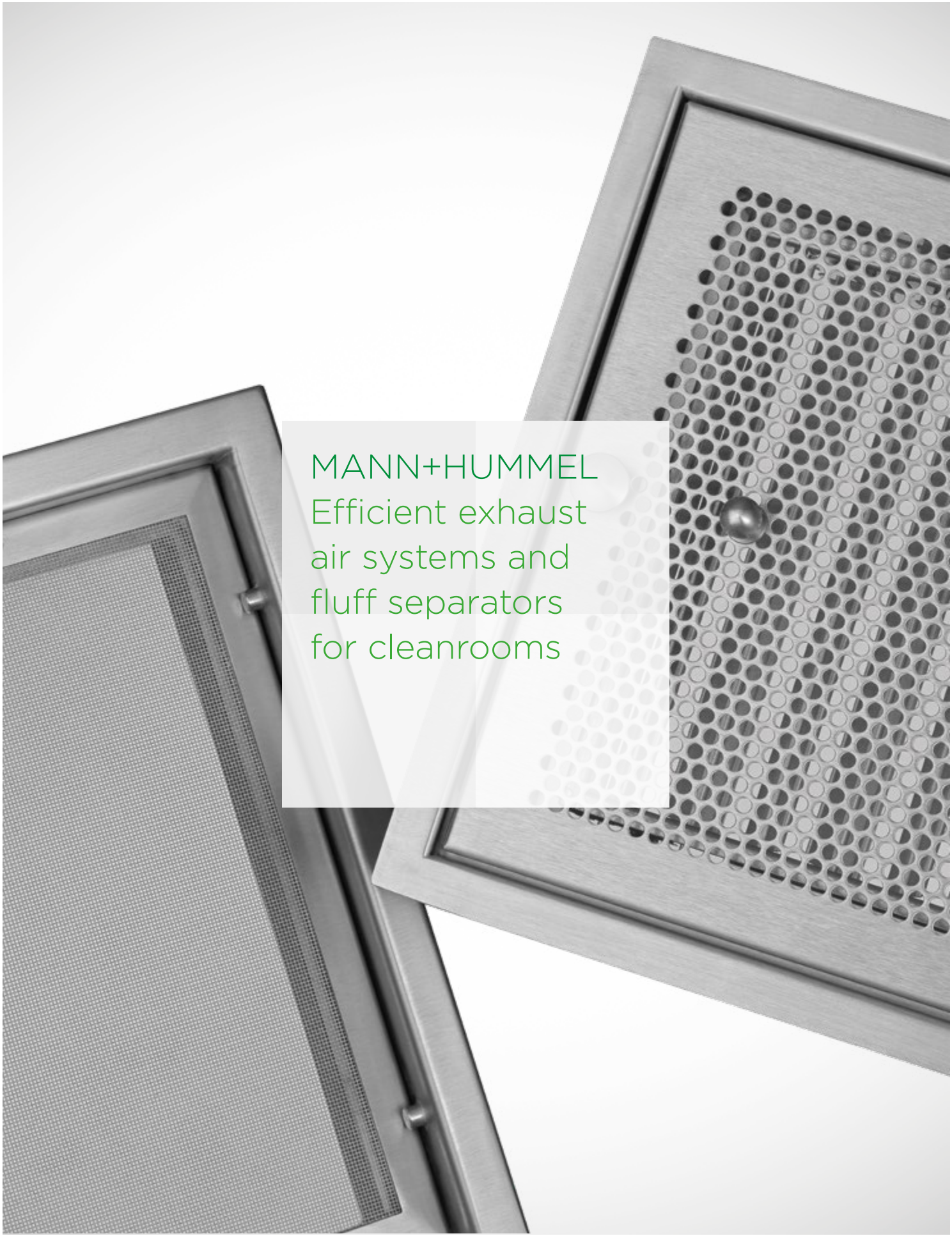


MANN+HUMMEL
Efficient exhaust air systems and fluff separators for cleanrooms

Leadership in Filtration

MANN+HUMMEL

We set ourselves the highest possible standards

As a specialist for ventilation components, MANN+HUMMEL has been engaged for over 40 years in reducing the germ load and enabling the highest level of air cleanliness in cleanrooms, while maintaining all the required comfort criteria.

EXHAUST AIR SYSTEMS ARE SPECIAL VENTILATION COMPONENTS THAT FULFILL A VARIETY OF FUNCTIONS.

Central aspects are on the one hand maintaining defined air flows, such as the low turbulence flow (LTF) in operation rooms, and on the other keeping air ducts clean as well as separating air pollutants and material contaminants such as clothing fluffs.

Based on different international standards and very varied application areas and cases, it is necessary to offer a very flexible range of products including both standard models and custom product solutions.

Correct functioning of ventilation systems in cleanrooms is an interaction between supply air and exhaust air systems. Therefore these ventilation components must be individually planned, dimensioned and attuned to each other.

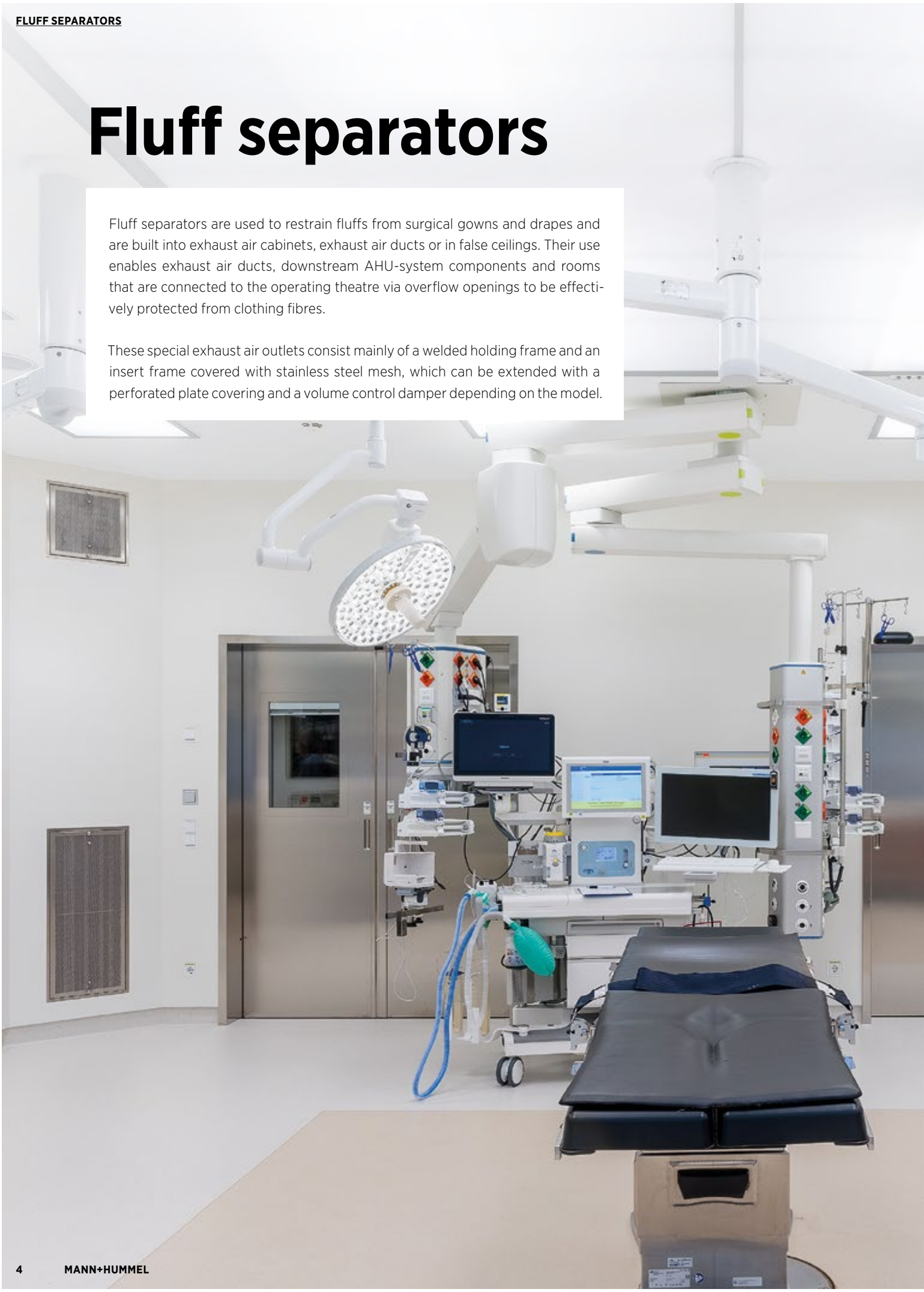
Already at the beginning of a project, care must be taken that the interaction of the supply and exhaust air systems is given appropriate consideration.

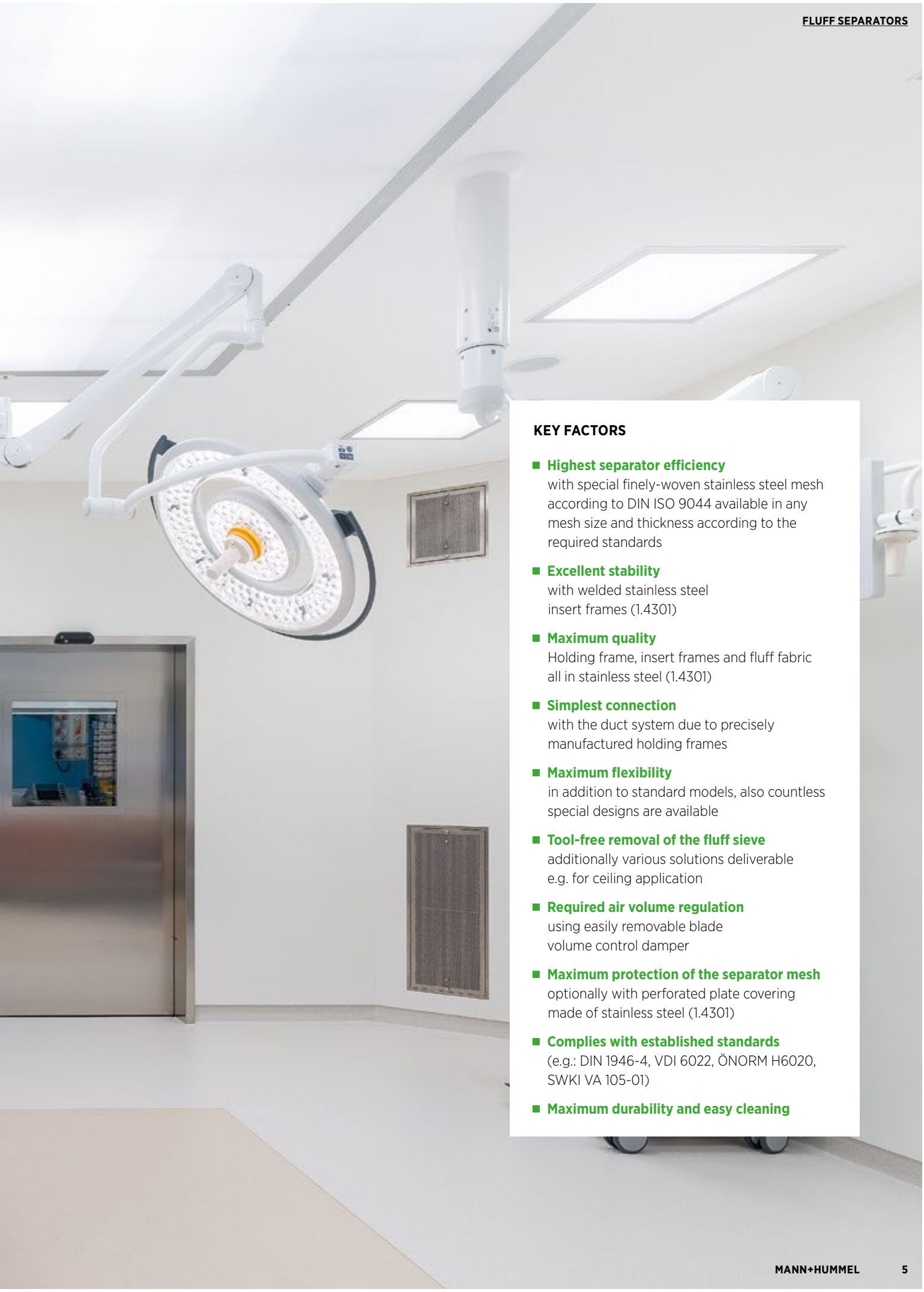
The **experience gained in over 5,000 projects** implemented worldwide provides high product quality and execution reliability for our customers.

Fluff separators

Fluff separators are used to restrain fluffs from surgical gowns and drapes and are built into exhaust air cabinets, exhaust air ducts or in false ceilings. Their use enables exhaust air ducts, downstream AHU-system components and rooms that are connected to the operating theatre via overflow openings to be effectively protected from clothing fibres.

These special exhaust air outlets consist mainly of a welded holding frame and an insert frame covered with stainless steel mesh, which can be extended with a perforated plate covering and a volume control damper depending on the model.



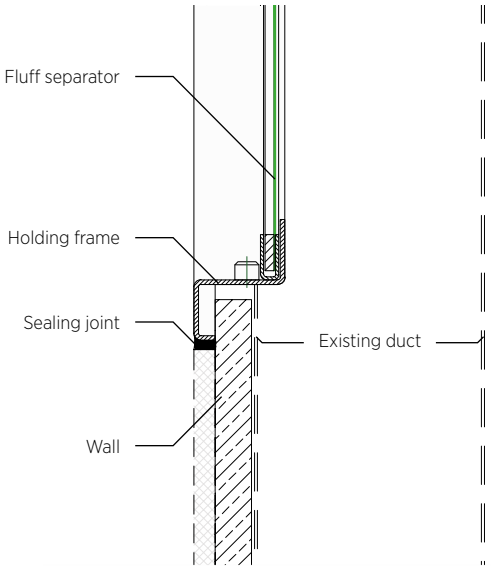


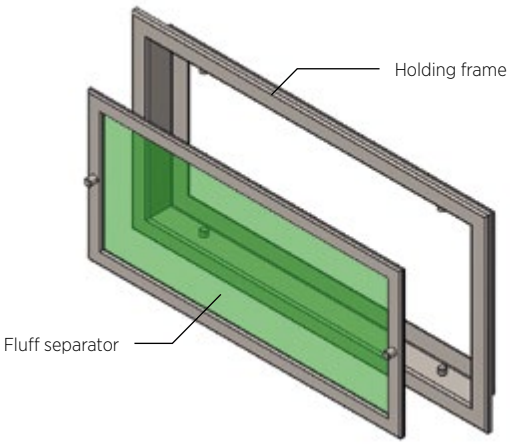
KEY FACTORS

- **Highest separator efficiency**
  with special finely-woven stainless steel mesh according to DIN ISO 9044 available in any mesh size and thickness according to the required standards
- **Excellent stability**
  with welded stainless steel insert frames (1.4301)
- **Maximum quality**
  Holding frame, insert frames and fluff fabric all in stainless steel (1.4301)
- **Simplest connection**
  with the duct system due to precisely manufactured holding frames
- **Maximum flexibility**
  in addition to standard models, also countless special designs are available
- **Tool-free removal of the fluff sieve**
  additionally various solutions deliverable e.g. for ceiling application
- **Required air volume regulation**
  using easily removable blade volume control damper
- **Maximum protection of the separator mesh**
  optionally with perforated plate covering made of stainless steel (1.4301)
- **Complies with established standards**
  (e.g.: DIN 1946-4, VDI 6022, ÖNORM H6020, SWKI VA 105-01)
- **Maximum durability and easy cleaning**

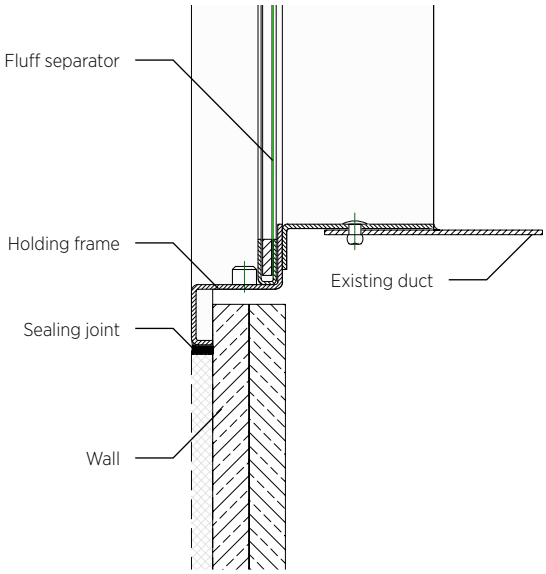
Fluff separator FA-W Design versions

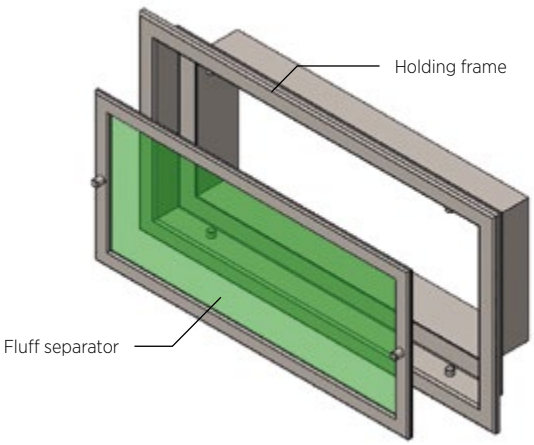
FA-W1 Version 1 for continuous duct



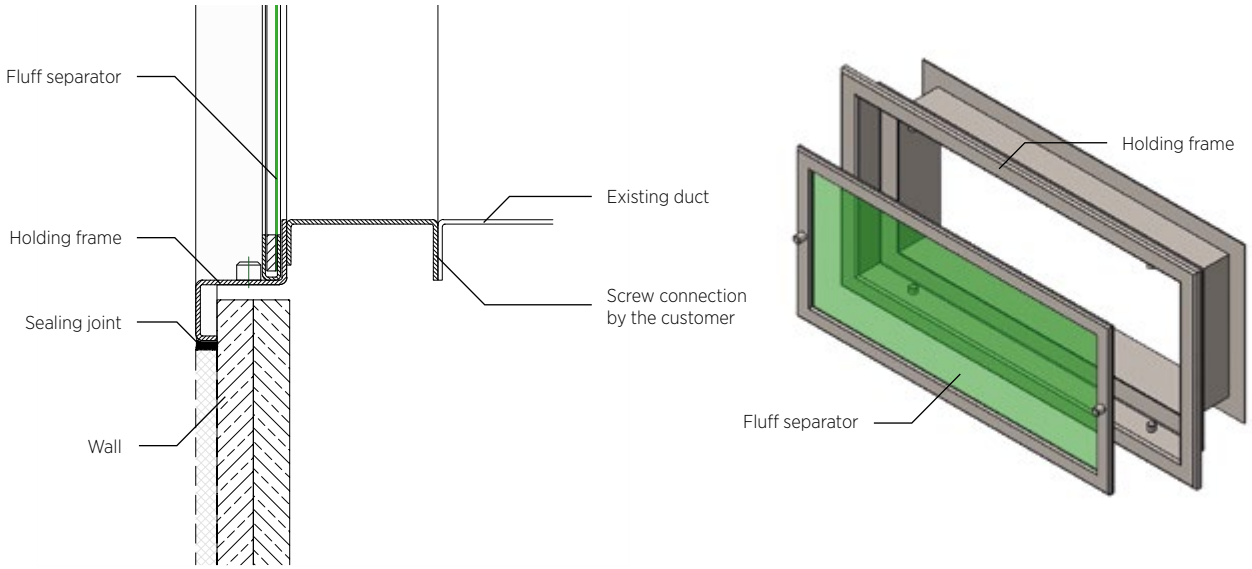


FA-W2 Version 2 for sliding connection

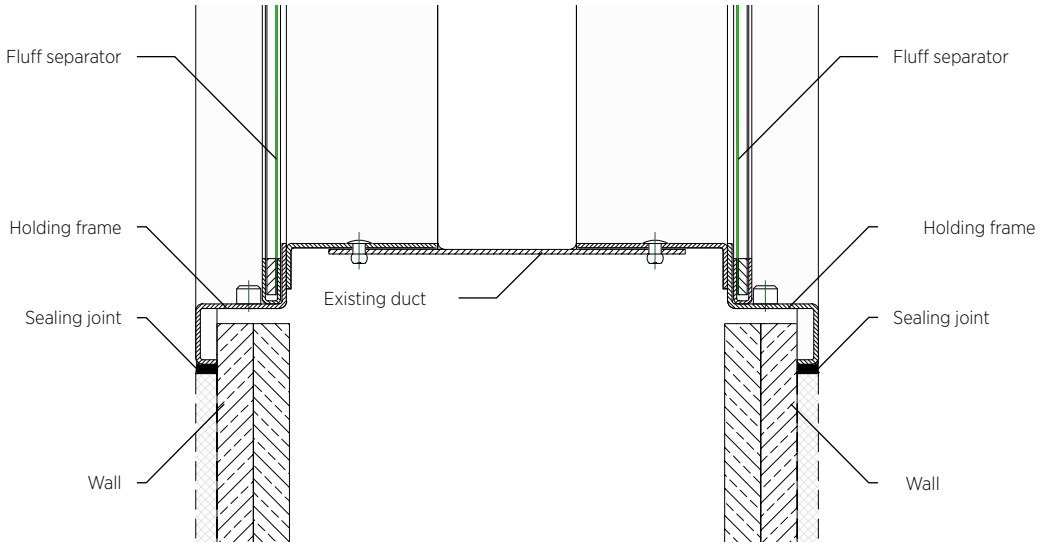




FA-W3 Version 3 fold edge



FA-W3 Version 3 for overflow



Perfect design and maximum flexibility

DIMENSIONING

According to the prevailing standards, the exhaust air outlets in an operating theatre must be located symmetrically, in all four corners of the room, to ensure the low turbulence flow (LTF) is maintained. The main part of the exhaust air volume (approx. 2/3) should be extracted close to the floor and the rest (approx. 1/3) close to the ceiling (DIN 1946-4). In principle, all fluff separators are available in all sizes. When volume control dampers are used, they provide the initial dimension which determines the size of the fluff separator.

The fluff separators must be dimensioned with an inflow velocity of 1.5 to 2.0 m/s, in relation to the duct connecting pieces.

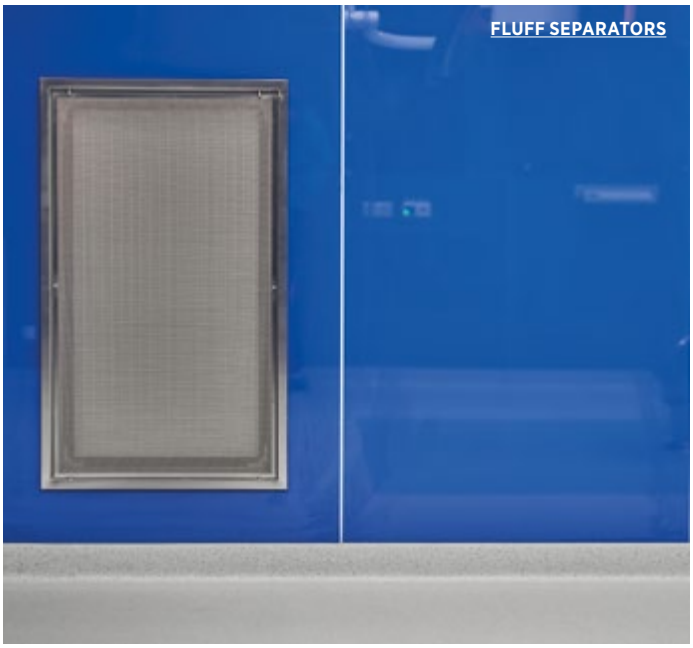
The following table shows the standard sizes and maximum air volumes.

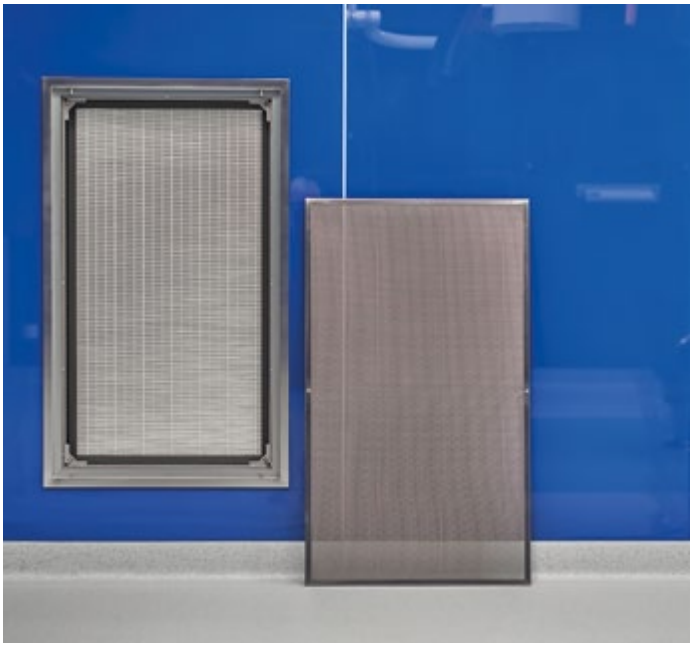
PRODUCT ADVANTAGES

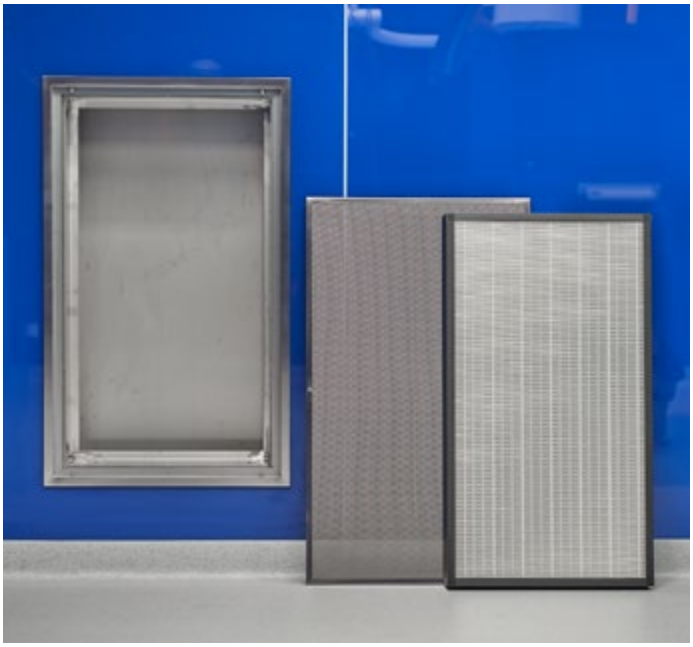
- Top separator efficiency with special finely-woven stainless steel mesh (1.4301) according to DIN ISO 9044
- Perfect design
  - flush with the wall due to recessed fluff insert frame
  - no protruding parts
  - nothing to get caught on therefore protection for staff and mobile operating equipment
  - Visible surfaces sanded, grit grade 240
- Tool-free removal of the fluff insert frame
  - no screw connection
  - no appliances required (mounting lever, etc.)
- Maximum manufacturing quality
  - all components made of stainless steel (1.4301)
- Top flexibility
  - in addition to standard sizes, also countless special sizes are available
- Maximum durability and cleanability
  - Autoclaving possible up to 134° C
- Complies with the requirements of DIN 1946-4

TECHNICAL DATA

	Width 225 (mm)		Width (325 mm)		Width 425 (mm)		Width 525 (mm)		Width 625 (mm)		Width 725 (mm)	
Height	m³/h	kg	m³/h	kg	m³/h	kg	m³/h	kg	m³/h	kg	m³/h	kg
125 (mm)	60	1.1	100	1.4	140	1.8	180	2.3	220	2.7	260	3.0
225 (mm)	190	1.3	320	1.6	450	2.0	580	2.5	710	2.9	840	3.3
325 (mm)	320	1.6	540	2.1	760	2.5	980	3.0	1,200	3.4	1,420	3.9
425 (mm)	450	2.0	760	2.5	1,070	3.0	1,380	3.2	1,690	4.0	2,000	4.4
525 (mm)	580	2.5	980	3.0	1,380	3.5	1,780	4.0	2,180	4.5	2,580	5.0
625 (mm)	710	2.9	1,200	3.4	1,690	4.0	2,180	4.5	2,670	5.0	3,160	5.5
725 (mm)	840	3.3	1,420	3.9	2,000	4.4	2,580	5.0	3,160	5.5	3,740	6.1
825 (mm)	970	3.8	1,640	4.4	2,310	4.9	2,980	5.5	3,650	6.2	4,330	6.6



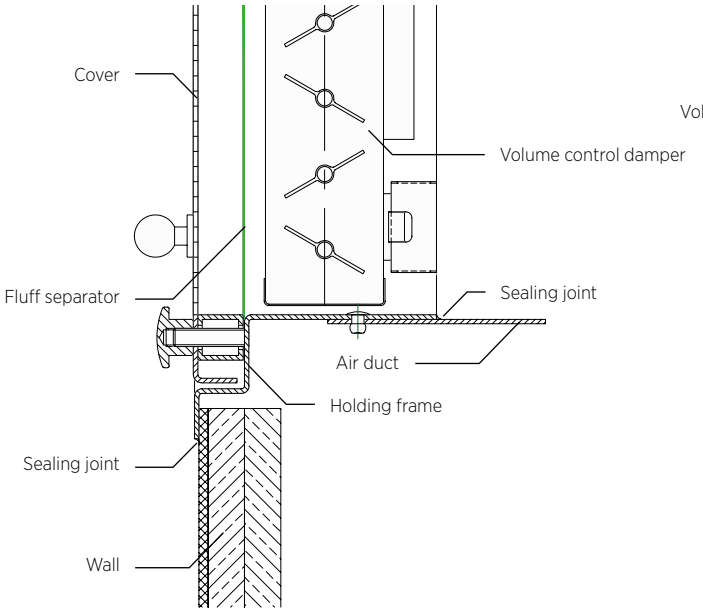


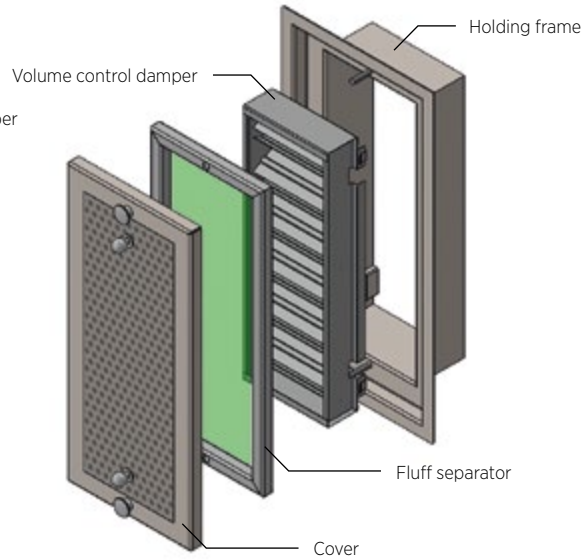


Fluff separator integrated in an exhaust air cabinet and glass wall

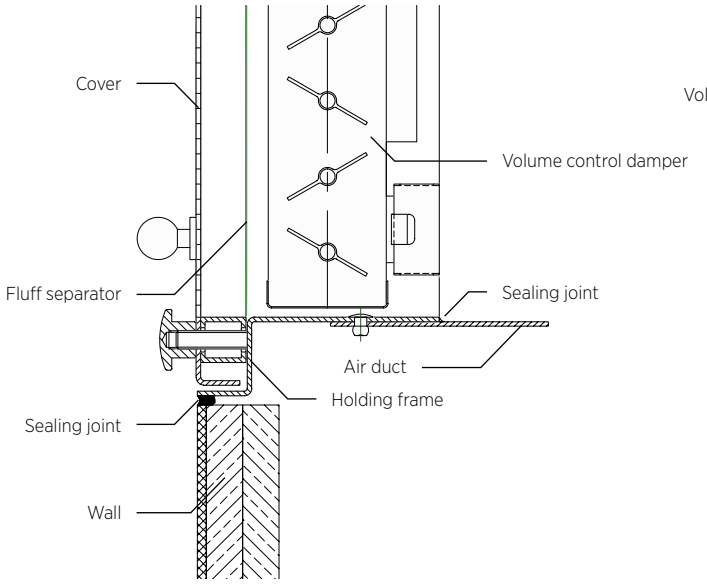
Fluff separator Optiflu Design versions

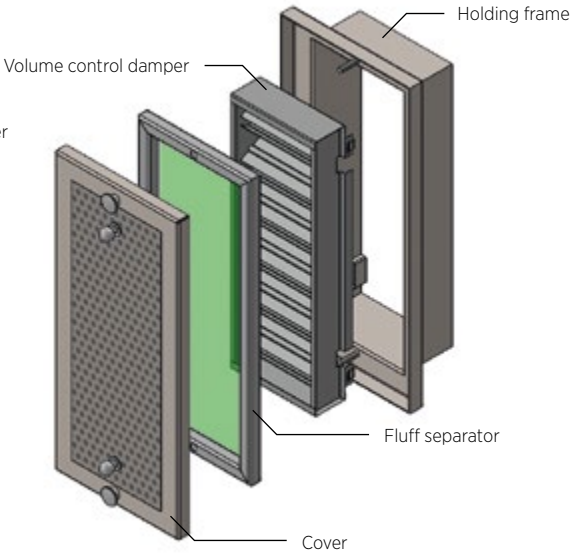
OPTIFLU Version 1 with circumferential connection angle

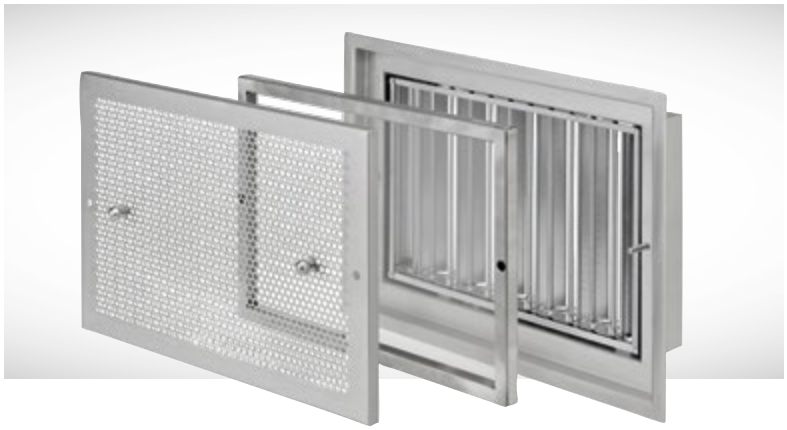




OPTIFLU Version 2 without circumferential connection angle







DIMENSIONING

According to the prevailing standards, the exhaust air outlets in an operating theatre must be located symmetrically, in all four corners of the room, to ensure the low turbulence flow (LTF) is maintained. The main part of the exhaust air volume (approx. 75 %) should be extracted close to the floor and the rest (approx. 25 %) close to the ceiling (ÖNORM H6020). In principle, all fluff separators are available in all sizes. When volume control dampers are used, they provide the initial dimension which determines the size of the fluff separator. The fluff separators must be dimensioned with a maximum inflow velocity of 2.0 m/s, in relation to the duct connecting pieces.

The following table shows the standard sizes and maximum air volumes.

PRODUCT ADVANTAGES

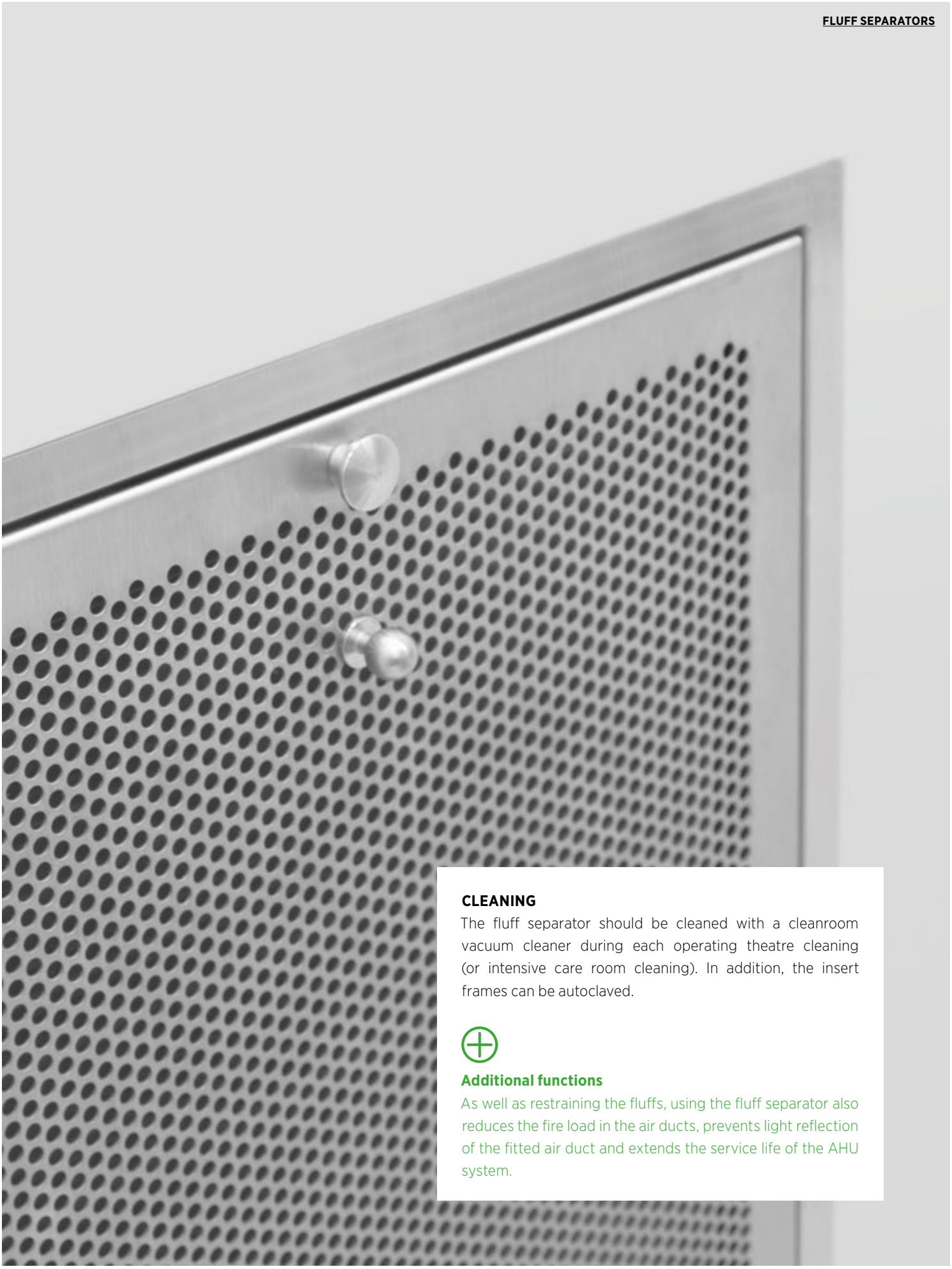
- Top separator efficiency with special finely-woven stainless steel mesh (1.4301) according to DIN ISO 9044, Mesh size: max. 250 µm; Mesh thickness: max. 50 µm
- Maximum stability with stainless steel (1.4301) insert frames made of welded shaped pipe
- Maximum flexibility: In addition to standard sizes, also countless special sizes are available. Blade volume control damper can be removed any time.
- Tool-free removal of the fluff sieve; additionally various solutions deliverable e.g. for ceiling applications
- Required air volume regulation via blade volume control damper
- Best possible protection of the stainless steel mesh via a stainless steel (1.4301) perforated plate covering with a nonperforated border area.
- Complies with the requirements of ÖNORM H6020

TECHNICAL DATA

	Width 170 (mm)		Width 270 (mm)		Width 370 (mm)	
Height	**m³/h**	**kg**	**m³/h**	**kg**	**m³/h**	**kg**
270 (mm)	190	2.7	340	3.8		
370 (mm)	270	3.5	500	4.8	730	6.2
470 (mm)	360	4.3	660	6.0	960	7.6
570 (mm)			810	7.1	1,190	9.1
670 (mm)			970	8.2	1,420	10.5
870 (mm)			1,280	10.4	1,870	13.2
1,070 (mm)					2,330	16.0

Fluff separator integrated in a Corian wall panel

Fluff separator close to the floor (75 %) and close to the ceiling (25 %)



CLEANING

The fluff separator should be cleaned with a cleanroom vacuum cleaner during each operating theatre cleaning (or intensive care room cleaning). In addition, the insert frames can be autoclaved.

Additional functions

As well as restraining the fluffs, using the fluff separator also reduces the fire load in the air ducts, prevents light reflection of the fitted air duct and extends the service life of the AHU system.

Detail view, wall installation (fluff separator flush to wall)

Exhaust air cabinets

Exhaust air cabinets are special ventilation components used to restrain fluffs from surgical gowns and drapes, efficiently remove exhaust air and support the low turbulence flow. These ventilation components consist mainly of a housing with a built-in fluff separator, inspection door and duct connecting pieces.

PRODUCT ADVANTAGES

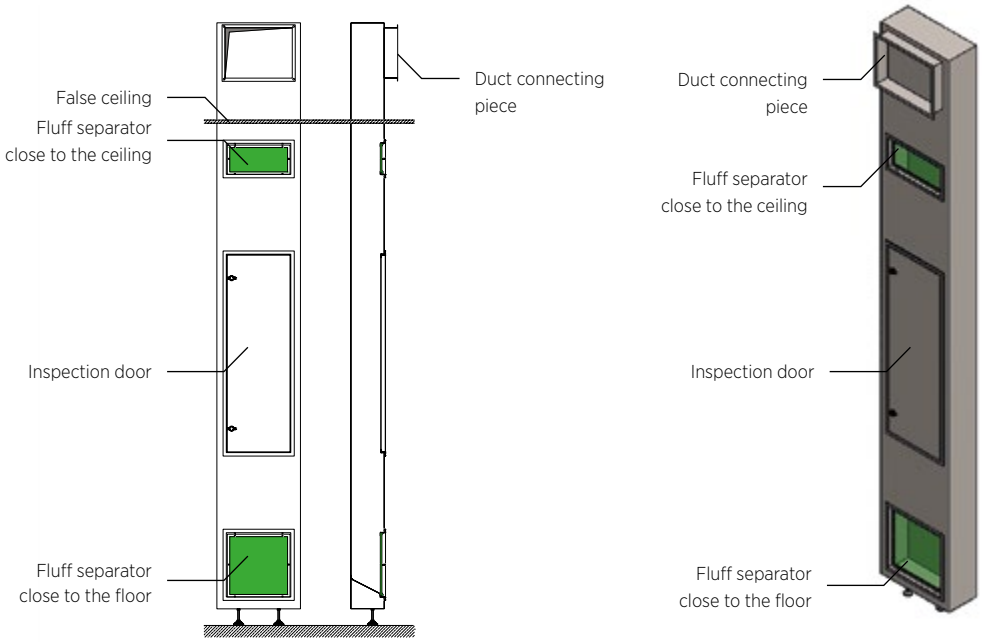
- Excellent separation efficiency
  due to the highly efficient fluff separator.
- Maximum flexibility
  In addition to standard sizes and models, custom-made special solutions are available. These allow trouble-free Integration in all modular wall systems made of metal, sheet steel, stainless steel, HPL and glass panels.
- Varying base forms
  Models with square, rectangular and triangular construction designs
- Excellent design
  evident in the various surface qualities and availability in all RAL standard colours and special colours.
- Various materials
  Stainless steel or powder-coated aluminium
- Easy to clean and disinfect due to direct access via a front-opening inspection door, disinfectant-proof finish
- Many positioning alternatives
  Integration in modular lightweight wall or standing in front of a wall or in a corner
- Sound level minimization with optional application of a hygienically uncritical, sound-absorbent lining
- Comply with the requirements of prevalent standards (e.g.: DIN 1946-4, ÖNORM H6020, SWKI VA 105-01)

APPLICATION

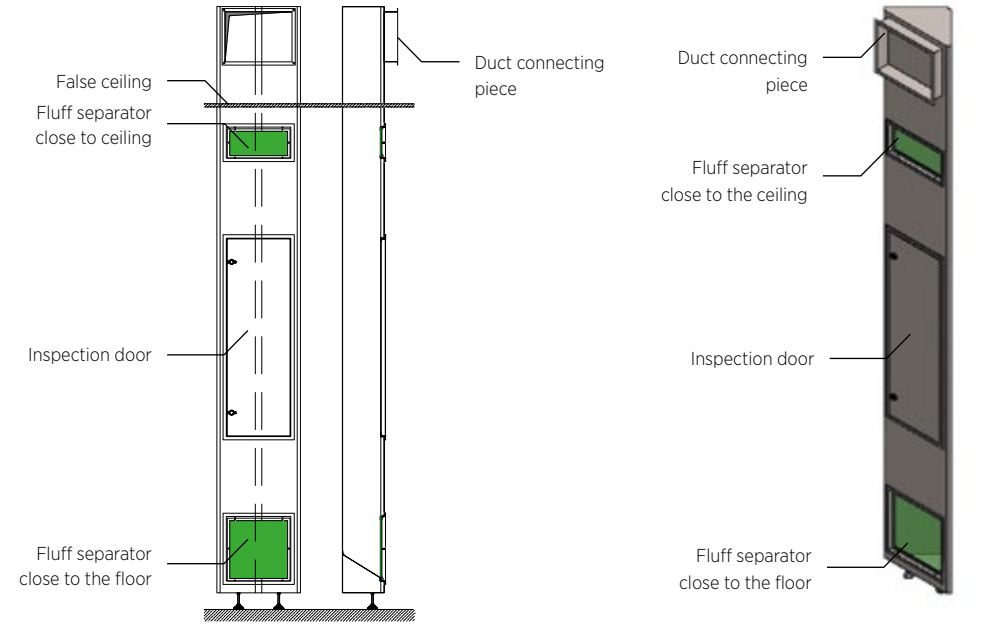
These ventilation components are used in cleanrooms with high hygienic requirements, mainly in operating theatres.

Exhaust air cabinets OP-ASS Design versions

OP-ASSR rectangular design



OP-ASSD triangular design



Exhaust air cabinet including fluff separator and inspection door

Exhaust air cabinet positioned behind a glass wall with integrated fluff separator

Proven standard sizes as the basis for your model

TECHNICAL DATA

rectangular	Width (mm)	Height (mm)	Depth (mm)	Air volume (m^3/h)	Air velocity (m/s)
OP-ASSR 40/20	**400**	**3,500**	**200**	**1,000**	**3.9**
Upper fluff separator	325	225		300	2.40
Lower fluff separator	325	425		700	2.40
OP-ASSR 50/20	**500**	**3,500**	**200**	**1,400**	**3.9**
Upper fluff separator	425	225		400	2.30
Lower fluff separator	425	425		1,000	2.40
OP-ASSR 60/20	**600**	**3,500**	**200**	**1,700**	**4.0**
Upper fluff separator	525	225		500	2.20
Lower fluff separator	525	425		1,200	2.20
triangular	**Width (mm)**	**Height (mm)**	**Depth (mm)**	**Air volume (m^3/h)**	**Air velocity (m/s)**
OP-ASSD 40/20	**400**	**3,500**	**200**	**550**	**3.9**
Upper fluff separator	325	225		170	1.30
Lower fluff separator	325	425		390	1.30
OP-ASSD 50/20	**500**	**3,500**	**250**	**850**	**3.9**
Upper fluff separator	425	225		250	1.40
Lower fluff separator	425	425		600	1.50
OP-ASSD 60/20	**600**	**3,500**	**300**	**1,250**	**4.0**
Upper fluff separator	525	225		370	1.60
Lower fluff separator	525	425		880	1.60

Your direct line to us!

GERMANY

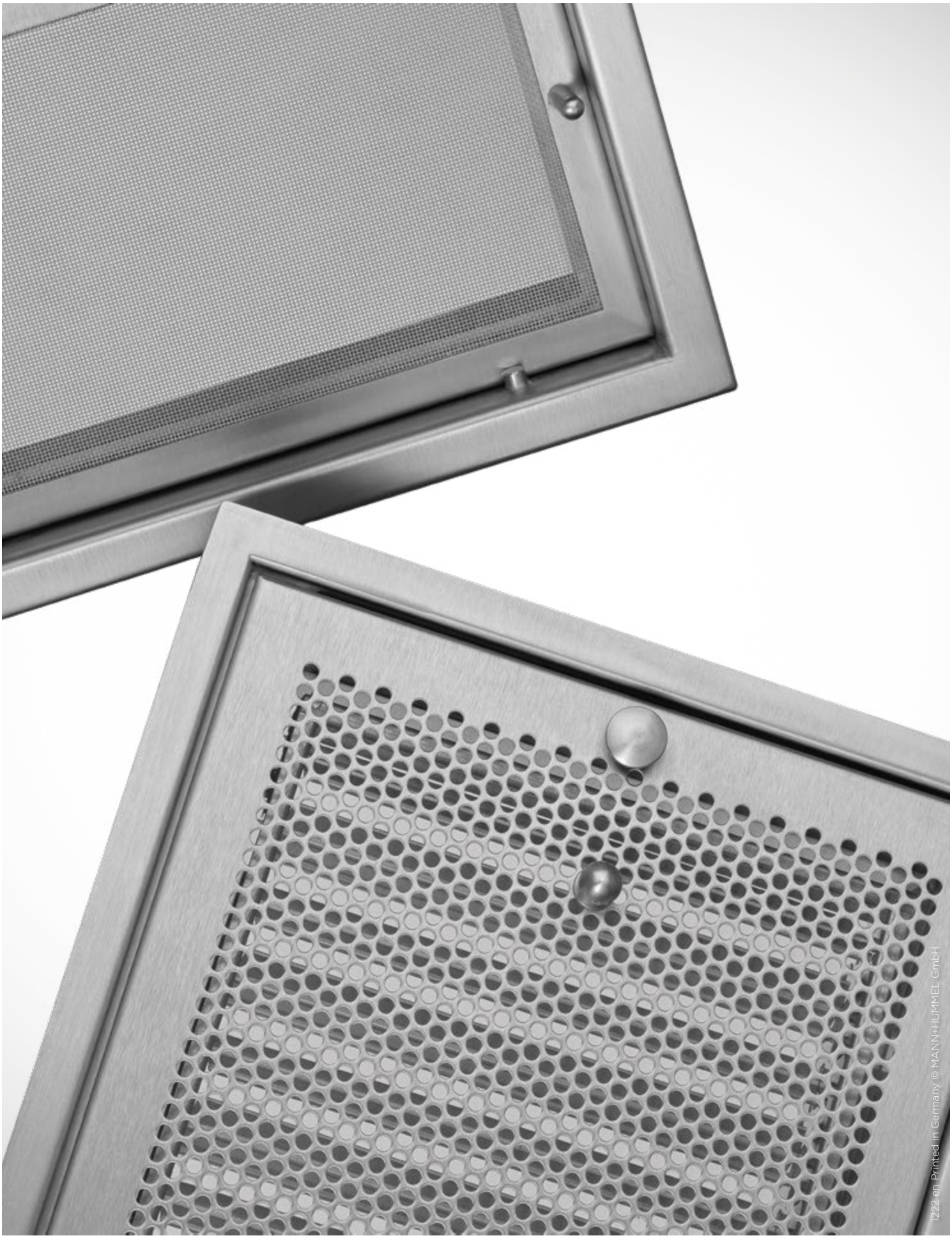
MANN+HUMMEL
Life Sciences & Environment Germany GmbH
Honeywellstraße 18
D-63477 Maintal

Tel: + 49 6181 9082 01 Fax: + 49 6181 9082 110
E-Mail: medical.de-mt@mann-hummel.com

AUSTRIA

MANN+HUMMEL
Vokes Air GmbH
Ortsstraße 18
A-2331 Vösendorf

Tel: + 43 1 698 66770 Fax: + 43 1 698 667734
E-Mail: medical.at-vd@mann-hummel.com



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