Laminar Flow
Hoods and Booths
Klimaoprema Cleanroom Technology is a leading Croatian manufacturer of equipment for cleanrooms. We offer complete engineering "turn key" solutions which includes design, construction, manufacturing, installation and validation (GMP Classes A, B, C, D), service and installation of HVAC and automation. 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 more than 200 workers at a central location and headquarters in Samobor, Croatia, which is the production site also. The factory covers 9,300 m² production, storage and office space. We strive to be the company to which people want to come to work, in which employees are satisfied and business partners receive all necessary assistance in the implementation of projects.

This catalog of laminar flow hoods and booths 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 catalog are standard. Upon request, variety of performance and other dimensions of products are possible.
What we can do for you?

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Laminar Flow Hoods and Booths are an integral part of every laboratory and modern medicament production facility. Production of medicaments includes the entire Pharmaceutical Technology treatment which consists of shaping the finished product, production or receipt of goods and materials, processing technology and equipment, quality control, storage and delivery.

Production of medicaments must be in accordance with clearly defined procedures, regulations and requirements - Law on Medicaments and Medical Products, PIC recommendation, GMP standards, FDA and PDA technical reports and all in order to reduce the risk of microbiological contamination and particulate contamination to a minimum. Klimaoprema Cleanroom Technology produces Laminar Flow Hoods and Booths, Microbiological Safety Cabinets, Weighing/Containment Booths and many special devices that are designed in accordance with EU GMP standards and customer gains a reputation of a medicament manufacturer to the highest standards of quality.

We are designing the entire cleanroom production facilities and making validations, confirming that the equipment is functioning properly, in accordance with regulations, proper application and in compliance with customer needs.

We are designing cleanrooms for sterile medicament production in which air is supplied through the appropriate filter efficiency (HEPA) that is necessary to maintain the difference in pressure between the individual zones. Spaces must be designed to meet the requirements for the number of particles: at-rest and in operation, and these conditions must be defined for each room (class) separately. Filtered air must have a positive pressure relative to surrounding areas in all operating conditions and must effectively flush the area.

Laminar Flow Hoods and Booths are designed in the way that repairs are done from the technical area which is outside of the clean area and the replacement of filters is done.
from the clean area. Parts of manufacturing equipment that comes into contact with the product must not be reactive, additive or absorptive to the limit that can affect product quality. Equipment should be designed for easy resizing of the series, cleaning and sanitisation.

Laminar Flow Hoods and Booths are protecting the operator, the item of work and working environment from possible contamination or biologically hazardous materials (biohazard) during the study or work with micro-organisms and microbes. Infectious particles, bacteria and viruses, unicellular and multicellular heterotrophic organisms are hazardous substances with which one can work only in laminar flow protection devices.

Laminar air flow is clean, uniform flow of fluids (liquids and gases) in parallel layers, without interference between them and without turbulence.

It is important to choose an optimal solution with optimal costs. When purchasing the product, customer also gets the training to work on the device and is secured with service and maintenance that will be done by our certified engineers and technicians.

It is often necessary to ensure a clean sterile conditions where there is limited space and equipment in it. Pharmacies and small manufacturing plants have no reason to worry because we offer special devices that are made to the user’s requirements and restrictions that inhibit the use of standard devices. Based on its special function devices provide operators protection, item of work protection, open pharmaceutical substances protection and cooling the recycle air.

We are permanently oriented toward customers whose needs we monitor and analyze with particular care, producing and delivering Laminar Flow Hoods and Booths for the production of medicaments in the form of ampoules, tablets, film tablets, capsules, ointments, gels, emulsions, suspensions and syrups.
Laminar Flow Hoods

Portable Laminar Flow Hood, KTP-A

Technical features:
- Protection: item of work protection
- Laminar flow: laminar, vertical
- Air flow velocity: 0.25-0.45 m/s, adjustable
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Operating: manually controlled parameters from the control panel
- Built-in materials: powder coated steel and special cleanroom profiles
- Work plate: perforated, polished stainless steel
- Work space: protected by glass shields
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Filter replacement: from above, without entering the work space
- Illumination: fluo lamp, >750 lux
- Noise: Low noise level
- Takes up little space

Operation principle:
The hood takes air through pre filter which holds larger particles. Then the fan pushes the air towards the absolute HEPA filter. Due to the special air distribution system, laminar air flows into the work space where provides a high level of cleanliness.

Additional equipment:
- UV bactericide light
- Differential pressure gauge for HEPA filter control
- Connections for media (gas, air, vacuum, water)
- Work hours counter
- UV light work hours counter
- Possible construction of stainless steel

Technical data:

<table>
<thead>
<tr>
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<th>KTP-A II</th>
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<tr>
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<td>494 x 556 x 950</td>
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<td>457 x 457 x 69</td>
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<td>Max. power (W)</td>
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<td>230/50</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

Other dimensions and performances according to customer request

KEY:
- Ambient air
- Recirculating air
- HEPA filtered air
Horizontal Laminar Flow Hood, KTH-S

Technical features:

- Protection: item of work protection
- Laminar flow: laminar, horizontal
- Air flow velocity: 0.25-0.45 m/s, adjustable
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: powder coated steel
- Work plate: polished stainless steel
- Work space: stainless steel AISI 304
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Illumination: fluo lamp, >750 lux
- Safety: visual alarms of unfavorable conditions
- Work hours counter
- UV light work hours counter
- Noise: Low noise level

Operation principle:

The hood takes air through pre filter which holds larger particles. Then the fan pushes the air towards the absolute HEPA filter. Due to the special air distribution system, laminar air flows into the work space where provides a high level of cleanliness.

Additional equipment:

- UV bactericide light
- Electrical socket in the work space 230V
- Connections for media (gas, air, vacuum, water)
- Differential pressure gauge for HEPA filter control
- Base stand (height: sitting - 750 mm, standing - 950 mm)
- Possible construction of stainless steel

Technical data:

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<thead>
<tr>
<th>Type</th>
<th>KTH-S I</th>
<th>KTH-S II</th>
<th>KTH-S III</th>
<th>KTH-S IV</th>
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<td>1855 x 500 x 610</td>
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<tr>
<td>Max. power (W)</td>
<td>1600</td>
<td>1600</td>
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<td>1650</td>
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<tr>
<td>Max. conn. power on socked (W)</td>
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<tr>
<td>Voltage/Frequency (V/Hz)</td>
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<td>Weight (kg)</td>
<td>200</td>
<td>255</td>
<td>285</td>
<td>315</td>
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</tbody>
</table>

Other dimensions and performances according to customer request

KEY:
- Ambient air
- Recirculating air
- HEPA filtered air
**Technical features:**
- Protection: item of work protection
- Laminar flow: laminar, vertical
- Air flow velocity: 0.25-0.45 m/s, adjustable
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: powder coated steel
- Work plate: perforated, polished stainless steel
- Work space: stainless steel AISI 304, electrical lifting of the front protective glass shield
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Illumination: fluo lamp, >750 lux
- Safety: visual alarms of unfavorable conditions
- Work hours counter
- UV light work hours counter
- Noise: Low noise level

**Operation principle:**
Fan directs air flow toward HEPA filter. Filtrated air laminarily flows into the work space. One part of air, 25-30%, goes out, into environment, toward operator. Second part of air, 70-75%, circulates back through work space through HEPA filter. Exhaust air is substituted with a new one which enters the system through pre filter class G4.

**Additional equipment:**
- UV bactericide light (15 W, 30 W, 36 W)
- Electrical socket in the work space 230V
- Connections for media (gas, air, vacuum, water)
- Differential pressure gauge for HEPA filter control
- Base stand (height: sitting - 750 mm, standing - 950 mm)
- Possible construction of stainless steel

**Technical data:**

<table>
<thead>
<tr>
<th>Type</th>
<th>KTV-S I</th>
<th>KTV-S II</th>
<th>KTV-S III</th>
<th>KTV-S IV</th>
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<td>Outer dimensions (mm)</td>
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<td>1335 x 825 x 2200</td>
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<tr>
<td>Work space (mm)</td>
<td>885 x 610 x 620</td>
<td>1190 x 610 x 620</td>
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<td>1800 x 610 x 620</td>
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<tr>
<td>Max. power (W)</td>
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<td>1850</td>
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<tr>
<td>Max. conn. power on socketed (W)</td>
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<td>550</td>
<td>550</td>
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<tr>
<td>Voltage/Frequency (V/Hz)</td>
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</tr>
<tr>
<td>Weight (kg)</td>
<td>270</td>
<td>300</td>
<td>320</td>
<td>350</td>
</tr>
</tbody>
</table>

Other dimensions and performances according to customer request
Vertical Laminar Flow Hood, KTV-A

Technical features:

- Protection: item of work protection
- Laminar flow: laminar, vertical
- Air flow velocity: 0.25-0.45 m/s, adjustable
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: powder coated steel and special cleanroom profiles
- Work plate: polished stainless steel
- Work space: protected by glass shields
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Illumination: fluo lamp, >750 lux
- Safety: visual alarms of unfavorable conditions
- Work hours counter
- UV light work hours counter
- Noise: Low noise level

Operation principle:

The hood takes air through pre filter which holds larger particles. Fan directs air flow toward HEPA absolute filter. Due to the special air distribution system, laminar air flows into the work space where provides a high level of cleanliness.

Additional equipment:

- UV bactericide light (15 W, 30 W, 36 W)
- Electrical socket in the work space 230V
- Connections for media (gas, air, vacuum, water)
- Differential pressure gauge for HEPA filter control
- Base stand (height: sitting - 750 mm, standing - 950 mm)
- Possible construction of stainless steel

Technical data:

<table>
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<tr>
<th>Type</th>
<th>KTV-A I</th>
<th>KTV-A II</th>
<th>KTV-A III</th>
<th>KTV-A IV</th>
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</thead>
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<td>Outer dimensions (mm) width x depth x height</td>
<td>970 x 750 x 2020</td>
<td>1275 x 750 x 2020</td>
<td>1580 x 750 x 2020</td>
<td>1885 x 750 x 2020</td>
</tr>
<tr>
<td>Work space (mm) width x depth x height</td>
<td>925 x 600 x 650</td>
<td>1230 x 600 x 650</td>
<td>1535 x 600 x 650</td>
<td>1840 x 600 x 650</td>
</tr>
<tr>
<td>Max. power (W))</td>
<td>450</td>
<td>520</td>
<td>650</td>
<td>750</td>
</tr>
<tr>
<td>Voltage/Frequency (V/Hz)</td>
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<td>230/50</td>
<td>230/50</td>
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<td>Weight (kg)</td>
<td>74</td>
<td>85</td>
<td>102</td>
<td>120</td>
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</tbody>
</table>

Other dimensions and performances according to customer request
Microbiological Safety Cabinets (Class II)

Microbiological Safety Cabinet, KTB-NS

**Technical features:**
- Protection: operator, item of work and environmental protection
- Laminar flow: laminar, vertical
- Air flow velocity: 0.25-0.45 m/s, adjustable
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: powder coated steel
- Work plate: perforated, polished stainless steel
- Work space: stainless steel AISI 304, electrical lifting of the front protective glass shield
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Illumination: fluo lamp, >750 lux
- Bactericidal UV light for sterilization
- Safety: visual alarms of unfavorable conditions
- Work hours counter
- UV light work hours counter
- Noise: Low noise level

**Operation principle:**
Microbiological safety cabinet circulates 70% of the contaminated air through one HEPA filter and exhausts remaining 30% of air flow through other HEPA filter. **This air flow performance makes the system suitable for Biosafety level 1, 2 and 3.**

**Additional equipment:**
- UV bactericide light (15 W, 30 W, 36 W)
- Electrical socket in the work space 230V
- Connections for media (gas, air, vacuum, water)
- Differential pressure gauge for HEPA filter control
- Base stand (height: sitting - 750 mm, standing - 950 mm)
- Possible construction of stainless steel

**Technical data:**

<table>
<thead>
<tr>
<th>Type</th>
<th>KTB-NS I</th>
<th>KTB-NS II</th>
<th>KTB-NS III</th>
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<td>Outer dimensions (mm)</td>
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<td>1030 x 825 x 2200</td>
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<tr>
<td>Work space (mm)</td>
<td>width x depth x height</td>
<td>885 x 610 x 620</td>
<td>1190 x 610 x 620</td>
<td>1495 x 610 x 620</td>
</tr>
<tr>
<td>Max. power (W)</td>
<td>1800</td>
<td>1800</td>
<td>1800</td>
<td>1800</td>
</tr>
<tr>
<td>Max. conn. power on socketed (W)</td>
<td>550</td>
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<tr>
<td>Voltage/Frequency (V/Hz)</td>
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<tr>
<td>Weight (kg)</td>
<td>270</td>
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<td>320</td>
<td>350</td>
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</table>

Other dimensions and performances according to customer request
Microbiological Safety Cabinet, KTB-VS
Special model with absolute pre filter for high risk laboratories

Technical features:
- Protection: operator, item of work and environmental protection
- Laminar flow: laminar, vertical
- Air flow velocity: 0.25-0.45 m/s, adjustable
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: powder coated steel
- Work plate: perforated, polished stainless steel
- Work space: stainless steel AISI 304, electrical lifting of the front protective glass shield
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard. Additionally fitted V pre filters
- Illumination: fluo lamp, >750 lux
- Bactericidal UV light for sterilization
- Connections for media (gas, air, vacuum, water)
- Safety: visual alarms of unfavorable conditions
- Work hours counter
- UV light work hours counter
- Noise: Low noise level

Operation principle:
Microbiological safety cabinet circulates 70% of the contaminated air through one HEPA filter and exhausts remaining 30% of air flow through other HEPA filter. Comparing to classical microbiological safety cabinet, this special model has V HEPA pre filters which are built in under the work desk. All incoming and circulation air is purified through them. It implies that exit and work HEPA filters are exposed to a contaminated air only during replacement of the V HEPA pre filters. Change of V pre filters takes place under the normal work mode. Pre filter segments are to be removed in the work space, in protective zone and then closed up in PVC bags. In this way, we assure complete protection when servicing cabinets in which is dealt with high risk substances.

Technical data:

<table>
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<tr>
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<th>KTB-VS I</th>
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<td>1335 x 825 x 2200</td>
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<td>Work space (mm) width x depth x height</td>
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<tr>
<td>Max. conn. power on socketed (W)</td>
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<td>Voltage/Frequency (V/Hz)</td>
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<tr>
<td>Weight (kg)</td>
<td>270</td>
<td>300</td>
<td>320</td>
<td>350</td>
</tr>
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</table>

Other dimensions and performances according to customer request

Additional equipment:
- UV bactericide light (15 W, 30 W, 36 W)
- Electrical socket in the work space 230 V
- Differential pressure gauge for HEPA filter control
- Base stand (height: sitting - 750 mm, standing - 950 mm)
- Possible construction of stainless steel
UV Sterilizer Hood

Technical features:
- Protection: item of work protection, operators protection from UV rays. Constant decontamination inside the work space
- Air flow: circular recirculating flow
- No of air changes in work space: 50 changes/h
- Built-in materials: stainless steel AISI 304
- Glass: double layer, UV-proof
- Recirculating set: inside the cabinets mask, consists of a fan, UV lamp and filter G4 (EN 779) for dust
- UV lamp: two lamps, one inside the recirculation set, other in the work space. 8.000 work hours, UV rays disinfects the work space by destroying the DNA/RNA fragments in the 15-30 minutes of exposure
- Time timer for UV lamps (30 min), automatic turn off of UV lamps when opening the protective glass
- Illumination: fluo lamp 15 W
- Work hours counter
- UV light work hours counter
- Noise: Low noise level
- While the operator works, UV lamp within the work space can not be in operation

Operation principle:
UV sterilizer hood is triggered by a key and it automatically runs the fan and turns on UV lamp inside the recirculating set. Fan draws air from the work space through filter class G4 which eliminates larger contaminants and directs it towards the UV part of recirculating set in which the UV lamp sterilizes the air. Sterilized air flows through the perforations in the ceiling of UV hood back into the work space, and the cycle repeats. During operation, a certain amount of air from the work space goes out under the glass and enters the room while the same amount of room air goes into the work space of UV hood.

Technical data:

| Outer dimensions (mm) width x depth x height | 690 x 515 x 555 |
| Work space (mm) width x depth x height | 675 x 500 x 405 |

Other dimensions and performances according to customer request

KEY:
- Ambient air
- Partially filtered air
- Sterilized air
**Technological Features:**
- Protection: item of work protection
- Laminar flow: laminar, vertical
- Air flow velocity: 0.25-0.45 m/s, adjustable
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: powder coated steel and special cleanroom profiles
- Work plate: polished stainless steel
- Temp. of work plate: heating plate 22°C-45°C, adjustable
- Work space: protected by glass shields, distance from HEPA filter 700 mm
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Illumination: fluo lamp, >750 lux
- Safety: visual alarms of unfavorable conditions
- Stereomicroscope: increase to min. 120 times, adapter for the camera
- Base stand
- Power: 230 V, 50 Hz
- UV bactericide light (15 W, 30 W, 36 W)
- Work hours counter
- UV light work hours counter
- Noise: Low noise level

**Operation Principle:**

The hood takes air through pre filter which holds larger particles. Fan directs air flow toward HEPA absolute filter. Due to the special air distribution system, laminar air flows into the work space where provides a high level of cleanliness. In the work space are built heating plate, a microscope and an LCD monitor.

**Additional Equipment:**
- LCD monitor 19”
- CO₂ incubator capacity of 14-16 liters
- Electrical socket in the work space 230 V
- Connections for media (gas, air, vacuum, water)

**Technical Data:**

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<tr>
<th>Type</th>
<th>IVF I</th>
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<td>Work space (mm) width x depth x height</td>
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<tr>
<td>Max. power (W)</td>
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<td>Voltage/Frequency (V/Hz)</td>
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<td>Weight (kg)</td>
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<td>95</td>
<td>112</td>
<td>130</td>
</tr>
</tbody>
</table>

Other dimensions and performances according to customer request
Technical features:

- Protection: item of work protection in large area work spaces
- Laminar flow: laminar, vertical
- Air flow velocity: 0.25 m/s ± 20%
- Possibility of air flow velocity selection - 0.30, 0.35, 0.40 m/s
- Stand by mode 0.25 m/s
- Cleanliness class: ISO class 5(4), 100(10) class according to U.S.F.S. 209 E, GMP class A
- Work space protected by UV stable PVC sheets
- Built-in materials: stainless steel AISI 304 (DIN 1.4301)
- Operating: microprocessor controlled parameters from the control panel
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Pre filters class G4 to F9 (EN 779)
- Safety: automatic filter and device failure control (visual and sound alarms). Additional visual filter control (analogue differential pressure gauge)
- Illumination: integral lighting supplying 500 lux at the working height
- UV bactericide light
- Option: Ex explosion proof design, certificates for installed components

Operation principle:

The booth takes air through pre filters which hold larger particles. Ventilators direct air toward HEPA absolute filters. Due to the special air distribution system, laminar air flows into the working space, wherein it provides air cleanliness of a high degree.

Assembly:

- Booth can be hanged on ceiling
- Booth can be put on fixed uprights
- Booth can be put on stainless steel swivel casters

Technical data:

Various dimensions and performances according to customer request
Interspace filter device, MFU

Technical features:

- **Purpose:** treatment of air in facilities, increasing the purity of air in the room where laminar flow hood or booth is installed, where the item of work is put next to the device
- **Installation:** in the wall or partition walls between two rooms. Installation is air tight and elastically performed in order to reduce vibrations and avoid air streaming
- **Operating:** manually controlled parameters from the control panel
- **Built-in materials:** steel sheet, satin
- **Main filter:** HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- **Differential pressure gauge - additional equipment**

Operation principle:

Contaminated air from an unclean room is drawn through a pre filter and using the fan it is pushed through the absolute filter of MFU’s. Thus purified, absolutely clean air goes out in the form of divergent jets on the pure side of MFU’s and is intensively mixed with air in clean room, increasing the purity. This cycle is continuous while the MFU is in use, while clean room is being used.

Speed adjustment of MFU’s is achieved through built-in speed regulator on the wall in the non clean room.

Technical data:

Depending on the size of the room various dimensions and performances according to customer request

KEY:
- HEPA filtered air
- Recirculating air
- Ambient air
Weighing/Containment Booth, VKA

Technical features:

- **Protection:** the booth provides an operator safe working environment (by preventing the operator inside the booth to inhale health hazardous particles), protection of the booth’s surroundings (by preventing dust particles, generated inside working space, to be distributed outside of the booth), protection of open pharmaceutical substances from contamination (by maintaining laminar air flow inside the booth and adequate air curtain in front of the booth)
- **Laminar flow:** laminar, vertical
- **Air flow velocity:** 0.30, 0.35, 0.40, 0.45 m/s
- **Stand by mode:** 0.25 m/s
- **Cleanliness class:** ISO class 6(5), 1000(100) class according to U.S.F.S. 209 E, GMP class A
- **Operating:** microprocessor controlled parameters from the control panel
- **Built-in materials:** stainless steel AISI 304 (DIN 1.4301)
- **Air curtain:** built in the entrance of the booth, prevents contamination of the working space
- **Main filter:** HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- **Safety:** automatic filter and device failure control (visual and sound alarms). Additional visual filter control (analogue differential pressure gauge)
- **Illumination:** integral lighting supplying 500 lux at the working height
- **The equipment is designed for 3 shift work**
- **Option:** Ex explosion proof design, certificates for installed components

Operation principle:

Fan directs air to flow through the package of the safe HEPA filters. Then air enters the working zone in a vertical laminar air flow. 10-15% of air quantity goes to the surrounding environment, increasing overall cleanliness. On the booths bottom air is sucked through pre filters, along with 10-15% of surrounding air which makes up exactly the same air quantity which is previously exhausted. Afterwards air flow goes through another set of pre filters and than cycle repeats again.

On the booths entrance, air curtain prevents pharmaceutical substances contamination and increases working space.

Technical data:

Various dimensions and performances according to customer request

**KEY:**
- HEPA filtered air
- Ambient air
- Partially contaminated air
- Partially filtered air
Weighing/Containment Booths

Weighing/Containment Booth, VKO

Technical features:

- Protection: the booth provides an operator safe working environment (by preventing the operator inside the booth to inhale health hazardous particles), protection of the booth’s surroundings (by preventing dust particles, generated inside working space, to be distributed outside of the booth), protection of open pharmaceutical substances from contamination (by maintaining laminar air flow inside the booth and adequate air curtain in front of the booth)
- **Operator Exposure Level - 100 µg/m³**
- Laminar flow: laminar, vertical
- Air flow velocity: 0.30, 0.35, 0.40, 0.45 m/s
- Stand by mode 0.25 m/s
- Cleanliness class: ISO class 6(5), 1000(100) class according to U.S.F.S. 209 E, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: stainless steel AISI 304 (DIN 1.4301)
- Air handling cooling unit for circulation air flow
- Main filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- Safety: automatic filter and device failure control (visual and sound alarms). Additional visual filter control (analogue differential pressure gauge)
- Two stage pre filters, safe change filter housings
- Illumination: integral lighting supplying 500 lux at the working height
- The equipment is designed for 3 shift work
- **Option: Ex explosion proof design**, certificates for installed components

Operation principle:

Fans draw air through perforation located on the working space lower end. Then air flow goes through two stage pre filters and package of H13 filters. Going through cooling unit air flow enters air distribution box. 85-90% of overall air quantity goes into working space via polyester cassettes. The rest of it, 10-15% goes into surrounding environment. This air quantity is being made up by drawing air from outside.

Technical data:

Various dimensions and performances according to customer request
Weighing/Containment Booths

Weighing/Containment Booth, VKL

Technical features:

- Protection: the booth provides an operator safe working environment (by preventing the operator inside the booth to inhale health hazardous particles), protection of the booth’s surroundings (by preventing dust particles, generated inside working space, to be distributed outside of the booth), protection of open pharmaceutical substances from contamination (by maintaining laminar air flow inside the booth and adequate air curtain in front of the booth)
- **Operator Exposure Level - 100 µg/m³**
- Laminar flow: laminar, vertical
- Air flow velocity: 0.30, 0.35, 0.40, 0.45 m/s
- Stand by mode 0.25 m/s
- Cleanliness class 5, 100, GMP class A
- Operating: microprocessor controlled parameters from the control panel
- Built-in materials: stainless steel AISI 304 (DIN 1.4301)
- Main filter, exhaust filter: HEPA H14, efficiency 99.995% MPPS, according to EN 1822 standard
- First stage filtration performed by F8 filter (EN 779)
- Safety: automatic filter and device failure control (visual and sound alarms). Additional visual filter and pre filter control (analogue differential pressure gauge)
- Electrical lifting of the front protective glass
- Illumination: integral lighting supplying 500 lux at the working height
- Scale base stand
- Barrel stand on wheels
- The equipment is designed for 3 shift work

Additional equipment:

- UV bactericide light (15 W, 30 W, 36 W)
- Electrical socket in the work space 230V
- Connections for media (gas, air, vacuum, water)

Operation principle:

Fans draw air through pre filters. 75-80% of overall air quantity, in laminar flow goes into working space through main HEPA filter, while the rest, via exit HEPA filter, goes into surrounding.

Technical data:

Various dimensions and performances according to customer request
Special Devices

It is often a case that we need to secure sterile clean zones in rooms limited with space and machinery located therein. Klimaoprema Cleanroom Technology is prepared to offer, according to customer requirements and space limitations, tailored special devices in rooms, wherein standard equipment is not an option.

Protection:

- Protection of the device’s surroundings, by preventing dust particles generated inside working space to be distributed outside of the booth
- Item protection from contamination in large area work spaces, by maintaining adequate laminar, absolutely clean air flow inside the facility
- Protection of open pharmaceutical substances from contamination, by maintaining clean air flow inside the device
- An operator safe working environment, which prevents the operator inside the facility to inhale health hazardous particles
- Cooling of circulated air

Technical features:

Features of these devices can include, but are not limited to the following:

- Dimensions of the work space (width x depth x height) are up to customer’s requirements
- Horizontal or vertical air flow
- Possibility of air flow velocity selection - work mode
- Stand by mode
- Microprocessor controlled parameters from the control panel
- Automatic filter and device failure control (visual and acoustic alarms)
- Additional visual filter control (analogue differential pressure gauge)
- Absolute filtration performed by HEPA and ULPA filters
- Air handling cooling unit for circulation air flow
- The equipment is designed for 3 shift work
- Integral lighting supplying 500 lux at the working height
- Finished to recognized international GMP requirements
- Option: Ex explosion proof design, certificates for installed components
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
Features:

- Recommended regular service and replacement of HEPA (ULPA) filters annually (once a year)
- Two years warranty
- Availability of replacement parts for the entire lifetime of the device
- Fifteen years warranty on Disperset Oil Particulate test (DOP test)
- Before service is performed decontamination of the device is done, to protect operators, laboratory, environment, item of work and service personnel in cases where the access to the interior of the hood is inevitable
- After each service it is necessary to validate the device
In order to protect personnel, item of work and environment, when using laminar flow hoods and booths the following should be considered:

- Bio safety level
- Type of laboratory
- Classification of agents (micro-organisms)
- Equipment biosecurity

Selection of laminar flow hoods and booths is the exclusive right of the user and depends on what it intends to use. There are some hybrid hoods that can be obtained, for example, by converting the hood of Class I to Class III by fitting cover with gloves in the work space. However, these hybrids can not meet the harsh demands of the relevant institutions and scientists themselves to work with particularly hazardous agents.

When working in a laminar flow hood or booth it is important that the operator feels comfortable. Discomfort and anxiety can cause an accident. The operator must be able to sit or stand so that his hands are in a natural position for the working surface of the device and must be able to reach all the items without stretching. The operator must be able to see through the workspace, not below it, and his field of vision may not be disturbed by glass holders.

Work space of laminar flow hood or booth should not be cluttered, too many products and accessories bother the air flow. When all the work in laminar flow device is done, fan still has to work a few minutes before turning off the device and fixing the front cover.

**Laminar Flow Hoods:**
- Pharmacy and pharmacology
- Laboratories and research
- Biotechnology
- Hospitals and clinics
- Food industry
- Optics
- Microelectronics

**UV Hoods:**
- Sterilization of instruments
- Dentistry
- Laboratories
- DNA search

**Microbiological Safety Cabinets (Class II):**
- Oncology
- Pharmacy
- Laboratories and research
- Biotechnology
- Microbiology
- Genetic engineering
- Hospitals and clinics
- Nuclear medicine

**Hood for IVF impregnation**
- Laboratories for extrauterine fertilization

**Laminar Flow Booths**
- Laboratories
- Pharmacy
- Optics
- Hospital facilities for intensive care
- Industrial production
- Food industry
- Electronic industry

**Weighing/Containment Booths**
- Pharmacy
- Industrial production
- Food industry
- Electronic industry