Krantz
Floor displacement outlet Q-B-DN 200

Air distribution systems
Floor displacement outlet

Construction design

Preliminary remarks

Floor displacement outlets are usually used where wall or plinth displacement outlets cannot be installed for reasons of space and a raised floor is available. The Q-B-DN 200 floor displacement outlet is suitable for the relatively large volume flow rate range up to 28 l/s \([100 \text{ m}^3/\text{h}]\). The air outlet element is made of aluminium and is intended for installation in conventional raised floor systems.

Construction design

The Q-B-DN 200 floor displacement outlet consists of the circular air outlet element 1 with 16 outer air slots 1a and a perforated air outlet centre 1b. It can be inserted either in the stepped bore 9b or, using a clamp insert 5, in the through bore 9a of the floor tile. The clamp insert has a protective collar 6 on the top which functions as edging for the tile cutout. This is particularly useful for raised floors with carpeting.

The clamp insert can be fastened to the floor tile with a claw fastener 5b or a clamp collar 5d. The air outlet element can be optionally locked to prevent unauthorized removal 1). The floor displacement outlet is supplied with a distributor basket 2 for even air supply. There are different types to choose from (Figure 2):  
- ‘Standard type’, with throttle device: VSD (without throttle device: VS)
- ‘Short type’, for raised floors with lower plenums; without throttle device: VK
- ‘Short type with fixed damper’ for even supply air distribution when using DN 200 in assembly rooms or with low air outlet volume flow rates: VL
- ‘Low type’, with openable basket bottom to enable additional air supply from below, best for raised floors with thicker tiles and lower plenums, with throttle device: VND (without throttle device: VN)
- ‘Perforated sheet metal type’ for metal floor air outlets, with throttle device: VPD

When the floor plan is altered the floor tiles with air outlets can be easily exchanged for tiles without air outlets. The local air supply to the room can therefore be increased or reduced as required. The supply air is fed to the floor displacement outlet via the distributor basket. The space under the raised floor acts as a pressurized plenum. The floor displacement outlet can also be connected to the supply air ductwork via a rectangular connection box 7 with flexible duct.

![Figure 1: Floor displacement outlet in a floor tile](image)

Left: in a stepped bore
Right: in a through bore with clamp insert

The supply air is fed to the floor displacement outlet via the distributor basket. The space under the raised floor acts as a pressurized plenum. The floor displacement outlet can also be connected to the supply air ductwork via a rectangular connection box 7 with flexible duct.

![Figure 2: Various types of distributor basket](image)

Table 1: Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air outlet volume flow rate ( V_{\cdot A} )</td>
<td>( \leq 28 \text{ l/s} )([100 \text{ m}^3/\text{h}])</td>
</tr>
<tr>
<td>Nominal ( \phi ) = Installation ( \phi )</td>
<td>DN 200</td>
</tr>
<tr>
<td>Supply air temperature ( \theta_{\text{su}} )</td>
<td>( \geq 20 \degree \text{C} )</td>
</tr>
<tr>
<td>Temperature difference between supply air and indoor air</td>
<td>-1 to (-4 \degree \text{K} )</td>
</tr>
<tr>
<td>Supply air and return air ( \Delta \theta )</td>
<td>(-7 \degree \text{K} )</td>
</tr>
<tr>
<td>Coverage radius of a floor displacement outlet:</td>
<td>( 4 \pm 5 \text{ m} )</td>
</tr>
<tr>
<td>Weight of air outlet:</td>
<td>0.8 kg</td>
</tr>
<tr>
<td>Breaking load ( \text{of air outlet element:} )</td>
<td>14.7 kN</td>
</tr>
</tbody>
</table>

1) For the required air outlet type (kind, material, etc.) or possible combination of individual components, see Table 3 ‘Types available’ on page 6
2) At head height of a seated person
3) For room heights up to approx. 3 m; otherwise higher \( \Delta \theta \) possible
4) Load class to EN 13264: ‘Heavy’; point load applied centrally with steel cube, edge length 25 x 25 mm with corner radius min. 2 mm
5) The slide 8b is adjustable from the room

Key for all pages:

1. Air outlet element
2. Distributor basket
3. Throttle device
4. Seal (by others)
5. Clamp insert
6. Protective collar
7. Connection box
8. Connection spigot
9. Floor tile
10. Through bore
11. Stepped bore
12. Claw fastener
13. Clamp collar
14. Slide

[Figure 2: Various types of distributor basket]
Floor displacement outlet
Installation options and dimensions

Notes:
Any distributor basket can be used for the respective installation options. Likewise connection box 7 can be used for the air outlet placement in the other figures.

1) ø 211+1 for fastening with claw fastener,
   ø 215+1 for fastening with clamp collar
2) The slide 8b is adjustable from the room
Mode of operation

The supply air flows into the distributor basket and then through the radial air slots and the perforated air outlet centre into the room. The special shape of the slots deflects the air jets which slide along the floor (Figure 3). The result is a low-turbulence horizontal, radial supply air flow at low velocity.

Figure 3: Floor displacement outlet, jet pattern

Figure 4: Low-turbulence horizontal, radial jet dispersion, made visible with smoke tracer

Figure 5 shows the air velocities measured in the near-zone of the air outlet for two air volume flow rates. Already at an approximate distance of 0.5 m from the air outlet they are low and allowable indoor air velocities to EN ISO 7730 are not exceeded. Despite the low air velocities, we recommend a minimum spacing of 0.8 m between air outlet and next seat. This prevents the seat from obstructing jet dispersion and possibly resulting in impaired thermal comfort for the occupants.

Figure 5: Air velocities above the floor with different air outlet volume flow rates $\dot{V}_A$

Above: $\dot{V}_A = 16.5 \text{ l/s} [60 \text{ m}^3/\text{h}]$
Below: $\dot{V}_A = 28 \text{ l/s} [100 \text{ m}^3/\text{h}]$
Floor displacement outlet

Sound power level and pressure drop

Table 2: Key to graphs

<table>
<thead>
<tr>
<th>No.</th>
<th>Size</th>
<th>Type</th>
<th>Throttle device</th>
<th>Aperture width / Disc lift mm</th>
<th>V damper in connection spigot</th>
<th>Damper angle α</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DN 200</td>
<td>VSD</td>
<td>100</td>
<td>8</td>
<td>90° open</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DN 200</td>
<td>VSD</td>
<td>100</td>
<td>8</td>
<td>45°</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DN 200</td>
<td>VPD</td>
<td>50</td>
<td>22.5</td>
<td>90° open</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DN 200</td>
<td>VPD</td>
<td>100</td>
<td>45.0</td>
<td></td>
<td>45°</td>
</tr>
<tr>
<td>5</td>
<td>DN 200</td>
<td>VPD</td>
<td>50</td>
<td>22.5</td>
<td></td>
<td>90° open</td>
</tr>
<tr>
<td>6</td>
<td>DN 200</td>
<td>VPD</td>
<td>100</td>
<td>45.0</td>
<td></td>
<td>45°</td>
</tr>
<tr>
<td>7</td>
<td>DN 200</td>
<td>VL</td>
<td>50</td>
<td>22.5</td>
<td></td>
<td>90° open</td>
</tr>
<tr>
<td>8</td>
<td>DN 200</td>
<td>VL</td>
<td>100</td>
<td>45.0</td>
<td></td>
<td>45°</td>
</tr>
<tr>
<td>9</td>
<td>DN 200</td>
<td>VL</td>
<td>50</td>
<td>22.5</td>
<td></td>
<td>90° open</td>
</tr>
</tbody>
</table>

1) The sound power level and pressure drop pertain to the use of the VSD and VPD distributor baskets. When the VK and VND distributor baskets are used, the values approximate those for the VSD type or remain within the permissible measuring tolerances.

2) The throttle devices in the distributor baskets enable continuous volume flow reduction, preferably up to 50%, as well as full shutoff.

3) Without connection box

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3) Without connection box
Floor displacement outlet
Types available, features

Figure 6: Floor displacement outlet Q-B-DN 200
Installation example: short distributor basket VK and floor tile with stepped bore

Figure 7: Floor displacement outlet Q-B-DN 200
Installation example: perforated sheet metal distributor basket VPD with throttle device and floor tile with clamp insert in a through bore; below it, connection box for duct connection

Table 3: Types available

<table>
<thead>
<tr>
<th>Component</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor displacement outlet</td>
<td>PC Al St</td>
</tr>
<tr>
<td>Air outlet element DN 200</td>
<td></td>
</tr>
<tr>
<td>For installation in through bore:</td>
<td></td>
</tr>
<tr>
<td>Clamp insert</td>
<td></td>
</tr>
<tr>
<td>– with clamp collar SR</td>
<td></td>
</tr>
<tr>
<td>– with claw fastener SK</td>
<td></td>
</tr>
<tr>
<td>For installation in through bore and stepped bore:</td>
<td></td>
</tr>
<tr>
<td>Distributor basket</td>
<td></td>
</tr>
<tr>
<td>– Standard type VS</td>
<td></td>
</tr>
<tr>
<td>with throttle device VSD</td>
<td></td>
</tr>
<tr>
<td>– Short type VK</td>
<td></td>
</tr>
<tr>
<td>– Short type with fixed damper VL</td>
<td></td>
</tr>
<tr>
<td>– Low type VN</td>
<td></td>
</tr>
<tr>
<td>with throttle device VND</td>
<td></td>
</tr>
<tr>
<td>– Perforated sheet metal type</td>
<td></td>
</tr>
<tr>
<td>with throttle device VPD</td>
<td></td>
</tr>
<tr>
<td>Connection box</td>
<td></td>
</tr>
<tr>
<td>– without V damper in connection spigot</td>
<td></td>
</tr>
<tr>
<td>– with V damper in connection spigot 2)</td>
<td></td>
</tr>
</tbody>
</table>

= available

Features

- Suitable for displacement ventilation in commercial application
- Installation in conventional raised floor systems
- Air supply direct from the pressurized plenum or via connection box with flexible duct
- Low-turbulence horizontal, radial jet dispersion over the floor
- For air volume flow rates up to 28 l/s [100 m³/h]
- Coverage radius of 4 to 5 m
- Temperature difference between:
  - supply air and indoor air –1 to –4 K
  - supply air and return air ≤ –7 K
- depending on heat load and room height
- Floor installation by insertion in a stepped bore or installation with clamp insert in a through bore of a floor tile
- Fastening of clamp insert to floor tile with clamp collar or claw fastener
- Air outlet element and clamp insert made of aluminium, connection box made of galvanized sheet metal
- Air outlet element can be optionally locked against unauthorized removal
- Distributor baskets made of polycarbonate or galvanized sheet metal, with or without throttle or shutoff device
- Can be walked over, driven over and can support a wheelchair

1) PC = polycarbonate; Al = aluminium; St = galvanized sheet metal
2) V damper not needed for distributor basket with throttle device
3) Lock is optional
4) For room heights up to approx. 3 m; otherwise higher ΔT possible
## Floor displacement outlet

### Type code and tender text

#### Type code

| Q-B – DN 200 – ___ __ – __ – __ |
|-------------------|-------------------|-------------------|-------------------|
| Floor displacement outlet | Size | Damper | Clamp insert | Connection type |

#### Damper (only for distributor baskets VS, VN and VP)

- **O** = no volume flow damper
- **D** = with throttle device

#### Clamp insert

- **SO** = no clamp insert
- **SK** = claw fastener
- **SR** = clamp collar

#### Connection type

- **P** = floor plenum
- **K** = connection box

#### Distributor basket

- **VS** = standard type
- **VK** = short type
- **VL** = short type with fixed damper
- **VN** = low type
- **VP** = perforated sheet metal type

#### Tender text ¹)

Floor displacement outlet for low-turbulence horizontal, radial supply air flow above the floor, for installation in floor tiles of conventional raised floor systems; the air outlet can be walked over, driven over and can support a wheelchair; load class to EN 13264: ‘Heavy’;

consisting of:

- circular air outlet element with radial air slots and perforated air outlet centre,
- distributor basket in the following options:
  - ‘Standard type’ with surrounding slots in basket casing, optionally fitted with throttle device for full shutoff of air outlet.
  - ‘Short type’ with surrounding slots in basket casing, best for low raised floors, without throttle device.
  - ‘Short type with fixed damper’ for even supply air distribution when used in assembly rooms or with low air outlet volume flow rates.
  - ‘Low type’ with surrounding slots in basket casing and openable bottom, best for raised floors with thicker tiles and lower plenums, optionally fitted with throttle device.
  - ‘Perforated sheet metal type’, for floor air outlets made of metal, including throttle device.
- optional clamp insert for installation in through bore of floor tile, fixed with clamp collar or claw fastener.
- optional connection box for direct connection of air outlet to a flexible duct, optionally fitted with volume flow damper adjustable from room.

The air outlet element can be optionally locked against unauthorized removal.

#### Material:

- Air outlet element made of aluminium in natural colour ²)
- Clamp insert made of aluminium in natural colour ²)
- Distributor basket made of galvanized sheet metal or polycarbonate
- Connection box made of galvanized sheet metal

**Make:** Krantz  
**Type:** Q-B – DN 200 – ___ __ – __ – __

Subject to technical alterations.

¹) For the required air outlet type (kind, material, etc.) or possible combination of individual components, see Table 3 ‘Types available’ on page 6

²) Powder coating to RAL ... on request