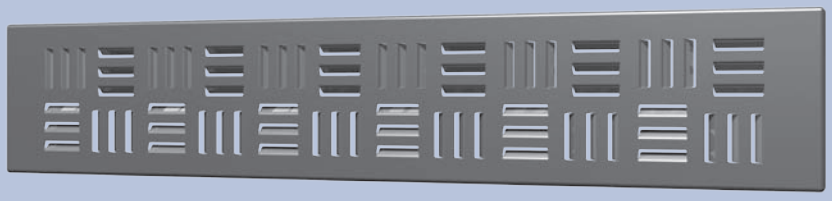


Krantz

Linear step twist outlet SD-L

Air distribution systems

DS 4187 E 07.2014

Linear step twist outlet

Preliminary remarks, construction design and installation

Preliminary remarks

The linear step twist outlet SD-L is designed for air distribution in assembly rooms with seating arranged on stepped floors such as auditoria, conference halls, sports arenas, theatres and cinemas. The air outlet can be mounted direct in a step front which can be made either of wood cement or gypsum fibreboard panels, or of concrete.

At floor level the linear step twist outlet generates a turbulent air flow which enables a rapid equalization of the supply and indoor air temperatures. At only 0.5 m above the floor, air velocities and temperature differences have decreased to such an extent that the air flow is directed upwards – like a displacement flow. Thus the warm stale room air is displaced towards the return air openings located in the ceiling area. This so-called microclimate air supply system features an even temperature distribution in the occupied zone and a draught-free indoor air flow in the microclimate zone.

Construction design and installation

The linear step twist outlet SD-L is suitable for installation in step fronts made of wood cement or gypsum fibreboard panels, or of concrete.
There are three ways of fastening the outlet to the step.

For fastening type 1 (Fig. 2) the outlet is fitted with four boreholes, one at each corner. The outlet will be screwed to the step made of wood cement or equivalent material by means of drywall screws whose length should be no less than 30 mm in order to ensure a solid fastening.

If fastening type 1 is not possible, then type 2 or 3 should be considered depending on the step front thickness. Fastening type 2 is suitable for a step front thickness of up to 60 mm, whereas fastening type 3 is required for greater step front thicknesses or for a bore in a concrete step.

Fastening type 2 (Fig. 3) uses two brackets which are fixed in the step cutout by means of metric Torx screws (to ISO 14581). For installation the brackets are held horizontally and inserted that way into the cutout; they must be inserted far enough to be in place behind the step front. Once done, the brackets get back to the vertical by themselves due to their geometry. Then the screws can be tightened using a manual or cordless screwdriver.

If the step front thickness is > 60 mm, fastening type 3 (Fig. 4) with two claw fasteners is appropriate. The claw fasteners are inserted horizontally and the screws are tightened up. Thereby the claws expand and get stuck in the step cutout, thus fixing the outlet to the step.

To properly install the linear step twist outlets using the appropriate fastening type, the cutout dimensions stated in Table 1 must be kept to.

Table 1: Technical data and dimensions

Volume flow rate			
Recommended volume flow rate	$\dot{V}_{recom}$	l/s	10
		m³/h	36
Maximum volume flow rate	$\dot{V}_{max}$	l/s	13
		m³/h	45
Max. temperature difference – supply air to indoor air – supply air to return air	 $\Delta\vartheta_{su\text{-}in}$ $\Delta\vartheta_{su\text{-}re}$	 K K	 –5 –12
Dimensions			
Air outlet			
Width	B_1	mm	420
Height	H_1	mm	80
Depth	T_1	mm	10
Cutout			
Width for fastening type 1	B_2	mm	370 – 380
Width for fastening types 2 + 3	B_2	mm	370 – 410
Height for fastening types 1 + 2	H_2	mm	55 – 75
Min. height for fastening type 3	H_2	mm	65 – 75
Min. screw length	L_1	mm	30
Max. step front thickness for fastening type 2 [1]	D_1	mm	30 – 60
Min. step front thickness for fastening type 3	D_2	mm	60

[1] Other step front thicknesses on request

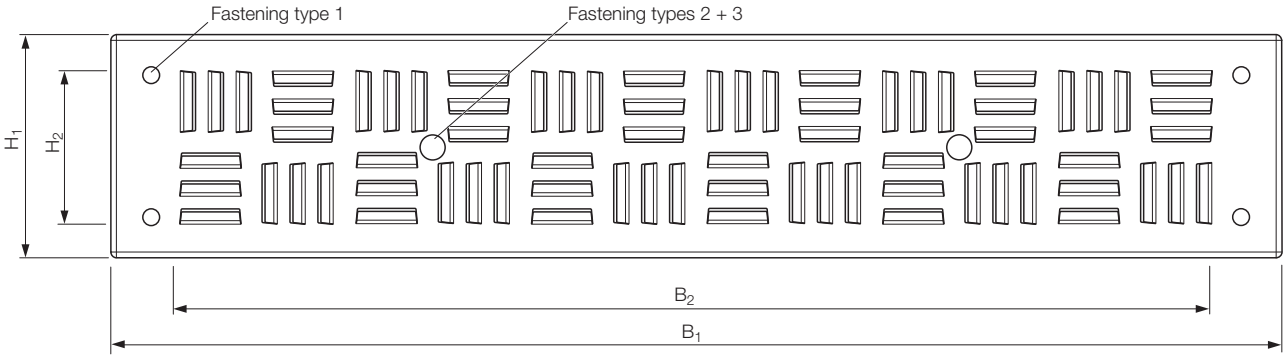


Fig. 1: Dimensions

Linear step twist outlet

Fastening types and mode of operation

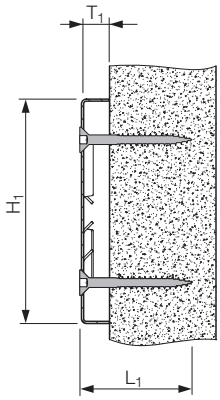


Fig. 2: **Fastening type 1**

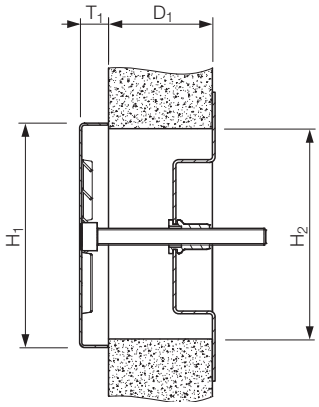


Fig. 3: **Fastening type 2**

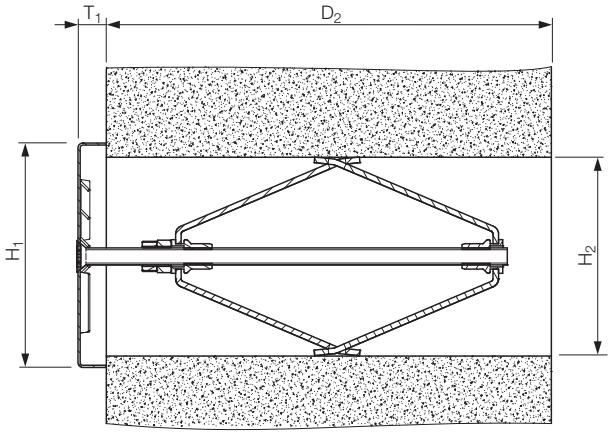


Fig. 4: **Fastening type 3**

Mode of operation

The supply air is delivered to the linear step twist outlet SD-L from a pressurized floor plenum. The discharged air jets are twisted and the air flow turbulent. Therefore, immediately upon discharge, the supply air mixes intensely with the indoor air at floor level. Thus the thermal stratification in the occupied zone is less than it is with displacement ventilation. The vertical temperature gradient in the occupied zone is ≤ 1.5 K/m, which complies with category A of EN 7730.

Due to the intense induction of indoor air at floor level, the air jet velocity decreases so quickly that it amounts to max. 0.1 m/s in the area of seated people. At heights > 0.5 m above the floor, the supply air spreads like a displacement flow, i.e. at the heat sources (occupants, notebooks, etc.) the fresh air flows upwards and displaces the warm stale indoor air to the return air openings at ceiling level. At 0.5 m above the floor, indoor air velocities are < 0.1 m/s. The air flow pattern makes for high air quality in the occupied zone since the fresh air flows past the occupants and moves upwards, thereby displacing air pollutants and heat towards the ceiling. The temperature of the return air is higher than that of the indoor air in the occupied zone; that's why the heat loads can be removed efficiently in spite of the relatively small temperature difference of 4 to 5 K between the indoor air at head level of seated occupants and the supply air. The maximum temperature difference between supply air and return air can amount up to –12 K, depending on the room height.

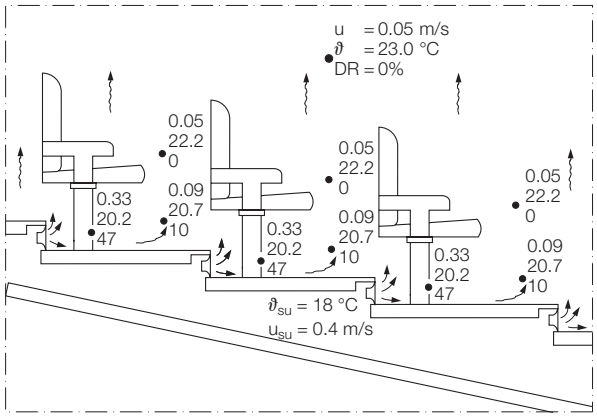


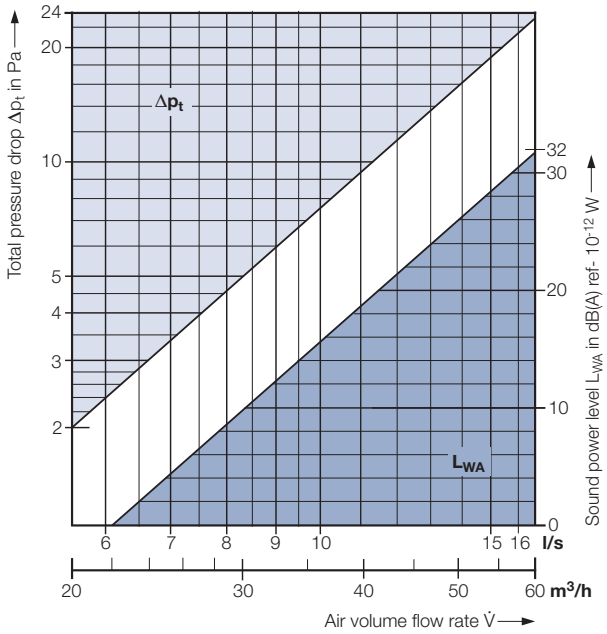
Fig. 5: **Example of air velocities and temperatures, and draught rating with supply air volume flow rate = 14 l/s [50 m³/h] per seat; temperature difference supply air to indoor air = –5 K**

Linear step twist outlet

Sound power level, pressure drop, and features

Sound power level and pressure drop

The sound power level of the linear step twist outlet is low and meets the high acoustic requirements for theatres and other assembly rooms. The sound power level and pressure drop ranges for the SD-L outlet are shown in Graph 1.



Graph 1: Sound power level and pressure drop

Table 2: Sound power level, pressure drop, and octave band centre frequencies

Air volume flow rate		Pressure drop	Sound power level L_W in dB ref. 10-12 W								
$\dot{V}$		Δp_t	L_{WA}	Octave band centre frequency in Hz							
l/s	m³/h	Pa	dB(A)	63	125	250	500	1 K	2 K	4 K	8 K
8	30	5	9	< 10	19	16	12				
10	35	7	14	< 10	21	18	15				
11	40	10	18	10	22	21	19	< 10	< 10	< 10	< 10
13	45	12	22	13	23	22	22				
14	50	16	25	19	25	24	25				

Features

- Air distribution system suitable for auditoria, convention centres, theatres and other assembly rooms
- Air outlet built into the step front
- Intense mixing of supply air with indoor air at floor level, thus low vertical temperature gradient in the occupied zone
- Supply air flow similar to displacement flow from the floor to the ceiling area
- Draught-free air flow in the occupied zone
- Low sound power level
- Max. volume flow rate: 14 l/s [50 m³/h]
- Temperature difference between supply air and indoor air up to –5 K and between supply air and return air up to –12 K depending on internal heat load and room height
- Simple installation from the room side – 3 different fastening types depending on kind and material of step front
- Low outlay option ensuring thermal comfort
- Very well suited for refurbishment on theatres and other assembly rooms

www.krantz.de DS 4187 E p. 4 07.2014

Linear step twist outlet

Type code and tender text

Type code

SD-L – ____– ___– ____

Microslot technology
Type
Length
Fastening
Surface finish

Type
L = linear step twist outlet with microslots

Length
420 = length 420 mm [1)]

Fastening
S = with screws
B = with brackets
K = with claw fasteners

Surface finish
9005 = face painted to RAL 9005, matt [2)]

Tender text

..... units
Linear step twist outlet for mounting in a step front, generating twisted supply air jets to ensure a direct and draught-free fresh air supply to the occupied zone, with rapid equalization of supply and indoor air temperatures at floor level,

consisting of:
a front plate with linear air discharge slots arranged vertically and horizontally, and featuring good aerodynamic properties; outlet fastening by means of screws, brackets, or claw fasteners.

Material:
- Linear step twist outlet made of galvanized sheet metal powder coated to RAL 9005, jet-black [2)]
- Fastening brackets made of galvanized sheet metal
- Claw fasteners made of galvanized sheet metal

Make: Krantz
Type: SD-L – ____– ___– ____

Subject to technical alterations.

[1)] Other lengths on request
[2)] Other colours on request

DS 4167 E 07.2014

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