Step diffuser WAVESTEP

Type WST

Int. mod. prot. reg.

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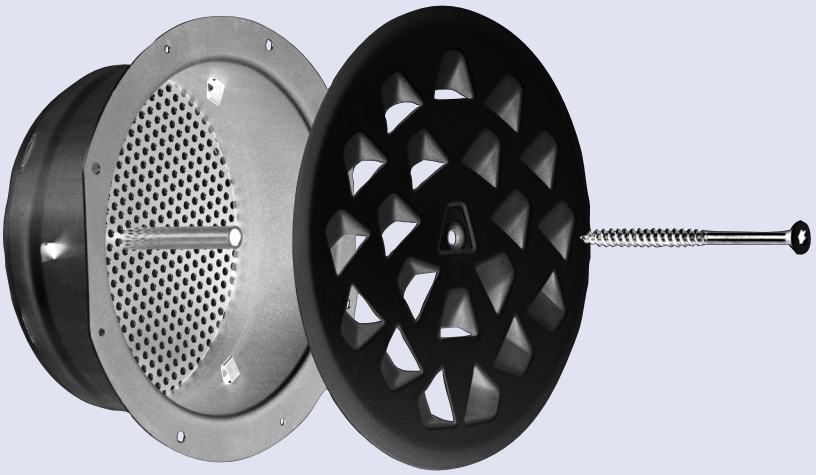
Contents

Application

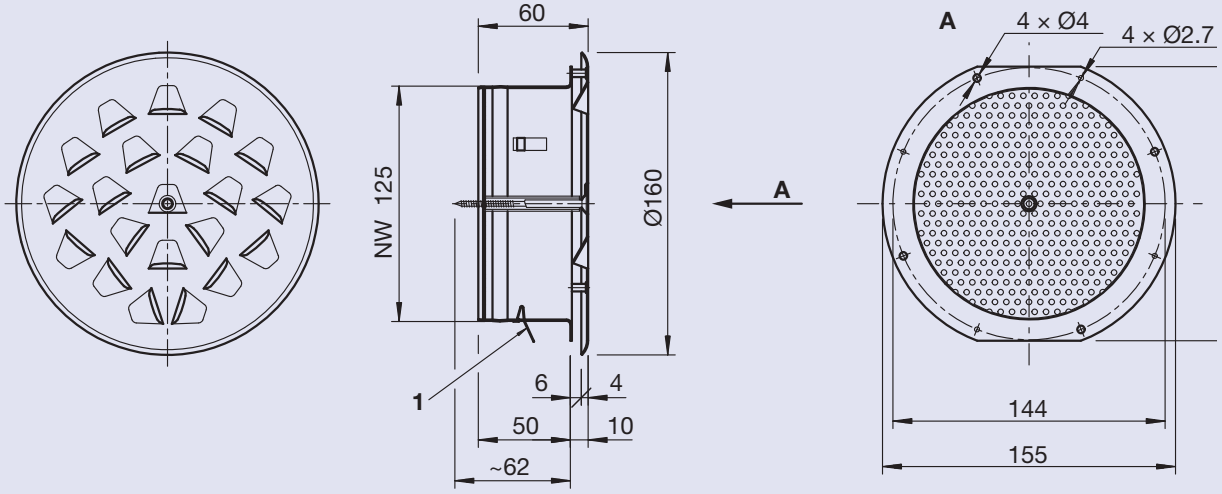
The circular step diffuser type WAVESTEP, supplied together with a spigot, is used primarily in theatres, cinemas or auditoriums.
The circular and compact inductive diffuser is fitted directly to the step risers. Because of its asymmetric wave-shape, 1/3 of the supply air leaves the face upward and lateral directions and 1/3 downwards and lateral direction.

Execution

- step diffuser WAVESTEP of steel plate, powder-coated, colour RAL 9010 matt (25% brilliance)
- spigot of galvanised steel plate
- fixing with central screw, retaining springs in the spigot



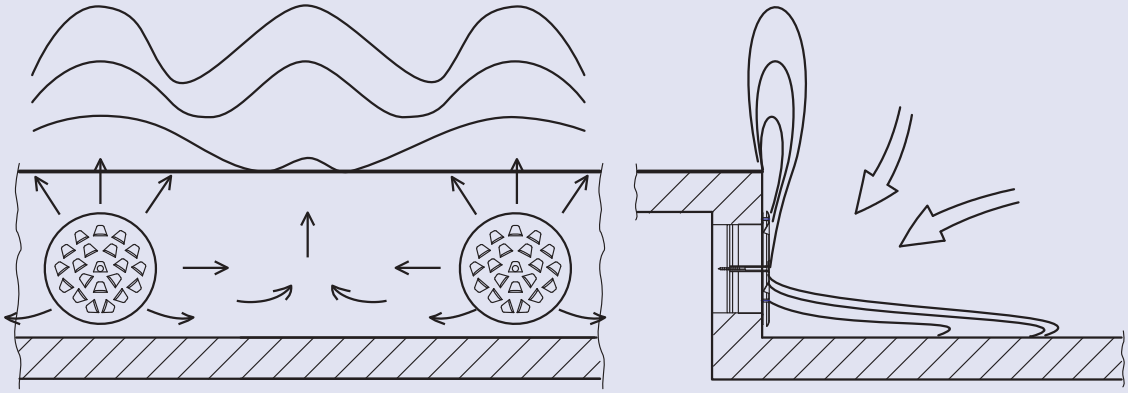
Dimensions



A View without front plate
1 Retaining spring

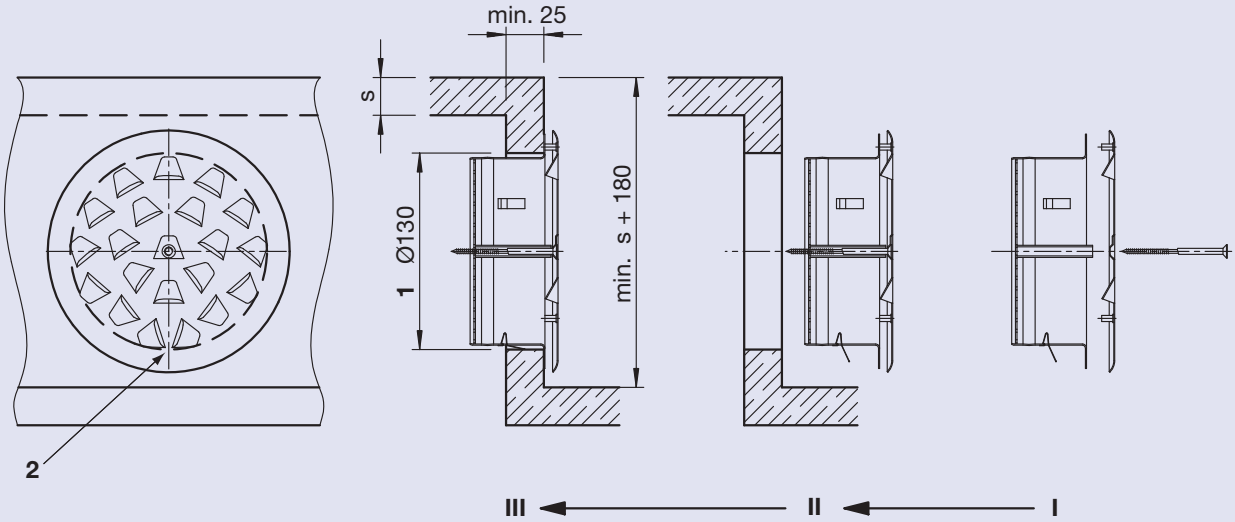
Flow pattern · Installation · Quick selection

Flow pattern



Installation

Installation using retaining springs



1 Recess
2 Attention to the position !

Quick selection

Volume flow rate	**20 m³/h 5.6 l/s**	**30 m³/h 8.3 l/s**	**40 m³/h 11.1 l/s**	**50 m³/h 13.9 l/s**	
Pressure drop	6	14	24	38	Pa
Sound power level	<15	<15	18	25	dB(A)
Air velocity in the spigot	0.45	0.68	0.91	1.13	m/s

Technical Data

Definitions

$\dot{V}$	m³/h; l/s	Volume flow rate per diffuser
v_{gem}	m/s	Blow-out velocity measured with a windmill-type anemometer
v_{125}	m/s	Velocity in the spigot: Ø 125 mm
Δt_u	K	Difference in temperature between the supply air and room air (see remark*)
Δp_s	Pa	Pressure drop
D	m	Distance between the diffusers
X_{max}, Y_{max}	m	Length of the diffusers
L_{wA}	dB(A)	A-weighted sound power level
L_{wokt}	dB	Sound power level in the octave-centre frequencies
f	Hz	Frequency
ΔL_w	dB	Corrections in relation to octave centre frequencies
ζ	-	Resistance coefficient

***Remark:**
The difference in the temperature of the supply air and the extract air depends on the height of the room as well as the type and position of the thermal loads.

Example of application

Given

Volume flow rate per diffuser	$\dot{V}$ 40 m³/h = 11.1 l/s	
Temperature difference	Δt_u	-4 K

Sought

Velocity	v_{gem}	m/s
Pressure drop	Δp_s	Pa
Sound power level	L_{wA}	dB(A)
Length of jet	X_{max}	m
Height of jet	Y_{max}	m
Sound power level in octavo volume	L_{wOkt}	dB

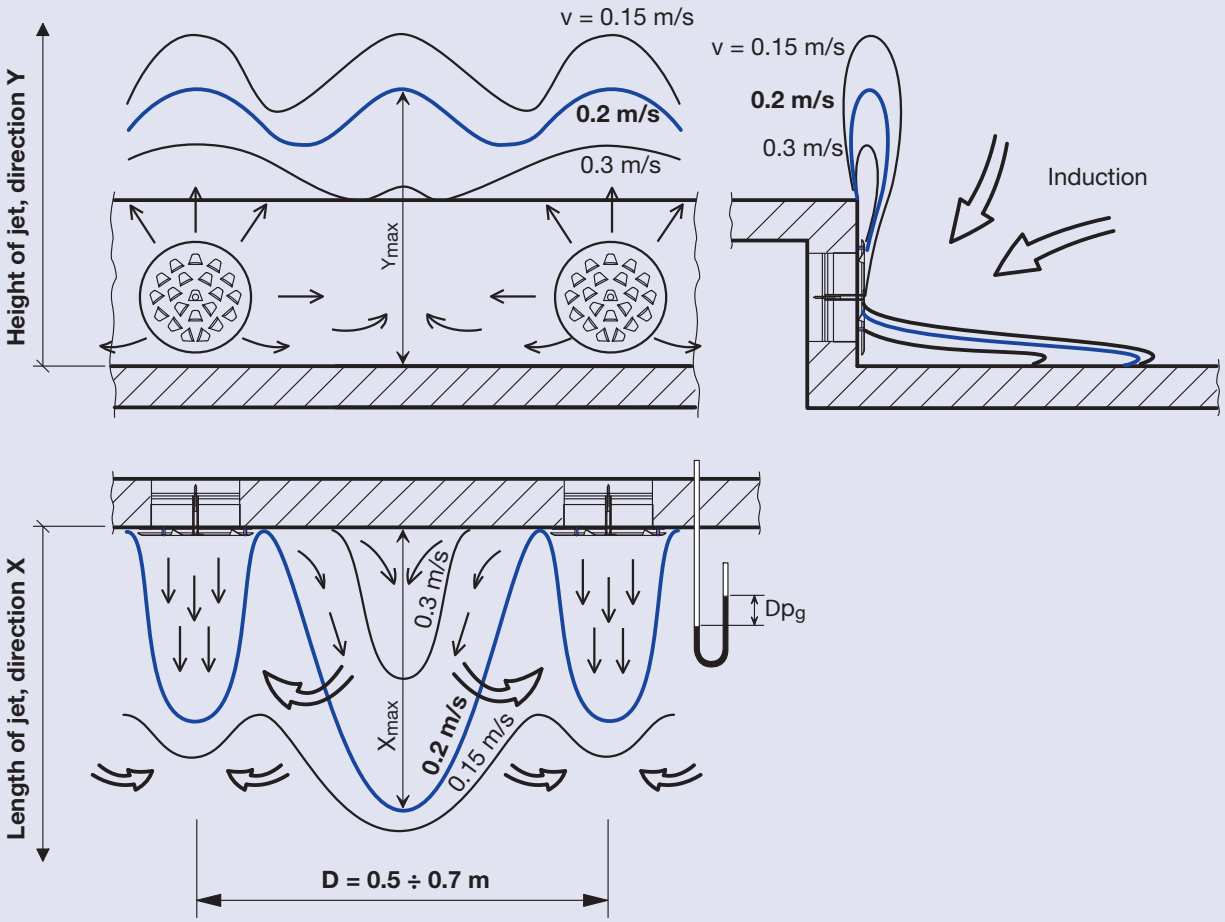
Sound power level in octavo volume L_{wOkt} see table

Solution

Velocity	v_{gem}	1.50 m/s
Pressure drop	Δp_s	24 Pa
Soundpower level	L_{wA}	18 dB(A)
Length of jet	X_{max}	0.48 m
Height of jet	Y_{max}	0.64 m

	Octave centre frequencies f							
	125	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Hz**
L_{wA}	18	18	18	18	18	18	18	dB(A)
Correction	0	-3	-3	-4	-11	-12	-9	dB
L_{wOkt}	18	15	15	14	7	6	9	dB

Curves of the same speed (Isovels)



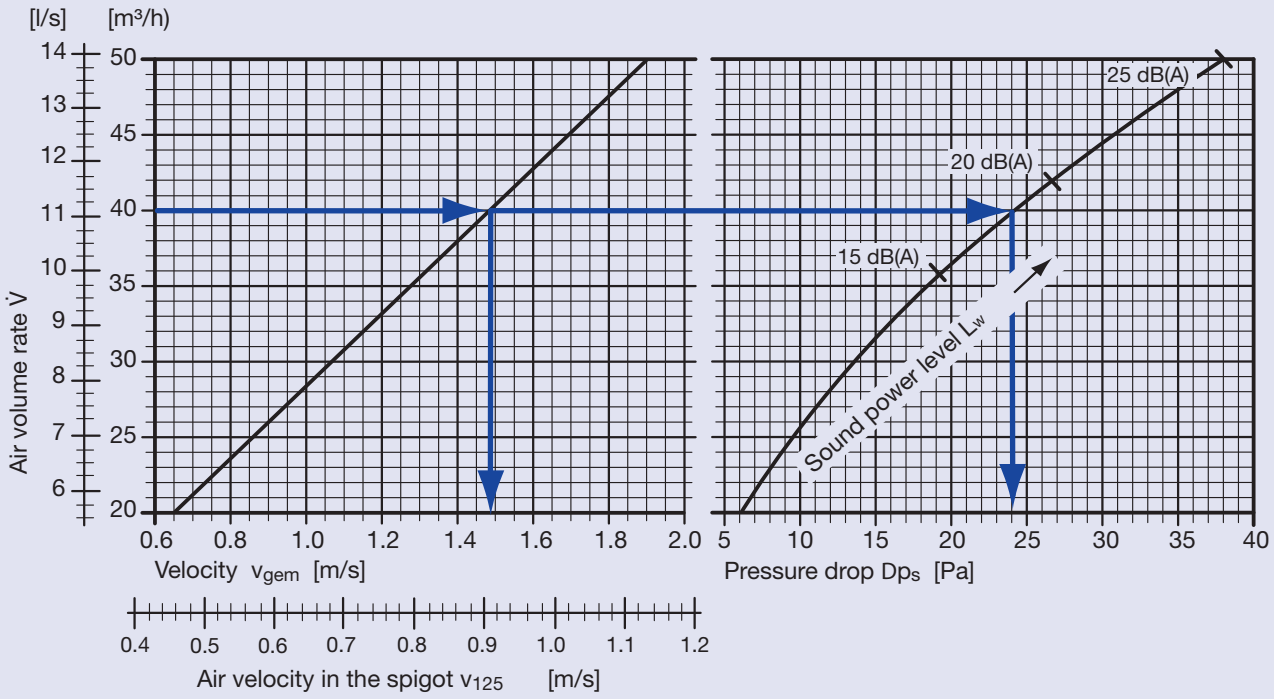
Position of the velocity curve v = 0.20 m/s
The table below shows the max. distance from the front of the diffuser at which the velocity is reduced to 0.20 m/s.
X_{max} = distance in horizontal direction
Y_{max} = distance in vertical direction

Δt_u is the difference in the temperature of the supply air and the room air at a height of about 1.1 m.

	20 m³/h 5.6 l/s		30 m³/h 8.3 l/s		40 m³/h 11.1 l/s		50 m³/h 13.9 l/s	
t_u [K]	X_{max} [m]	Y_{max} [m]	X_{max} [m]	Y_{max} [m]	X_{max} [m]	Y_{max} [m]	X_{max} [m]	Y_{max} [m]
0	0.11	0.32	0.23	0.52	0.36	0.72	0.49	0.92
-3	0.20	0.26	0.32	0.46	0.45	0.66	0.58	0.86
-6	0.28	0.20	0.41	0.40	0.54	0.60	0.67	0.80

Technical Data

Pressure drop, volume flow rate, velocity



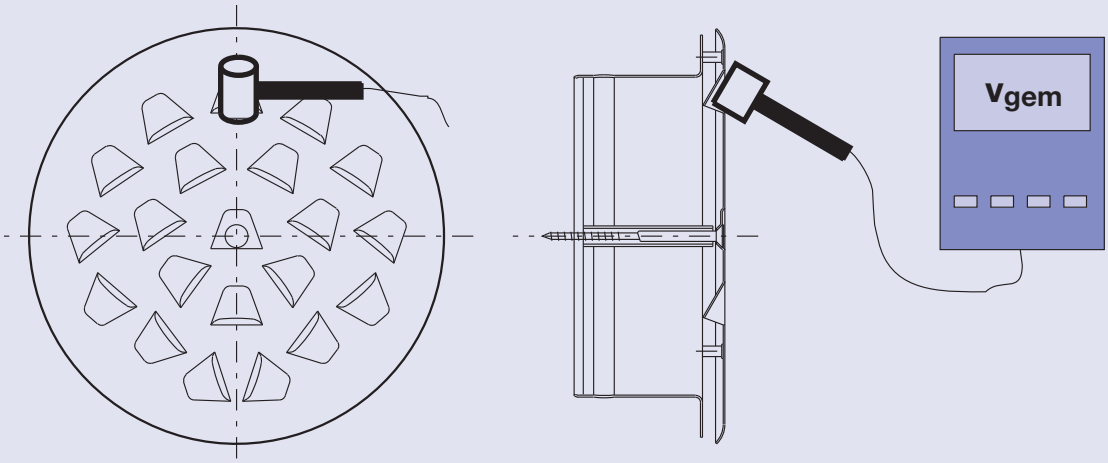
Resistance coefficient $\zeta_{125} = 50$
The resistance ζ_{125} relates to the connection diameter 125 mm.

Linear sound power level in the octave band

Correction table ΔL_w in relation to dB(A)

	Octave centre frequencies f							
	125	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Hz**
L_w to dB(A)	0	-3	-3	-4	-11	-12	-9	dB

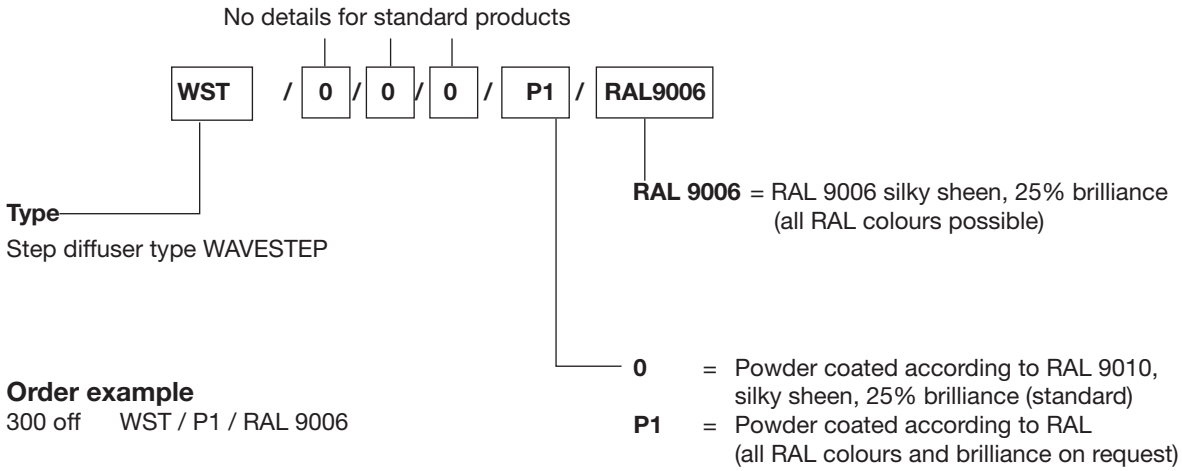
Measurement method - determination of the volume flow rate via v_{gem}



Remark: v_{gem} is measured on the uppermost nozzle.
Measuring device for blow-out velocity v_{gem}: Mini-Air 5, windmill-type anemometer, probe diameter = 20 mm
(Tolerance up to ± 20 %)

Order details

Order codes



Order example
300 off WST / P1 / RAL 9006

Text for tendering purposes
Step diffuser type WAVESTEP with concave shaped openings arranged in a circle. High induction due to a number of individual pulsating air jets. Low resistance. Fixation of the step diffuser by means of retaining springs and central screw.

Material:
Step diffuser - steel plate, powder coated according to RAL 9010, 25% brilliance.
Spigot - galvanised steel
Nominal diameter: Ø 125 mm
Outside dimension: Ø 160 mm

Options:
- without retaining springs
- without slots in the spigot
- screw head lacquer finish according to RAL...
- other RAL colours