klimaoprema

Cleanroom Technology

Operating rooms

... we go further
... to absolutely clean air!

DNV

DET NORSKE VERITAS

MANAGEMENT SYSTEM CERTIFICATE

KLIMAOPREMA d.d.

HRN EN ISO 9001

17021-HAA

4075/09

Klimaoprema Cleanroom Technology is a leading Croatian manufacturer of equipment for cleanrooms. We offer complete engineering, **"turn key"** solutions that include design, development, manufacturing, installation, validation (GMP Classes A, B, C, D), service, HVAC and automatics. The entire know-how in this sector is the result of our own research and development. Our applications have been confirmed in practice and meet the most stringent regulations pertaining to the pharmaceutical, chemical and food industries.

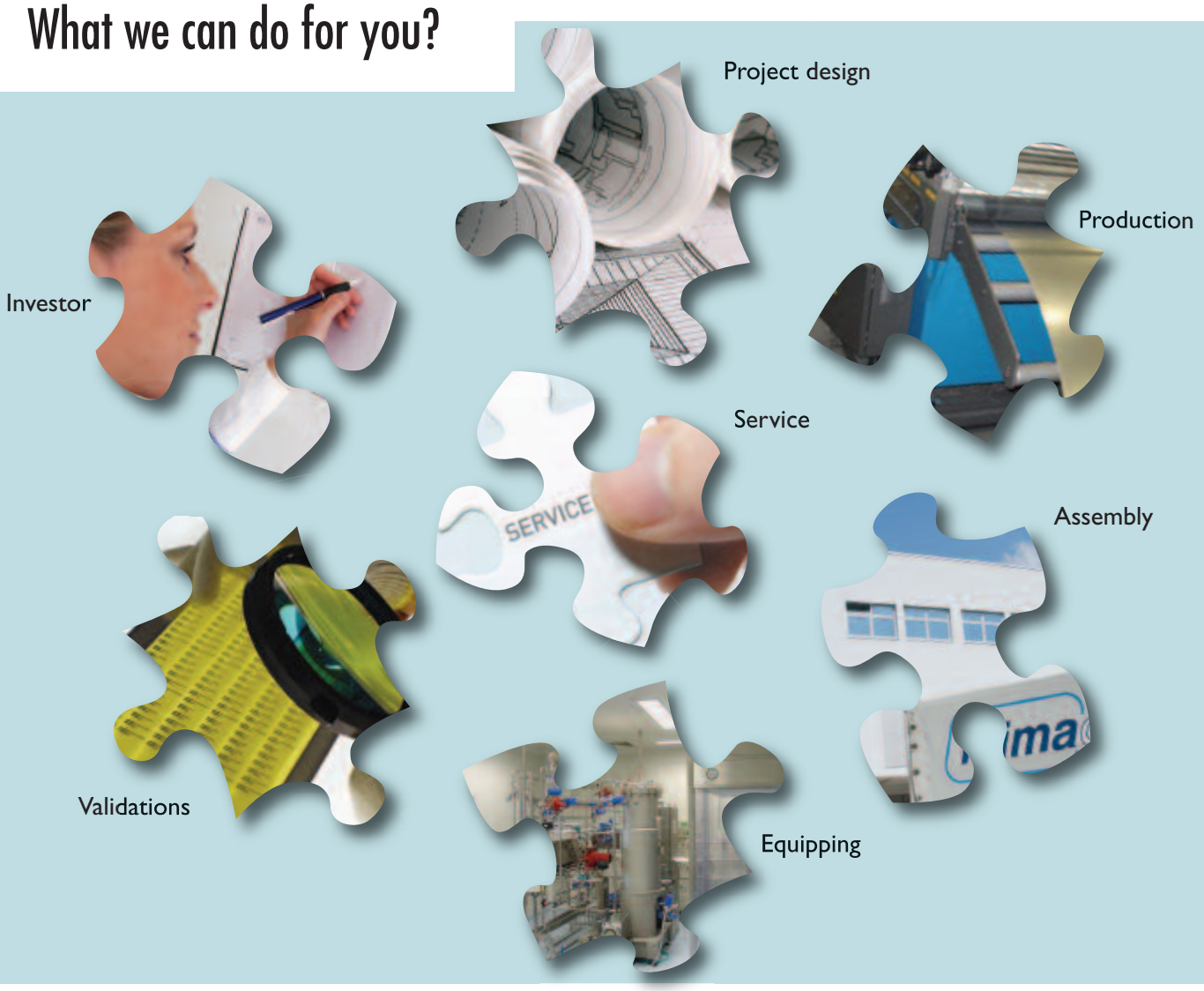
The experience we gain from our foundation in 1975. until today when Klimaoprema Cleanroom Technology is a modern company with excellent engineers, quality CNC machine park, testing laboratory, ERP information system for business process management and ISO 9001:2008 certified.

The company employs 150 workers at a central location and headquarters in Samobor, Croatia. The factory covers 9.300 m² production, storage and office space. We strive to be the company where at people want to come to work, employees are satisfied and business partners receive all necessary assistance required for implementation of projects.

This catalogue of operating rooms is just a way to meet us. Personal contact and meeting customers specific requirements is our mission and our staff, with their knowledge, engineering experience and energy, will realize your idea.

Technical data and dimensions given in the catalogue are standard. Upon request, variety of features and other dimensions of products are possible.

What we can do for you?



Content

Operating rooms by „turn key“ solutions

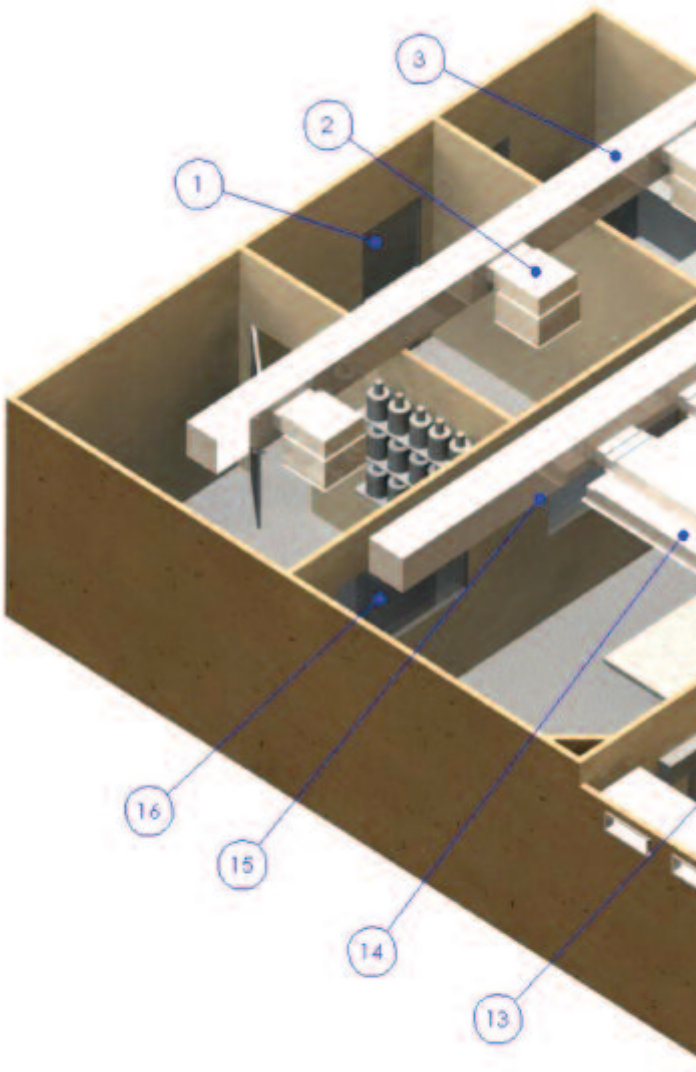
Paneling Systems

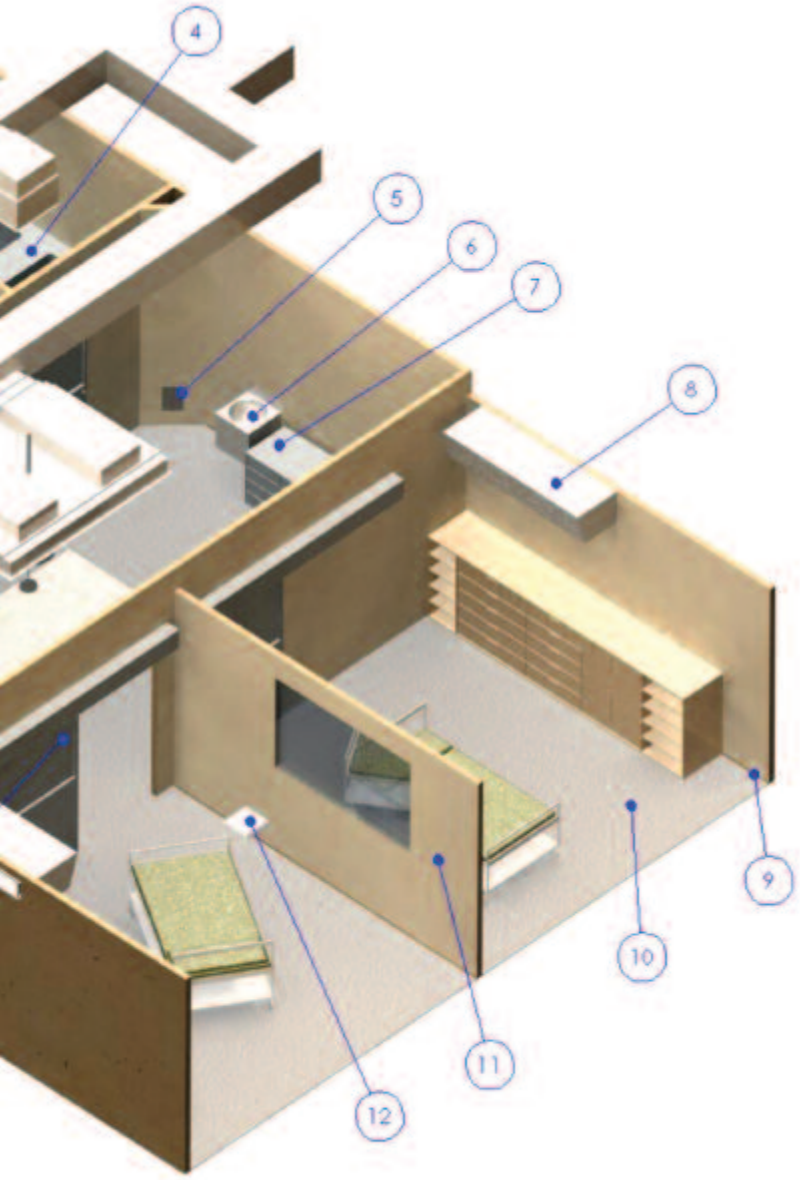
As houses are designed, operating rooms are designed as well. All the elements that make a house: walls, floors, windows, doors and other elements make up the operating room too. The house is a safe home to its owner, and the operating room is a safe place for patients, surgeons and other medical staff.

Operating rooms must be designed, constructed and adapted to suit the operations which will be performed in them. Project design should minimize the risk of contamination, dust and other impurities. Lighting, temperature, humidity and ventilation must comply with requirements of operations and must not affect the quality of operation or the work of equipment.
Flow of people, materials and equipment should be unidirectional to the fullest extent possible, in order to avoid the possibility of cross-contamination.
Work space must allow orderly and logical arrangement of materials and equipment in order to avoid possible cross-contamination and exclude the risk of release or replacement of any phase of the operation or control.
Walls, floors and ceilings of operating rooms should be of impervious material, smooth, without cracks and easily washable, and finishing of walls, floors and ceilings must be rounded.

The basic process fuels are an integral part of the plant and their distribution to the place of consumption should be performed on a short route, and connection to consumers should be from a ceiling.
When designing and installing power lines it is important to avoid dents and ensure that the maintaince is outside of the operating room.
Drains must be of adequate size and without the possibility of spills or backflow.
It is necessary to ensure an adequate exhaust system to control contaminants in case of eventual failure of ventilation system.
Access to the facility must be controlled and limited to authorized persons by codes or card reader.
Servicing and replacement of filters is performed in operating rooms and service and replacement of light fixtures is done from the technical area.

Conceptual design is the first step to successful construction of operating rooms whose walls are based od paneling systems.





1. Swing doors
2. Absolute Ceiling Filter FAC
3. Ventilation duct
4. Sink
5. Exhaust Surgical Grille OPR
6. Washing stand
7. Furniture for Operating rooms (Cabinet, hung sink, shelf, etc.)
8. Inclined Outflow Box KIK
9. Cove profile
10. Floor in Operating room
11. Wall panels (82, 62, 42 mm)
12. Lighting in Operating room
13. Sliding doors
14. Operation Ceiling SIP
15. Control elements (telephone, differential manometer, etc.)
16. Window in Operating room

Walls in Operating rooms

Wall Panels

Technical features:

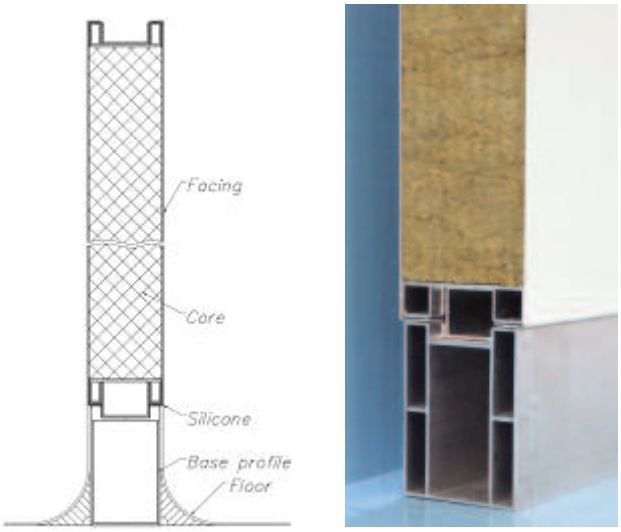
- Wall panel is made out of two facing sheets, folded all around the edges of aluminium frame
- Panel sheets can be made from:
  - Galvanized steel sheet coated in paint thickness 60-80 µm
  - Aluminium sheet coated in paint thickness 60-80 µm
  - Antibacterial sheet
  - Inox sheet
  - Kerrock
- Between the sheets is filling with dense stone wool or polystyrene which give excellent mechanical, thermodynamic and attenuation features and provide heat insulation, sound insulation and fire protection
- Panels are made watertight - all joints filled with silicone, retaining over pressure max. 500 Pa
- Panels without filling are used for installations or for cladding building structures, thickness min. 4 cm
- Standard wall color iz RAL 9002, other colors on request
- Panel thickness: 42, 62, 82 mm

Performance:

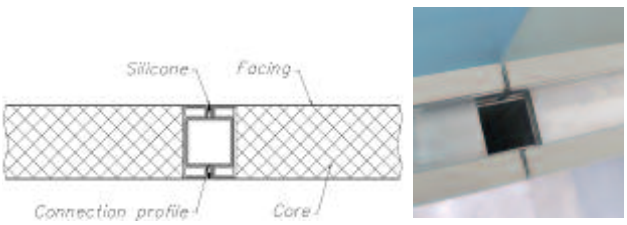
- Hardness
- Smooth surface, without bumps
- Easy cleaning and maintenance
- Waterproof
- Resistance to abrasion, chemicals
- Thermal and sound insulation
- Corrosion protection
- Long lasting

Assembly:

- Panels are mounted on to solid aluminium base profile
- Fixing is done by aluminium „H“ profiles (before installing the floor) or „U“ profiles (when floor is pre installed)
- Panel joints are made out of aluminium profiles and connections are siliconized
- Demontable panels for getting in larger equipment are available
- Easy montage/dismantling in case of changes



Cleanroom panel mounted on aluminium base profile



Horizontal connection of two Cleanroom panels

Technical data:

WALL PANELS, THICKNESS 42 mm							
Type	CRWPAN 42 GS RW	CRWPAN 42 AL RW	CRWPAN 42 ST RW	CRWPAN 42 GS PS	CRWPAN 42 AL PS	CRWPAN 42 ST PS	CRWAB 42 PS or RW
Description	Modular monoblock Cleanroom wall panel, without visible substructure						
Thickness	42 mm (± 1,0 mm)						
Dimensions	According to project requirements. Max. dimensions 1200 x 3600 mm (width x height)						
Facing sheets	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Antibacterial aluminium sheet 1,0 mm
Finish	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Powder coated PVC 100 microns thick
Color	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart
Fixing	Aluminium frame						
Filling	Stone wool (100 kg/m³) Reaction to fire: M0 - panel, λ = 0,035 W/mK			Polystyrene (30 kg/m³) Reaction to fire: M1 - panel, λ = 0,031 - 0,035 W/mK			Stone wool or Polystyrene
Weight/m²	15 kg	9 kg	5 kg	13 kg	7 kg	13 kg	13 kg
Connection	Connection profile						
Base profile	Aluminium base profile, height 100 mm or U shaped base profile						

WALL PANELS, THICKNESS 62 mm						
Type	CRWPAN 62 GS RW	CRWPAN 62 AL RW	CRWPAN 62 ST RW	CRWPAN 62 GS PS	CRWPAN 62 AL PS	CRWPAN 62 ST PS
Description	Modular monoblock Cleanroom wall panel, without visible substructure					
Thickness	62 mm (± 1,0 mm)					
Dimensions	According to project requirements. Max. dimensions 1200 x 3600 mm (width x height)					
Facing sheets	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm
Finish	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available
Color	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart		-
Fixing	Aluminium frame					
Filling	Stone wool (100 kg/m³) Reaction to fire: M0 - panel, λ = 0,035 W/mK			Polystyrene (30 kg/m³) Reaction to fire: M1 - panel, λ = 0,031 - 0,035 W/mK		
Weight/m²	17 kg	11 kg	17 kg	14 kg	8 kg	14 kg
Connection	Connection profile					
Base profile	Aluminium base profile, height 100 mm or U shaped base profile					

WALL PANELS, THICKNESS 82 mm							
Type	CRWPAN 82 GS RW	CRWPAN 82 AL RW	CRWPAN 82 ST RW	CRWPAN 82 GS PS	CRWPAN 82 AL PS	CRWPAN 82 ST PS	CRWAB 82 PS or RW
Description	Modular monoblock Cleanroom wall panel, without visible substructure						
Thickness	82 mm (± 1,0 mm)						
Dimensions	According to project requirements. Max. dimensions 1200 x 3600 mm (width x height)						
Facing sheets	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Antibacterial aluminium sheet 1,0 mm
Finish	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Powder coated PVC 100 microns thick
Color	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart
Fixing	Aluminium frame						
Filling	Stone wool (100 kg/m³) Reaction to fire: M0 - panel, λ = 0,035 W/mK			Polystyrene (30 kg/m³) Reaction to fire: M1 - panel, λ = 0,031 - 0,035 W/mK			Stone wool or Polystyrene
Weight/m²	19 kg	13 kg	19 kg	14 kg	8 kg	14 kg	14 kg
Connection	Connection profile						
Base profile	Aluminium base profile, height 100 mm or U shaped base profile						

Other dimensions and performances according to customer request

MARK	
CRWPAN	Cleanroom Wall Panel
GS	Galvanized steel sheet
AL	Aluminium sheet
ST	Stainless steel

MARK	
RW	Stone Wool
PS	Polystyrene
CRWAB	Cleanroom Wall Panel Antibacterial

Antibacterial Panels

Types of metal sheets:

- Galvanized steel sheet
- Aluminium sheet
- Inox

Types of caoting:

- Antibacterial coating - plastic coated PVC layer, thickness 100 µm
- Plastic coated layer, thickness 60 µm, standard color is RAL 9002, other colors on request

Technical features:

- Coating with antibacterial performances
- Antibacterial performances occur in the presence of environmental conditions conducive to the spread of bacteria, fungi and algae
- Routine cleaning does not affect the antibacterial activity
- Variety of colors and patterns, depending on the interior

Performance:

- Durability
- Easy maintenance
- Nice appearance, comfortable to touch
- High aesthetics
- Does not absorb water
- Fire resistance in accordance with standard EN 13501-1
- Chemical resistance
- Shock resistance
- Thermal resistance
- Resistance to microorganisms
- Resistance to corrosion and scratches

Fields of application:

- Medical and dental ordinations
- Hospitals
- Pharmacy
- Laboratories
- Research Institutes
- Computer centers

Standard Panel colors

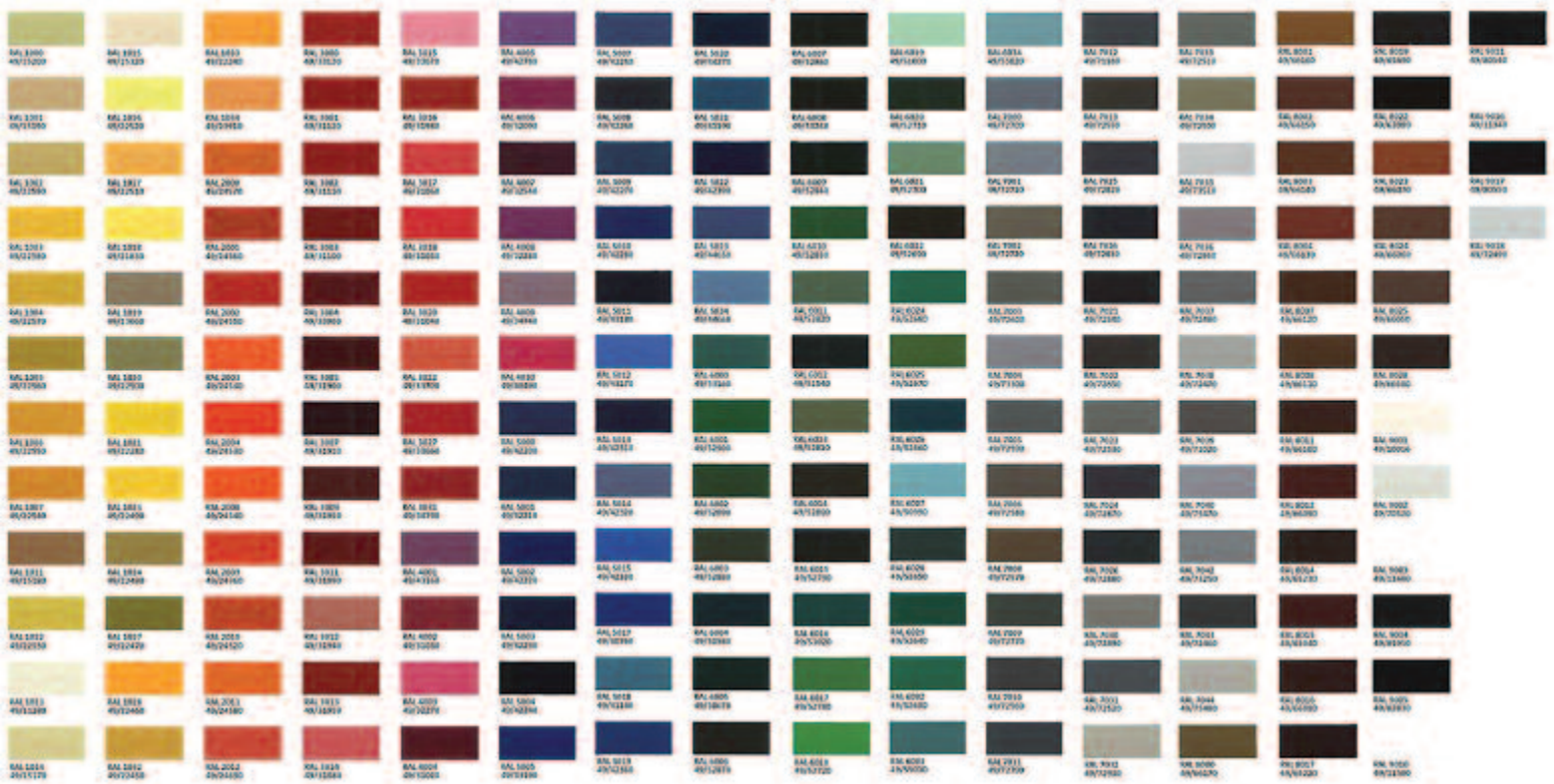
RAL 5024

RAL 9021

RAL 6019

RAL 9002

Door frame colors



Ceiling in Operating rooms

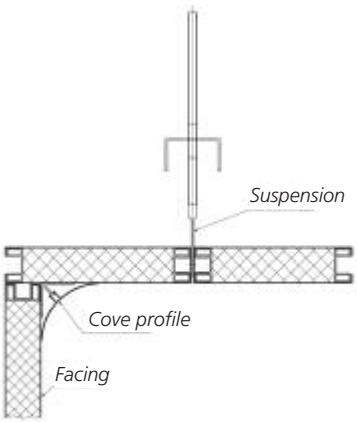
Ceiling Panels

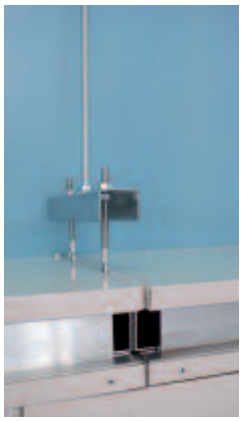
Technical features:

- Ceiling panel is made out of two facing sheets, folded all around the edges of aluminium frame
- Panel sheets can be made from:
  - Galvanized steel sheet coated in paint thickness 60-80 µm
  - Aluminium sheet coated in paint thickness 60-80 µm
  - Antibacterial sheet
  - Inox sheet
  - Kerrock
- Between the sheets is filling with dense stone wool or polystyrene which give excellent mechanical, thermodynamic and attenuation features and provide heat insulation, sound insulation and fire protection
- Panels are made watertight - all joints filled with silicone, retaining over pressure max. 500 Pa
- Panels without filling are used for installations or for cladding building structures, thickness min. 4 cm
- Standard color iz RAL 9002, other colors on request
- Panel thickness: 42, 62, 82 mm
- Ceilings are walkable. Non walkable ceilings available on request

Assembly:

- Ceiling panels are made from paneling systems in which the suspension is, for montage on concrete or steel construction
- Installation of suspended ceiling with standard dimensions 1,2 x 2,4 m (depending on shape and height of the room)
- Ceiling grid has to be harmonized with installations, distribution system and other elements in between the ceiling
- The ceiling is left open for installation of air distributers, lights and skylights. Aroud them it will be siliconed





Wall/ceiling panels connection. Ceiling invisibly suspended.

Performance:

- Hardness
- Smooth surface, without bumps
- Easy cleaning and maintenance
- Waterproof
- Resistance to abrasion, chemicals
- Walkable
- Thermal and sound insulation
- Corrosion protection
- Long lasting

Technical data:

CEILING PANELS, THICKNESS 42 mm							
Type	CRCPAN 42 GS RW	CRCPAN 42 AL RW	CRCPAN 42 ST RW	CRCPAN 42 GS PS	CRCPAN 42 AL PS	CRCPAN 42 ST PS	CRCAB 42 PS or RW
Description	Modular monoblock Cleanroom ceiling panel						
Thickness	42 mm (± 1,0 mm)						
Dimensions	According to project requirements. Max. dimensions 1200 x 3600 mm (width x height)						
Facing sheets	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Antibacterial aluminium sheet 1,0 mm
Finish	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Powder coated PVC 100 microns thick
Color	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart
Fixing	Aluminium frame						
Filling	Stone wool (100 kg/m³) Reaction to fire: M0 - panel, λ = 0,035 W/mK			Polystyrene (30 kg/m³) Reaction to fire: M1 - panel, λ = 0,031 - 0,035 W/mK			Stone wool or Polystyrene
Weight/m²	15 kg	9 kg	5 kg	13 kg	7 kg	13 kg	13 kg
Connection	Connection profile						
Suspension	Invisible suspension, montage on concrete or steel structure						
Walkable	Walkable up to 100 kg						

CEILING PANELS, THICKNESS 62 mm						
Type	CRCPAN 62 GS RW	CRCPAN 62 AL RW	CRCPAN 62 ST RW	CRCPAN 62 GS PS	CRCPAN 62 AL PS	CRCPAN 62 ST PS
Description	Modular monoblock Cleanroom ceiling panel					
Thickness	62 mm (± 1,0 mm)					
Dimensions	According to project requirements. Max. dimensions 1200 x 3600 mm (width x height)					
Facing sheets	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm
Finish	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available
Color	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart		-
Fixing	Aluminium frame					
Filling	Stone wool (100 kg/m³) Reaction to fire: M0 - panel, λ = 0,035 W/mK			Polystyrene (30 kg/m³) Reaction to fire: M1 - panel, λ = 0,031 - 0,035 W/mK		
Weight/m²	17 kg	11 kg	17 kg	14 kg	8 kg	14 kg
Connection	Connection profile					
Suspension	Invisible suspension, montage on concrete or steel structure					
Walkable	Walkable up to 100 kg					

CEILING PANELS, THICKNESS 82 mm							
Type	CRCPAN 82 GS RW	CRCPAN 82 AL RW	CRCPAN 82 ST RW	CRCPAN 82 GS PS	CRCPAN 82 AL PS	CRCPAN 82 ST PS	CRCAB 82 PS or RW
Description	Modular monoblock Cleanroom ceiling panel						
Thickness	82 mm (± 1,0 mm)						
Dimensions	According to project requirements. Max. dimensions 1200 x 3600 mm (width x height)						
Facing sheets	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Galvanized steel sheet 0,8 mm	Aluminium sheet 1,0 mm	Inox 0,8 mm	Antibacterial aluminium sheet 1,0 mm
Finish	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Polyester lacquered 25 microns thick with removable protective film	Powder coated 60 microns thick with removable protective film	Various surface finishing available	Powder coated PVC 100 microns thick
Color	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart		-	RAL 9002 Other colors on request according to the RAL chart
Fixing	Aluminium frame						
Filling	Stone wool (100 kg/m³) Reaction to fire: M0 - panel, λ = 0,035 W/mK			Polystyrene (30 kg/m³) Reaction to fire: M1 - panel, λ = 0,031 - 0,035 W/mK			Stone wool or Polystyrene
Weight/m²	19 kg	13 kg	19 kg	14 kg	8 kg	14 kg	14 kg
Connection	Connection profile						
Suspension	Invisible suspension, montage on concrete or steel structure						
Walkable	Walkable up to 140 kg						

Other dimensions and performances according to customer request

MARK	
CRCPAN	Cleanroom Ceiling Panel
GS	Galvanized steel sheet
AL	Aluminium sheet
ST	Stainless steel

MARK	
RW	Stone Wool
PS	Polystyrene
CRCAB	Cleanroom Ceiling Panel Antibacterial

Cove profiles

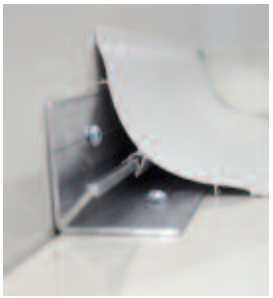
Technical features:

- All ceiling and wall connections made using cove profiles
- All floor and wall connections made using cove profiles
- Cove profiles are covering aluminium profiles that vertically conect walls or horizontally connect walls with the ceiling
- Made out of PVC or aluminium
- Due to flexibility there is no need for sealing
- Cove profiles are connecting wall panels with ceiling and wall panels with floor and form one complex

Mounted cove profile

Performance:

- Hardness
- Smooth surface, without bumps
- Easy cleaning and maintenance
- Waterproof
- Flexibility



PVC cove profile

Aluminium cove profile

Technical data:

Type	Dimensions (mm)
Base aluminium profile	40 x 40
PVC cove profile	70 x 70
Aluminium cove profile	70 x 70

Windows in Operating rooms

Technical features:

- Window is an integral part of wall panel and together they form one complex
- Thickness of the window is equal to the thickness of the wall panel
- Window is made of double glass 6+6 mm
- Window frame is filled with silica gel that absorbs moisture to avoid condensation in empty space between two glasses

Performance:

- Hardness
- Smooth surface, without bumps
- Easy cleaning and maintenance
- Waterproof
- Protection from condensation

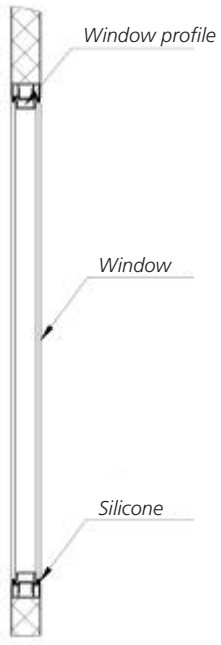
Technical data:

CLEANROOM WINDOW DIMENSIONS				
Type	CRW 42 AL 900 mm	CRW 42 AL 1200 mm	CRW 82 AL 900 mm	CRW 82 AL 1200 mm
Description	Cleanroom windows from double glass 6+6 mm filled with silica gel against moisture			
Thickness	42 mm	42 mm	82 mm	82 mm
Height	900 mm	1200 mm	900 mm	1200 mm
Dimensions (mm)	600 x 900 900 x 900 1200 x 900 1500 x 900 1800 x 900	600 x 1200 900 x 1200 1200 x 1200 1500 x 1200 1800 x 1200	600 x 900 900 x 900 1200 x 900 1500 x 900 1800 x 900	600 x 1200 900 x 1200 1200 x 1200 1500 x 1200 1800 x 1200
Frame	Aluminium			

Other dimensions and performances according to customer request

Assembly:

- Windows in aluminum frame fitted into panels



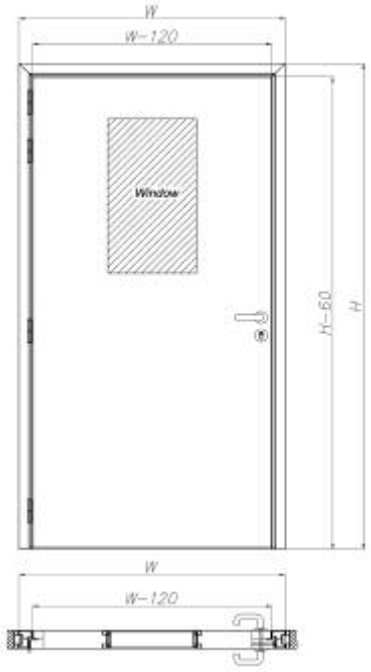
Cleanroom window mounted

MARK	
CRW	Cleanroom Window
AL	Aluminium framed

Doors in Operating rooms

Technical features:

- Doors are made from wall panels and aluminium, filled with rock wool or polystyrene
- Possible performance with or without window
- Fitted with key locks and door handles from inox
- On the floor side of doors is built drop seal that prevents air to flow under the door (to maintain the pressure difference in space)
- Standard color iz RAL 9002, other colors on request
- All doors in spaces that are classified premises have self-closing mechanism that ensures maximum adhesion
- Door glazing is performed without joints, slots, etc.
- Doors are designed to maintain overpressure in the room



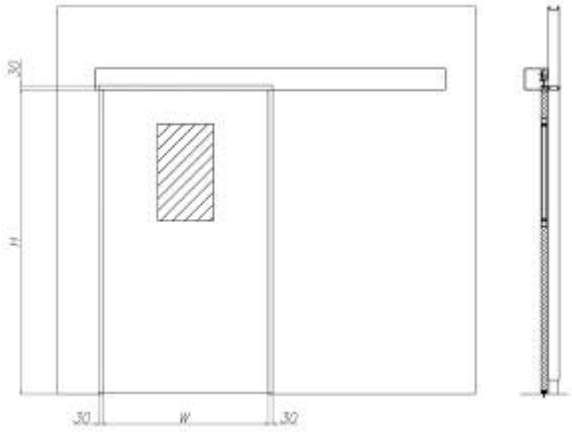
One leaf door

Types of Cleanroom door:

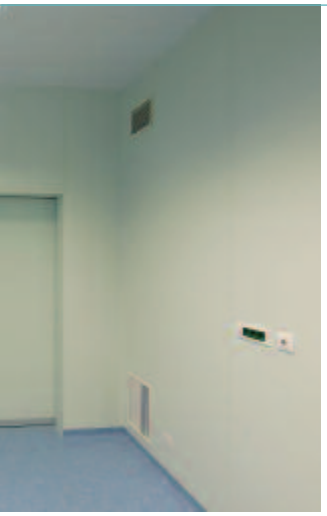
- Manual leaf, one leaf/two leaf door
- Manual sliding, one leaf/two leaf door
- Automatic leaf, one leaf/two leaf door
- Automatic sliding, one leaf/two leaf door

Interlock systems:

- Possibility of different ways to programming the system
- When the doors within the system are closed, LED light is green. When one door opens, other automatically lock and the LED light is red
- When more doors are opened, light and alarm indication will appear
- In case of alarm, panic button automatically unlocks all doors
- Possibility of an authorized entery, using the security card



Sliding door



Technical data:

CLEANROOM DOOR DIMENSIONS				
Type	Dimensions (width x height)	Filling	Lock with key	Glass
One leaf swing door CRD 82 AL	800 x 2200 /82 mm 900 x 2200 /82 mm 1000 x 2200 /82 mm 1100 x 2200 /82 mm 1200 x 2200 /82 mm	Polystyrene or rock wool, thickness 80 mm	Yes	No
One leaf swing door with window CRDW 82 AL	800 x 2200 /82 mm 900 x 2200 /82 mm 1000 x 2200 /82 mm 1100 x 2200 /82 mm 1200 x 2200 /82 mm	Polystyrene or rock wool, thickness 80 mm	Yes	Double 6+6 mm, in a plane with wing 400 x 700 mm
Two leaf swing door CRD 82 AL	1300 x 2200 /82 mm 1400 x 2200 /82 mm 1500 x 2200 /82 mm 1600 x 2200 /82 mm 1700 x 2200 /82 mm 1800 x 2200 /82 mm 1900 x 2200 /82 mm 2000 x 2200 /82 mm 2100 x 2200 /82 mm 2200 x 2200 /82 mm	Polystyrene or rock wool, thickness 80 mm	Yes	No
Two leaf swing door with window CRDW 82 AL	1300 x 2200 /82 mm 1400 x 2200 /82 mm 1500 x 2200 /82 mm 1600 x 2200 /82 mm 1700 x 2200 /82 mm 1800 x 2200 /82 mm 1900 x 2200 /82 mm 2000 x 2200 /82 mm 2100 x 2200 /82 mm 2200 x 2200 /82 mm	Polystyrene or rock wool, thickness 80 mm	Yes	Double 6+6 mm, in a plane with wing 400 x 700 mm
One leaf sliding door with window CRDS 42 AL	800 x 2200 /42 mm 900 x 2200 /42 mm 1000 x 2200 /42 mm 1100 x 2200 /42 mm 1200 x 2200 /82 mm 1300 x 2200 /82 mm	Polystyrene or rock wool, thickness 40 mm	No	Double 6+6 mm, in a plane with wing 400 x 700 mm
Two leaf sliding door with window CRDS 42 AL	1300 x 2200 /42 mm 1400 x 2200 /42 mm 1500 x 2200 /42 mm 1600 x 2200 /42 mm 1700 x 2200 /82 mm 1800 x 2200 /82 mm 1900 x 2200 /82 mm 2000 x 2200 /82 mm 2100 x 2200 /82 mm 2200 x 2200 /82 mm	Polystyrene or rock wool, thickness 40 mm	No	Double 6+6 mm, in a plane with wing 400 x 700 mm

Other dimensions and performances according to customer request

Type	Swing door system	Hydraulic pumps	Rubber bumper
	for one leaf and two leaf doors	• Weaker (for leaf door width up to 1100 mm) • Stronger (for leaf door width up to 1400 mm) - Sprocket lock with sliding rail - Adjustable door closing force - Adjustable closing speed of the door - For right or left side (pulling or pushing) - Optical closing force indicator	Rubber bumper for wall protection

MARK	
CRD	Cleanroom door
CRDW	Cleanroom door with window
CRDS	Cleanroom door sliding
AL	Aluminium sheet

Floors in Operating rooms

Technical features:

- Electro conductive (granular structure)
- Antistatic
- Suitable for underfloor heating
- Resistance to chemicals, mechanical stains and heat
- No traces of damage
- Without joints
- Watertight
- Anti slip
- Resistant surface, suitable for frequent, intensive cleaning
- Many colors and patterns
- Durability: 15-40 year

Minimum requirements:

- Electrical resistant EN 1081: ≤1 x 10^6 Ω
- Thickness EN 428: 2,2 mm
- Abrasion resistance EN 685: 31/43
- Thermal conductivity EN12524: 0,25 W/mK
- Residual imprint EN 433: 0,04
- Weight per area unit EN 430: 2900 g/m²
- Compressive strength: 80N/mm²
- Adhesion: >3N/mm²
- Mechanical flexibility: 15´000N/mm²
- Hardness: Sh.75
- High chemical resistance: DIN 53454, 53452, 53750, ISO 868

Security features:

- Fire resistance EN 13501-1: Bfl-S1 (DIN 4102 B1)
- Floor slippery BGR 181: group R10
- Attenuation of steps ISO 140-8: 3 dB

Types of Cleanroom floors:

- EPOXY
  - compact, smooth surface without pores, made from epoxy resin powder granules
  - performed on the surface of the smoothing concrete or cement screed
  - suitable for pharmaceutical industry

- PVC
  - highly impregnated PVC
  - usually is performed on the cement screed surface

Light in Operating rooms

Technical features:

- Metal housing, powder coated in white
- Lamps completely wired and ready to connect to the voltage of electricity from the grounding
- Clear protective glass, 4 mm thick, strong
- For operating rooms, intensive care sections, laboratories, cleanrooms
- Leading PE13 built on the top of the housing
- Lights are making one complex with panel systems and provide air-tightness - positive pressure in operating room

Assembly:

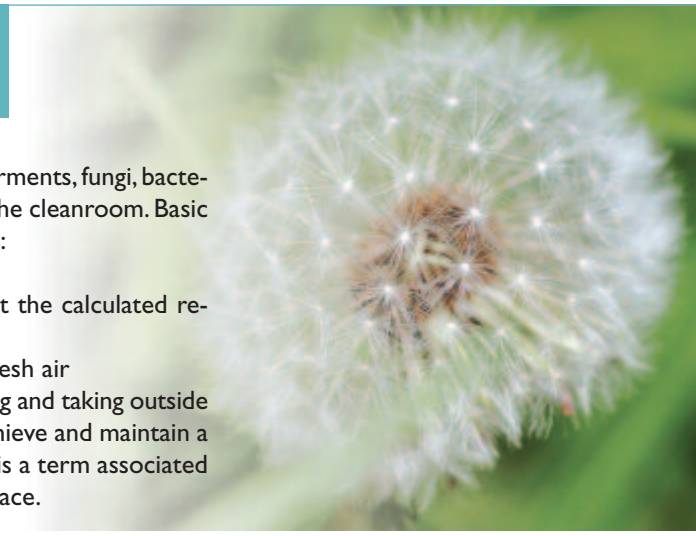
- Clenching in the ceiling
- Replacement of tubes in lamps is done from the technical area or clean area

Technical data:

	Fluorescent tubes	Protection class
Cleanroom lamps	4 x 14 W	IP 54, IP 65, IP 66
	4 x 24 W	
	2 x 36 W	
	2 x 54 W	

Other dimensions and performances according to customer request

Design of Ventilation systems



Environmental and ambient air contains microorganisms, microbes, ferments, fungi, bacteria, viruses and other particles, and as such can not be distributed in the cleanroom. Basic requirements for the design of ventilation systems in cleanrooms are:

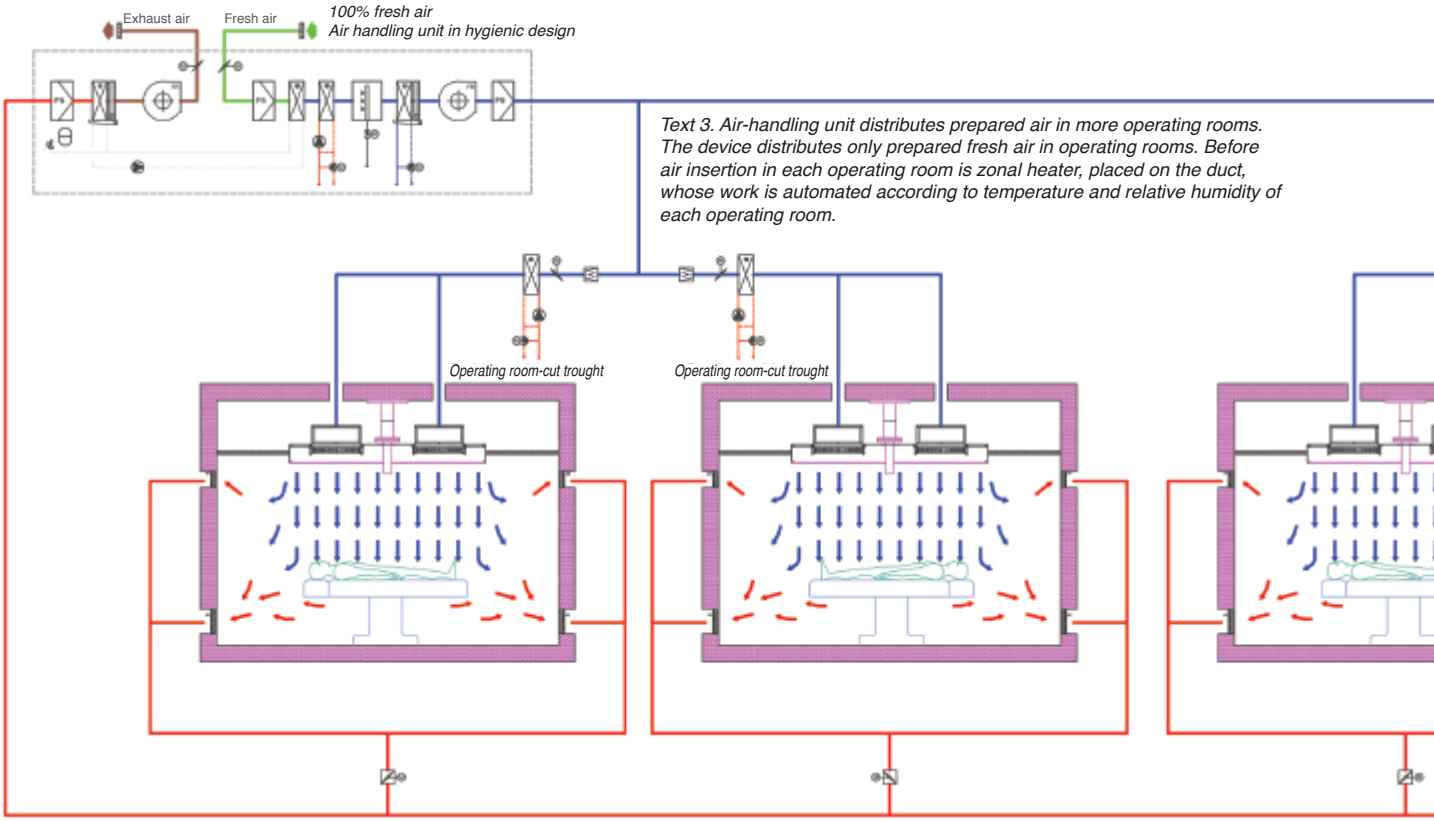
- Air in space should be clean, without dust or other impurities
- Temperature and relative humidity in indoor space should meet the calculated requirements depending on the purpose and activities in space
- Total air flow must contain at least some share of the outside fresh air

Design of ventilation systems is determinated by the process of bringing and taking outside fresh air into the building, through projected openings, in order to achieve and maintain a certain quality of air in the inner space. Air quality in the inner space is a term associated with friendliness, health and productivity of people who are in the space.

Air-handling units

Technical features:

- Hygienic air-handling units - specially constructed devices for air-conditioning of operating rooms, cleanrooms, laboratories, pharmaceutical and electronic facilities
- Made from materials that do not pose any threat to human health and do not facilitate the growth of harmful micro organisms
- Internal surfaces made of wear-resistant materials and easily accessible for cleaning and disinfection purposes
- All parts for air movement should allow easy inspection, cleaning and disinfection
- Control cabinets with all neccessary elements of DDC regulation and elements of power installations (bimetals, contactors, cam control switches)

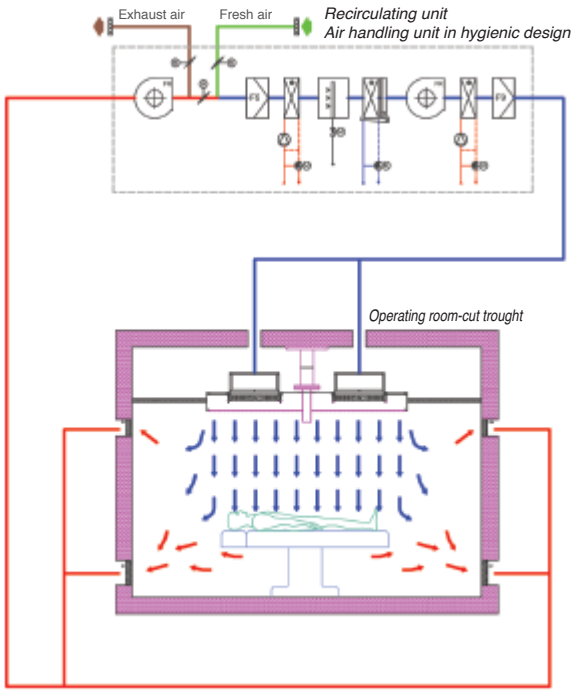


Text 3. Air-handling unit distributes prepared air in more operating rooms. The device distributes only prepared fresh air in operating rooms. Before air insertion in each operating room is zonal heater, placed on the duct, whose work is automated according to temperature and relative humidity of each operating room.

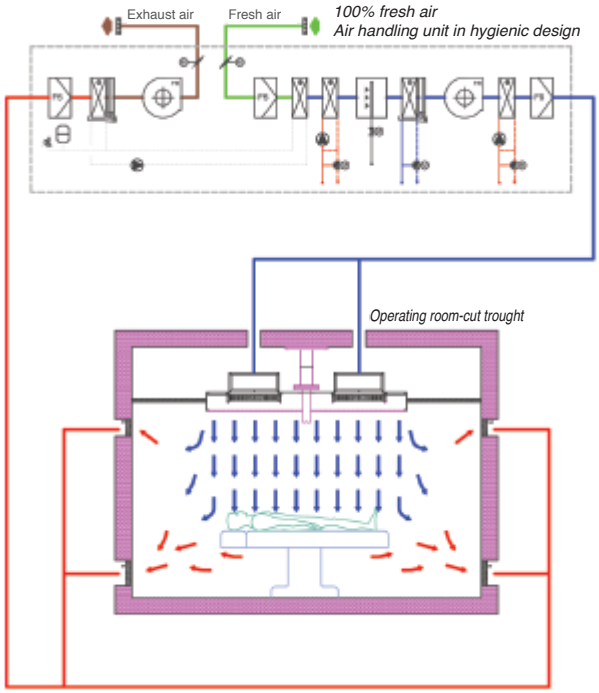
Standards and guidelines for construction:

- HRN EN 1886 - ventilation for buildings
- HRN EN 13053 - ventilation for buildings
- VDI 3803 - air-conditioning systems, structural and technical principles
- VDI 6002 - hyginic standards for ventilation and air-conditioning systems
- DIN 1946 - ventilation and air-conditioning systems in hospitals

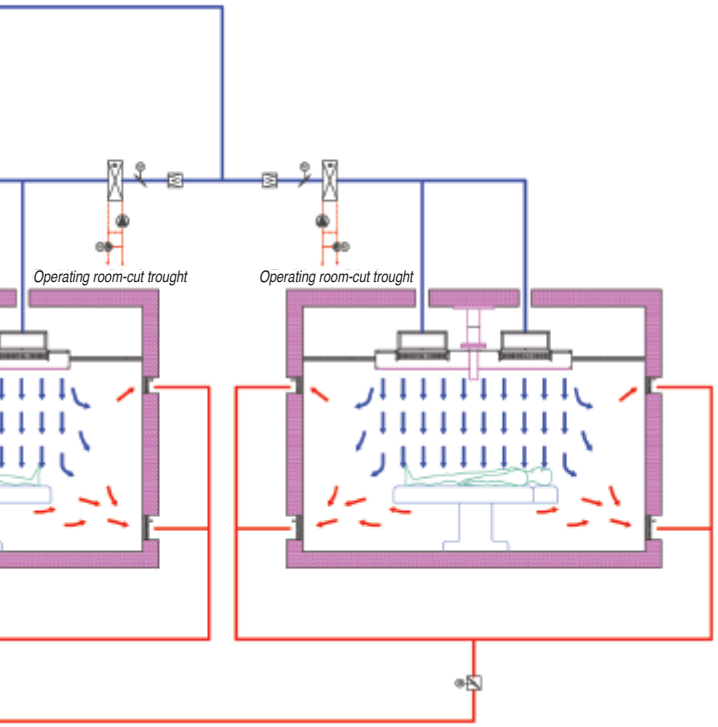
Cetificates:
- TÜV München



Text 1. Air-handling unit distributes prepared air in one operating room. The device uses a reverse air circulation from operating room and is mixing required quantity of hygiene air.



Text 2. Air-handling unit distributes prepared air in one operating room. The device distributes only prepared fresh air in operating room.



MARKS:

- Constant air volume control damper
- Room air pressure damper
- Circulating pump
- 3-way regulating valve
- 2-way regulating valve
- Expansion
- Filter
- Heater
- Cooler
- Heater run around
- Cooler run around
- Humidifer
- Fan
- Regulating damper

- Fresh air duct
- Supply air duct
- Return air duct
- Exhaust air duct
- Startup pipe line of heating media
- Return pipe line of heating media
- Startup pipe line of cooling media
- Return pipe line of cooling media
- Pipe line divorcement media in the circle of run around recuperator

Operation Ceiling SIP

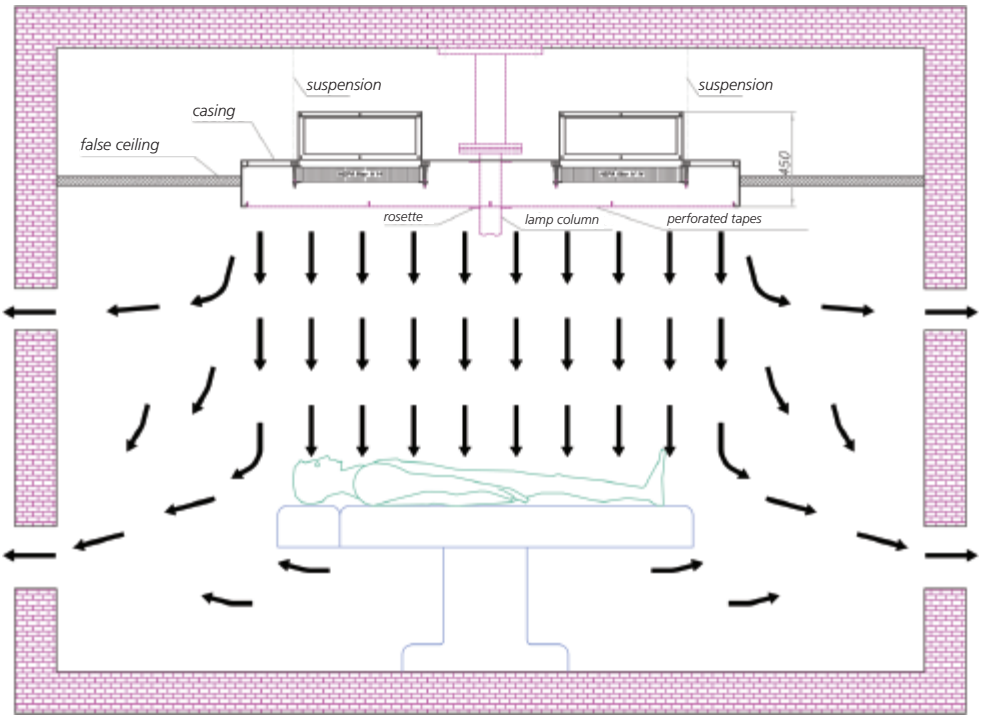
Technical features:

- Operation ceiling is intended for supply of filtrated air into operating rooms
- Optimal aseptic conditions are being achieved due to laminar air flow which is gradualy directed toward exhaust openings
- Recomended air flow velocity, above operation table is between 0,15-0,30 m/s
- Absolute filtration is done by high quality HEPA filters class H14 (H13) according to EN 1822
- Casing and air flow surface are made from inox
- Air flow surface can be made of poliethilene fiber with lamps installed within
- Easy to clean and disinfect

Technical data:

OPERATING CEILING DIMENSIONS					
SIP	Dimensions length x width x height (mm)	Air connection (mm)	HEPA H14 filter (mm)	Air flow velocity (m/s)	Air flow (m^3/h)
SIP-2014	2000 x 1400 x 450	540 x 180 2 pcs.	1220 x 610 x 69 2 pcs.	0,15 0,25 0,25 0,30	1500 2000 2500 3000
SIP-2418	2400 x 1800 x 450	540 x 180 2 pcs.	1525 x 610 x 69 2 pcs.	0,15 0,25 0,25 0,30	2300 3000 3800 4600
SIP-2720	2700 x 2000 x 450	690 x 180 2 pcs.	1830 x 762 x 69 2 pcs.	0,15 0,25 0,25 0,30	2900 3880 4860 5800

Other dimensions and performances according to customer request



Assembly:

- Mounting in false ceiling

Inclined Outflow Box KIK

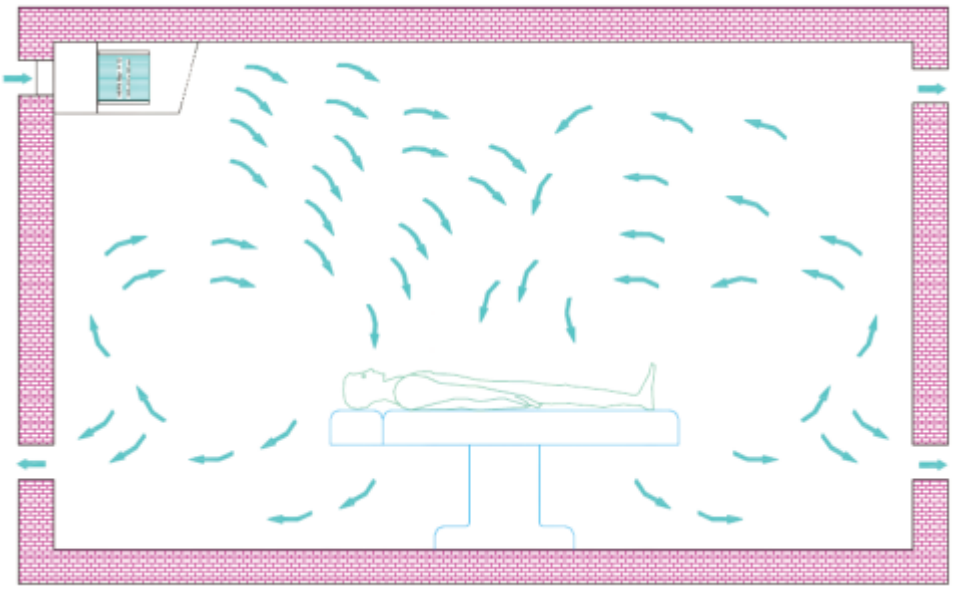
Technical features:

- Inclined outflow box is intended for supply of filtrated air into operating rooms and intensive care sections that have limited ceiling height so operating ceiling SIP can not be installed
- Casing and air flow surface are made from inox
- Duct connection can be located at the back or upper side
- In casing is installed high quality HEPA filter class H13 or H14 for particulates 0,3 µm of efficiency 99,95-99,995% according to EN 1822

Technical data:

INCLINED OUTFLOW BOX DIMENSIONS					
KIK	Unit	KIK 1000	KIK 1500	KIK 2000	KIK 3000
Dimensions of housing width x height x length	mm	490 x 410 x 1000	490 x 410 x 1000	720 x 410 x 2000	720 x 410 x 2000
Duct connection height x length	mm	200 x 600	200 x 600	200 x 800	200 x 800
Filter dimensions	mm	305 x 610 x 292	305 x 610 x 292	305 x 610 x 292	305 x 610 x 292
No. of filters	kom	1	1	2	2
Flow trough	m^3/h	1000	1500	2000	3000
Pressure drop	Pa	250	250	250	250

Other dimensions and performances according to customer request



Absolute Ceiling Filter FAC

Technical features:

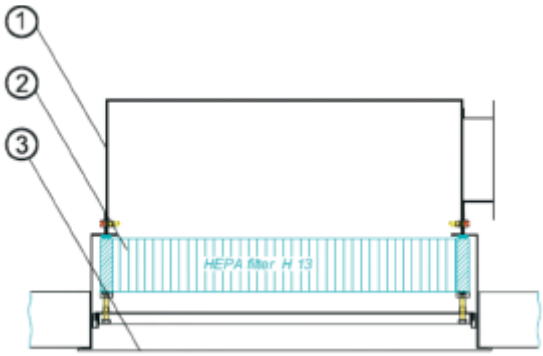
- Absolute ceiling filter with diffuser plate is intended for supply of „absolutely“ clean, filtrated air into operating rooms, intensive care sections, laboratories and cleanrooms that are in class 7 and 8 according to ISO 14644 standard
- Filter casing is made from inox, plastic coated in white color RAL 9010
- Filter casing is made as an air-tight construction
- Absolute filter according to EN 1822 is installed in casing
- Casing is fitted with differential pressure gauge connections for pressure drop measurements and filter saturation control
- Diffuser plate is made of steel sheet, plastic coated in white color RAL 9010. Other colors or performance out of inox are available on request
- Size of diffuser plate is adapted to dimensions of the casing
- Filter change is performed from the lower, clean side, after removal of diffuser plate

Filter casing air-connection options:

- Horizontal circular connection
- Vertical circular connection
- Horizontal rectangular connection
- Horizontal rectangular connection with air-tight damper. Air-tight damper with motor is an option

Components:

1. Housing/Casing
2. HEPA filter
3. Diffuser plate



Ceiling diffuser for air supply in up to 4 m high rooms. Due to high induction they are very convenient for cooling rooms that have high temperature differences.

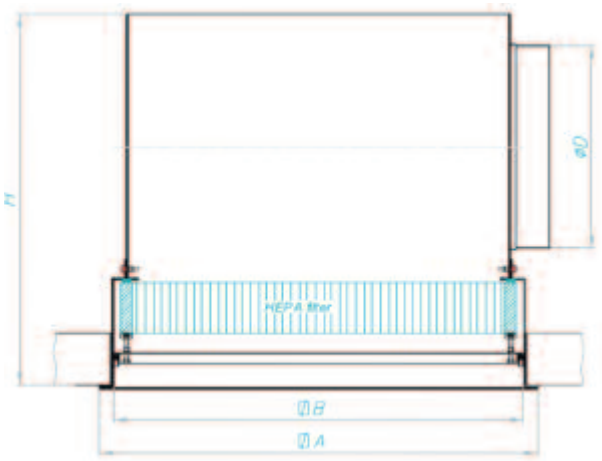
Swirl ceiling diffuser whose radial jet is mixing with room air, achieving key contaminant „dilution“ effect.

Diffusers that are suitable for areas with a large number of air changes in rooms up to 4 m high. Large effective velocity discharge of air flow provides a steady flow.

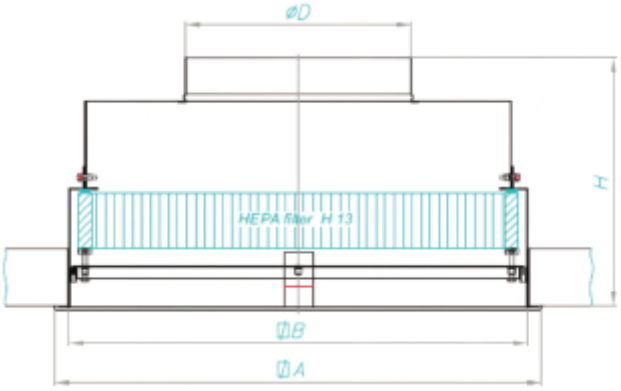
Ceiling diffuser with perforated front plate whose directed jet secures absolutely clean air in target area.

Technical data:

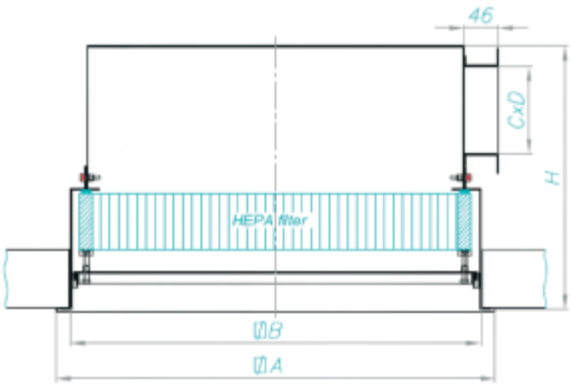
HORIZONTAL CIRCULAR CONNECTION, TYPE FAC-HO								
	Nominal size				Filter dimensions			Air flow
	B	H	ØD	A	b	h	t	Q
	mm	mm	mm	mm	mm	mm	mm	m³/h
FAC-HO	331	380	158	370	305	305	78	250
	483	420	198	522	457	457	78	570
	561	470	248	598	535	535	78	770
	601	470	248	625	575	575	78	890
	636	520	298	675	610	610	78	1000
	636	784	348	675	610	610	292	2000
	636	834	398	675	610	610	292	3400



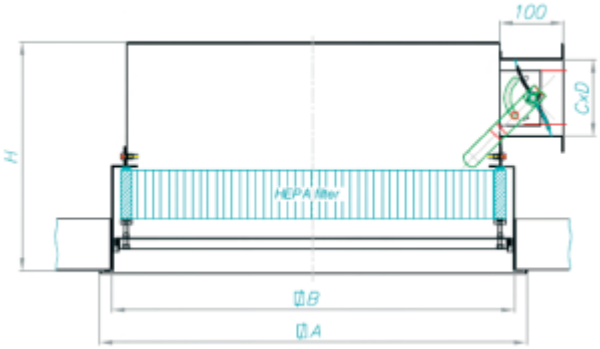
VERTICAL CILCURAL CONNECTION, TYPE FAC-V								
	Nominal size				Filter dimensions			Air flow
	B	H	ØD	A	b	h	t	Q
	mm	mm	mm	mm	mm	mm	mm	m³/h
FAC-V	331	328	158	370	305	305	78	250
	483	328	198	522	457	457	78	570
	561	328	248	598	535	535	78	770
	601	328	248	625	575	575	78	890
	636	328	298	675	610	610	78	1000
	636	542	348	675	610	610	292	2000
	636	542	398	675	610	610	292	3400



HORIZONTAL RECTANGULAR CONNECTION, TYPE FAC-H									
	Nominal size					Filter dimensions			Air flow
	B	H	A	C	D	b	h	t	Q
	mm	mm	mm	mm	mm	mm	mm	mm	m³/h
FAC-H	331	360	370	250	120	305	305	78	250
	483	360	522	400	120	457	457	78	570
	561	360	598	475	120	535	535	78	770
	601	360	625	520	120	575	575	78	890
	636	360	675	550	120	610	610	78	1000
	636	634	675	550	180	610	610	292	2000
	636	704	675	550	250	610	610	292	3400



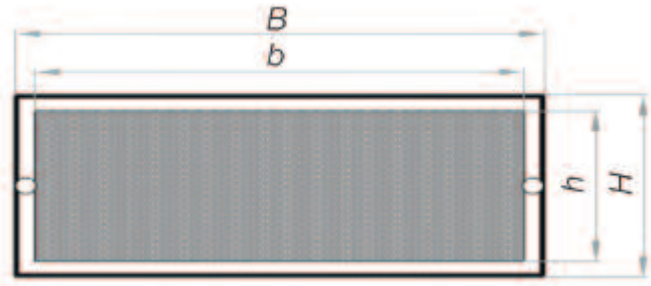
HORIZONTAL RECTANGULAR CONNECTION WITH AIR-TIGHT DAMPER, TYPE FAC-HZ									
	Nominal size					Filter dimensions			Air flow
	B	H	A	C	D	b	h	t	Q
	mm	mm	mm	mm	mm	mm	mm	mm	m³/h
FAC-HZ	331	360	370	250	120	305	305	78	250
	483	360	522	400	120	457	457	78	570
	561	360	598	475	120	535	535	78	770
	601	360	625	520	120	575	575	78	890
	636	360	675	550	120	610	610	78	1000
	636	634	675	550	180	610	610	292	2000
	636	704	675	550	250	610	610	292	3400



Exhaust Surgical Grille OPR

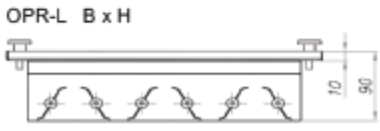
Technical features:

- Exhaust surgical grille is designed for wall mounting in areas with specific requirements of purity (operating rooms)
- Made from inox
- Possible options with filter class G4 or with regulation damper



OPR B x H

OPR-F B x H - with filter class G4



OPR-L B x H - with regulation damper

Technical data:

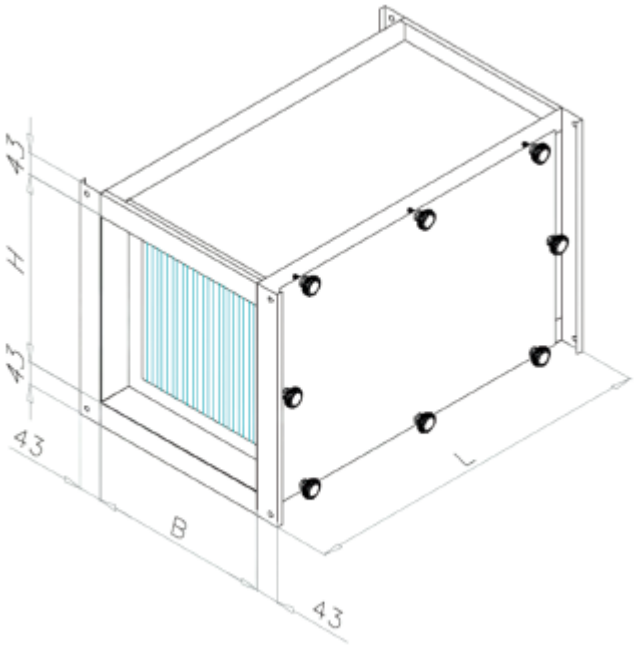
	Nominal size width x height (mm)	Diffuser plate width x height (mm)	Air flow Q (m³/h)
OPR	325 x 225	285 x 185	450
	425 x 225	385 x 185	650
	525 x 225	485 x 185	800
	425 x 325	385 x 285	1000
	525 x 325	485 x 285	1200
	625 x 325	585 x 285	1500

Other dimensions and performances according to customer request

Absolute Duct Filter FAK

Technical features:

- Absolute duct filter is designed for absolute air filtration in spaces prior to the premises where high class of air cleanliness is required (hospitals, pharmaceutical, food, electronic industry)
- Filter insert is absolute HEPA filter, class H13 or H14 for airborne particles 0.3 μm, efficiency 99,95÷99,995% according to EN 1822
- Replacement of filter insert is done from the side, after cover removal
- Casing contains connections for filter saturation control
- Casing is made from galvanized steel sheet, plastic coated in white color RAL 9010



Technical data:

	Nominal size width x height x length (mm)	Filter dimensions width x height x length (mm)	Air flow Q (m³/h)
FAK	309 x 309 x 450	305 x 305 x 78	250
	461 x 461 x 450	457 x 457 x 78	570
	309 x 614 x 450	305 x 610 x 78	500
	614 x 614 x 450	610 x 610 x 78	1000
	309 x 309 x 600	305 x 305 x 292	500
	461 x 461 x 600	457 x 457 x 292	1140
	309 x 614 x 600	305 x 610 x 292	1000
	614 x 614 x 600	610 x 610 x 292	2000
	309 x 614 x 600 - max.	305 x 610 x 292 - max.	1500
	614 x 614 x 600 - max.	610 x 610 x 292 - max.	3400

Other dimensions and performances according to customer request

Automatic

BMS - Building Management System

- Computer system
- Complete control of parameters in the operating room: room temperature, airflow, ventilation, lighting, fire systems, security systems, control systems, interlock systems
- Capturing all the phenomena in accordance with GMP standards
- Data recording, easy access to data
- Central or remote management
- Control, monitoring and optimization of energy consumption
- Effective monitoring and targeting energy consumption
- Control of working conditions, increased comfort and productivity of staff
- Early detection of problems
- Greater reliability of the plant

Validations

Features:

- Validations are done by international rules and norms
- According to EN 12469 norm for microbiological safety cabinets and according to GMP or ISO standards for clean rooms we do tests and measuring
- We confirm that the devices are correct, in accordance with regulations, proper application and compliance with customer needs
- Speed test and uniformity of air flow test
- HEPA and ULPA filters integrity test
- Number of particles test in work space
- Visualization flow test, smoke test
- Overpressure test
- Noise and vibration test
- Illumination test

References

Clinical hospital „Dubrava“, Zagreb

Traumatology clinic, Zagreb

Maternity hospital, Split

Special hospital „Magdalena“, Krapinske toplice

References

Maternity hospital, Split

Clinical hospital „Rebro“, Zagreb

Polyclinic „Medico“, Rijeka

Clinical hospital „Rebro“, Zagreb

Clinical hospital „Rebro“, Zagreb

Clinical hospital „Dubrava“, Zagreb

Maternity hospital, Split

Clinical hospital „Rebro“, Zagreb

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02/2011