



Air filtration and clean room units

Impilo (Laminar Airflow Unit)

At Gerhman we are driven by a strong desire to continuously generate improvements. We do that by developing products and systems that are easy to use and energy efficient, together with industry-leading knowledge, support, logistics and efficient availability.



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Air filtration and clean room units

Impilo

Laminar Airflow Unit

Impilo laminar airflow units supply clean air in a low-turbulent and vertical flow into an operating room.



Key features and applications

Impilo



Key features and applications

- Complete filtration of operating area
- Easy installation, maintenance and disinfection
- Low initial pressure drop of HEPA filters
- Tailored dimensions with LED lighting and control unit
- Air flow speed 0.18 - 0.38 m/s
- Dimensions 1.83 m x 1.23 m (min.) and 3.20 m x 3.20 m (max.)
- Central passage for mounting surgical lighting
- Operating mode: air supplied by AHU or Recirculated
- Casing material in varnished steel sheet RAL 9010 or stainless steel sheet V2A / AISI 304 or AISI 316
- H13 and H14 class standard and high airflow HEPA filters
- Outlets as single-layer laminarizer or double-layer laminarizer (for differential air flow) in PES fabric
- Optionally fully stainless steel perforated diffuser laminarizer
- Pressure difference transmitter to inform the user when to change the filter (optional).

Cleanrooms depend on precisely controlled environmental conditions. To minimize contamination risks and protect people, their technological infrastructure must adhere to the most stringent quality standards. We draw on decades of experience to tailor our integrated cleanroom solutions to your facility's specific requirements.



RE-ENGINEERING THE OPERATING ROOM CEILING WITH HIGHEST POSSIBLE STANDARDS



Low-turbulence laminar flow units are intended for operating theaters with the highest requirements for uniform vertical air flow in hospitals complying with the local requirements and international standards, including VDI 6022, DIN 1946-4, EN15780, EN 13779, VDI 3803

AIR CLEANLINESS

Highest air cleanliness ISO class 5 acc. to DIN EN ISO 14644-1

AREA OF APPLICATION

Operating rooms and for special applications such as burn units

Models

Impilo / Impilo-X

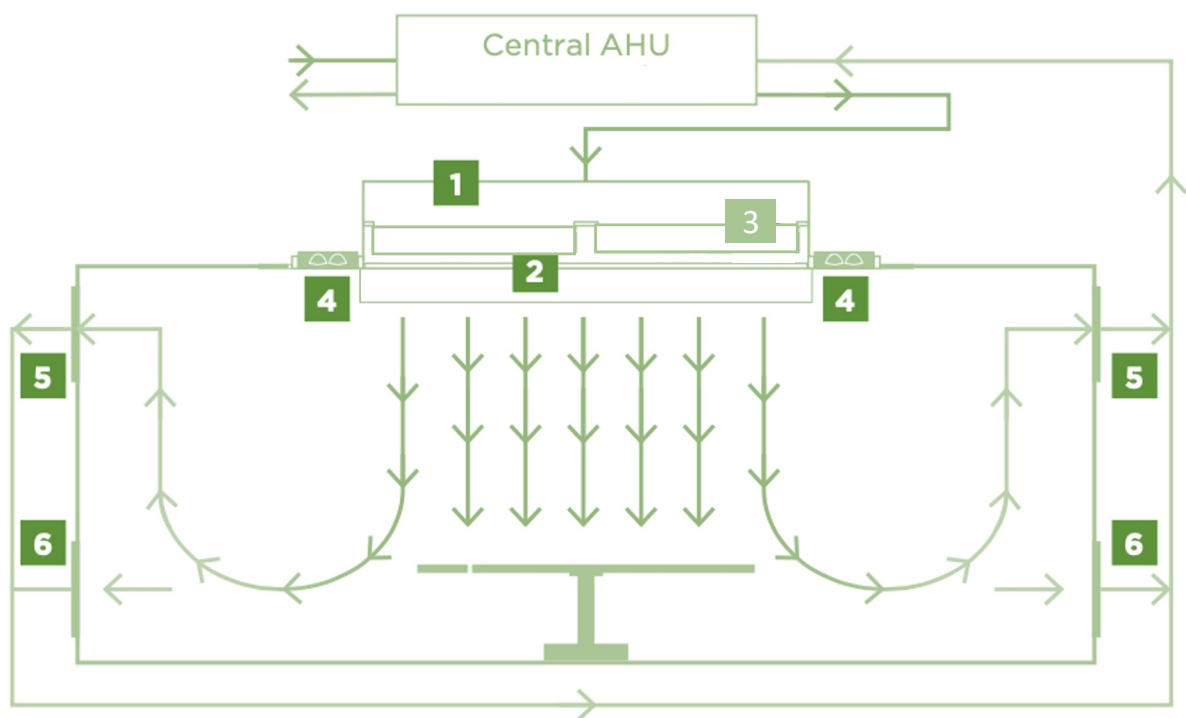
Mode	Impilo	Impilo-X
Air flow speed	0.18 - 0.38 m/s	0.18 - 0.38 m/s
Dimensions	1.83 m x 1.23 m (min.) 3.20 m x 3.20 m (max.)	1.83 m x 1.23 m (min.) 3.20 m x 3.20 m (max.)
Central passage	For mounting surgical lighting	For mounting surgical lighting
Operating mode/air supply	Supplied by AHU (100%)	Supplied by AHU (20-30% of total volume) and mixed with recirculated air
Casing material	Varnished steel sheet RAL 9010 or stainless steel sheet V2A / AISI 304 or 316 optionally	Varnished steel sheet RAL 9010 or stainless steel sheet V2A / AISI 304 or 316 optionally
Filter class	H13 / H14 class	H13 / H14 class
Filter seal	Gel / Foam Type	Gel / Foam Type
Outlets (Diffuser)	Single-layer laminarizer or double-layer laminarizer (differential air flow) PES fabric on aluminium frame / Stainless steel perforated panel (optional)	Single-layer laminarizer or double-layer laminarizer (differential air flow) PES fabric on aluminum frame / Stainless steel perforated panel (optional)

Functional Principle

Impilo

The supply air is preconditioned via a central air handling unit (central AHU) directed via the ventilation ducts into the laminar flow ceiling pressure chamber and guided in via HEPA filters. The supply air is filtered and blown out at a speed of 0.25 (0.38) m/s towards the surgical protection zone via a flow-optimised, trapezoid profile air distributor covered with a special fabric. Air distributor produces stable, low-turbulence displacement flow. Flow stabilisers reduce the constriction of the air flow.

The protection zone includes both the surgical team and the patient as well as the instrument and side tables. Impurities in the working/patient area are detected by the low-turbulence displacement flow and discharged via fluff separators near the floor.

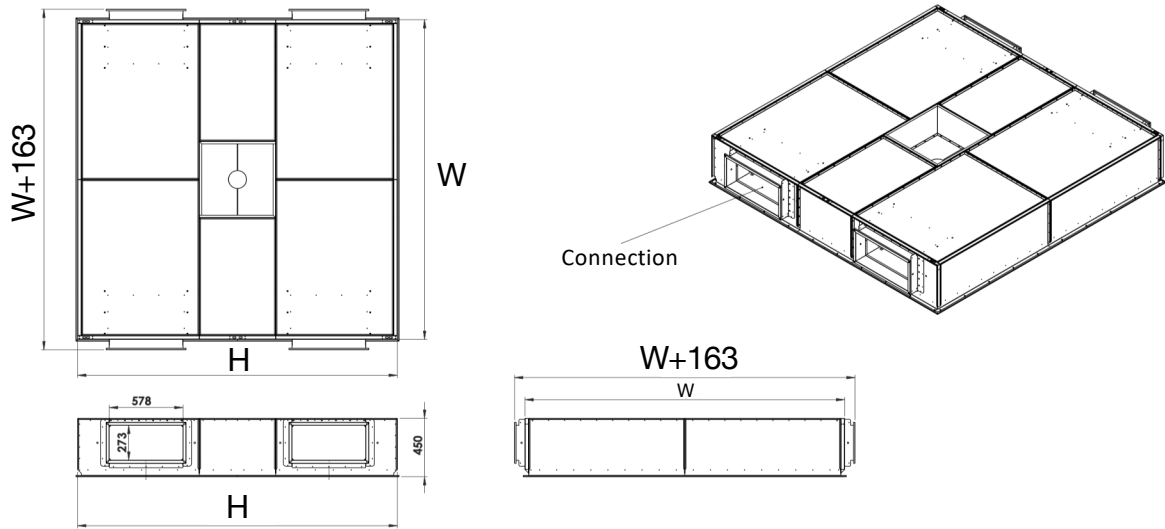


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|-----------------------|--------------------------|-------------------------------|
| 1 Impilo (LFU) | 3 Side Connection | 5 Purus exhaust grille |
| 2 Laminarizer | 4 Lighting | 6 Purus exhaust grille |

Technical Details

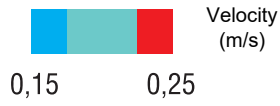
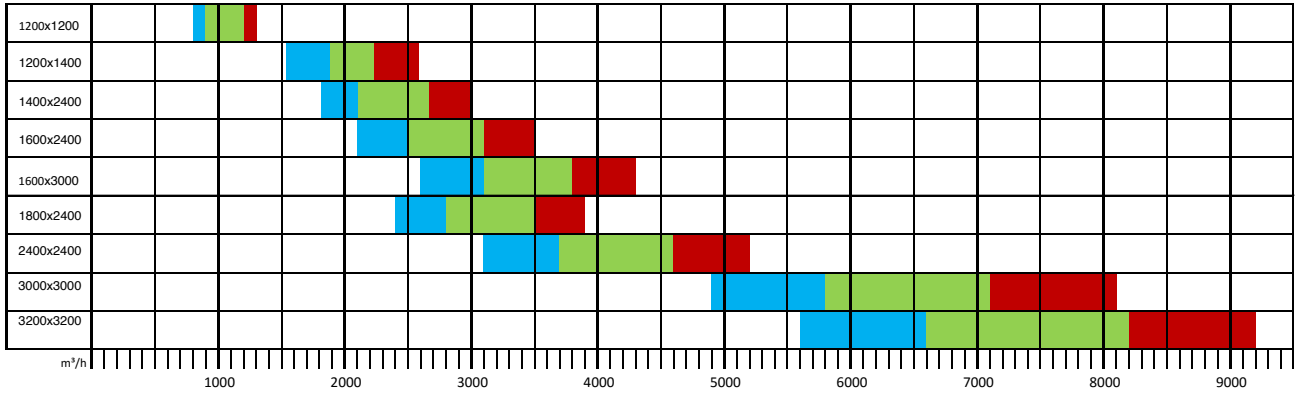
Impilo

Model	1200x1200	1200x2400	1400x2400	1600x2400	1600x3000	1800x2400	2400x2400	3000x3000	3200x3200
WXH (mm)	1310x1310	1310x2510	1510x2510	1710x2510	1710x3110	1910x2510	2510x2510	3110x3110	3310x3310
L (mm)	450	450	450	450	450	450	450	450	450
Air Volume (m3/h)	780-1300	1555-2600	1815-3020	2080-3460	2600-4350	2350-3890	2110-5190	4860-8100	5530-9210
Velocity m/s	0,15 -0,25 m/s	0,15 -0,25 m/s	0,15 -0,25 m/s	0,15 -0,25 m/s	0,15 -0,25 m/s	0,15 -0,25 m/s	0,15 -0,25 m/s	0,15 -0,25 m/s	0,15 -0,25 m/s
No of inlet	2	2	2	4	4	4	4	6	6
Connection size	578x273	578x273	578x273	578x273	578x273	578x273	578x273	578x273	578x273
Filter position	Vertical (on connection)	Vertical (on connection)	Vertical (on connection)	Vertical (on connection)	Vertical (on connection)	Vertical (on connection)	Vertical (on connection)	Vertical (on connection)	Vertical (on connection)
Filter size	305x610x292	305x610x292	305x610x292	305x610x292	305x610x292	305x610x292	305x610x292	305x610x292	305x610x292
Pressure drop (start - final)	300 - 500 Pa	300 - 500 Pa	300 - 500 Pa	300 - 500 Pa	300 - 500 Pa	300 - 500 Pa	300 - 500 Pa	300 - 500 Pa	300 - 500 Pa



Quick Selection

Impilo



Flow Rate (m³/h)

Laminar flow ceiling systems with recirculation modules



Impilo-X

Recirculation fan unit

AIR CLEANLINESS

Highest air cleanliness
ISO class 5 acc. to DIN
EN ISO 14644-1

AREA OF APPLICATION

Operating rooms and for
special applications

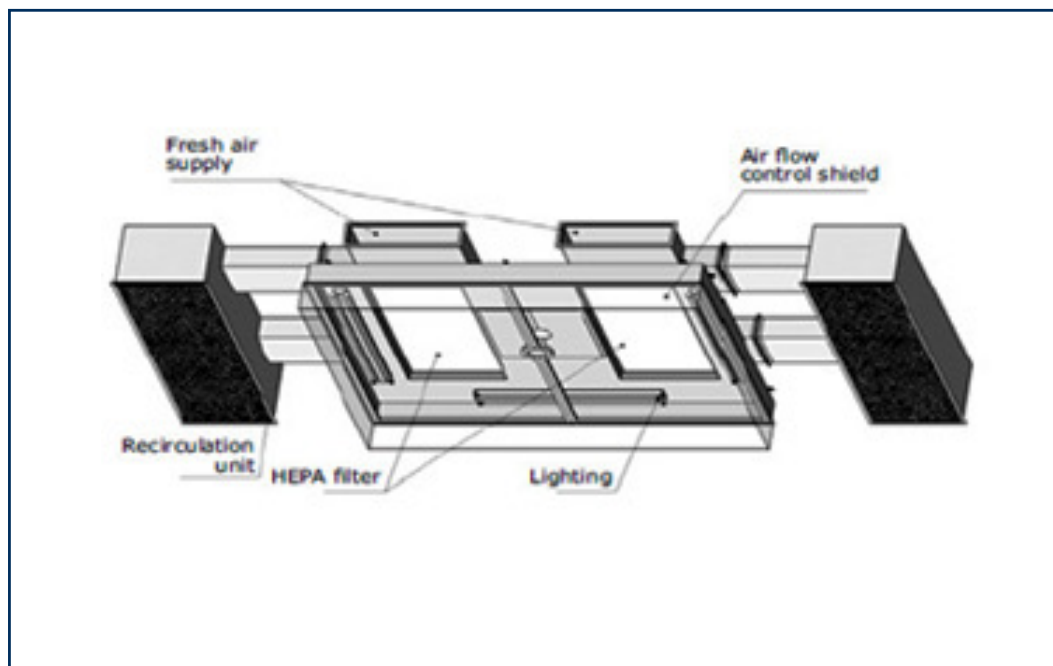
Functional Principle

Impilo-X

The energy-efficient recirculated air ceilings with integrated fans allow large operating theatre ceiling areas to be supplied using only a low fresh air proportion. This comfortable climate is created through homogenous mixing of the cool air from the central air conditioning unit with the warmed recirculated air from the operating theatres. The entire air volume is blown through HEPA filters and supplied sterile to the operating theatre protective zone as laminar flow; optionally as differential flow with higher core and lower edge velocities.

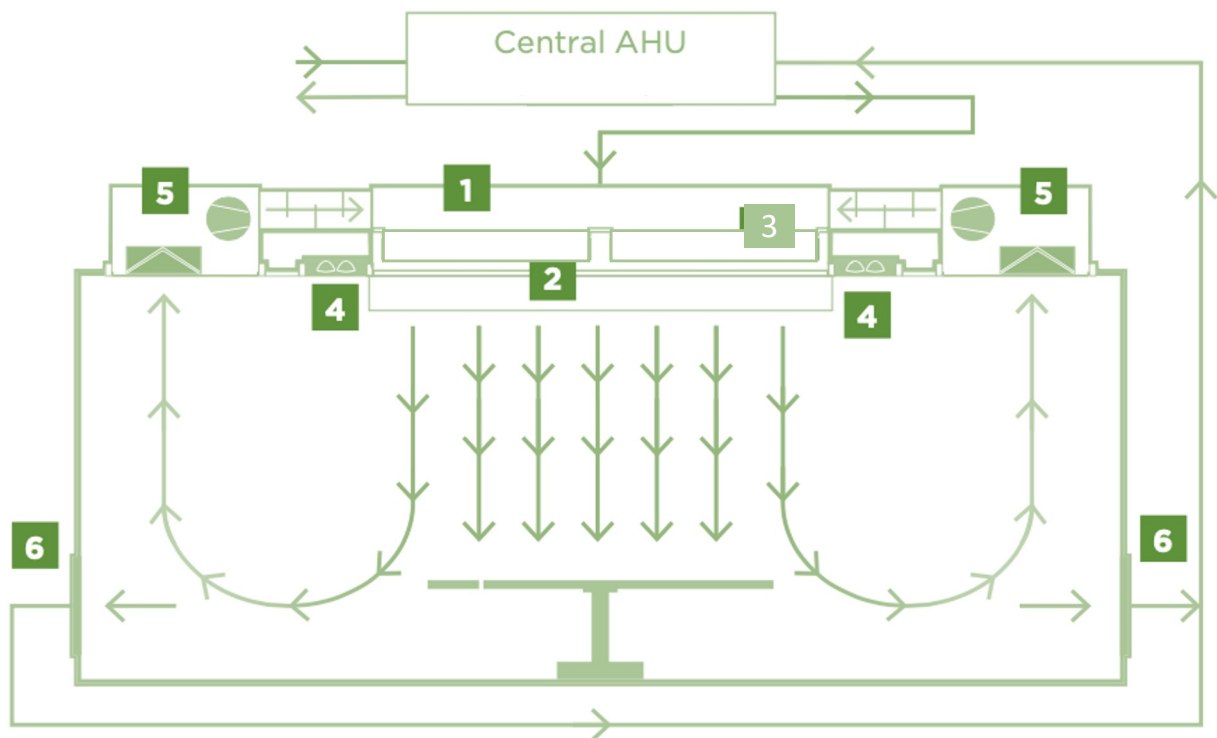
Air flow from the air-handling unit is mixed with the recirculated air from the fan module in the mixing chamber and discharged into the pressure chamber above a set of filters.

After passing through full-area HEPA (H13/H14) filters air creates a low-turbulent displacement flow. The filters are fixed via clamps to a welded frame. Clean air, after filtering, flows out of laminarizer frame into the operating theater and forms the protection zone.



Product Benefits

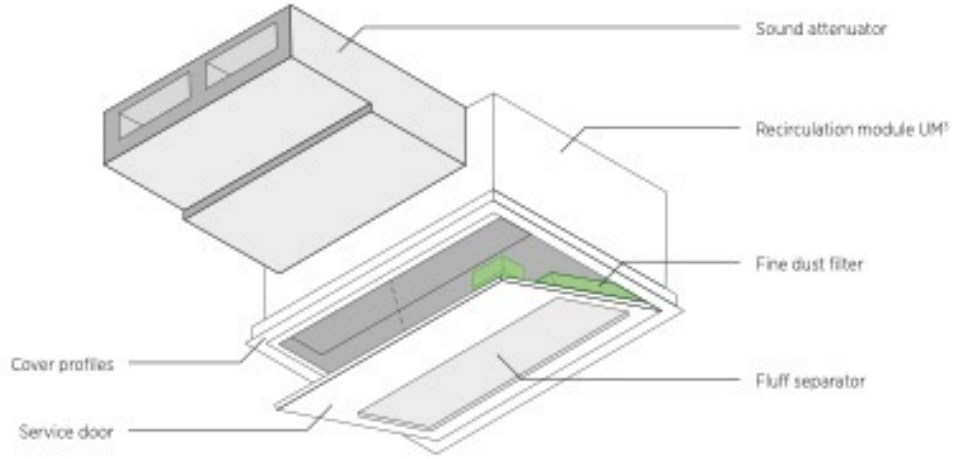
- Compact design
- Very high system safety
- Concealed installation in the false ceiling
- Low maintenance and operating costs
- Reduced investment due to short conversion times
- Very low sound pressure level ≤ 48 dBA



- | | | |
|-------------------------|--------------------------|---------------------------------------|
| 1 Impilo-X (LFU) | 3 Side Connection | 5 Ceiling recirculation module |
| 2 Laminarizer | 4 Lighting | 6 Purus exhaust grille |

Technical Details

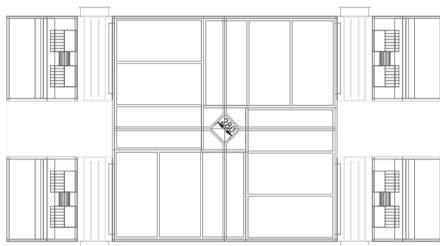
Impilo-X



Technical data

100% recirculation	Airflow at 0.30 m/s	Electric power consumption at 200 PA	Max. static pressure	Max. electric power consumption	Airflow at 0.38 m/s	Electric power consumption at 200 PA	Max. static pressure	Max. electric power consumption
size	m ³ /h	kW	Pa	kW	m ³ /h	kW	Pa	kW
3200x3200	11059	1.5	560	3.4	14008	2.0	420	3.9
3000x3000	9720	1.4	500	3.3	12312	1.7	440	3.6
2400x2400	6221	0.9	620	2.9	7880	1.1	555	3.0

Specifications for airflow, power consumption and pressure



- Minimum total length 5400 - 6200 mm
- False ceiling requires up to 600 mm

Filter selection

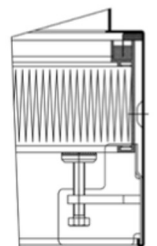
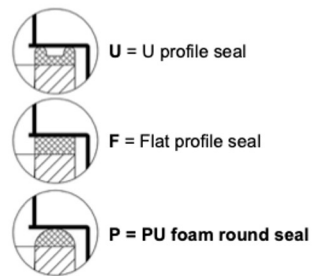
Hepa



Filters

Filtration units are equipped with HEPA filters of class H13, H14 or U15 available in two versions of sealing: polyurethane or gel. Frame is made of extruded aluminum or mdf, while the filter media is protected against damages by a steel epoxy varnished mesh situated at the pure side. Optionally.

Please contact with our technical department for all filter options and technical details.



fluid seal

EN 1822 – The test method for particulate air filters

The European filter test standard is the most important basis for testing and classifying particulate filters.

ENSURING THE QUALITY OF EPA, HEPA AND ULPA FILTERS

The European filter testing standard is the most important basis for testing and classifying absolute filters. The standard is based on state-of-the-art particle measurement technology and authorized procedures for determining the efficiencies. It has five parts. The filter is assigned to the relevant filter class using the results from sections 4 (local arrestance) and 5 (integral arrestance). An individual test report and serial number are produced for filters in classes H13 and higher. Therefore each filter from H13 onwards can be assigned to its own individual test. Individual testing of EPA filters is not necessary according to the standard, and is possible with the testing procedure described. EPA filters are tested in the course of sample testing, whereby the arrestance is obtained as a mean value from individual, random measurements.

PART 1: CLASSIFICATION, PERFORMANCE TEST AND IDENTIFICATION

EN 1822-1:2009 sets three groups:

- Group E: EPA** – Efficient particulate air filter
 - Group H: HEPA** – High efficiency particulate air filter
 - Group U: ULPA** – Ultra low penetration air filter
- Absolute filters are classified according to the local and integral arrestance values determined during testing.

PART 2: AEROSOL PRODUCTION, MEASURING EQUIPMENT, PARTICLE COUNTING STATISTICS

This part describes the conditions for testing and the aerosol generators, the particle measuring technology and the statistical procedures to evaluate the counts.

PART 3: TESTING FLAT SHEET FILTER MEDIA (DETERMINING MPPS)

Part 3 describes the determination of the fractional efficiency and determination of the most penetrating particle size (MPPS) of the flat sheet filter media.

A test aerosol is applied to the filter media at the nominal flow velocity specified for later use of the filter. Partial flows of the test aerosol are taken upstream and downstream of the filter sample. The particle counting method determines the particulate concentrations and calculates the fractional efficiency curve. The particle size at which the fractional efficiency curve reaches its minimum is called the MPPS. Put in simple terms, this is the particle size at which the filter medium performs worst for a defined flow velocity.

Filter Class	Integral Value		Local Value	
	Efficiency [%]	Penetration [%]	Efficiency [%]	Penetration [%]
E10	≥ 85	≤ 15		
E11	≥ 95	≤ 5		
E12	≥ 99.5	≤ 0.5		
H13	≥ 99.95	≤ 0.05	≥ 99.75	≤ 0.25
H14	≥ 99.995	≤ 0.005	≥ 99.975	≤ 0.025
U15	≥ 99.9995	≤ 0.0005	≥ 99.9975	≤ 0.0025
U16	≥ 99.99995	≤ 0.00005	≥ 99.99975	≤ 0.00025
U17	≥ 99.999995	≤ 0.000005	≥ 99.9999	≤ 0.0001

Installations

Impilo / Impilo-X

- Insert filter into the housing up to the corners with the clamps.
- Press the filter carefully in the frame and tighten the holder screws only "somewhat". Seal thereby touches the frame
- Finally, subsequently tighten the holder screws – always turn one screw revolution at a time.
- The leak test can be performed either with a probe or with a particle counter along the filter frame.

ATTENTION

- Damage to the unit!
- Only filters with a U-profile seal allow a pressure test of the filter clamping tightness.
- If you determine a leak during the inspection, turn the screws one after the other by half a screw rotation.
- If, after renewed measurements, the filter nonetheless leaks, exchange the filter seal or the entire filter insert.

Estimation of the filter integrity:

- Air tightness is not longer given if no vacuum is ensured with a 60 kPa pressure difference. Leaks are not permitted.
- Do not exceed the local values for the porosity or the permeability of filter inserts according to EN 1822.



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