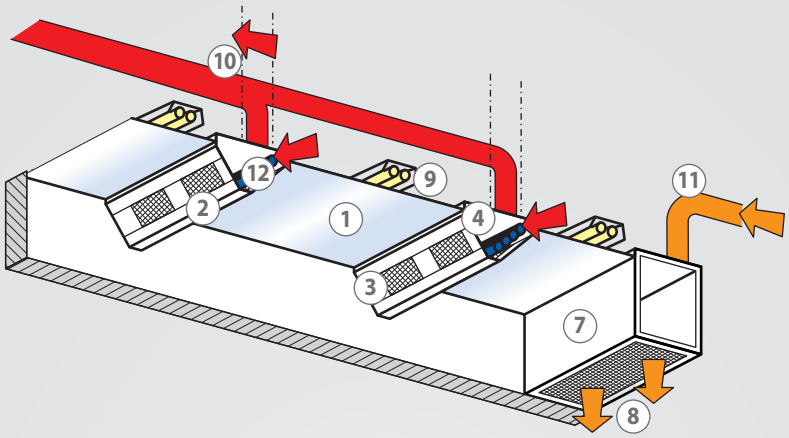
AVAILABLE TYPES OF VENTILATED CEILINGS – BASIC DESCRIPTION

SKV and TPV ventilated and air-conditioning ceilings are designed as a versatile modular system with high layout and installation flexibility.

They are divided into types **A**, **B** and **C** according to the way they are connected to the collection and supply ducts.

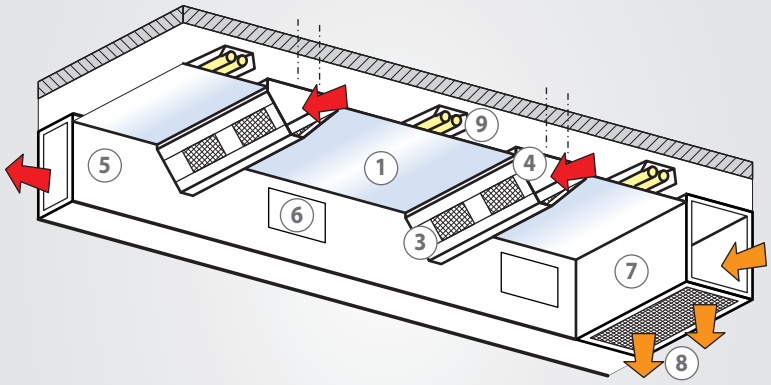
Type A: Integrated system - with transparent false ceilings and UV-C filtration

It is intended for all kitchens where maximum efficiency of waste air filtration is required, and it is equipped with UV-C filtration as standard.



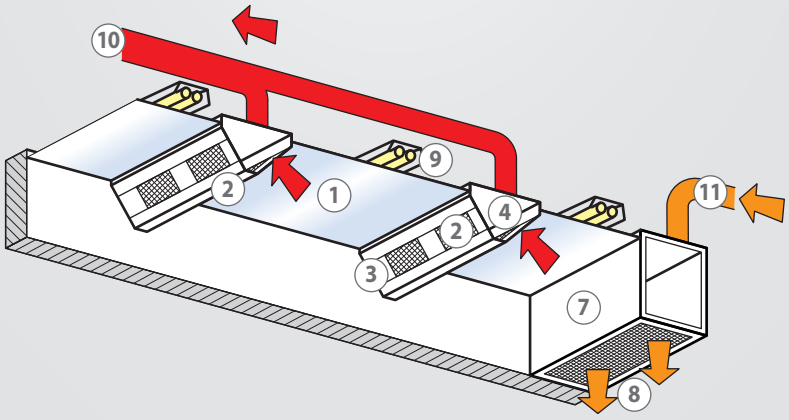
Type B: Integrated systems - with transparent false ceilings

Extraction, collection and supply air ducts are installed horizontally. They are used in low-ceiling rooms.



Type C: Systems with top-mounted ductwork

Extraction and supply air ducts are connected to the collection ducts vertically from the top. They are used in high rooms, which is beneficial in large kitchens where there is a requirement to reduce the exiting room height.



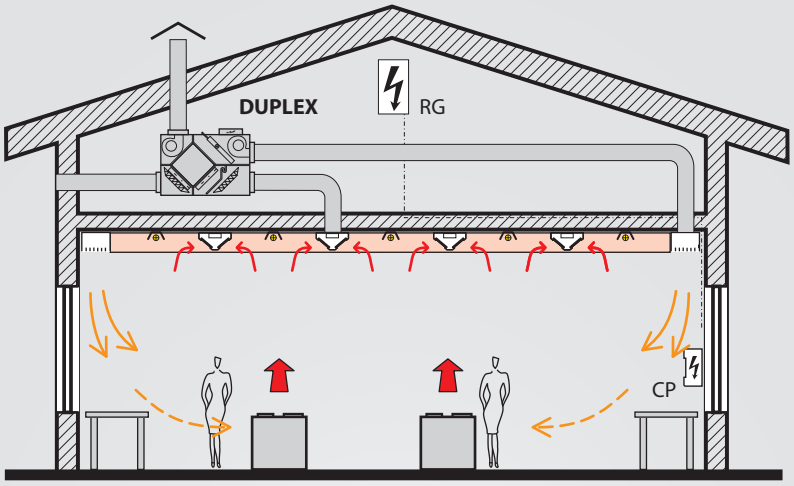
Legend:

1. transparent false ceiling
2. grease filters
3. intermediate liners
4. exhaust air duct
5. collection air duct
6. cleaning and inspection openings
7. supply air duct
8. large diffusers
9. fluorescent lighting
10. *top-mounted extraction air ducts
11. *top-mounted supply air ducts
12. *UV-C filtration

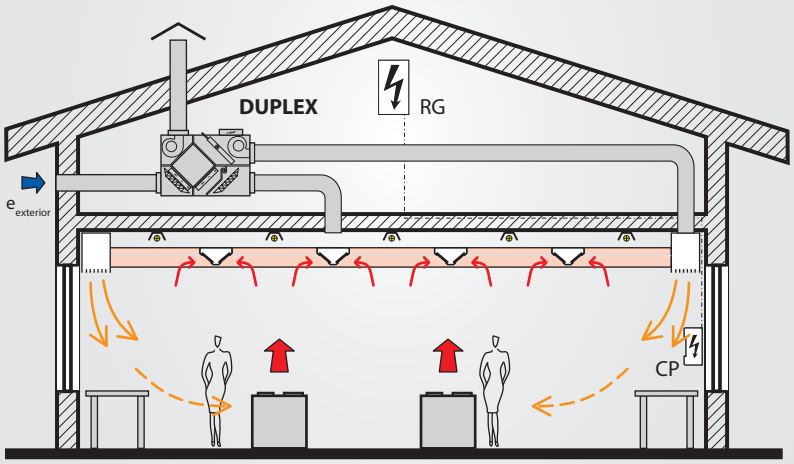
*) not a standard feature of the TPV

SYSTEMS

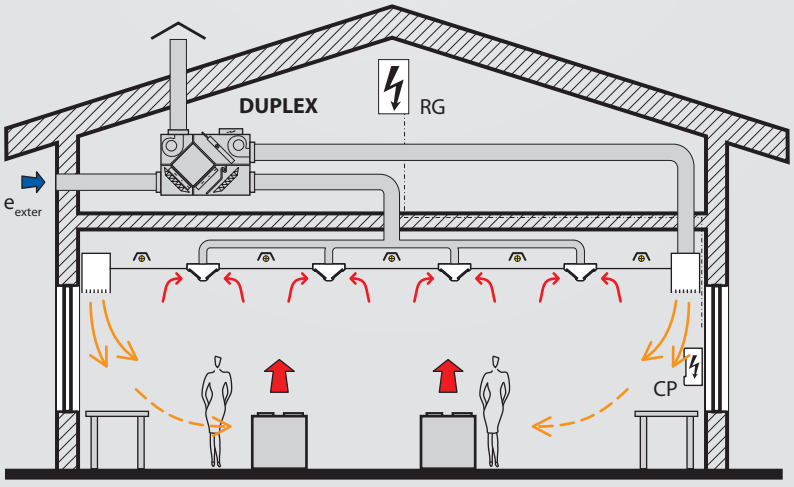
Type A:
- a ventilated and air conditioning ceiling equipped with UV-C filtration technology
- a ceiling with transparent false ceilings, integrated air supply from above or in a horizontal plane
- the integrated system is suitable for kitchens with a minimum height of **2.6 m**
- the air ducts are suspended on rods from the ceiling structure, as is the fluorescent lighting, for kitchens requiring maximum efficiency.



Type B:
- a ceiling with transparent false ceilings with integrated horizontal air collection and supply ducts
- the integrated system with transparent false ceilings and horizontal air ducts is generally designed for low and medium-height rooms **from 2.6 m**
- exhaust air ducts are suspended from the ceiling structure, fluorescent lighting is suspended from the ceiling



Type C:
- a ceiling with transparent false ceilings and integrated peripheral air supply and top-mounted extraction ducts
- a system with top-mounted extraction ducts and peripheral supply ducts is used for medium-sized rooms and heights **from 3.2 m**
- the exhaust air ducts are suspended on rods from the ceiling structure, as is the fluorescent lighting



CONTROL, MAINTENANCE

AUTOMATIC OPERATION CONTROL

Basic description

An automatic control system for kitchen ventilation is an optional accessory for ATREA kitchen hoods and ventilated and air conditioning ceilings.

This digital control system ensures economical operation of ventilation depending on the instantaneous heat production of the kitchen equipment, thus avoiding uneconomical operation of the fans during non-cooking times or when the heat load is reduced.

The basic principle of automatic control is the reading of temperature in the areas above the appliances and in the kitchen space. If the temperatures do not differ, only the minimum (set) fan speed is applied to ensure a basic air change rate in the kitchen, and the operation of gas appliances is allowed. When the temperature differential between the temperature sensor readings increases, the exhaust and supply fan power is automatically increased. The fans are continuously controlled by a 0–10 V signal. When this differential drops, the power is automatically reduced, with the air change rate possibly switching to the basic minimum.

Advantages of automatic control

- Maximum economy of operation
- Perfect hygienic conditions in the kitchen
- External signal from the combi oven for maximum performance
- Continuous control of ventilation power (0–10 V)
- Fully automatic control of ventilation power according to the current kitchen load
- Control based on temperature and humidity
- Zone ventilation in cooking areas or cooking blocks
- Remote access
- Option to set weekly programmes
- Holiday mode (can be used for bank holidays, for instance)
- Option to set several segments of operation for 1 day
- Heating and non-heating season control

AUTOMATIC OPERATION CONTROL

Maintenance

It mainly consists of regular cleaning of the grease filters. The grease cartridge filters are very easy to remove and clean in a dishwasher, for instance, or in a kitchen sink using water and detergent. A cleaning interval of 10 to 20 days is recommended, depending on the nature of the kitchen operation and contamination.

Cleaning

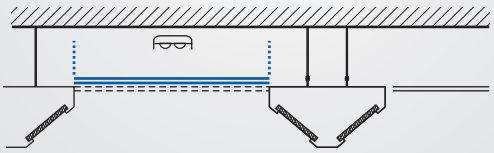
All stainless steel surfaces should be cleaned with special cleaning and preservative products (e.g. Cilit Bang) each 1 to 3 months, depending on the nature of the kitchen operation.

The air collection ducts have cleaning openings with hermetically sealed caps for inspecting the state of contamination and performing maintenance.

The transparent polycarbonate false ceilings are virtually dirt-free due to their completely smooth surface. The "no-drop" surface finish also prevents the formation and dripping of condensate droplets.

Replacing fluorescent lighting

Access to the fluorescent lighting is possible by loosening the screws of the hermetically sealed transparent false ceiling panels and sliding them laterally over the adjacent panels.



Fixing of macrolon false ceilings by means of eccentric pressure caps.

DESIGN, SIZING AND ORDER SPECIFICATION

1) Concept design

For the specified space and layout of the kitchen equipment, room height and connection to the ventilation system, a ceiling type with exhaust air duct layout in module M = 1 800 to 2 400 mm is selected by ATREA. The cross-sections of the collection and supply air ducts and the number of grease filters are then specified based on the calculated ventilation capacity..

If kitchen appliances with flue gas extraction ("B") are used, the flue gas duct passages through the ceiling must be indicated.

2) Sizing

The air capacity of the extraction ceiling is designed according to EN 16282 and ATREA's free Selection software (available at www.atrea.com) is used to calculate the exhaust air flow rate.

To size the system we recommend that the following air flow velocities and rates should be observed:

– grease filters	:	w = 0,8 to 1,0 m/s	V_1 = 200 to 250 m³/h/pc
– extraction air ducts	:	w = 3,0 to 4,0 m/s	V_1 = 1 000 to 2 900 m³/h
– air collection ducts	:	w = 6,0 to 7,0 m/s	ΣV ~ according to cross section
– supply air ducts	:	w = 5,0 to 6,0 m/s	ΣV ~ according to cross section

3) Heat recovery design (HRD)

For the vast majority of kitchen ventilation projects it is economically viable and recommended to install a heat recovery system. For ceilings, plastic plate heat exchangers by ATREA can be used (in the machine room or as part of a DUPLEX air handling unit).

4) Design of the automatic HVAC control system

ATREA's automatic operation control systems, which ensure optimum ventilation performance according to the instantaneous heat production from cooking, become cost-effective for large capacities (above 2,500 m³/h). To order this control system specify the type and size of the fan motors (voltage or frequency speed control).

5) Technical clarification and ordering

The customer shall submit a purchase order to the manufacturer specifying items 1–4, with accurate indication of all floor plan dimensions (including tolerances), heights, passageways including installation passages (including flue gas exhausts if applicable) through the ceiling, and specifying the type of the kitchen ceiling to design the anchoring system. If the electrical installation system is provided by ATREA, the lighting control zones and cable routing must also be specified.

The manufacturer will prepare a technical design plan (including the positioning of lights and sensors, if any, and the wiring diagram) and a quotation for the complete supply and installation project and return it to the client.

Example of a ceiling design brief

type: **„B"** – with transparent false ceilings, with integrated air intake and supply ducts in a horizontal plane

dimension	: 9 635 x 4 895 mm (tolerance ±15 mm)
room height	: H = 3 120 mm
ventilation capacity	: V = 4 800 m³/h
air change multiplicity factor	: n = 32 /h⁻¹/
HVAC	: external unit DUPLEX
automatic control	: voltage-controlled fans
lighting	: fluorescent – part of the SKV package

Example of a simplified ceiling project

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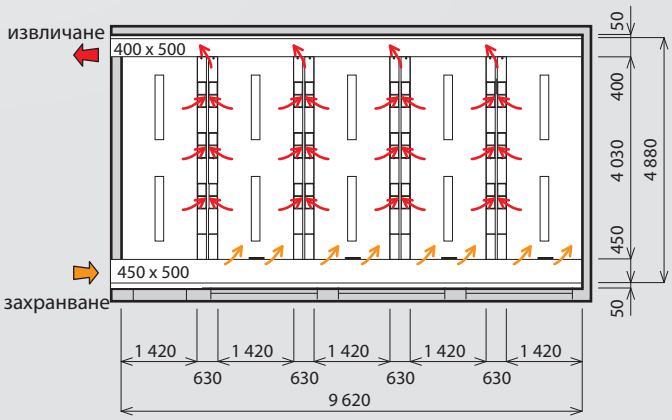

ADVANTAGES, REFERENCES

ADVANTAGES OF **SKV, TPV, TPV EXCLUSIVE** CEILINGS

- The closed extraction system eliminates contamination of the ceiling and surfaces and, subsequently, the formation of mould
- low purchase costs
- built-in UV-C filtration technology
- easy and quick installation
- exhaust air from the kitchen area is extracted evenly throughout the entire false ceiling area
- the location of the grease separators along the length of the ducts is flexible and allows for changes in the layout of the kitchen technology
- efficient exhaust air filtration in easily accessible and easily removable grease separators
- even, wall-to-wall illumination by diffusion indirect lighting
- easy maintenance of transparent ceilings
- perfect protection of the built-in lights against contamination by fat aerosols
- excellent architectural appearance of interiors in modern kitchens
- versatile installation also in existing spaces, particularly advantageous for low and vaulted ceilings
- simple design solution
- ventilated ceilings are approved by the National Institute of Health for all types of kitchens
- certified for use throughout the EU

REFERENCES

• Airest, Václav Havel Airport, Prague, Czech Republic •

• Škoda Auto, Mladá Boleslav, Czech Republic •

• Military hospital, Pitesti, Romania •

• Hotel SPO Sjenjak, Tuzla, Bosnia and Herzegovina •

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