Krantz KOMPONENTEN®
Applied system solutions

Air distribution systems for assembly rooms

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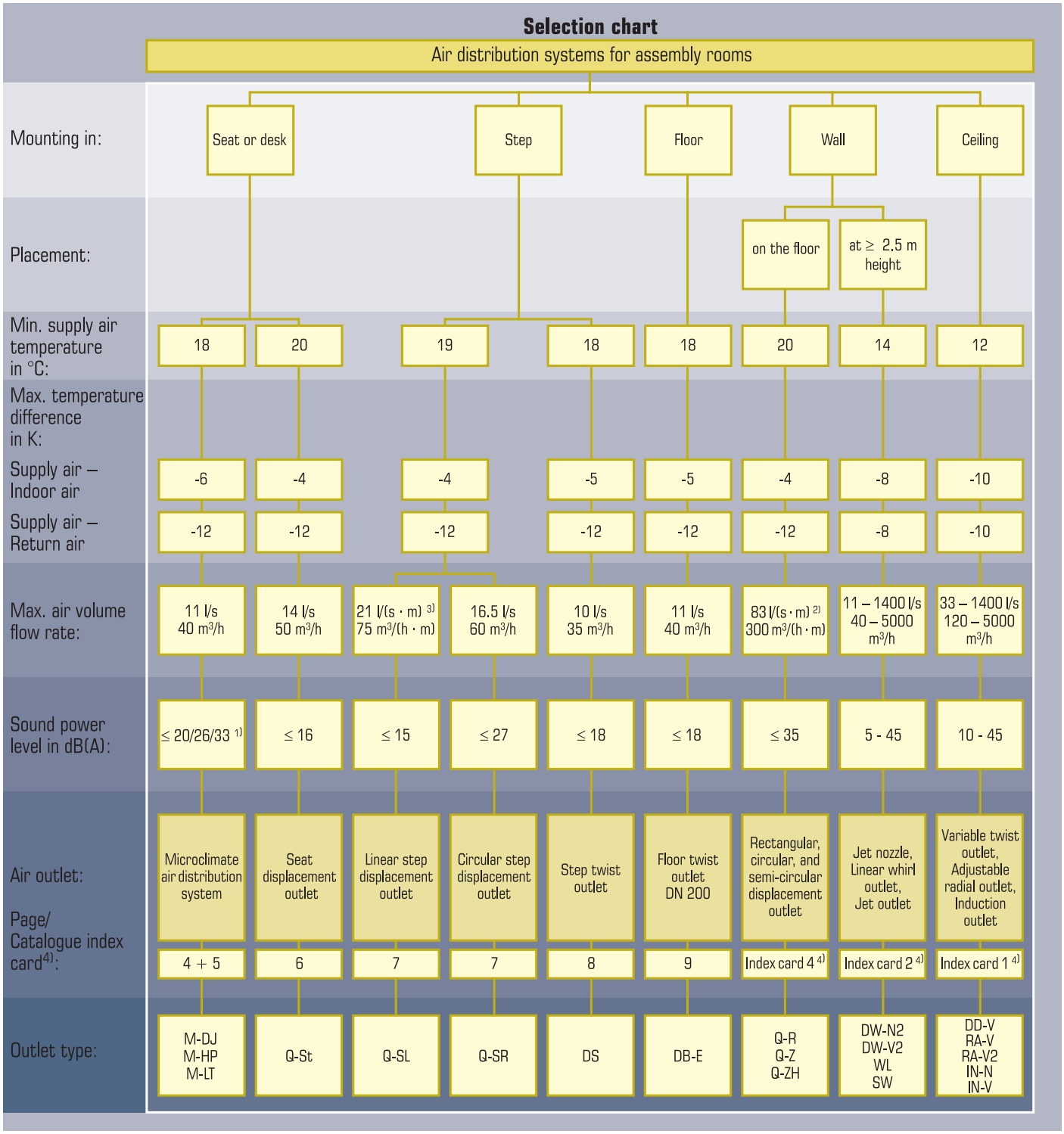
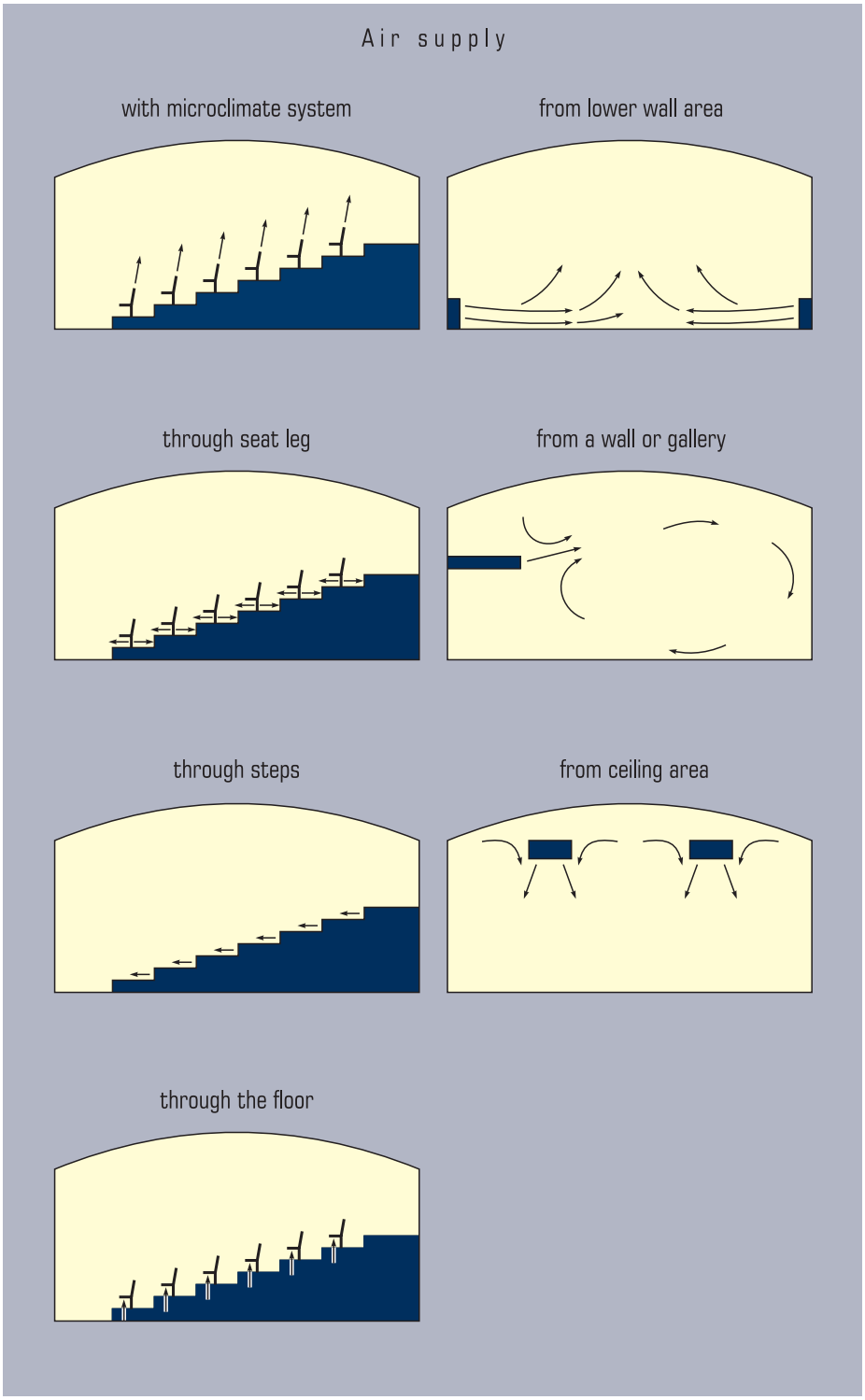


1) Seat outlet M-DJ ≤ 20 dB(A)
Fixed desk outlet M-HP ≤ 26 dB(A)
Adjustable desk outlet M-LT ≤ 33 dB(A)

2) For Q-Z: 105 l/(s · m) / 375 m³/(h · m)
3) At a standard height of 120 mm
4) Catalogue "Air distribution systems"



Air distribution systems for assembly rooms

Air supply in assembly rooms, such as theatres, lecture halls and concert halls, places high requirements on air distribution systems. The following special criteria have to be taken into account:

- Great number of occupants
- Great room heights
- Low permissible sound levels
- Small percentage of external heat gain as adjacent outer walls and windows are frequently lacking
- Different room configurations, e.g. galleries, platforms, seating on stepped floors.

The broad product range of KRANTZ KOMPONENTEN includes an assortment of air distribution systems for assembly rooms which have been in successful use for many years. Depending on kind and type, they are installed in the seating or in the floor, wall, or ceiling area. While the supply air is fed from the installation zone of the given air distribution system, the return air is extracted by the HVAC system in the ceiling zone.

Microclimate air distribution system
Types M-DJ, M-HP, and M-LT

The supply air is discharged from the seat back or the front edge of the desk. Prior to discharge, the primary air is admixed with a part of indoor air by pre-induction. The pre-induction increases the discharge temperature of the supply air jets. This enables operation at a low primary air temperature, which raises the cooling capacity of the supply air volume flow rate.

There are 3 types available:

- **Seat outlet, type M-DJ**
  for installation in the seat back
- **Fixed desk outlet, type M-HP**
  for installation in the front edge of the desk
- **Adjustable desk outlet, type M-LT**
  for installation in the front edge of the desk
  M-LTI – with induction device
  M-LTK – without induction device

A linear, turbulent free jet is formed. With the seat outlet and the fixed desk outlet, the jet angle is 70 to 90° to horizontal. The discharge direction is selected for direct, draught-free fresh air supply to the occupied zone.

With the adjustable desk outlet, the discharge direction can be manually altered from 30 to 90° to horizontal. This means the air velocity in the occupied zone can be adjusted individually – from perfectly draught-free to a fresh breeze sensation. This air outlet is also available without induction device.

Features:

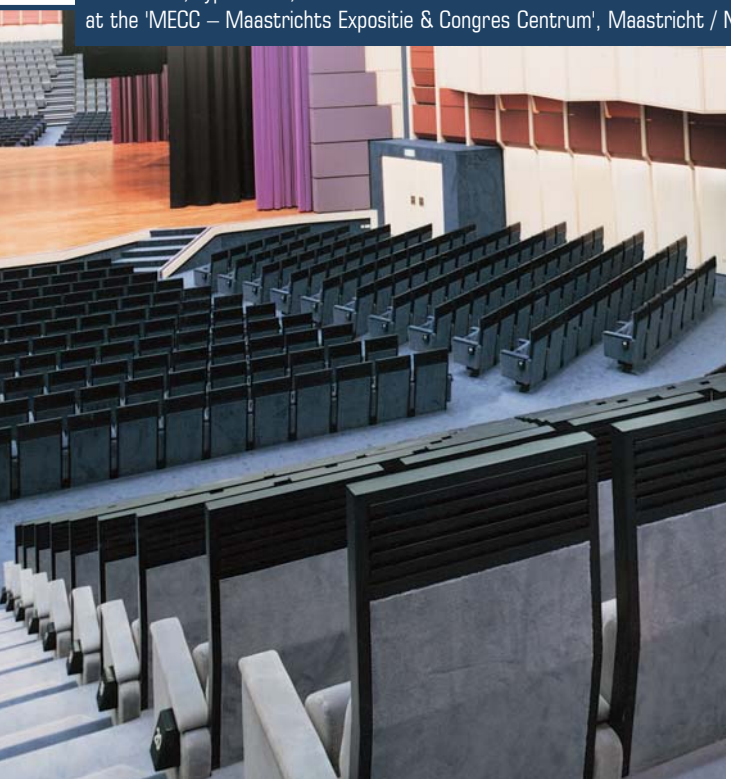
- For assembly rooms with fixed seating
- Air supply through seat back or front edge of desk directly into the microclimate zone
- Linear, turbulent free jet
- Even temperature distribution around seated person due to pre-induction
- Stable, steady microclimate
- Connection to a pressurized plenum under the floor

Technical layout to DS 4098

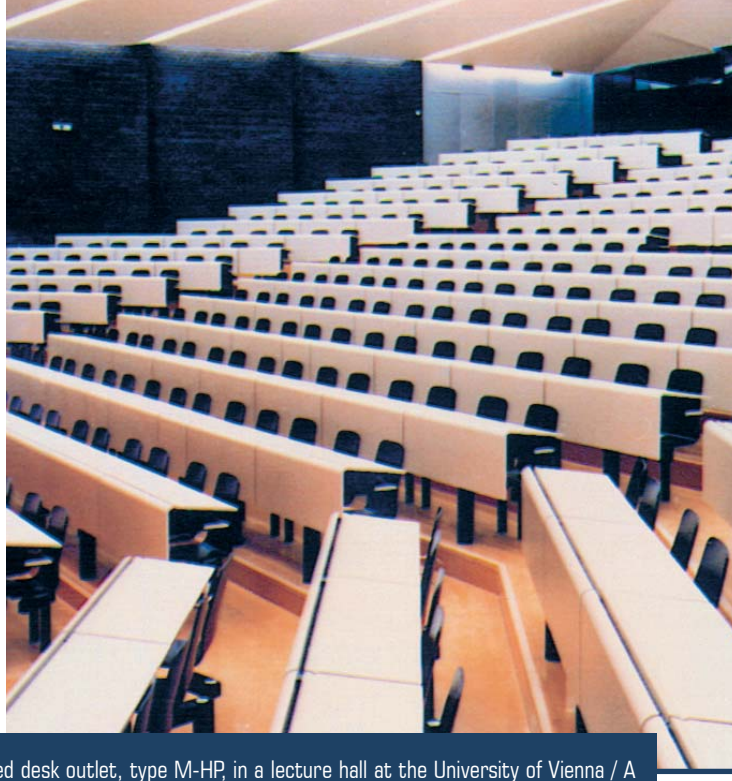
Seat outlet, type M-DJ

Air jet pattern of M-DJ

Seat outlet, type M-DJ,
at the 'MECC – Maastrichts Expositie & Congres Centrum', Maastricht / NL



Adjustable desk outlet, type M-LT,
in the Second House of Parliament, The Hague / NL



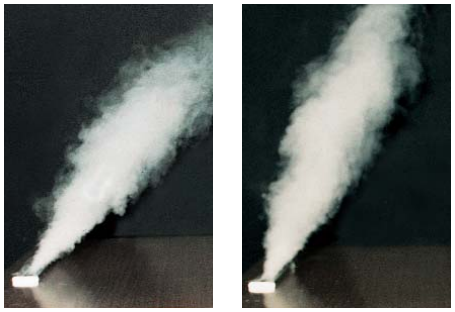
Fixed desk outlet, type M-HP, in a lecture hall at the University of Vienna / A

Fixed desk outlet, type M-HP

Air jet pattern of M-HP

Adjustable desk outlet, type M-LT

Air jet pattern of M-LT at different, adjustable discharge angles



Type		M-DJ	M-HP	M-LT	
				M-LTI	M-LTK
Primary air volume flow rate:	l/s m³/h	5.5 – 11 20 – 40	5.5 – 11 20 – 40	5.5 – 11 20 – 40	5.5 – 11 20 – 40
Induction ratio:	–	≈ 1.4	≈ 1.3	≈ 1.5	1.0
Primary air temperature:	°C	≥ 18	≥ 18	≥ 18	≥ 19
Max. temperature difference supply air – return air:	K	–12	–12	–12	–11
Sound power level:	dB(A)	15 – 20	20 – 26	28 – 33	25 – 30

Seat displacement outlet
Type Q-St

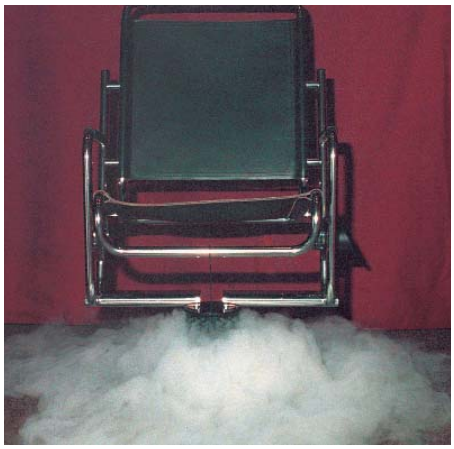
For air distribution in assembly rooms with fixed seating. It is designed for connection to a raised floor/plenum. The seat leg is constructed as a perforated metal cylinder; it houses a distribution unit which evenly distributes the supply air from the pressurized plenum throughout the height of the perforated cylinder. The radially discharged air flows at very low, steady velocity and at low height over the floor.

Features:

- For rooms with raised floors/plenums and fixed seating
- Air outlet built into seat leg
- Low-turbulence, radial and horizontal jet spread over the floor
- Very low sound power level
- Suitable for any seat design

Volume flow rate:	up to 14 l/s up to 50 m³/h
Min. supply air temperature:	20 °C
Max. temperature difference supply air – return air:	–12 K
Sound power level:	≤ 16 dB(A)
Nominal diameter:	DN 100, DN 127, DN 190
Standard height:	200 mm

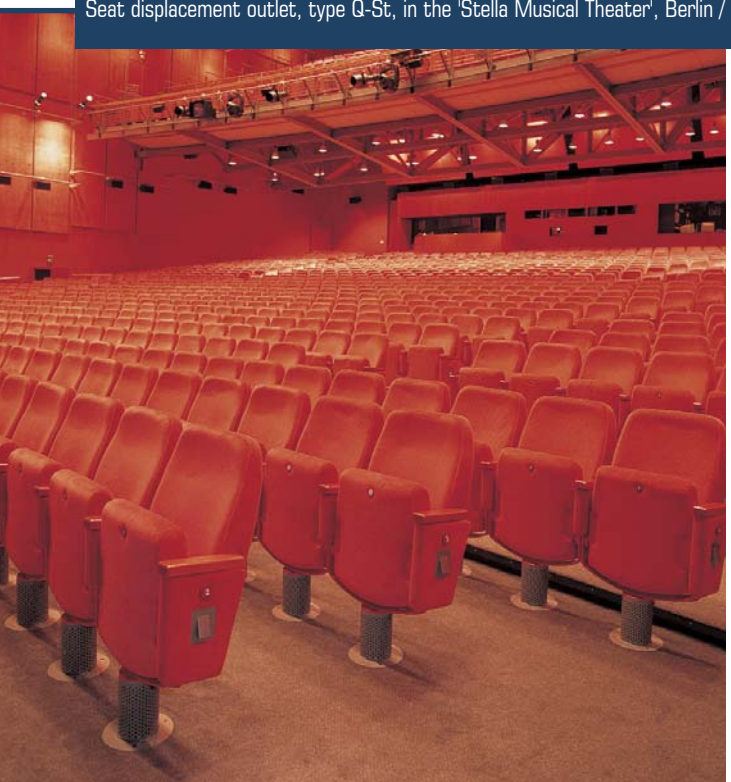
Technical layout to DS 4028



Left:
Seat displacement outlet, type Q-St

Right:
Air jet pattern of Q-St

Seat displacement outlet, type Q-St, in the 'Stella Musical Theater', Berlin / D



Seat displacement outlet, type Q-St,
in the 'Muziekgebouw aan 't IJ', Amsterdam / NL

Step displacement outlet
Types Q-SL and Q-SR

For air distribution in assembly rooms with raised floors and seating arranged on steps. The seating can be fixed or removable. The air outlet is built into the step front and is available in **2 types:**

- **Linear step displacement outlet, type Q-SL**
  with rectangular frontal plate
- **Circular step displacement outlet, type Q-SR**
  with circular frontal plate.

The linear outlet is variable in length and its height depends on the step height. With curved step fronts, the linear outlets can be arranged in polygons. A built-in jet straightener raises the air jet direction, thus preventing jet constriction and jet acceleration.

The circular step displacement outlet discharges the supply air at low turbulence both axially and radially; this is why the outlet protrudes 7 mm from the step front. The centre distance between 2 circular step displacement outlets is at least 500 mm.

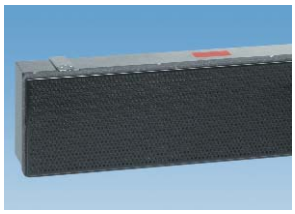
Features:

- For rooms with steps and raised floors
- Air outlet built into step front
- Low-turbulence supply air flow close to floor
- Low sound power level

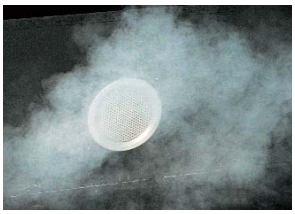
Technical layout to DS 4054

Step displacement outlet, type Q-SL,
in a lecture hall at the Lausitz University of Applied Sciences, Cottbus / D

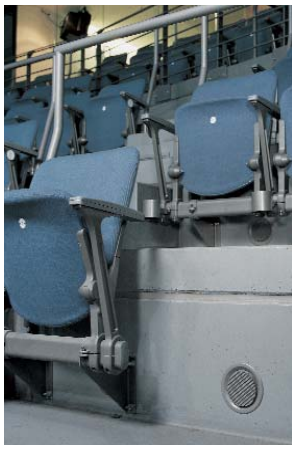
Step displacement outlet
top: type Q-SL
bottom: type Q-SR



Air jet pattern
top: type Q-SL
bottom: type Q-SR



Step displacement outlet, type Q-SR, at 'Kölnarena', Cologne / D



Type	Q-SL	Q-SR	
		DN 80	DN 100
Air volume flow rate:	21 l/(s · m)[1)] 75 m³/(h · m)[1)]	10 l/s 35 m³/h	16.5 l/s 60 m³/h
Min. supply air temperature:	19 °C	19 °C	
Max. temperature difference supply air – return air:	–12 K	–12 K	
Sound power level:	≤ 15 dB(A)	≤ 27 dB(A)	
Standard height:	120 mm [2)]	146 mm [3)] and 212 mm [3)]	
Depth:	75 mm	80 mm	
Length:	variable	-	

[1)] For standard heights of 120 mm
[2)] Other heights on request
[3)] As diameter

Step twist outlet
Type DS

For assembly rooms with seating arranged on steps. The air outlets are inserted into the step front. The air outlet element is available in **3 types:**

- **Twist outlet, type DS-DD**
  DN 63 and DN 100
  Material: plastic
- **Radial outlet, type DS-RA**
  with circular or square visible face
  DN 100
  Material: sheet metal, painted
- **Adjustable floor outlet, type DS-BA**
  DN 150
  adjusted for displacement ventilation
  Material: plastic

The advantage of radial, turbulent discharge of supply air is quick temperature equalization between supply air and indoor air. From about 0.5 m height above the floor the air flow - similar to a displacement flow - is directed upwards and displaces the warm, stale indoor air to the ceiling zone where it is extracted.

Features:

- For assembly rooms with stepped floors, with fixed or removable seating
- Built into the step front
- Turbulent, radial supply air flow with intensive admixture of indoor air, hence quick reduction of jet velocity and rapid temperature equalization
- Installation in wooden or concrete steps
- Air supply via a pressurized plenum

Top:
Step twist outlet, type DS-DD
Bottom:
Step twist outlet, type DS-BA

Step twist outlet, type DS-RA
top: with circular visible face
bottom: with square visible face

Air jet pattern of
DS-DD, DS-RA, and DS-BA

Step twist outlet, type DS-DD,
in a lecture hall at the University of Amsterdam / NL

Type		DS-DD -DN 63	DS-DD -DN 100	DS-RA	DS-BA
Max. air volume flow rate:	l/s m³/h	3.5 12	10 35	10 35	10 35
Number per seat:	–	3	1	1	1
Min. supply air temperature:	°C	18	18	18	18
Max. temperature difference supply air – return air:	K	–12	–12	–12	–12
Sound power level:	dB(A)	≤ 12	≤ 16	≤ 18	≤ 14
Outside diameter:	mm	110	165	150	172
Min. centre distance:	mm	150	500	500	500

Technical layout to DS 4065

Floor twist outlet
Type DB-E

For assembly rooms with set seating arrangements, with or without steps. The DB-E-DN 200 floor twist outlet is placed under the seat. The supply air is discharged vertically upwards as a turbulent jet. The air jet is deflected in the lower segment of the seat; it spreads in an umbrella shape around the person and then moves upwards as a displacement flow.

Due to the intensive induction effect of the supply air jets, the jet velocity declines rapidly so that the air velocities in the leg zone of the seated person do not exceed 0.15 m/s.

The air outlet is supplied with a perforated distributor basket with fixed damper. The air is supplied from a pressurized plenum; the distributor basket evens the distribution of the air volume flow rate within this plenum.

Features:
- For assembly rooms with set seating arrangements
- Placement under seat
- Vertical, turbulent air jet with intensive admixture of indoor air in the floor zone
- Draught-free indoor air flow
- Air outlet with distributor basket
- Air supply via a pressurized plenum

Max. air volume flow rate:	11 l/s 40 m³/h
Nominal diameter:	DN 200
Min. supply air temperature:	18 °C
Max. temperature difference supply air – return air:	–12 K
Sound power level::	≤ 18 dB(A)

Technical layout to DS 1146

Floor twist outlet, type DB-E, in the 'Theater Markant', Uden / NL

Floor twist outlet, type DB-E (in stepped bore)

Floor twist outlet, type DB-E (with clamp insert)

Distributor basket, VL type

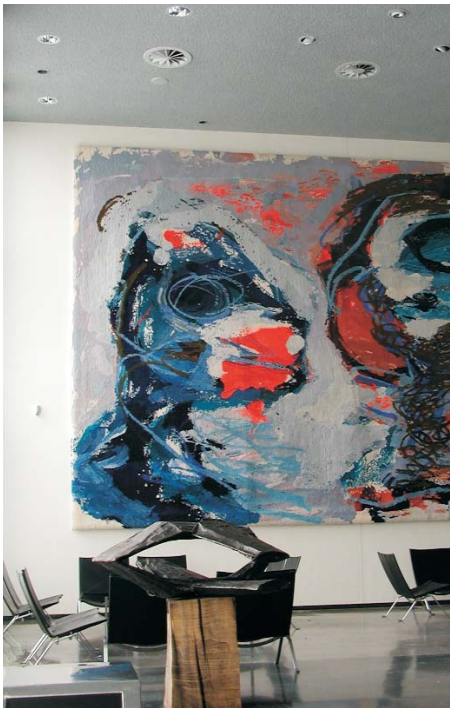
Air jet pattern of DB-E

Floor twist outlet, type DB-E, in the media centre of Osaka University of Commerce, Osaka / J

Perforated distributor basket of type VL with silent fixed damper for even distribution of the air volume flow rate within the plenum

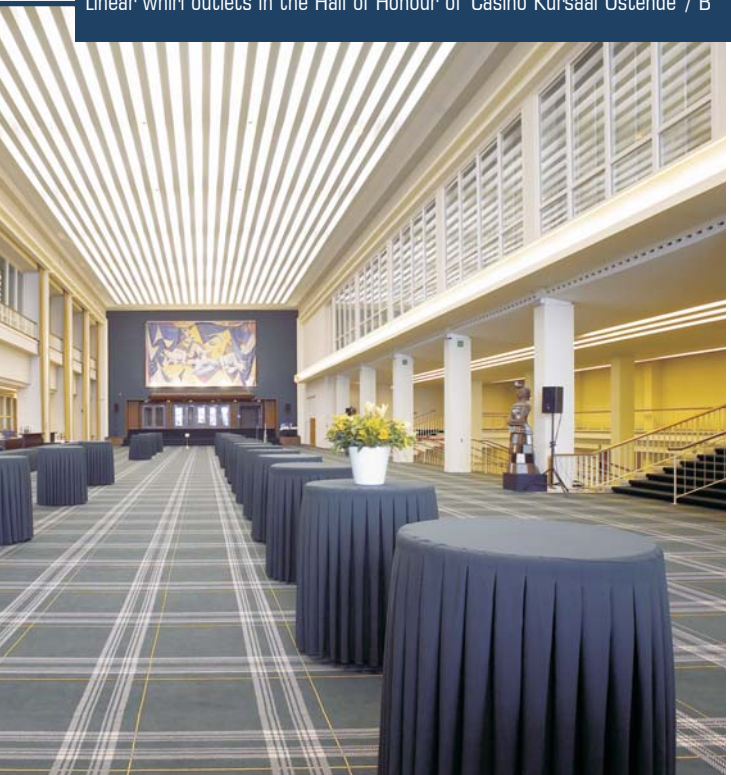
Some installation examples

Adjustable radial outlets in the foyer of
'Theater Schouwburg Tilburg' / NL

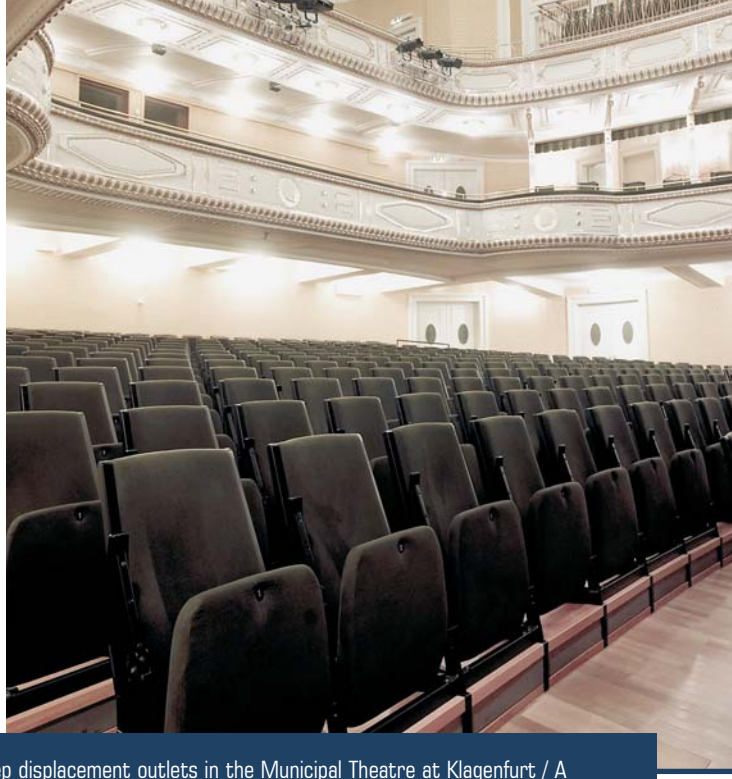


Step displacement outlets at Beiersdorf AG, Hamburg / D

Linear whirl outlets in the Hall of Honour of 'Casino Kursaal Ostende' / B



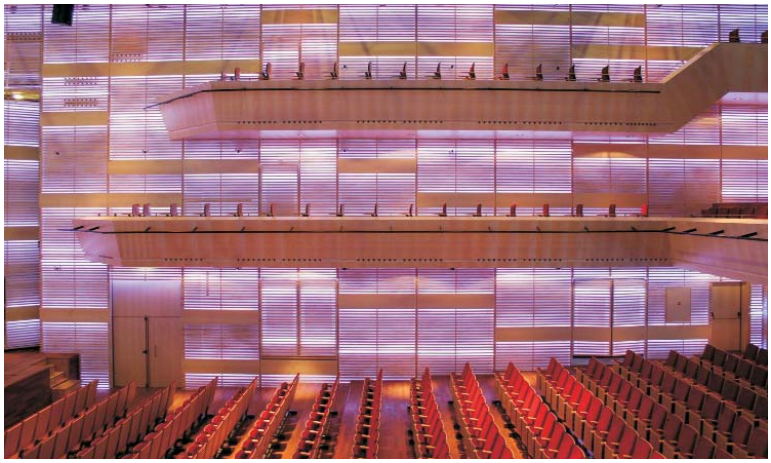
Swivel jet nozzles in the 'Theater Tuschinski', Amsterdam / NL

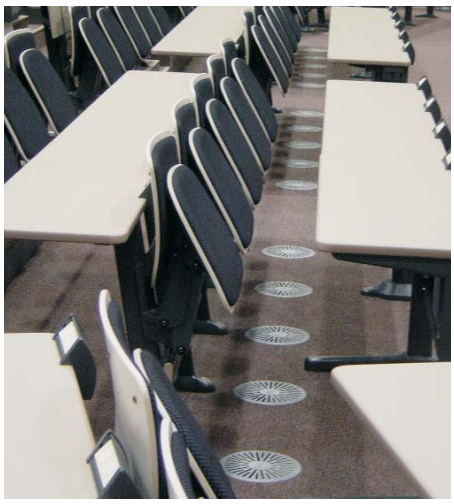


Step displacement outlets in the Municipal Theatre at Klagenfurt / A

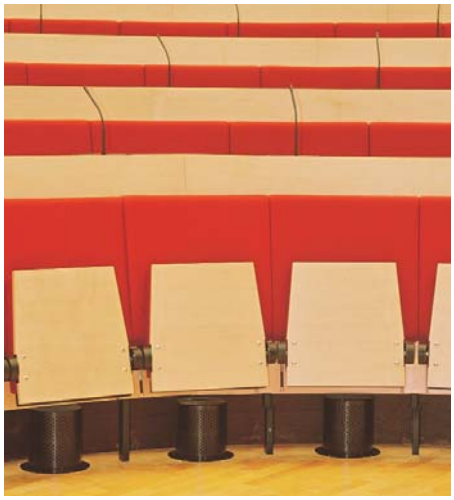
Twist outlets in the foyer of
'Het Concertgebouw', Amsterdam / NL

Jet nozzles and seat displacement outlets
in the 'Muziekgebouw aan 't IJ', Amsterdam / NL





Floor twist outlets at the University of Osaka / J



Seat displacement outlets at the
'Konrad-Adenauer-Stiftung', Berlin / D

Plinth displacement outlets at
'Kunsthalle Bremen' / D

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Applied system solutions

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