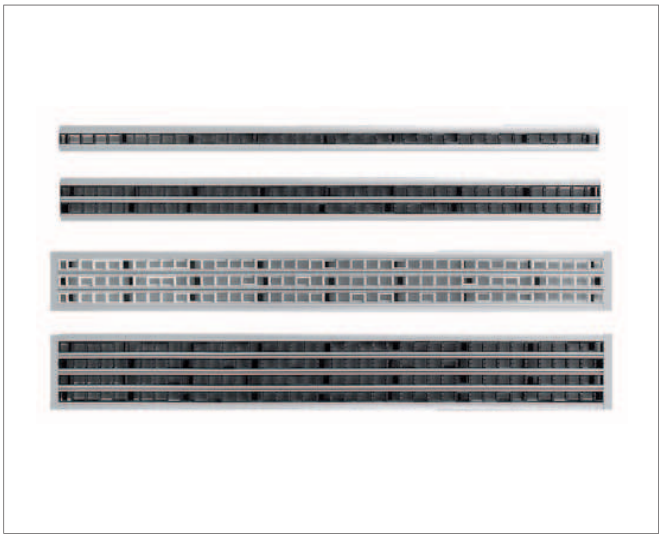
NSZ

slot air vents



registered design

DESCRIPTION

NSZ are slot air vents with mobile directing elements, available for installation in false ceilings. They consist of a front element and 1 to 4 slots. Finishing is available in the form of plates or angle brackets, fitted with elements directing the air stream, factory-adjustable with a possibility of later adaptation to local conditions.

The choke length of a slot air vent is variable. The front element is installed on an expansion box only at the construction site. Upon request, the expansion box may be fitted with internal insulation, with a round connector pipe on the side, which is connected to the choke valve, adjustable from the front.

Thanks to their small dimensions, these air vents can be used in low mid-ceiling areas, especially in false ceilings. Their high stream induction results in a rapid decrease in the difference of temperature and flow velocity.

The recommended difference of air-supply temperature is 10 K. A stable air-supply stream makes slot air vents perfect for small and variable flow of air. The air-supply direction may be adjusted to desired internal conditions. If the change of direction of exhaust is needed, it can be performed by turning directing elements.

MATERIAL:

The front element, extra profile and finishing elements are made of moulded aluminium profile, natural colour anodised or powder veneered with a RAL palette colour. Elements controlling the stream of air are made of black plastic (polystyrene, standard finish) – colour similar to RAL 9005, or of white plastic – colour similar to RAL 9010.

SHORT CHARACTERISTIC

- simultaneous vertical and horizontal air-supply
- high rate of induction
- possibility to adjust air-supply to desired internal conditions
- controlling elements are made of high quality white or black PVC
- air vents are made of decorative aluminium profiles
- possibility to install single vents in a row
- possibility to install with an SR/NSZ plenum box
- low height
- standard air vents are natural colour anodised
- possibility to prepare a vent of any length (upon special request)
- assembly with springs

ORDER REFERENCE

NSZ - 1 - SR - P	Z1	1000	C

- C: colour; B - white, C - black
- 1000: length: 600,1000,1200,1500,1800,2000
- Z1: 1 – finishing angle bracket; 2 – finishing plate
- SR - P: P - performance control expansion box
- 1: number of slots 1 - 2 - 3 - 4
- NSZ: type

INSTALLATION

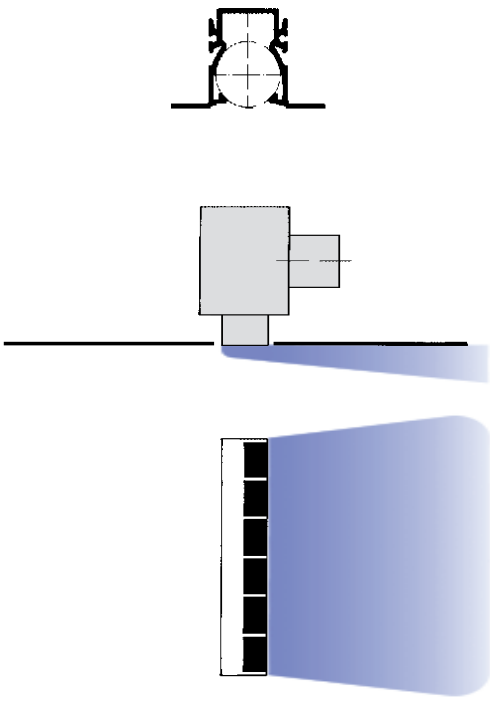
NSZ slot air vents can be installed together with an SR/NSZ plenum box. The air vent should be fitted into a box with the use of rivets or screws. It is important to remember about sealing the connection, for example with a silicone gasket.

Thanks to their small dimensions, these air vents can be used in low mid-ceiling areas, especially in false ceilings.

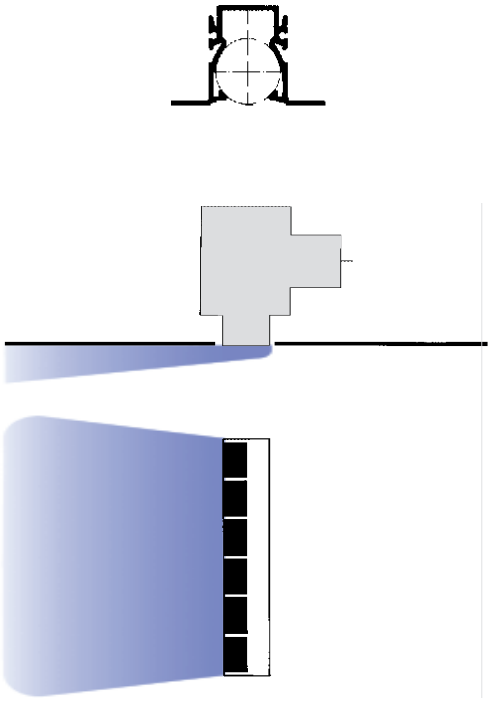
NSZ

slot air vents

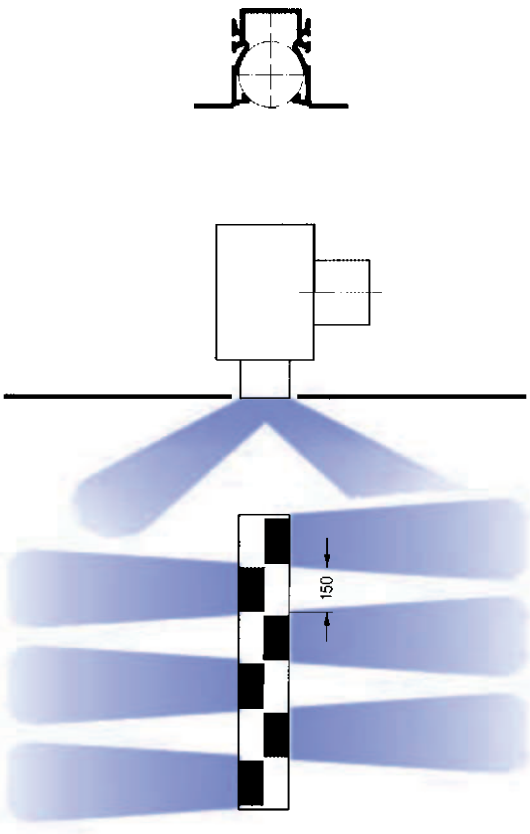
Horizontal air exhaust - right



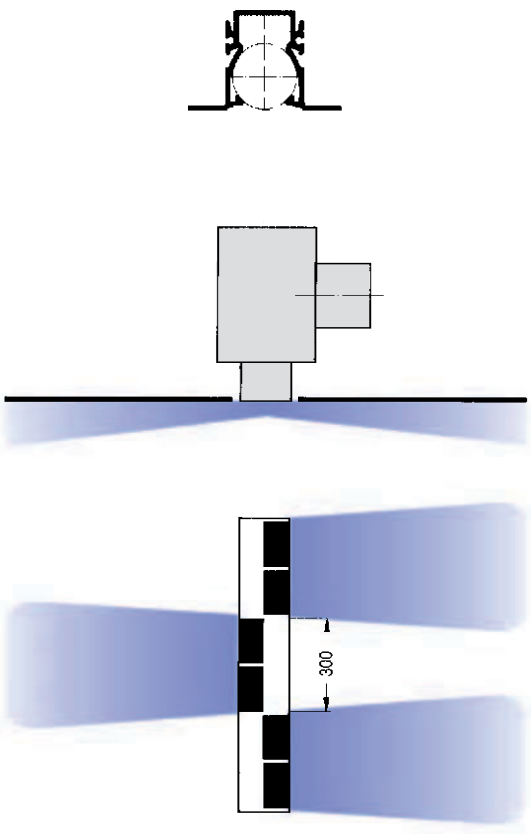
Horizontal air exhaust - left

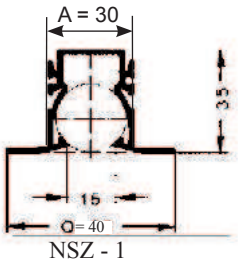


Variable air exhaust - slant

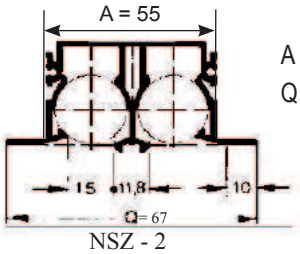


Variable air exhaust - horizontal



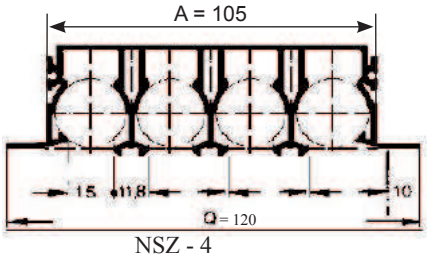


NSZ - 1

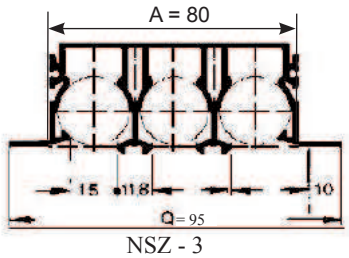


NSZ - 2

A - installation opening
Q -total size

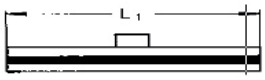


NSZ - 4



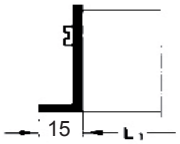
NSZ - 3

Finishing elements

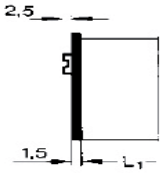


without the finishing element


finishing element on both sides



finishing angle bracket

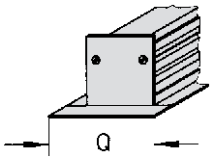


finishing plate

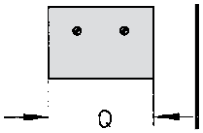
NSZ

slot air vents

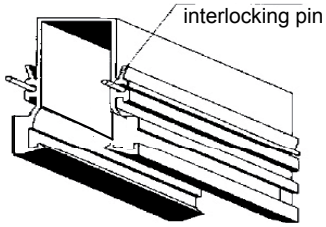
finishing angle bracket

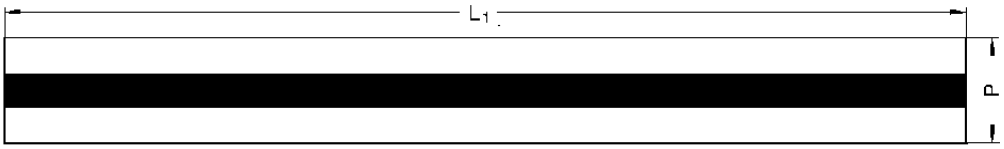


finishing plate

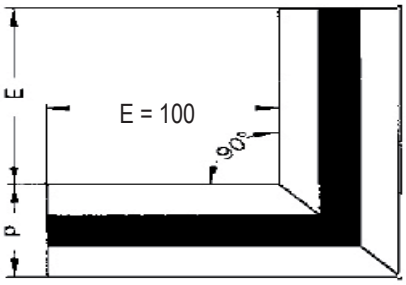


joint connection

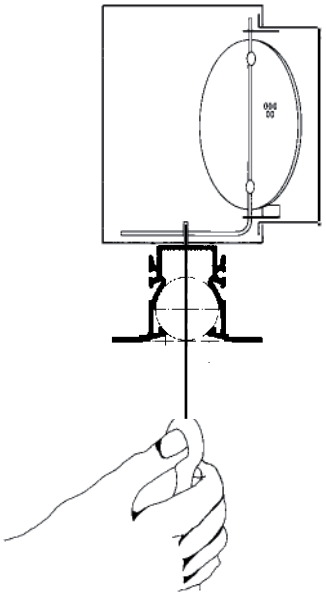




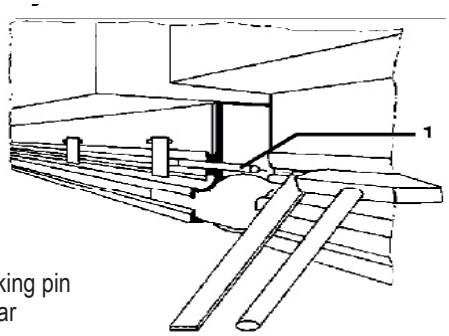
front bar ‘F’



90° angle element



Frontal air stream control



1 - interlocking pin
2 - guide bar

Effective inflow velocity

$\dot{V}_t$ l/s

$$v_{eff} = \frac{\dot{V}_t}{s_{eff} \cdot L_1 \cdot 1000} \text{ [m/s]}$$

$\dot{V}_t$ m³/h

$$v_{eff} = \frac{\dot{V}_t}{s_{eff} \cdot L_1 \cdot 3600} \text{ [m/s]}$$

Effective width of a slot

Air exhaust	horizontal	slant
Seff [m]	0,0062	0,0049

Designations

V	l/s * m:	efficiency for 1 rms
V	m3/h * m:	efficiency for 1 rms
Vt	l/s:	total efficiency
Vt	m3/h:	total efficiency
A	m:	distance between two air vents
H1	m:	distance between the ceiling and human activity zone
H1 max	m:	max. range of a warm air stream
L	m:	distance from an air vent L=A/2 +H1 or L=X + H1
VH1	m/s:	average velocity of the air stream between two air vents in H1 time
VL	m/s:	average velocity of the air stream along the wall, in distance L
Veff	m/s:	effective exhaust velocity
Δ tZ	K:	difference in temperature between air in the room and supplied air
Δ tL	K:	difference between the temperature of the room and stream temperature, in distance L
ΔtH1	K:	difference between the temperature of the room and stream temperature, in distance H
ΔPt	Pa:	loss of total pressure
LWA	dB(A):	sound intensity level in A scale
LW NC	:	limit curve of the sound intensity spectrum
LW NR	:	LW NR = LW NC + 2
LpA, LpNC	:	acoustic pressure in the A or NC scale in a room LpA = LWA – 8 dB LpNC = LW NC – 8 dB
ΔL	dB/oct:	relative level of sound intensity, in reference to LWA
Lw	dB/oct:	octave level of sound intensity for /illegible/

NSZ

slot air vents

Spectrum data

Example
Data:
NSZ -1; variable slant exhaust
slot length L_1 = 1000 mm
total efficiency V_t = 25 l/s
connector pipe diameter D = 98 mm
search for: octave level of sound intensity

Average octave frequency [Hz]	63	125	250	500	1000	2000	4000	8000
LWA dB(A)	29	29	29	29	29	29	29	29
ΔL dB	3	1	7	-3	-15	-23	-31	-38
LW dB	32	30	36	26	14	6	-2	-9

Wykres 1: Sound intensity and pressure loss
$\Delta p_t = 17\ Pa \cdot 1,4 \approx 24\ PS$
$L_{WA} = 29\ dB(A)$
Effective exhaust velocity V_{eff}:

$$v_{eff} = \frac{\dot{V}_t}{s_{eff} \cdot L_1 \cdot 1000} = \frac{25}{0,0049 \cdot 1,05 \cdot 1000} = 4,9\ m/s$$

Type	lenght mm	effective outflow velocity Veff m/s	average frequencies of octave band Hz							
			63	125	250	500	1000	2000	4000	8000
NSZ-1	600	2	13	6	6	– 6	– 28	– 42	– 45	– 50
	1050		17	2	7	– 10	– 30	– 43	– 46	– 52
	1500		16	8	6	– 8	– 26	– 36	– 47	– 53
	600	3	9	5	6	– 4	– 21	– 32	– 35	– 40
	1050		11	2	7	– 6	– 22	– 34	– 42	– 48
	1500		11	6	7	– 5	– 20	– 29	– 38	– 46
	600	5	3	2	6	– 1	– 14	– 21	– 28	– 34
	1050		3	1	7	– 3	– 15	– 23	– 31	– 38
	1500		3	2	6	– 2	– 13	– 20	– 30	– 40
	600	7	– 2	0	4	0	– 10	– 14	– 27	– 31
	1050		– 3	0	6	– 2	– 10	– 16	– 29	– 34
	1500		– 3	– 1	5	– 1	– 9	– 16	– 33	– 36
NSZ-2	600	2	14	9	5	– 5	– 24	– 33	– 37	– 42
	1050		20	7	6	– 9	– 20	– 27	– 35	– 45
	1500		5	8	7	– 5	– 18	– 26	– 37	– 47
	600	3	9	7	6	– 3	– 18	– 26	– 30	– 36
	1050		14	6	7	– 5	– 15	– 23	– 34	– 43
	1500		1	5	7	– 3	– 14	– 22	– 36	– 43
	600	5	0	3	6	– 1	– 11	– 19	– 27	– 33
	1050		6	3	6	– 3	– 12	– 19	– 30	– 38
	1500		– 5	1	6	– 2	– 10	– 17	– 32	– 40
	600	7	– 6	– 1	5	– 1	– 8	– 15	– 29	– 30
	1050		– 1	0	6	– 2	– 10	– 17	– 35	– 38
	1500		– 10	– 2	5	– 1	– 8	– 15	– 36	– 38
NSZ-3	600	2	10	5	6	– 3	– 24	– 39	– 44	– 51
	1050		9	6	7	– 7	– 16	– 28	– 38	– 48
	1500		11	2	7	– 5	– 17	– 26	– 36	– 48
	600	3	5	4	6	– 2	– 18	– 28	– 35	– 42
	1050		3	4	7	– 5	– 13	– 23	– 36	– 45
	1500		5	1	7	– 4	– 13	– 21	– 35	– 45
	600	5	– 2	1	6	– 2	– 10	– 17	– 28	– 36
	1050		– 6	0	7	– 3	– 11	– 17	– 29	– 39
	1500		– 3	0	6	– 3	– 9	– 15	– 33	– 42
	600	7	– 8	– 2	4	– 2	– 6	– 10	– 30	– 34
	1050		– 12	– 3	6	– 2	– 9	– 14	– 32	– 36
	1500		– 8	– 2	5	– 3	– 7	– 12	– 36	– 40
NSZ-4	600	2	9	6	7	– 5	– 18	– 29	– 34	– 45
	1050		13	5	7	– 7	– 18	– 28	– 38	– 50
	1500		4	3	7	– 5	– 13	– 21	– 36	– 45
	600	3	5	5	7	– 4	– 13	– 22	– 29	– 40
	1050		5	3	7	– 5	– 13	– 21	– 32	– 44
	1500		1	2	7	– 4	– 10	– 18	– 26	– 38
	600	5	– 2	2	6	– 4	– 7	– 15	– 28	– 36
	1050		– 6	– 1	6	– 4	– 7	– 15	– 28	– 38
	1500		– 4	1	6	– 3	– 7	– 14	– 26	– 35
	600	7	– 7	– 1	4	– 4	– 5	– 11	– 31	– 35
	1050		– 14	– 4	3	– 4	– 4	– 11	– 30	– 33
	1500		– 8	– 1	5	– 3	– 6	– 12	– 27	– 32

Acoustic data

Diagram 1 update: choke valve location

D=98 mm		horizontal exhaust			slant exhaust		
angle		0°	45°	90°	0°	45°	90°
L1=600	Δp_t	x1	x1,3	x2,0	x1,7	x1,9	x2,6
L1=1000	Δp_t	x1	x1,3	x2,6	x1,4	x1,7	x3,0
L1=1500	Δp_t	x1	x1,5	x3,5	x1,2	x1,6	x3,8
	L_{WA}	-	+3	+5	-	+3	+5
	L_{WNC}	-	+3	+5	-	+4	+6

Diagram 2 update: choke valve location

D=98 mm		horizontal exhaust			slant exhaust		
angle		0°	45°	90°	0°	45°	90°
L1=600	Δp_t	x1	x1,1	x1,6	x1,8	x1,9	x2,3
L1=1000	Δp_t	x1	x1,2	x2,2	x1,6	x1,8	x2,8
L1=1500	Δp_t	x1	x1,3	x2,3	x1,4	x1,7	x3,2
	L_{WA}	-	+3	+5	-	+4	+5
	L_{WNC}	-	+4	+6	+1	+5	+6

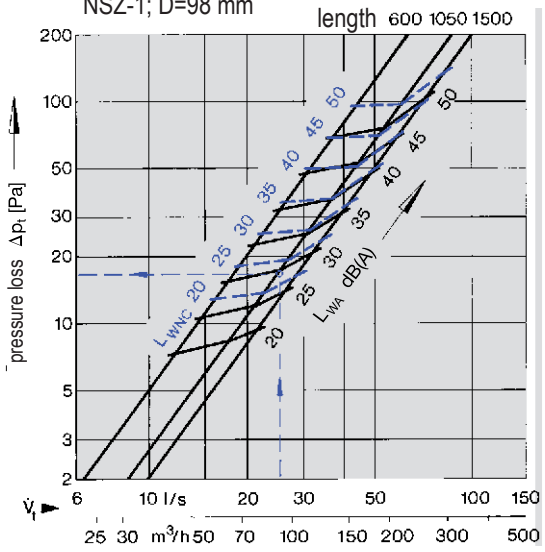
Diagram 3 update: choke valve location

D=98 mm		horizontal exhaust			slant exhaust		
angle		0°	45°	90°	0°	45°	90°
L1=600	Δp_t	x1	x1,3	x2,4	x1,,7	x2,0	x3,4
L1=1000	Δp_t	x1	x1,6	x3,8	x1,3	x1,9	x4,7
L1=1500	Δp_t	x1	x1,5	x4,3	x1,2	X1,8	x4,4
	L_{WA}	-	+3	+5	-	+4	+7
	L_{WNC}	-	+4	+6	+1	+5	+8

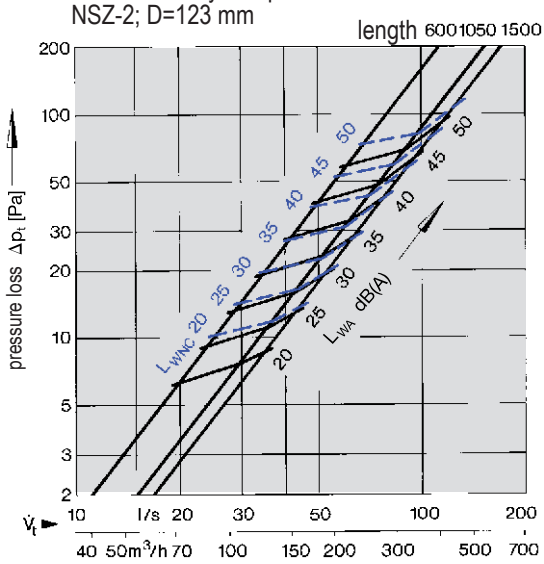
Diagram 4 update: choke valve location

D=98 mm		horizontal exhaust			slant exhaust		
angle		0°	45°	90°	0°	45°	90°
L1=600	Δp_t	x1	x1,3	x2,4	x1,5	x1,8	x3,4
L1=1000	Δp_t	x1	x1,5	x4,0	x1,5	x1,9	x5,1
L1=1500	Δp_t	x1	x1,7	x4,9	x1,3	x2,0	x6,6
	L_{WA}	-	+4	+7	-	+5	+8
	L_{WNC}	-	+4	+6	+1	+5	+8

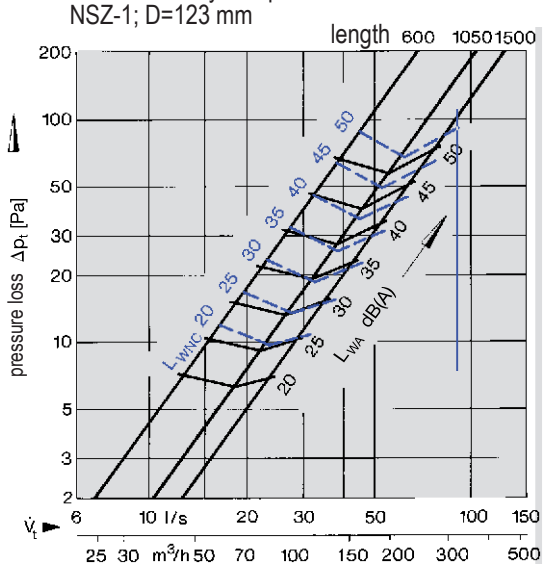
Sound intensity and pressure loss
NSZ-1; D=98 mm



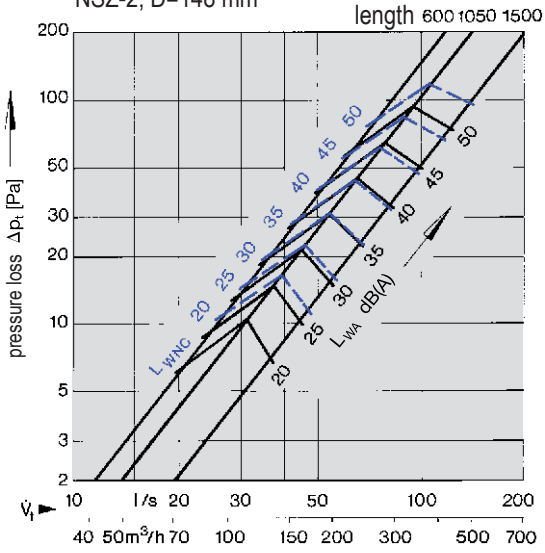
Sound intensity and pressure loss
NSZ-2; D=123 mm



Sound intensity and pressure loss
NSZ-1; D=123 mm



Sound intensity and pressure loss
NSZ-2; D=148 mm

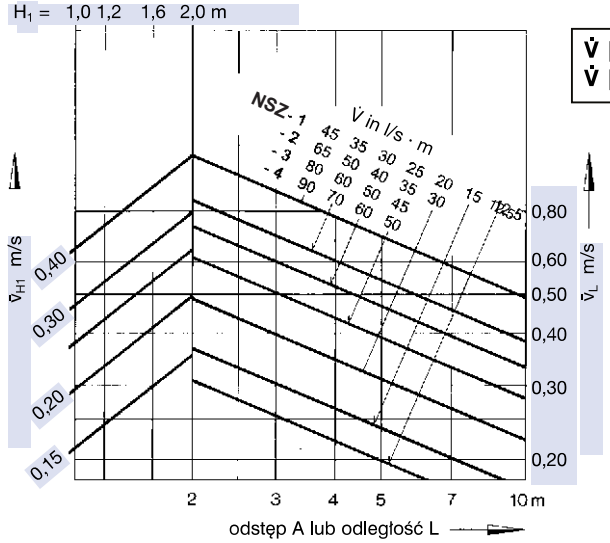


NSZ

slot air vents

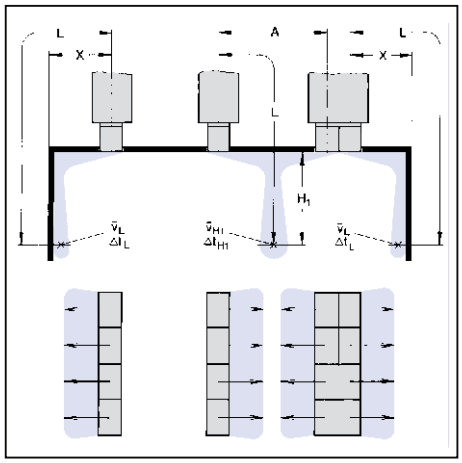
Characteristics
exhaust: one- and two-side, horizontal

Stream velocity between two air vents and along the wall

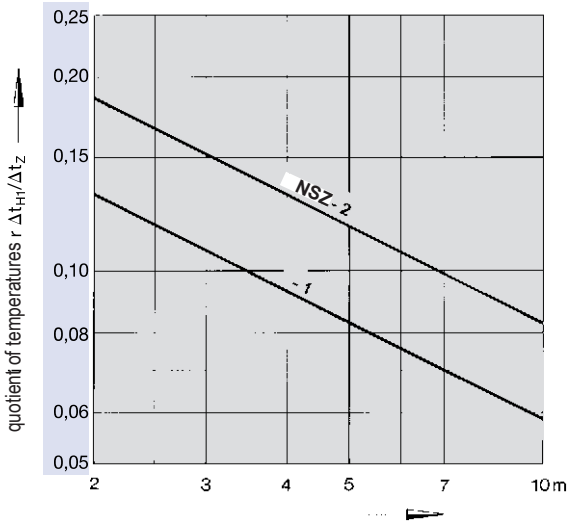


V̇ [m³/h] =
V̇ [l/s] x 3,6

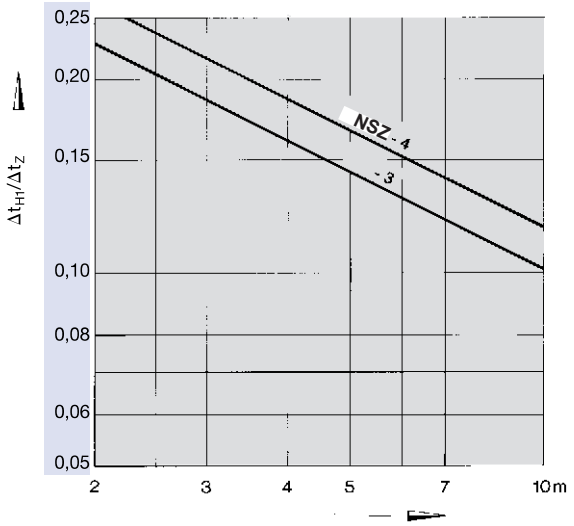
Rule of selection



Quotient of temperatures



Quotient of temperatures



Characteristics

exhaust: variable, horizontal

Example

Data:

NSZ-1; variable horizontal exhaust

efficiency for 1 rms — V= 30 l/s · m

temperature difference between the room and air-supply in the cooling mode — Δt_z= - 10 K

distance between the ceiling and human activity and human activity — H_1=1,2 m

distance from the air vent axis to the wall — x = 2,4 m

Stream velocity between two air vents

L= X+H_1=2,4+1,2=3,6 m

ΔL=0,27 m/s

Flow velocity alongside the wall

L=A/2+H_1=0,9+1,2=2,1 m

$\Delta t_L/\Delta t_z$ = 0,064

Δt_L = 0,064 x (-10) K

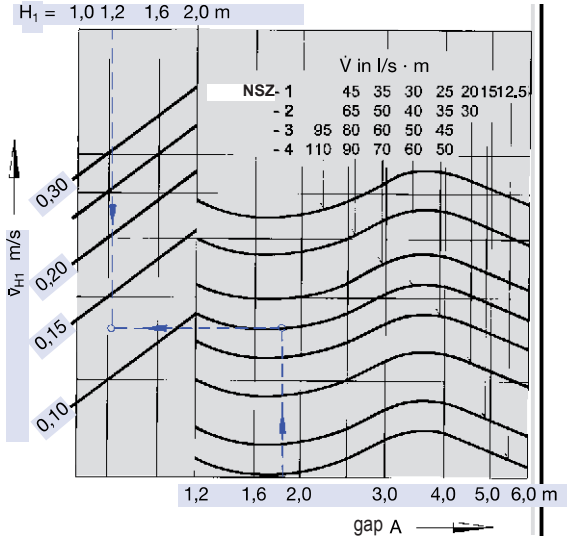
Δt_L =-0,64 K

For L=X+H_1=3,6 m; $\Delta t_L/\Delta t_z$ = 0,049;

Δt_L ≈-0,5 K

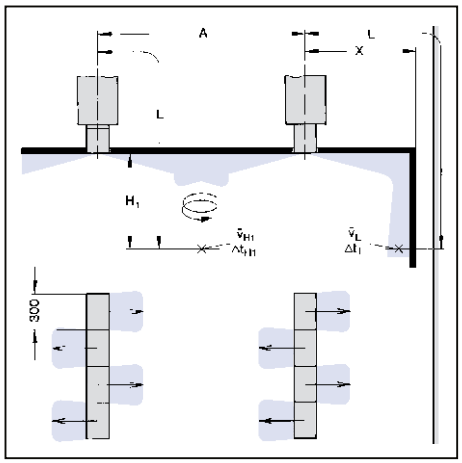
Quotient of temperatures

Stream velocity between two air vents

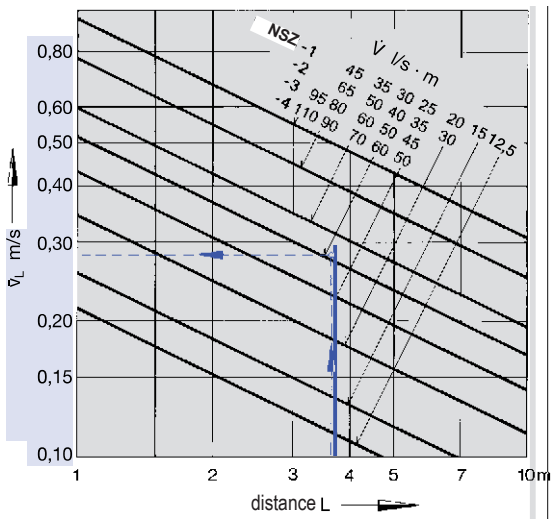


V̇ [m³/h] = V̇ [l/s] x 3,6

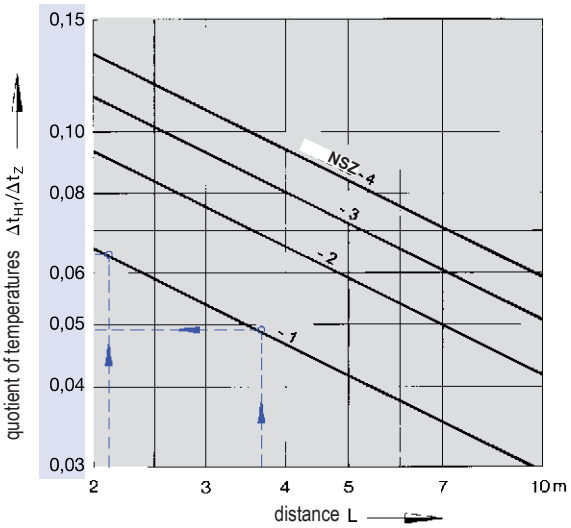
Rule of selection



Flow velocity alongside the wall



Quotient of temperatures



NSZ

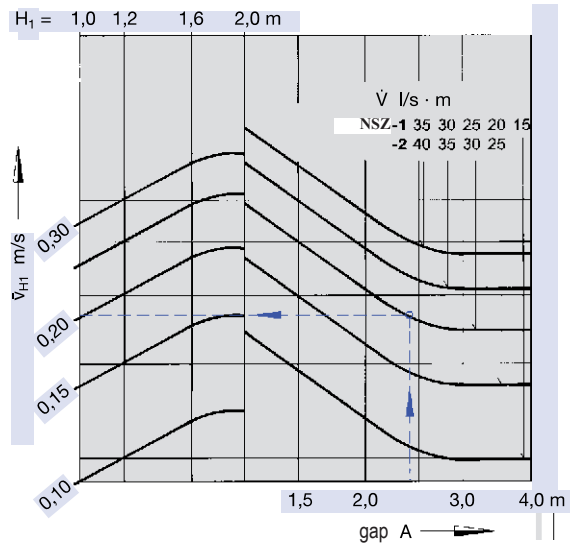
slot air vents

Characteristics
exhaust: variable, horizontal

Example
Data:

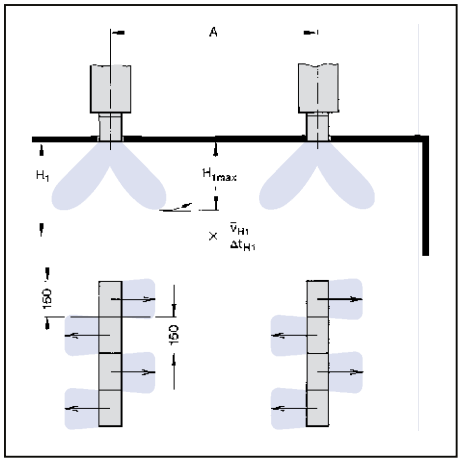
NSZ-1; variable horizontal exhaust efficiency for 1 rms	V= 25 l/s · m	V_{H1} =0,20 m/s	Stream velocity between two air vents
temperature difference between the room and air-supply	Δt_z= - 8 K lub +8 K	$\Delta t_{H1}/\Delta t_z$= 0,051 Δt_{H1}=-0,051 x (-8 K) ≈ -0,4 K	temperature quotient in the cooling mode
distance between the ceiling and human activity	H_1 =1,0	H_{1max} ≈ 1,5 m	max. range of a warm air stream

Stream velocity between two air vents

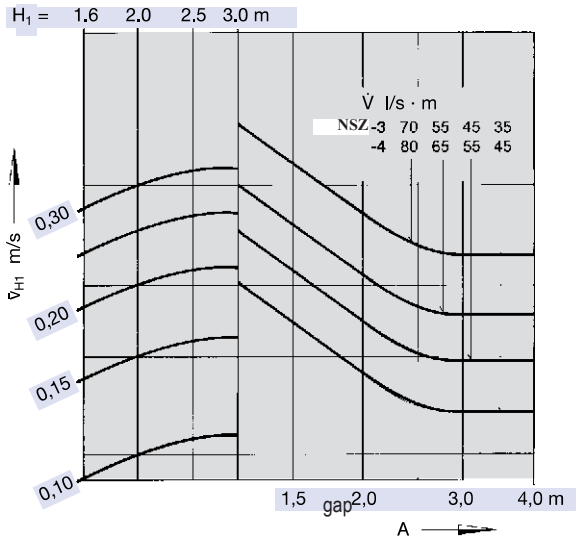


V̇ [m³/h] = V̇ [l/s] x 3,6

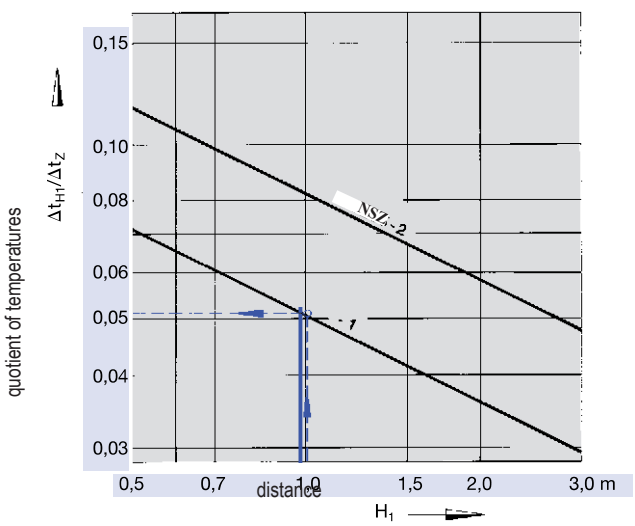
Rule of selection



Stream velocity between two air vents

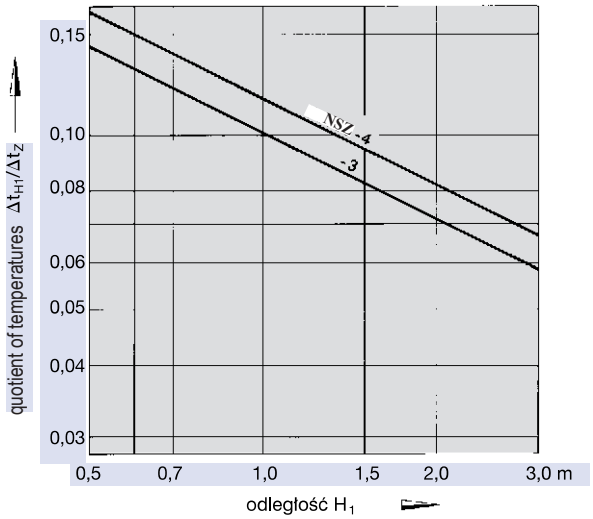


Quotient of temperatures

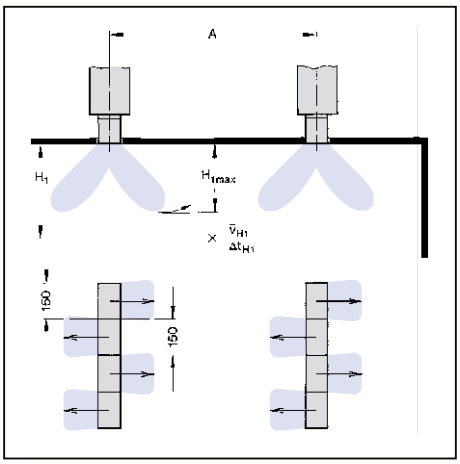


Characteristics
exhaust: variable, horizontal

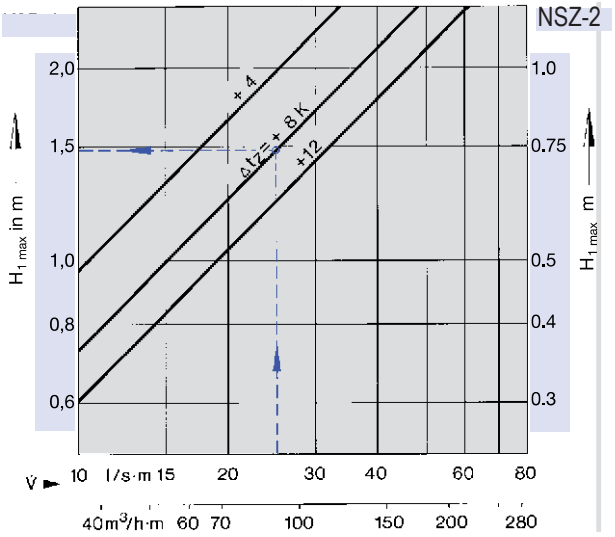
Temperature quotient in the cooling mode



Rule of selection



Maximum range of a warm air stream



Maximum range of a warm air stream