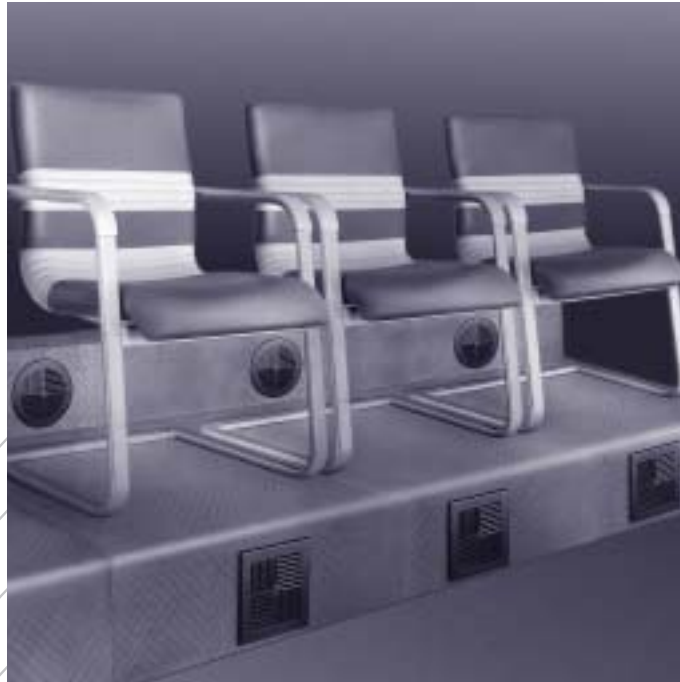


# Staircase Swirl Diffusers

Type SD



**TROX<sup>®</sup> TECHNİK**

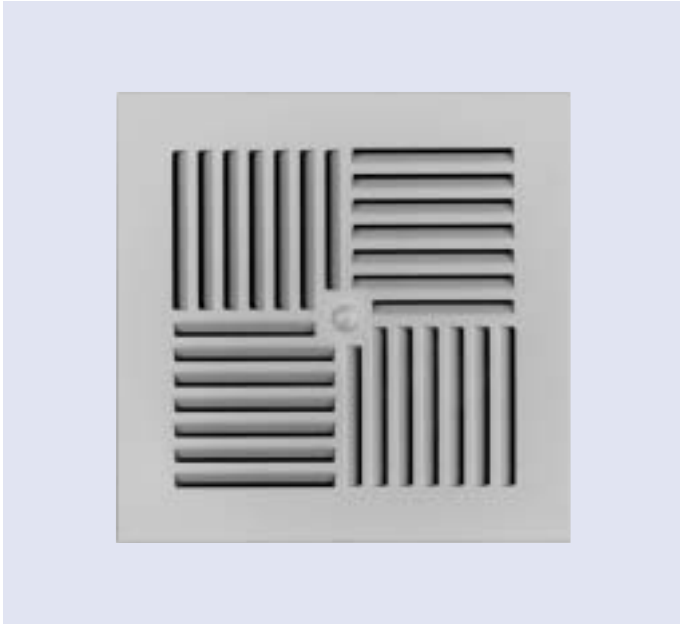
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Type SD-Q-LQ-...



Type SD-Q-LR-...



Staircase swirl diffusers type SD are ideal for use in theatres, auditoria, concert halls, cinemas etc. They can be installed vertically in steps or in floors which do not carry foot traffic.

The permitted supply air temperature difference is  $\pm 6$  K.

Staircase swirl diffusers can be used for horizontal or angled air flow depending on the requirements of the location.



Type SD-R-LR-...

# Construction · Dimensions · Materials

## Construction

Staircase swirl diffusers type SD are available in size 180 as standard (special construction down to size 158 possible).

Depending on the architectural requirements, the staircase swirl diffuser can be made circular or square.

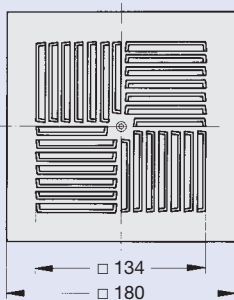
To achieve a swirled flow, the diffuser face has four air outlet sections with fixed blades offset at 90° to each other, in circular or square construction.

The spigot with perforated plate ensures a horizontal air supply.

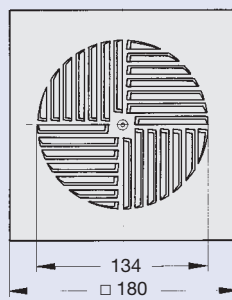
## Materials

The staircase swirl diffuser is made from sheet steel, and the rear spigot and subframe are in galvanised sheet steel. The diffuser face is pre-treated and powder coated white (RAL 9010) and the rear spigot stove-enamelled black (RAL 9005).

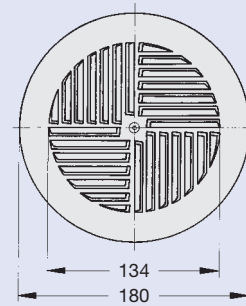
SD-Q-LQ



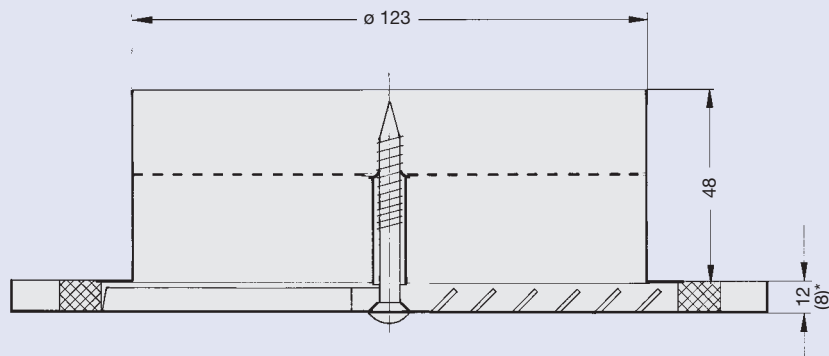
SD-Q-LR



SD-R-LR



SD-...-S



\* ( ) -Dimension for SD-R-...

# Installation · Fixing

## Installation of Diffuser Face using a Spigot (fixing by others)

Three pilot holes at 120° to each other are drilled in the stair covering. The diameter of the pilot holes depends on the type of stair covering.

The entire spigot assembly is fitted into the opening in the stair covering and firmly fixed at the edges using the wood screws provided.

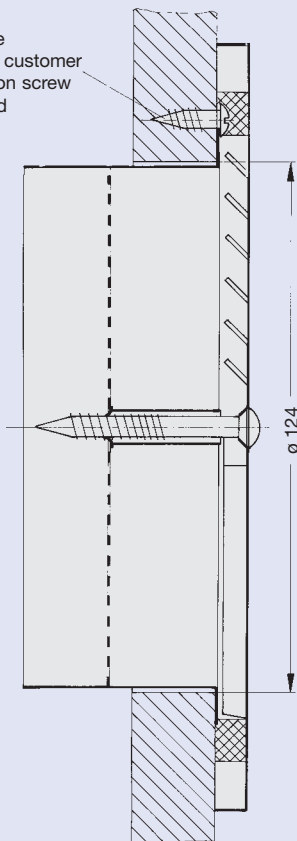
The face plate is then attached using the centre screw. To cover the screw head, a decorative cap is provided which is pushed into the recess in the screw head.

## Installation of Diffuser Face with a Subframe (fixing by others)

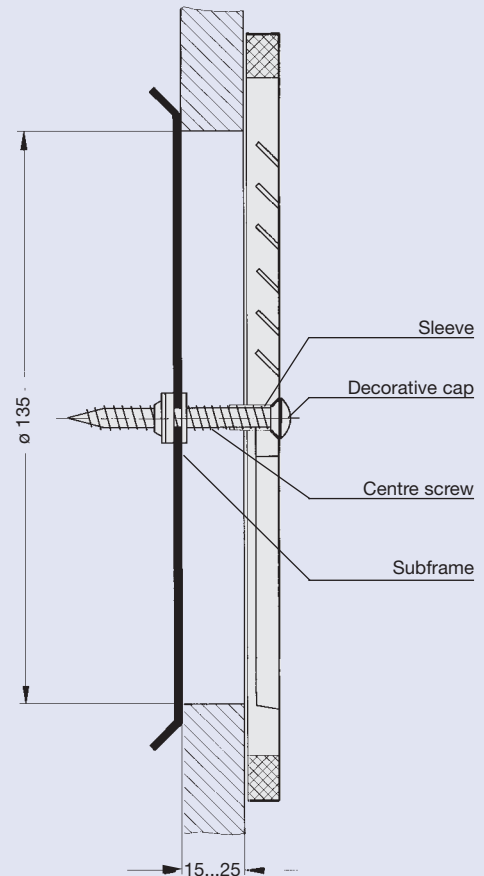
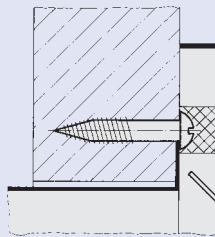
The parts supplied – centre screw, sleeve and subframe – these are assembled to the rear of diffuser and then the assembly fitted into the opening provided.

The centre screw on the diffuser face is tightened. To cover the screw head, the cap provided is pushed into the recess in the screw head.

Hole size to be determined by customer depending upon screw size to be used

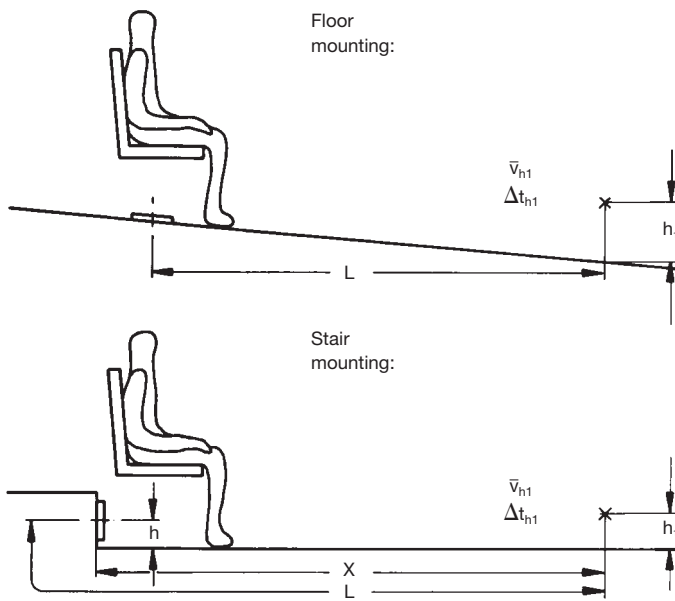


Installation of diffuser with a spigot



Installation of diffuser with subframe

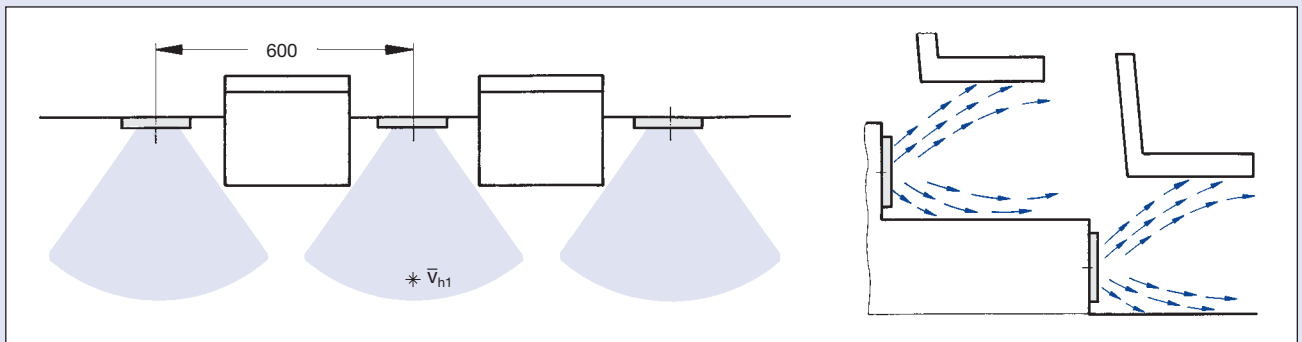
# Nomenclature



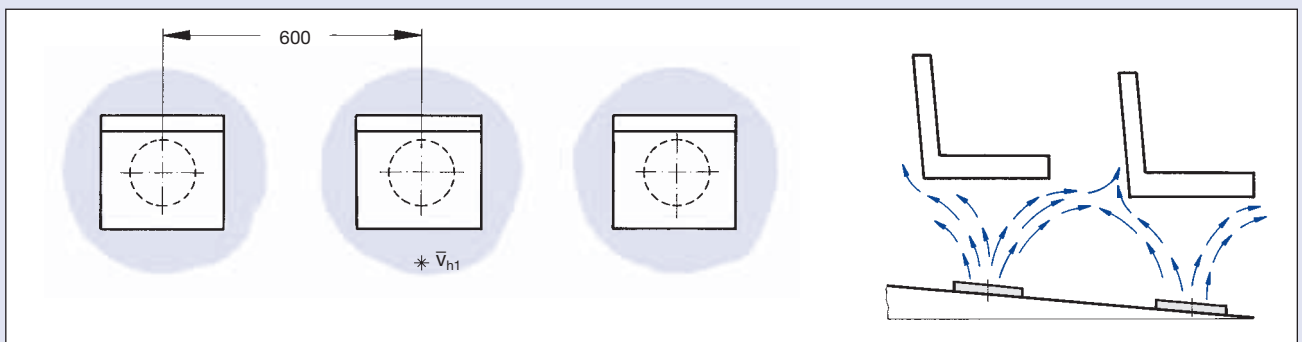
- $\dot{V}$  in l/s: Volume flow per diffuser
- $\dot{V}$  in m<sup>3</sup>/h: Volume flow per diffuser
- $h$  in m: Installation height above floor
- $L$  in m: Distance from diffuser  
( $L = h + X$  for stair mounting)
- $h_1$  in m: Height of measurement point above floor
- $\bar{v}_{h1}$  in m/s: Time average air velocity at height  $h_1$  above floor
- $\Delta t_z$  in K: Temperature difference between supply air and room air <sup>1)</sup>
- $\Delta t_{h1}$  in K: Difference between core temperature at height  $h_1$  above floor and room temperature <sup>1)</sup>
- $\Delta p_t$  in Pa: Total pressure drop
- $L_{WA}$  in dB(A): A-weighted sound power level
- $L_{WNC}$  : NC rating of sound power level
- $L_{WNR}$  :  $L_{WNR} = L_{WNC} + 2$
- $L_{pA}, L_{pNC}$  : A-weighting or NC rating respective of room sound pressure level  
 $L_{pA} \approx L_{WA} - 8 \text{ dB}$ ,  
 $L_{pNC} \approx L_{WNC} - 8 \text{ dB}$

<sup>1)</sup> The room temperature is measured at 1.0 m to 1.3 m above the floor!

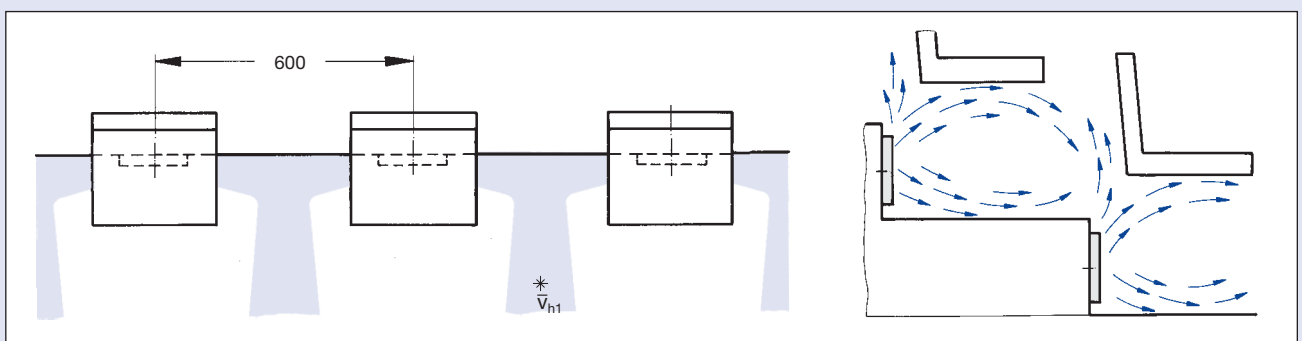
## Stair fixing · angled discharge



## Floor fixing · angled discharge



## Stair fixing · horizontal discharge



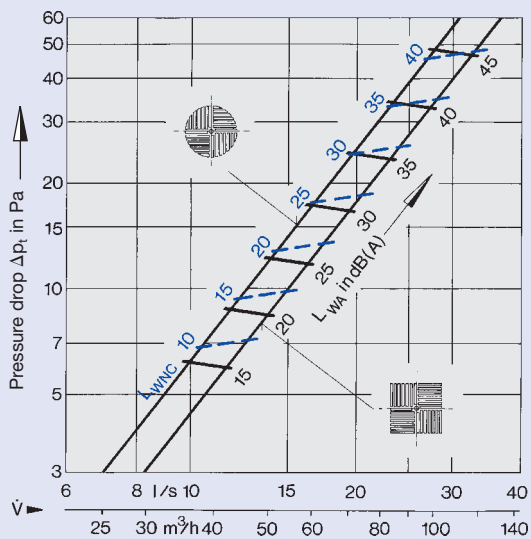
## Effective Outlet Area

Construction	Circular discharge face	Square discharge face
$A_{\text{eff}}$ in $\text{m}^2$	0.00354	0.00445

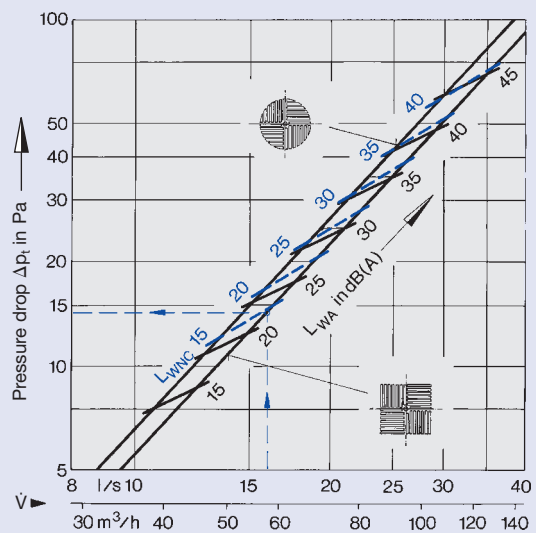
## Spectral Data

Type	$\dot{V}$		Octave band centre frequency								$L_{\text{WA}}$ dB(A)	$L_{\text{WNC}}$ NC
	l/s	$\text{m}^3/\text{h}$	Hz									
			63	125	250	500	1000	2000	4000	8000		
SD-...-LR-T	14	50	38	30	27	25	16	10	-	-	25	19
	12	43	34	25	23	21	12	6	-	-	21	14
	10	36	28	20	17	15	6	-	-	-	15	8
SD-Q-LQ-T	14	50	28	24	22	20	11	6	-	-	20	13
	12	43	24	20	18	16	9	-	-	-	16	9
	10	36	18	14	12	10	-	-	-	-	10	-
SD-...-LR-S	24	86	39	33	32	33	34	34	26	10	39	34
	16	58	29	27	26	25	23	16	-	-	27	22
	10	36	26	18	15	13	-	-	-	-	13	6
SD-Q-LQ-S	24	86	35	32	31	30	30	27	20	5	34	29
	16	58	27	25	23	21	17	10	-	-	22	15
	12	43	22	18	16	14	5	-	-	-	14	7

1 Sound power level and pressure drop  
Type SD-...-T

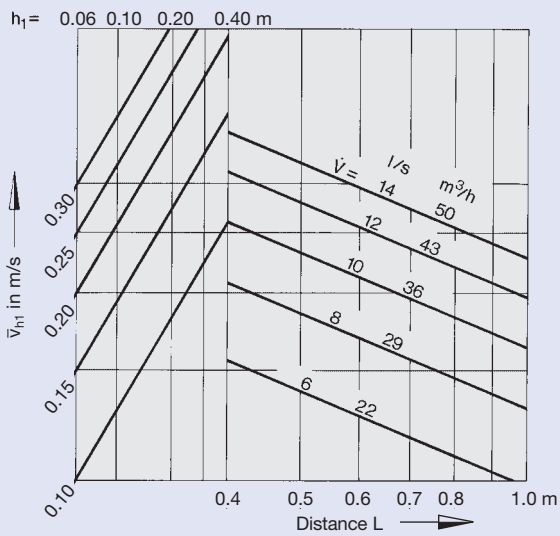


2 Sound power level and pressure drop  
Type SD-...-S

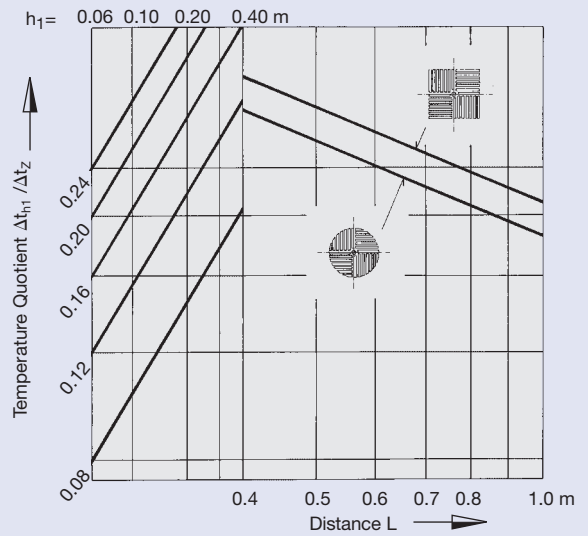


The construction and arrangement of the seating can affect the aerodynamic data.

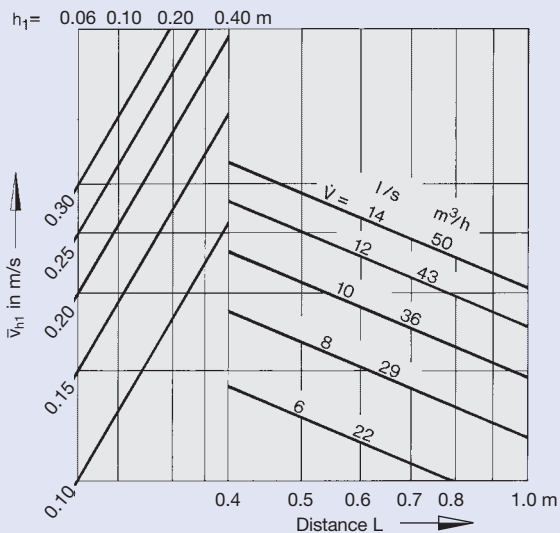
**3** Air velocity  
Type SD-...-LR-T · Stair fixing



**5** Temperature quotient  
Type SD-...-T · Stair fixing



**4** Air velocity  
Type SD-...-LQ-T · Stair fixing

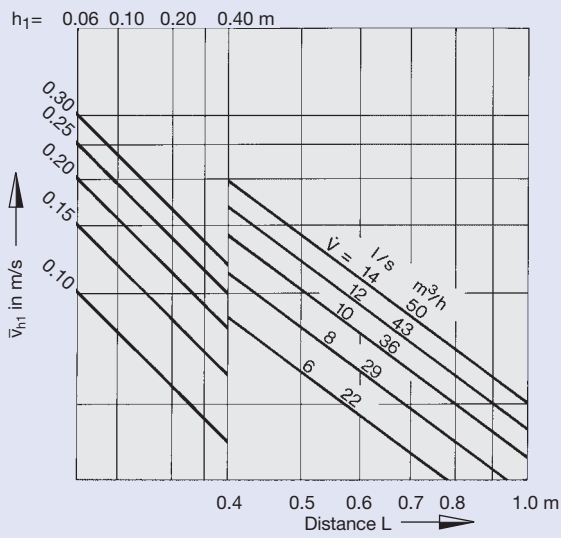


# Aerodynamic Data

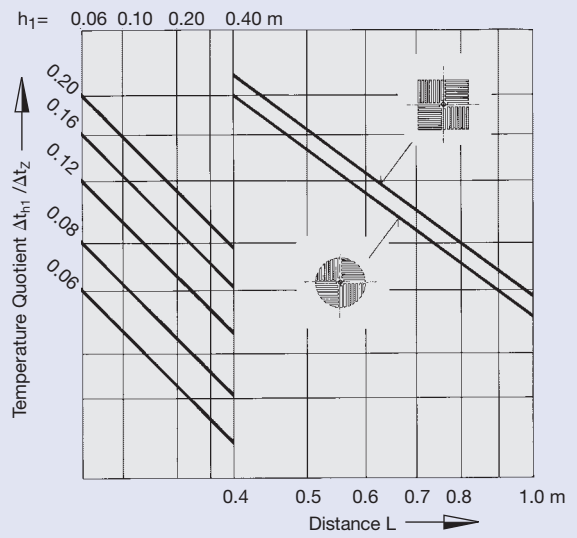
## Angled Discharge

The construction and arrangement of the seating can affect the aerodynamic data.

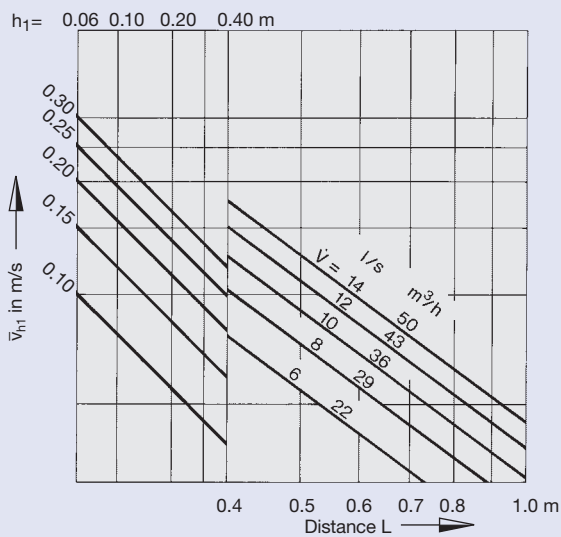
**6** Air velocity  
Type SD-...-LR-T · Floor fixing



**8** Temperature quotient  
Type SD-...-T · Floor fixing



**7** Air velocity  
Type SD-...-LQ-T · Floor fixing





# Aerodynamic Data

## Horizontal Discharge

### Example

A multi purpose hall with 750 seats is to be fitted with stair swirl diffusers.

A supply air quantity of 12,000 l/s is required. The volume flow will thus be  $\dot{V} = 16$  l/s per diffuser.

The stair swirl diffusers type SD-Q-LQ-S/size 180 will be installed vertically in the stairs.

Mounting height above floor	$h = 0.11$ m
Distance from diffuser	$X = 0.60$ m
Height of measurement point above floor	$h_1 = 0.10$ m
Supply air temperature difference	$\Delta t_z = -5$ K

Diagram 10:

$$L = h + X$$

$$L = 0.11 + 0.6 = 0.71 \text{ m}$$

$$\bar{v}_{h1} = 0.14 \text{ m/s}$$

Air velocity

Diagram 11:

$$L = 0.71 \text{ m}$$

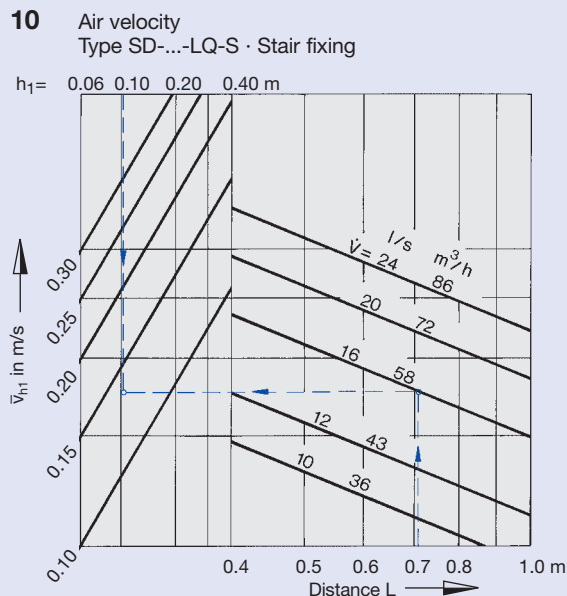
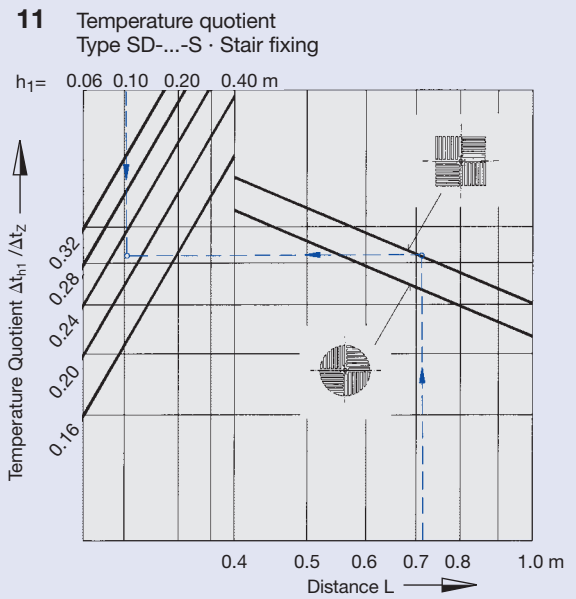
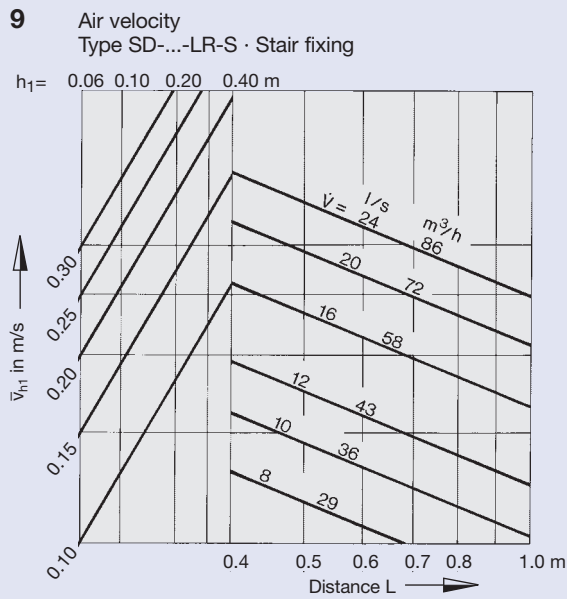
$$\Delta t_{h1} / \Delta t_z = 0.22$$

$$\Delta t_{h1} = 0.22 \cdot (-5) = -1.10 \text{ K}$$

Temperature quotient

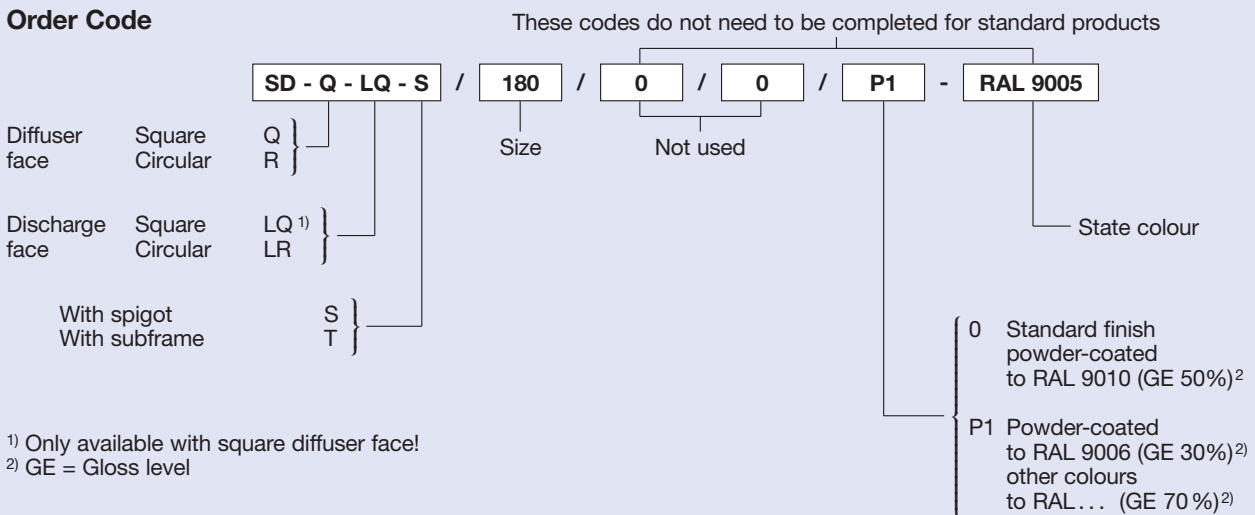
Diagram 2: Sound power level and pressure drop  
 $L_{WA} = 22$  dB(A) ( $L_{WNC} = 15$  NC)  
 $\Delta p_t = 14$  Pa

The construction and arrangement of the seating can affect the aerodynamic data.



# Order Details

## Order Code



## Specification Text

Staircase swirl diffuser suitable for mounting vertically in stairs or in floors not carrying foot traffic, comprising circular or square diffuser face with either circular or square discharge area each with four outlet sections offset by 90° to each other to give a swirl flow, optionally with rear-mounted spigot and perforated plate or with rear mounted subframe, diffuser face fixed by central screw.

### Materials:

The diffuser face is made from sheet steel, the rear spigot and rear subframe of galvanised sheet steel. The diffuser face is pre-treated and powder coated white (RAL 9010), rear spigot stove-enamelled black (RAL 9005).

## Order Example

Make: TROX  
 Type: SD - Q - LQ - S/180/P1/RAL 9005