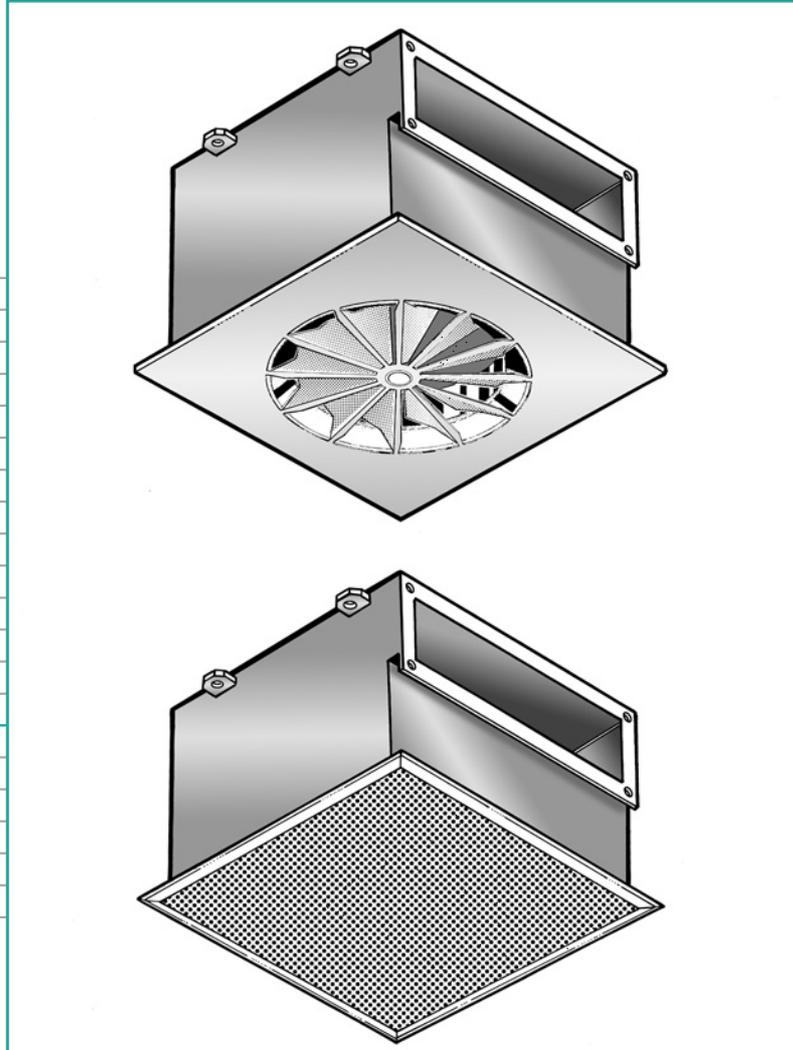


## Technical Selection



**Puridrall and Puri-inlet**  
**Air outlets for clean rooms**

*Kranz*

## Preliminary remarks

Cleanroom classes 6 to 8 to DIN EN ISO 14644-1 (VDI 2083) or 1 000 to 100 000 to US Federal Standard 209 as well as C and D to EG-GMP are obtained using turbulent mixing-air flow. This is a mode of ventilation in which clean supply air entering the room is mixed - as intensively as possible - with the indoor air. The key effect on the degree of cleanliness is the dilution of air pollutants emitted in the room. The more even the dilution, the higher the degree of cleanliness reached.

This calls for air outlets that achieve intensive admixture of supply air and indoor air due to their induction effect. For this, KRANTZ KOMPONENTEN uses its own tried and tested twist outlets. Supply air discharge is horizontal and radial. The strong induction effect of the air jets causes a turbulent, diffuse mixing-air flow with constant, low indoor air velocity. This reliably prevents zones of higher particle concentration.

The Puridrall is made up of a twist outlet and a HEPA filter cell accommodated in a joint housing.

To filter return air directly at the collection point in clean rooms KRANTZ KOMPONENTEN provides the Puri-inlet. This has the same shape and quality as the Puridrall. Instead of a twist outlet element, the Puri-inlet has a perforated plate for return air intake.

## Applications

Both air outlets can be used in all areas of industry, research and medicine where air cleanliness to the above-mentioned cleanliness classes is required (see chart on page 9).

Puridrall and Puri-inlet are well suited for refitting existing HVAC systems in clean rooms.

## Construction design

### Puridrall

Puridrall is available in 7 sizes, for a volume flow rate range of 20 to 450 l/s (75 to 1600 m<sup>3</sup>/h). Its essential components are the housing 1 with built-in HEPA filter cell 2 and twist outlet 3.

Attractive slim ceiling twist outlets are used for all Puridrall sizes.

The twist outlet is detachable downwards. Two different constructions are available to enable the HEPA filter cell replacement:

**U construction:** Filter cell replacement from below, from clean room.

**O construction:** Filter cell replacement from above, from false ceiling.

After releasing the contact pressure fixture 4 the filter cell 2 can be easily removed. In the U construction, the twist outlet or in the O construction the upper endplate 17 must be dismantled.

The sealing frame 5 for the filter cell is available with a test groove 5b (DIN 1946, Part 4) for dry sealing. The tightness test with the U construction is conducted from below with the twist outlet removed, and with the O construction from above, with the endplate detached at measurement point 6.

Instead of a dry sealing, the filter cells for housing sizes 1 to 6 are available with fluid sealing 2c. They have a groove with fluid filling in the segment of the cell frame. In this option, the sealing frame 5 is fitted with a surrounding knife edge 5a which immerses in the fluid filling to make an airtight connection.

The air-side connection can be made either via a lateral, rectangular connection spigot 8 with a connection flange, or from above with a circular connection spigot. An airtight shutoff damper 9 with either an electric or pneumatic servomotor 10 can be built into the connection spigot. Depending on the housing construction (U or O), the servomotor is accessible from below or above. Strap fasteners 14 are used for ceiling attachment.

### Puri-inlet

The construction design is the same as for Puridrall but a perforated plate is used instead of the twist outlet element.

## Materials and types

Housing, connection spigot, sealing frame and knife edge made of galvanized sheet metal, coated on both sides with disinfectant-proof epoxy polyester resin, colour to RAL 7035 (light grey). Contact pressure fixture, holder for crossbeam and test pipe for tight fit and filter pressure made of stainless steel.

Twist outlet and perforated plate made of galvanized sheet metal, coating with disinfectant-proof epoxy polyester resin, colour to RAL 9010 (pure white) or as required.

Class H13 or H14 HEPA filter cell (to DIN EN 1822-1), filter cell frame made of aluminium,

Filter cell frame with handles on the extraction side for filter cell replacement from above.

Cell frame with polydimethyl siloxene fluid sealing

Properties: liquid, colourless, odourless

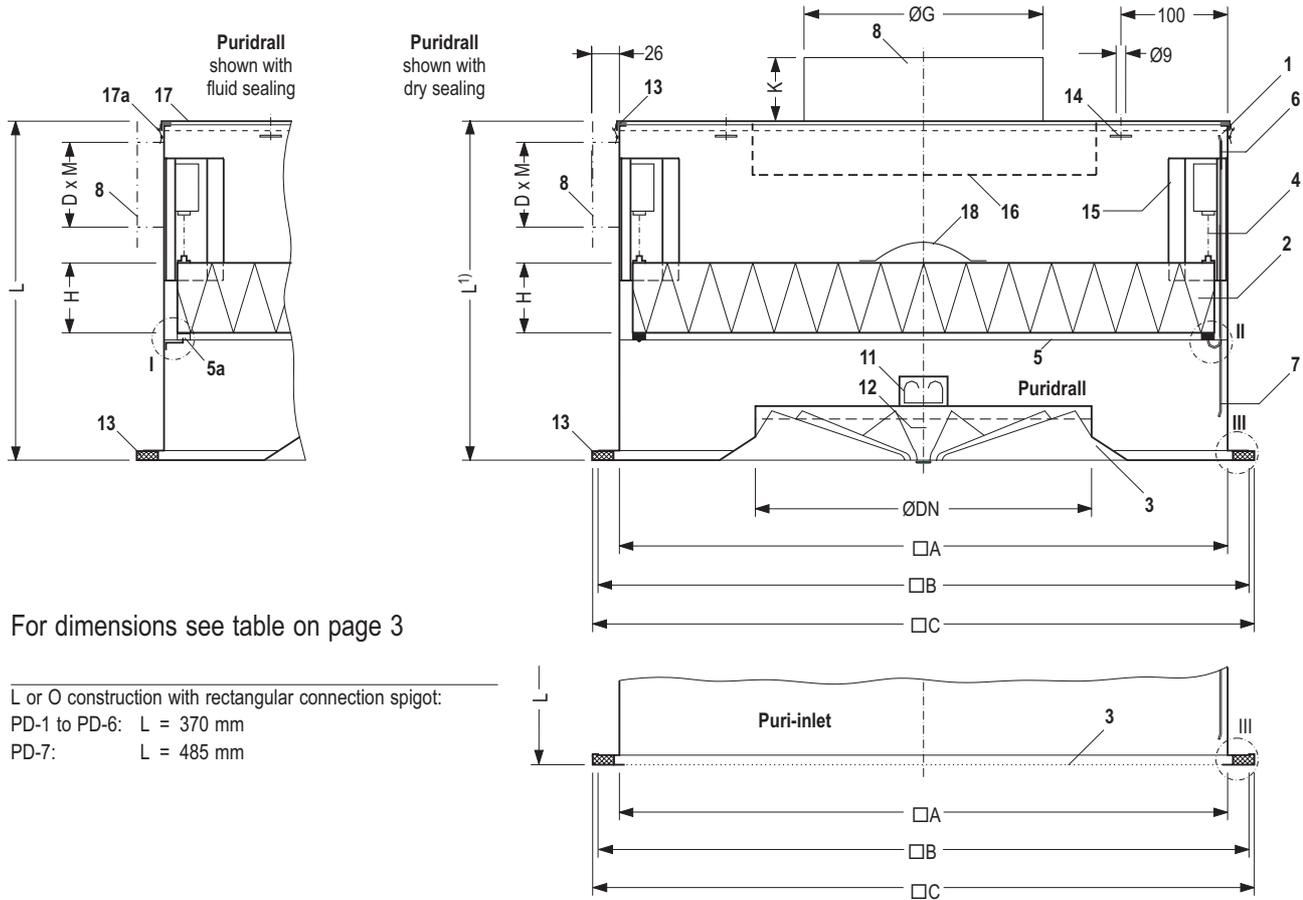
Density: 0.97 g/cm<sup>3</sup> at 20°C

Thermal decomposition: ≥ 200°C

All parts are made of rustproof material or protected from corrosion, and are disinfectant-resistant.



### O construction: Filter cell replacement from above



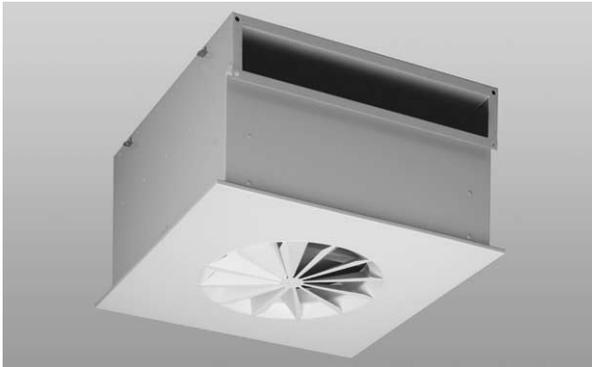
For dimensions see table on page 3

L or O construction with rectangular connection spigot:

PD-1 to PD-6: L = 370 mm

PD-7: L = 485 mm

### Filter cell replacement from below



Puridral with rectangular connection spigot



Air outlet removed, filter cell and contact pressure fixture visible

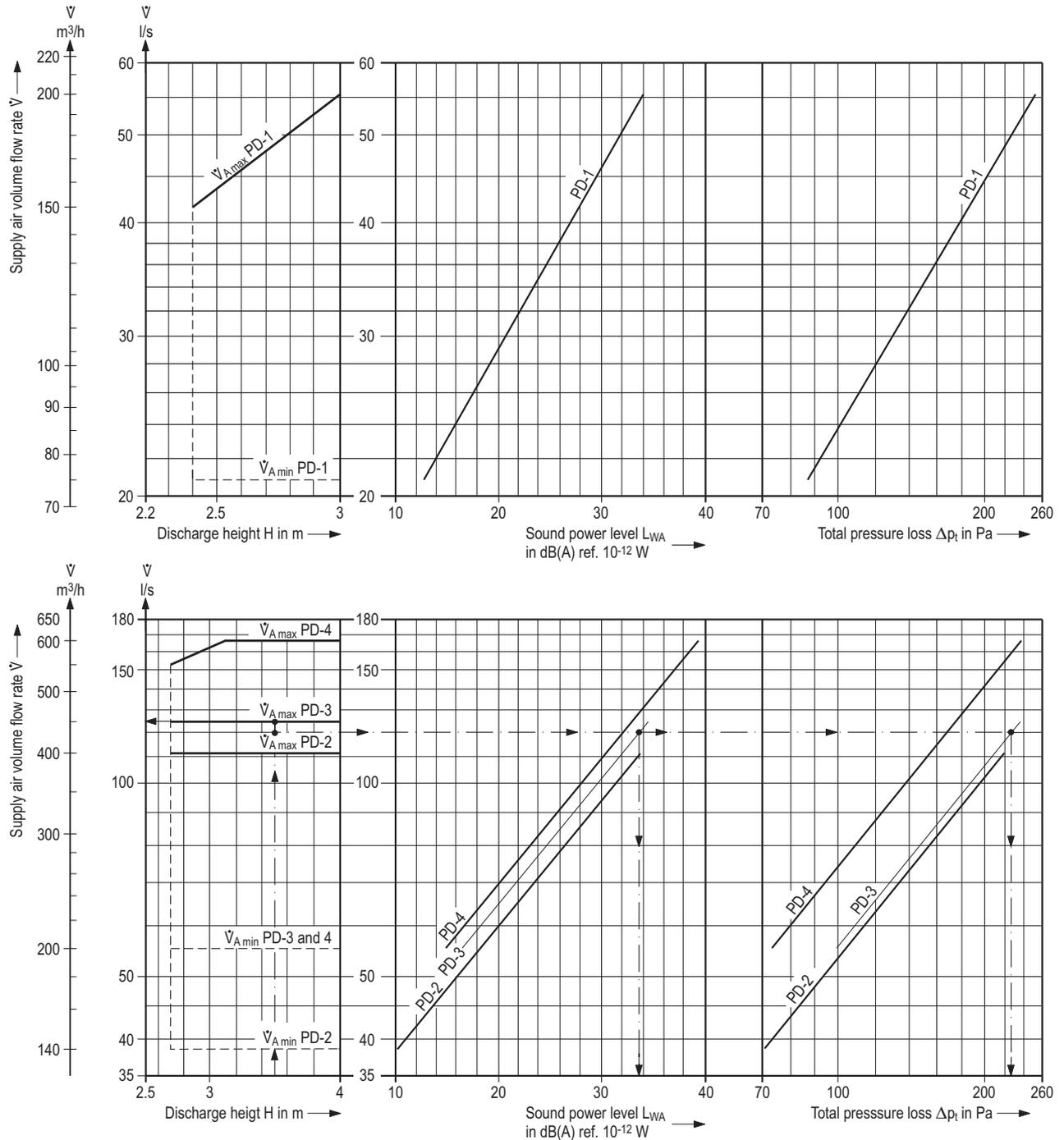
### Filter cell replacement from above



Puridral with circular connection spigot in the detachable cover plate



Cover plate removed, filter cell and contact pressure fixture visible



### Layout example for Puridrall PD-3:

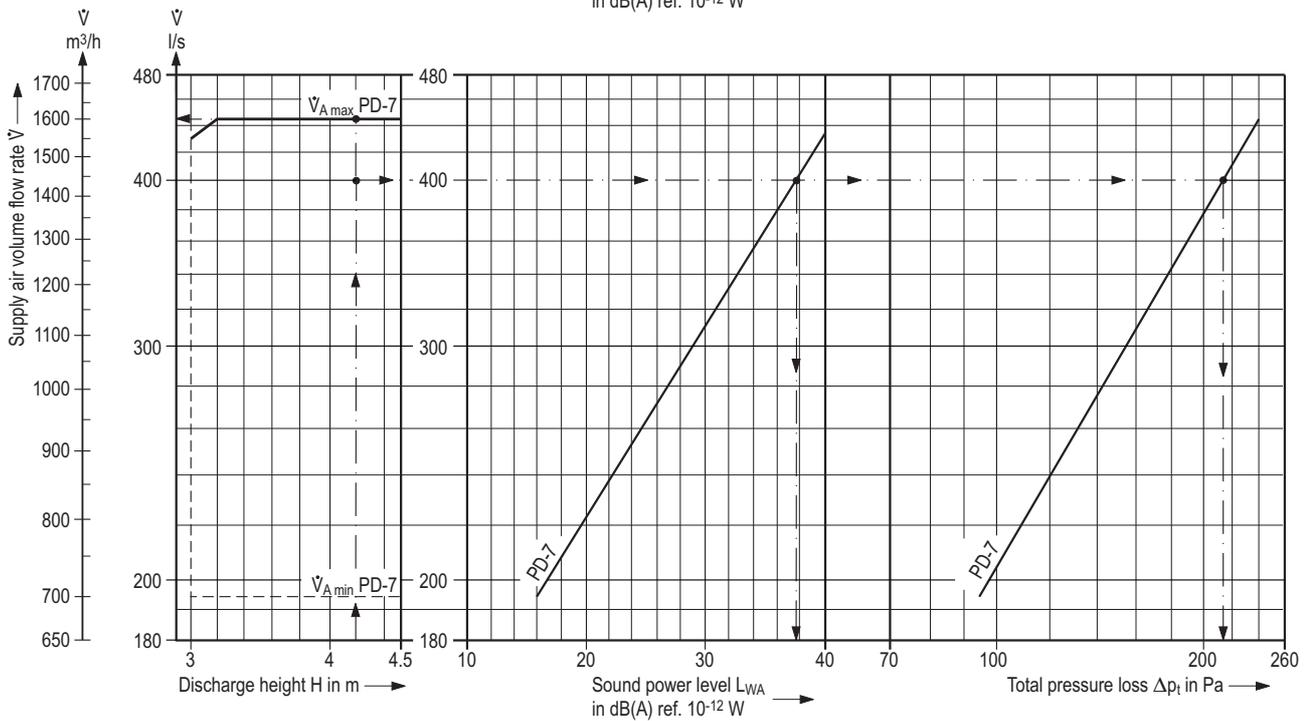
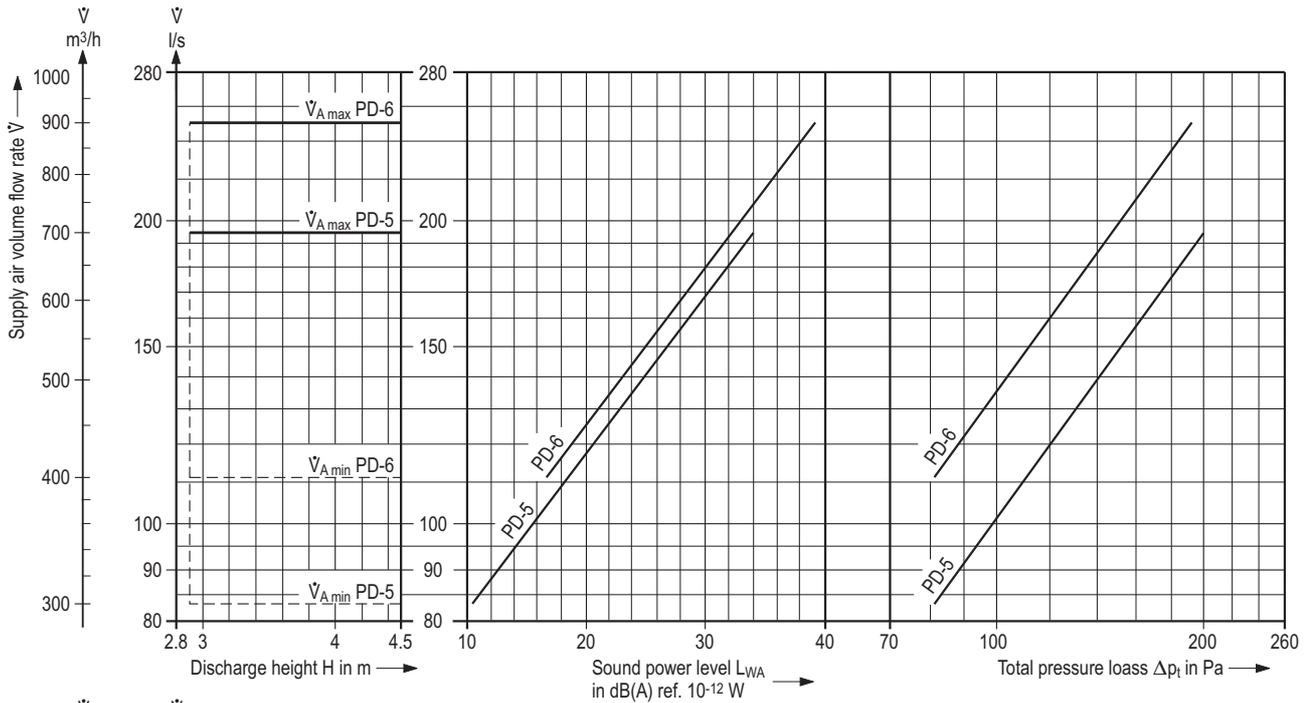
- 1 Supply air volume flow rate  $\dot{V} = 5\,000$  l/s
- 2 Discharge height  $H = 3.5$  m
- 3 Room area  $A = 245$  m<sup>2</sup>
- 4 Specific volume flow rate  $\dot{V}_{Sp} = 20.4$  l/(s · m<sup>2</sup>) (① : ③)
- 5 Max. perm. sound power level  $L_{WA} = 35$  dB(A) ref.  $10^{-12}$  W

### From chart:

- 6  $\dot{V}_{Amax} = 125$  l/s
- 7  $\dot{V}_A$  selected = 120 l/s and hence
- 8  $Z = 42$  units from (① : ⑦)
- 9  $L_{WA} \approx 33$  dB(A) ref.  $10^{-12}$  W
- 10  $\Delta p_t \approx 225$  Pa
- 11  $t_{min} \approx 2.4$  m (Chart page 7)

### Key:

- $\dot{V}$  = Total supply air volume flow rate
- $\dot{V}_{Amax}$  = Max. volume flow rate per Puridrall depending on discharge height (outlet to floor)
- $\dot{V}_{A sel.}$  = Selected volume flow rate per outlet
- $H$  = Discharge height
- $\Delta p_t$  = Total pressure loss of Puridrall with uncontaminated filter cell
- $t_{min}$  = Minimum Puridrall spacing
- $\dot{V}_{Sp}$  = Specific air volume flow rate per m<sup>2</sup> of room area



### Layout example for Puridral PD-7:

- 1 Supply air volume flow rate  $\dot{V} = 9\,700$  l/s
- 2 Discharge height  $H = 4.2$  m
- 3 Room area  $A = 415$  m<sup>2</sup>
- 4 Specific volume flow rate  $\dot{V}_{Sp} = 23.4$  l/(s · m<sup>2</sup>) (① : ③)
- 5 Max. perm. sound power level  $L_{WA} = 40$  dB(A) ref.  $10^{-12}$  W

### From chart:

- 6  $\dot{V}_{Amax} = 444$  l/s
- 7  $\dot{V}_A$  selected = 400 l/s and hence
- 8  $Z = 24$  units from (① : ⑦)
- 9  $L_{WA} \approx 38$  dB(A) ref.  $10^{-12}$  W
- 10  $\Delta p_t \approx 215$  Pa
- 11  $t_{min} \approx 4.15$  m (Chart page 7)

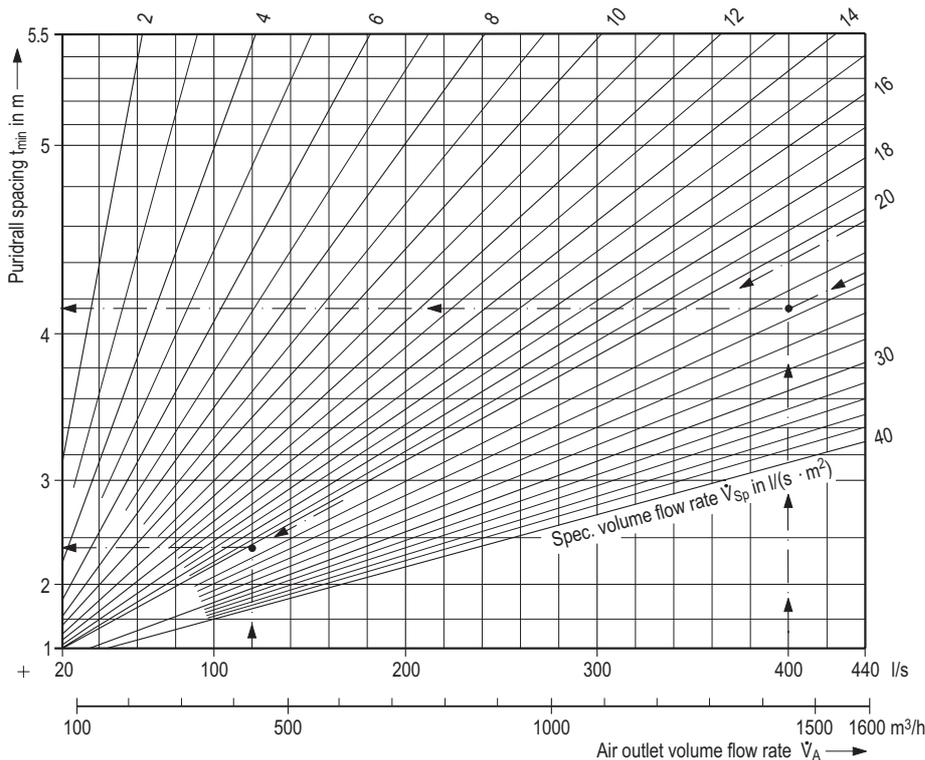
### Key:

- $\dot{V}$  = Total supply air volume flow rate
- $\dot{V}_{Amax}$  = Max. volume flow rate per Puridral depending on discharge height (outlet to floor)
- $\dot{V}_{A sel.}$  = Selected volume flow rate per outlet
- $H$  = Discharge height
- $\Delta p_t$  = Total pressure loss of Puridral with uncontaminated filter cell
- $t_{min}$  = Minimum Puridral spacing
- $\dot{V}_{Sp}$  = Specific air volume flow rate per m<sup>2</sup> of room area

## Total pressure loss and sound power level for Puridrall

Puridrall housing size	Outlet volume flow rate		Total pressure loss $\Delta p_t$ Pa	$L_{WA}$ dB(A)	Sound power level $L_W$ in dB ref. $10^{-12}$ W						
	$\dot{V}$ l/s	$\dot{V}$ m <sup>3</sup> /h			Octave band centre frequency in Hz						
					63	125	250	500	1000	2000	4000
PD - 1	22	80	93	14	17	21	16	14	—	—	—
	33	120	145	23	26	30	25	23	16	—	—
	44	160	200	29	32	36	31	29	22	16	—
	55	200	250	34	37	41	36	34	27	21	—
PD - 2	55	200	105	18	27	28	20	14	—	—	—
	70	250	135	23	32	33	25	19	14	—	—
	85	300	160	27	36	37	29	23	18	17	16
	110	400	220	34	43	44	36	30	25	24	23
PD - 3	85	300	153	26	36	37	24	18	19	15	15
	97	350	180	29	40	40	28	22	23	18	19
	110	400	210	32	43	43	31	25	26	21	22
	125	450	232	34	45	46	33	27	28	24	24
PD - 4	85	300	112	24	29	32	22	17	16	17	17
	110	400	152	31	35	38	28	23	23	23	23
	140	500	195	35	40	43	33	28	28	28	28
	165	600	235	39	44	47	37	32	31	32	32
PD - 5	110	400	110	18	31	31	19	—	—	—	—
	140	500	140	25	38	37	25	18	—	—	—
	165	600	170	30	43	42	30	23	17	—	—
	195	700	200	34	47	47	35	28	21	18	16
PD - 6	165	600	125	28	35	35	30	25	23	17	—
	195	700	148	32	39	39	34	29	27	21	—
	220	800	170	36	43	43	38	33	31	25	17
	250	900	190	39	46	46	41	36	34	28	20
PD - 7	280	1000	141	27	35	36	31	25	18	—	—
	335	1200	174	32	40	41	36	30	23	—	—
	390	1400	208	37	45	46	41	35	28	19	—
	445	1600	240	41	49	50	45	39	32	23	17

## Minimum Puridrall spacing



### 1. Example Puridrall PD-3 (see page 5)

Air outlet volume flow rate  $\dot{V}_A = 120$  l/s

Specific volume flow rate  $\dot{V}_{Sp} = 20.4$  l/(s · m<sup>2</sup>)<sup>1)</sup>

Min. Puridrall spacing  $t_{min} \approx 2.4$  m<sup>2)</sup>

### 2. Example Puridrall PD-7 (see page 6)

Air outlet volume flow rate  $\dot{V}_A = 400$  l/s

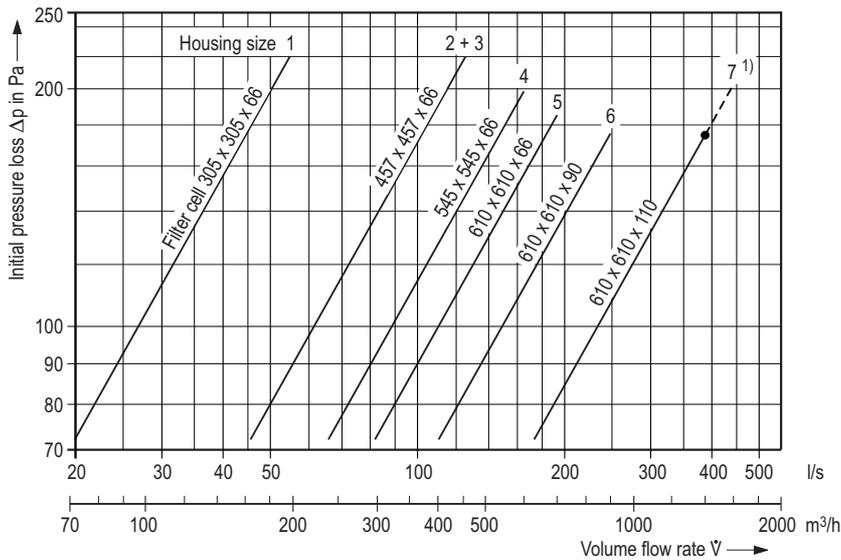
Specific volume flow rate  $\dot{V}_{Sp} = 23.4$  l/(s · m<sup>2</sup>)<sup>1)</sup>

Min. Puridrall spacing  $t_{min} \approx 4.15$  m<sup>2)</sup>

1) Related to floor area

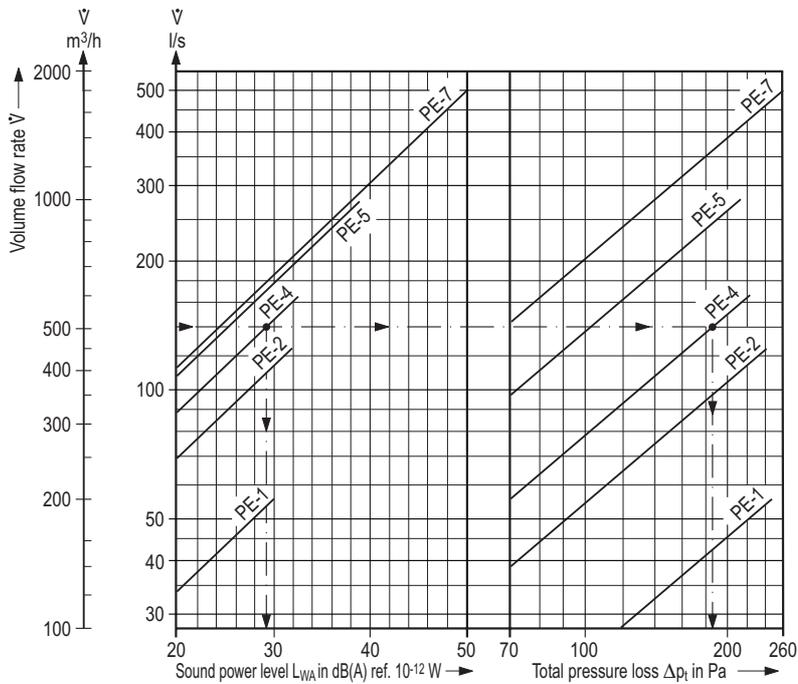
2) When the Puridrall outlets are unevenly spaced the  $t_{min}$  selected can be max. 25% smaller

## Pressure loss of class H14 <sup>1)</sup> HEPA filter



1) Housing size 7: Volume flow rate > 1400 m<sup>3</sup>/h corresponds to class H13

## Puri-inlet



### Layout example for Puri-inlet:

- 1 Return air volume flow rate  $\dot{V}$  = 6945 l/s
- 2 Max. permitted sound power level  $L_{WA} = 35 \text{ dB(A)}$  ref.  $10^{-12} \text{ W}$

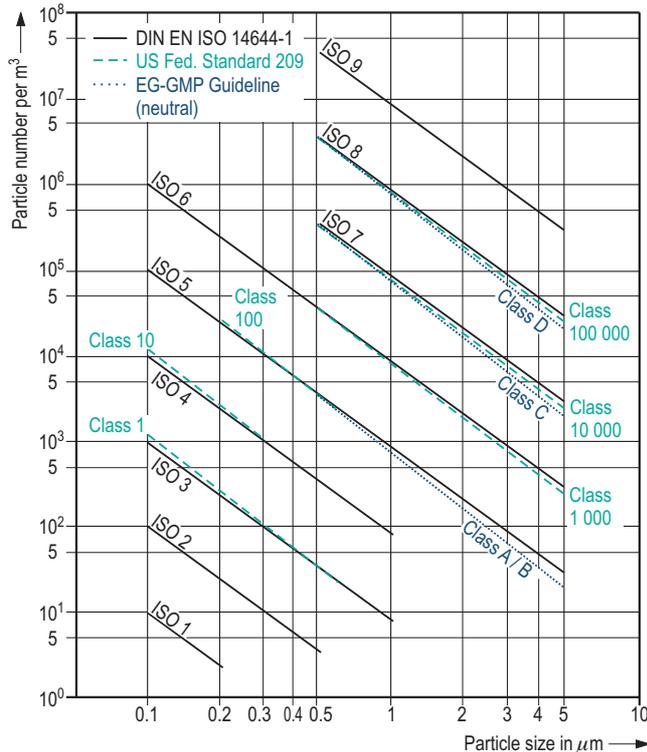
### From chart:

- 3 Selected Puri-inlet = PE-4
- 4 Volume flow rate per inlet = 140 l/s
- 5 Number of Puri-inlet = 50 units from (1) : (4)
- 6 Sound power level  $L_{WA} \approx 29 \text{ dB(A)}$  ref.  $10^{-12} \text{ W}$
- 7 Pressure loss  $\Delta p_t = 185 \text{ Pa}$

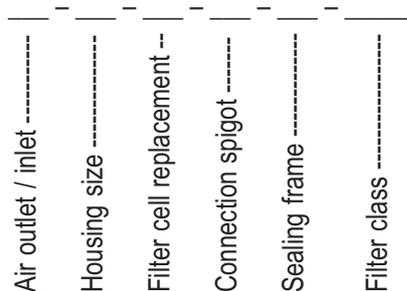
## Total pressure loss and sound power level for Puri-inlet

Puri-inlet housing size	Volume flow rate		Total pressure loss $\Delta p_t$ Pa	$L_{WA}$ dB(A)	Sound power level $L_W$ in dB ref. $10^{-12} \text{ W}$						
	$\dot{V}$ l/s	$\dot{V}$ m <sup>3</sup> /h			Octave band centre frequency in Hz						
					63	125	250	500	1000	2000	4000
PE - 1	28	100	120	16	20	26	16	--	--	--	--
	40	150	182	24	28	34	24	21	17	--	--
	55	200	245	30	34	40	30	27	23	17	--
PE - 2	55	200	105	16	20	26	16	--	--	--	--
	85	300	155	24	28	34	24	21	17	--	--
	125	450	235	32	36	42	32	29	25	19	--
PE - 4	110	400	145	25	29	35	25	22	18	--	--
	140	500	180	29	33	39	29	26	22	16	--
	165	600	220	33	37	43	33	30	26	20	--
PE - 5	165	600	123	29	37	41	33	23	20	--	--
	220	800	165	35	43	47	39	29	26	20	--
	280	1000	205	39	47	51	43	33	30	24	15
PE - 7	280	1000	140	39	48	52	43	32	28	24	15
	415	1500	210	47	56	60	51	40	36	32	23
	555	2000	280	52	61	65	56	45	41	37	28

## Cleanliness classes to DIN EN ISO 14644-1, US Federal Standard 209 and EG-GMP Guideline



### Type code



**Air outlet / inlet:**  
PD = Puridrall;  
PE = Puri-inlet

**Housing size:**  
1 to 7

### Filter cell replacement:

U = from below                      O = from above

### Connection spigot:

E = Square, lateral  
R = Circular, above  
EE = Square, lateral with electric spring-return motor  
EP = Square, lateral with pneumatic servomotor

### Sealing frame:

T = Dry sealing; F = Fluid sealing

**Filter class** to DIN EN 1822-1: H13 or H14

### Example:

**Puridrall**, housing size PD-4, filter cell replacement from below, with lateral square connection spigot, fluid sealing, filter class H14:

Type PD - 4 - U - E - F - H14

**Puri-inlet**, housing size PE-5, filter cell replacement from above, with circular connection spigot, dry sealing, filter class H13:

Type PE - 5 - O - R - T - H13

### Features

- For cleanliness classes 6 to 8 to DIN EN ISO 14644-1 (VDI 2083) or 1 000 to 100 000 to US Federal Standard 209 as well as C and D to EG-GMP
- As **Puridrall** for air supply with twist outlet (Type RA-N) for horizontal, radial air discharge and for generating high-induction, turbulent mixing-air flow
- Even dilution of pollutants emitted in room
- As **Puri-inlet** for air filtering directly at the collection point, with perforated plate for air intake
- Air-tight housing to DIN 25414; max. leakage volume flow rate well below 0.003% of nominal volume flow rate at a pressure differential of 2000 Pa
- Optional construction for filter cell replacement from below (from room) or from above (from plenum)
- HEPA filter cell, type tested to DIN EN 1822-1, filter class H13 or H14 (optional)
- Filter cell frame with dry sealing or fluid sealing (for housing sizes 1 to 6)
- Filter cell frame with handles on the extraction side for filter cell replacement from above
- Filter sealing frame for dry sealing with connection for pressure differential measurement, particle sampling and leakage testing to DIN 1946, Part 4
- Filter sealing frame for fluid sealing (gel seal) with knife edge, pressure differential measurement, particle sampling; leakage testing not required
- Compact construction with easy accessibility for disinfection and maintenance work
- Low pressure loss and low sound power level
- Air connection lateral or from above, lateral also with air-tight shutoff damper (optional)
- With electric or pneumatic servomotor (optional)
- All parts rustproof or protected against corrosion
- Well suited for refitting existing HVAC systems in clean rooms

## Tender text

..... units

Puridrall, air outlet for clean rooms, with twist outlet for turbulent mixing-air flow and strong induction effect between supply air and indoor air, easily detachable from room,

suitable for clean rooms of classes 6 to 8 to DIN EN ISO 14644-1 or 1 000 to 100 000 to US Federal Standard 209 as well as C and D to EG-GMP,

Puri-inlet, for filtering return air from clean rooms directly at the collection point, with perforated plate for air intake,

filter cell replacement  from below  from above

also consisting of:

air-tight housing with contact pressure fixture for the filter cell and

square connection spigot, lateral,  with built-in air-tight shutoff damper.

Damper actuation by

electric spring-return motor,

pneumatic servomotor,

Damper de-energized  "open".  "closed".

Circular connection spigot, above.

Sealing frame for dry sealing with surrounding test groove for leakage test to DIN 1946, Part 4.

Sealing frame for fluid sealing (gel seal), with surrounding knife edge.

Measurement point for pressure differential as well as particle sampling on the untreated air side.

HEPA filter cell, cell frame including

dry sealing.

fluid sealing. <sup>1)</sup>

## Technical data:

Volume flow rate: ..... l/s (m<sup>3</sup>/h)

Filter class:  H13  
 H14<sup>1)</sup>

Perm. sound power level: ..... dB(A) ref. 10<sup>-12</sup> W

Total pressure loss with uncontaminated filter cell ..... Pa

Materials:

Housing, twist outlet, perforated plate,

contact pressure frame and sealing frame:

Galvanized sheet metal

Filter cell frame:

Aluminium

Surface protection:

Housing, twist outlet

and contact pressure frame:

Epoxy polyester resin coating, disinfectant-proof

Colour

– housing:

RAL 7035 (light grey)

– square visible surface

incl. air outlet / inlet:

RAL 9010 (pure white) or

RAL .....

Dimensions:

Housing LxWxH: ..... mm x ..... mm x ..... mm

Filter cell LxWxH: ..... mm x ..... mm x ..... mm

Weight with filter cell: ..... kg

Make:

KRANTZ

Type: \_\_\_\_\_

Subject to technical alterations!

1) Available for sizes 1-6 and size up to 1400 m<sup>3</sup>/h; size 7 > 1400 m<sup>3</sup>/h corresponds to class H13