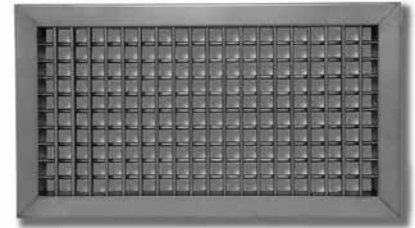# Stainless steel grilles

RR-1, RR-3, RR-5, RR-6

- Visible or hidden screw installation
- Flat framer
- **Stainless steel AISI 304
  (BA – polished, high gloss)**
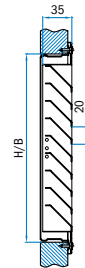
RR-1

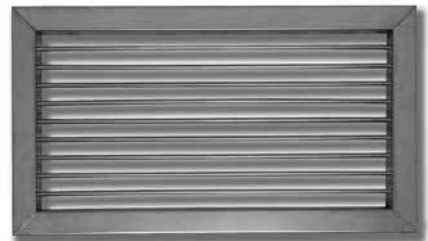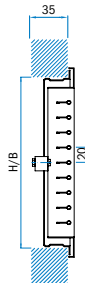- Individually adjustable vertical and
  horizontal blades

RR-3

- Fixed horizontal blades
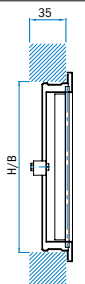
RR-5

- Individually adjustable horizontal
  blades

RR-6

- Individually adjustable vertical blades

Ordering key

RR-1 / V - FI BxH
  1   2   3   4

1   Grille type

RR-1	Stainless steel grille (INOX)
RR-3	Stainless steel grille (INOX)
RR-5	Stainless steel grille (INOX)
RR-6	Stainless steel grille (INOX)

2   Installation

V	Visible screw installation - screw INOX

3   Register

FI	Register - INOX (frame INOX, aluminium blades) (for RR-1, RR-5, RR-6 only)

4   Dimensions

BxH	Dimension BxH in mm

Grille standard dimensions and cross-sections (m²) for RR-5, RR-6:

B/H	75	125	175	225	325	425	525
225	0.007	0.015	0.021	0.029			
325	0.011	0.023	0.033	0.044	0.066		
425	0.015	0.031	0.044	0.060	0.089	0.118	
525	0.019	0.038	0.055	0.075	0.112	0.148	0.185
625	0.022	0.046	0.067	0.090	0.134	0.179	0.223
725	0.026	0.054	0.078	0.106	0.157	0.209	0.261
825	0.030	0.062	0.089	0.121	0.180	0.239	0.298
925	0.034	0.070	0.101	0.136	0.203	0.270	0.336
1025	0.038	0.077	0.112	0.151	0.226	0.300	0.374
1125	0.041	0.085	0.123	0.167	0.248	0.330	0.412
1225	0.045	0.093	0.134	0.182	0.271	0.360	0.450

B/H	100	150	200	250	300	350	400	500
150	0.007	0.011						
200	0.010	0.016	0.022					
250	0.013	0.021	0.029	0.037				
300	0.015	0.026	0.035	0.046	0.055			
350	0.018	0.031	0.042	0.055	0.065	0.078		
400	0.021	0.036	0.049	0.063	0.076	0.090	0.103	
450	0.024	0.041	0.055	0.072	0.086	0.103	0.117	
500	0.027	0.046	0.062	0.080	0.097	0.115	0.131	0.166
600	0.033	0.055	0.075	0.098	0.117	0.140	0.160	0.202
700	0.039	0.065	0.088	0.115	0.138	0.165	0.188	0.238
800	0.044	0.075	0.102	0.132	0.159	0.190	0.216	0.274
900	0.050	0.085	0.115	0.150	0.180	0.214	0.245	0.309
1000	0.056	0.095	0.128	0.167	0.201	0.239	0.273	0.345
1100	0.062	0.104	0.142	0.184	0.221	0.264	0.301	0.381
1200	0.068	0.114	0.155	0.202	0.242	0.289	0.330	0.417

Grille standard dimensions and cross-sections (m²) for RR-1:

B/H	75	125	175	225	325	425	525
225	0.006	0.014	0.021	0.029			
325	0.009	0.020	0.032	0.043	0.066		
425	0.012	0.027	0.042	0.057	0.088	0.118	
525	0.015	0.034	0.053	0.072	0.109	0.147	0.185
625	0.018	0.040	0.063	0.086	0.131	0.176	0.222
725	0.021	0.047	0.074	0.100	0.153	0.206	0.258
825	0.024	0.054	0.084	0.114	0.174	0.235	0.295
925	0.027	0.061	0.094	0.128	0.196	0.264	0.332
1025	0.030	0.067	0.105	0.142	0.218	0.293	0.368
1125	0.032	0.074	0.115	0.157	0.239	0.322	0.405
1225	0.035	0.081	0.126	0.171	0.261	0.351	0.442

B/H	100	150	200	250	300	350	400	500
150	0.006	0.011						
200	0.009	0.015	0.022					
250	0.011	0.020	0.029	0.037				
300	0.013	0.024	0.034	0.045	0.055			
350	0.016	0.028	0.041	0.053	0.066	0.078		
400	0.018	0.032	0.047	0.061	0.075	0.089	0.103	
450	0.021	0.037	0.053	0.069	0.085	0.102	0.118	
500	0.023	0.041	0.059	0.077	0.095	0.113	0.130	0.166
600	0.028	0.049	0.071	0.093	0.114	0.136	0.158	0.201
700	0.033	0.058	0.083	0.109	0.134	0.160	0.185	0.236
800	0.037	0.067	0.096	0.125	0.154	0.183	0.212	0.271
900	0.042	0.075	0.108	0.141	0.174	0.207	0.240	0.305
1000	0.047	0.084	0.120	0.157	0.194	0.230	0.267	0.340
1100	0.052	0.092	0.133	0.173	0.213	0.254	0.294	0.375
1200	0.057	0.101	0.145	0.189	0.233	0.277	0.322	0.410

Standard dimensions for RR-3:

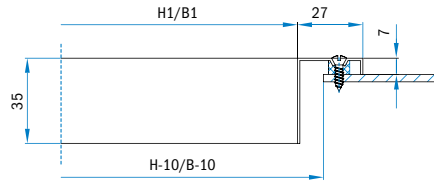| B/H	75	125	225	325	425	525
225	■	■				
325	■	■	■			
425	■	■	■	■		
525	■	■	■	■		
625	■	■	■	■	■	
825	■	■	■	■	■	
1025	■	■	■	■	■	■
1225	■	■	■	■	■	■

Ventilating grilles installation

- **Direct installation in wall or duct via the visible fixing**
  B1 = B-27   H1 = H-27

  The list of grilles and their designation:
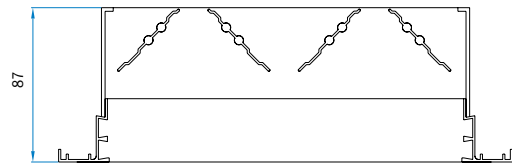 RR-1/V, RR-3/V, RR-5/V, RR-6/V

Registers

When adjusting the system, desired operating conditions are obtained by the means of ventilation elements control. Registers are installed for additional air volume control, thus influencing air velocity and throw distance as well. Register FI, is made of stainless steel. Blades of FI register are made from aluminum.

FI

Register has wide counter-directional blades which can be moved with screw-driver via the gear wheel. It is used to control the air flow volume.Blades are made of plastics.

Set-up of different registers

Register F

Ventilating grilles/registers combinations

Grille	F
RR-1	■
RR-3	□
RR-5	■
RR-6	■

■ standard combination
□ possible combination

Technical data

Effective discharge area A_{ef} (m²)

B	H	RR-3		RR-5	RR-1 RR-6
225	75	0.0060		0.0080	0.0090
325		0.0100		0.0110	0.0130
425		0.0130		0.0150	0.0170
525		0.0160		0.0190	0.0210
625		0.0190		0.0230	0.0250
825		0.0260		0.0300	0.0340
1025		0.0320		0.0380	0.0420
1225		0.0380		0.0460	0.0510
225	125	0.0090		0.0150	0.0170
325		0.0140		0.0230	0.0260
425		0.0190		0.0310	0.0350
525		0.0240		0.0390	0.0430
625		0.0290		0.0470	0.0520
825		0.0380		0.0620	0.0690
1025		0.0480		0.0780	0.0860
1225		0.0570		0.0930	0.1040
325	225	0.0320		0.0460	0.0530
425		0.0430		0.0610	0.0710
525		0.0530		0.0760	0.0870
625		0.0640		0.0910	0.1050
825		0.0860		0.1220	0.1400
1025		0.1070		0.1530	0.1740
1225		0.1290		0.1830	0.2090
425	325	0.0660		0.0910	0.1070
525		0.0830		0.1140	0.1310
625		0.1000		0.1360	0.1570
825		0.1340		0.1820	0.2110
1025		0.1670		0.2280	0.2620
1225		0.2010		0.2730	0.3150
625	425	0.1360		0.1810	0.2100
825		0.1810		0.2420	0.2820
1025		0.2270		0.3020	0.3490
1225		0.2720		0.3630	0.4210
1025	525	0.2870		0.3770	0.4370
1225		0.3440		0.4530	0.5270

Discharge or inlet air flow volume is determined via air velocity measuring at the effective area with horizontally positioned blades.
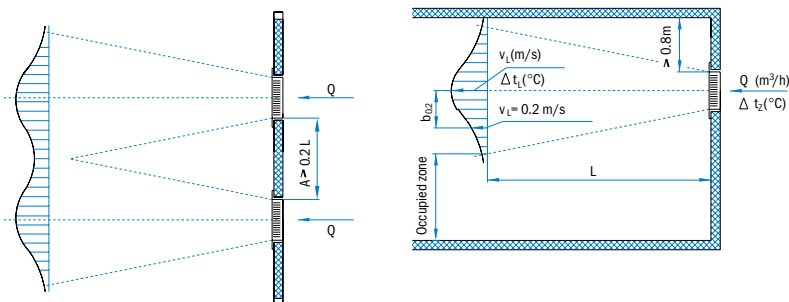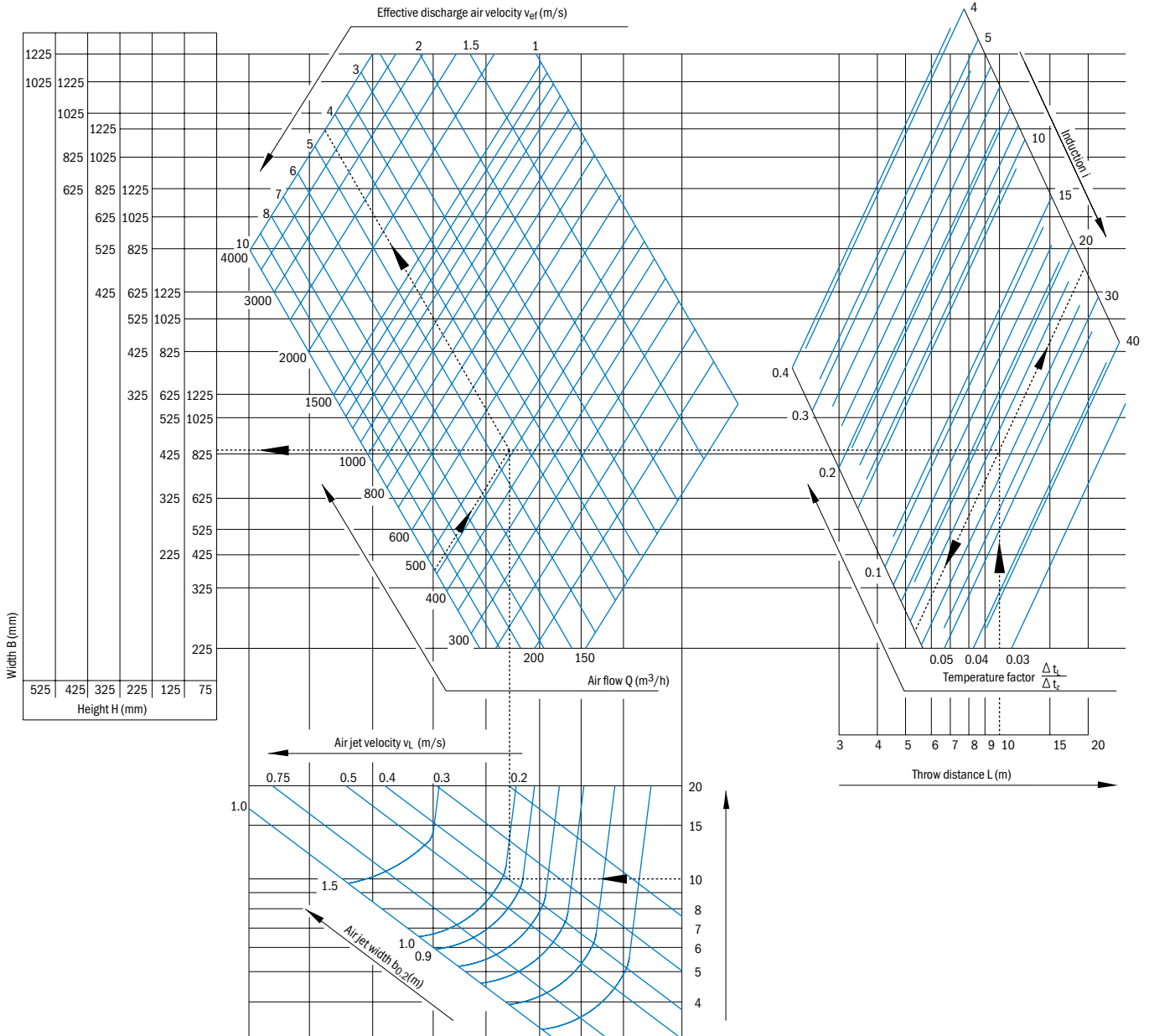
Use the below formula to calculate air low volume

$Q = V_{ef} \times A_{ef} \times 3600$ (m³/h)

V_{ef} (m/s)   Effective jet velocity

A_{ef} (m²)   Effective area

Ventilating grilles RR-1, 3, 5, 6; without ceiling effect (distance from ceiling ≥ 0.8 m)

Chart for determining the size, induction and temperature of the air flow
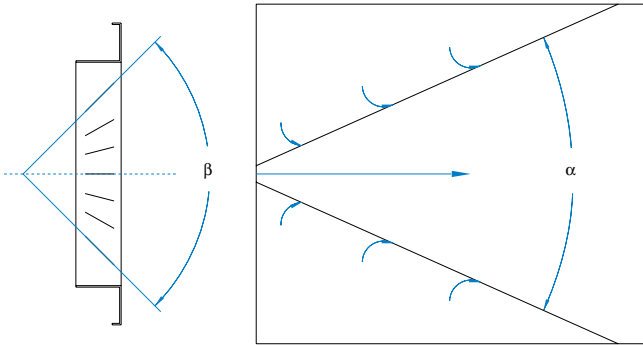valid for B/H ≤ 12 – fully opened blades

Definition of Symbols

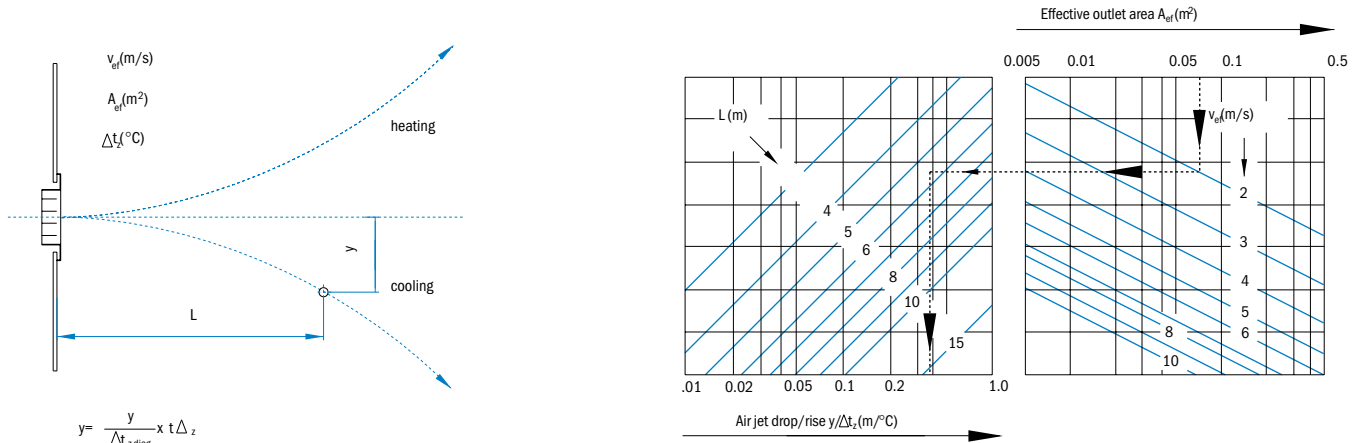|	
Q (m³/h)	Air flow
L (m)	Throw distance
V_{ef} (m/s)	Effective discharge air velocity
V_L (m/s)	Max. air velocity at the throw distance L
Δt_z (K)	Temperature difference between supply and room air
Δt_L (K)	Temperature difference between air jet and room temperature
i	Induction rate = total airstream volume flow / volume flow at diffuser discharge
$b_{0.2}$ (m)	Width of air jet is measured at a distance from ceiling where air flow velocity 0.2 m/s

Ventilating grilles RR-1, 3, 5, 6
without ceiling effect (distance from ceiling ≥ 0.8 m)

Table with correcting factors for horizontal air jet deflection:

Blade adjusting angle	β	45°	90°
Air jet spread angle	α	35°	60°
Air flow velocity	V_L	V_L diag. x 0.7	x 0.5
Temperature factor $\Delta t_L / \Delta t_Z$		($\Delta t_L / \Delta t_Z$ diag.) x 0.7	x 0.5
Induction	i	i diag. x 1.4	x 2.0
Air jet drop	y	y diag. x 1.4	x 2.0
Distance between grilles	A	0.25 L	0.3 L

Chart for determining air jet deflection:

$$y = \frac{y}{\Delta t_{z\,diag.}} \times t \, \Delta_z$$

Example

Given:

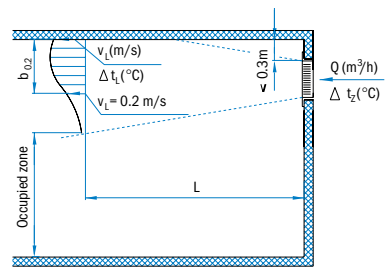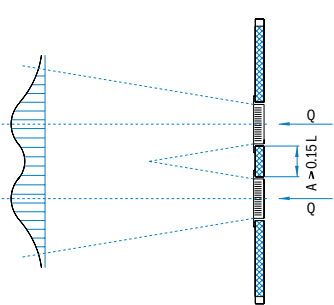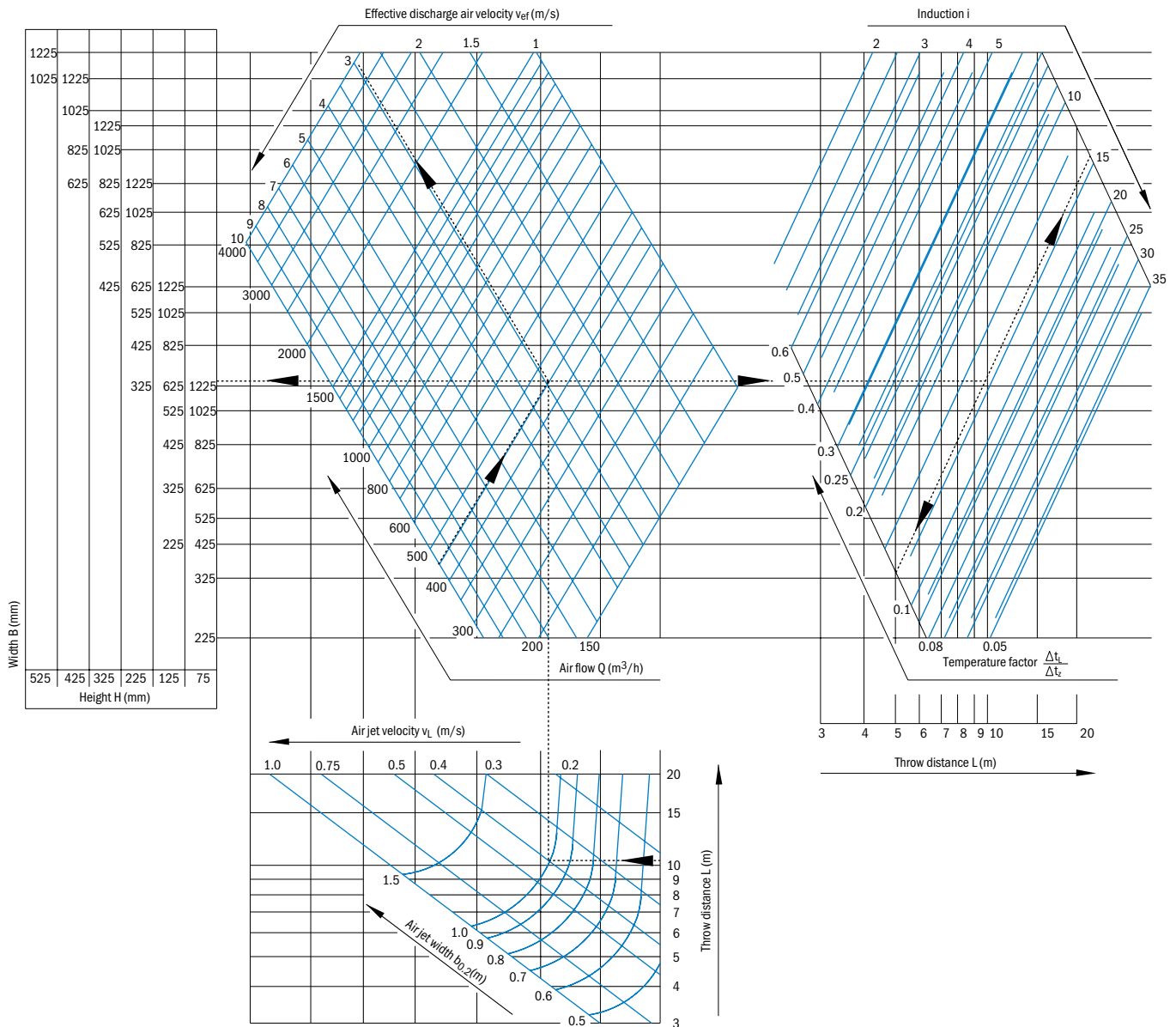|	
Air flow:	**Q = 460 m³/h, L = 10m**
Air flow velocity:	**VL = 0.4 m/s**
Temperature difference:	**Δt_Z = 5 °C**

Solution:

Use the chart, distance from ceiling ≥ 0.8 m
and select the grille type AR-13 size B = 425, H = 125

Effective outlet air velocity	**V_{ef} = 4.5 m/s**
Temperature factor	**$\Delta t_L / \Delta t_Z$ = 0.065**
Temperature difference	**Δt_L = 0.065 x 5 = 0.32 °C**
Induction	**i = 23**
Width of the air jet	**$b_{0.2}$ = 1.0 m**
Min. distance between grilles	**A = 2 m**

Ventilating grilles RR-1, 3, 5, 6 with ceiling effect
(distance from ceiling ≤ 0.3 m)

Chart for determining the size, induction and temperature of the air flow
valid for B/H ≤ 12 – fully opened blades

Definition of symbols

Q (m³/h)	Air flow
L (m)	Throw distance
V_{ef} (m/s)	Effective discharge air velocity
V_L (m/s)	Max. air velocity at the throw distance L
Δt_z (K)	Temperature difference between supply and room air
Δt_L (K)	Temperature difference between air jet and room temperature
i	Induction rate = total airstream volume flow / volume flow at diffuser discharge
$b_{0.2}$ (m)	Width of air jet is measured at a distance from ceiling where air flow velocity 0.2 m/s

8

Ventilating grilles RR-1, 3, 5, 6 with ceiling effect
(distance from ceiling ≤ 0.3 m)

Chart for determining the size, induction and temperature of the air flow
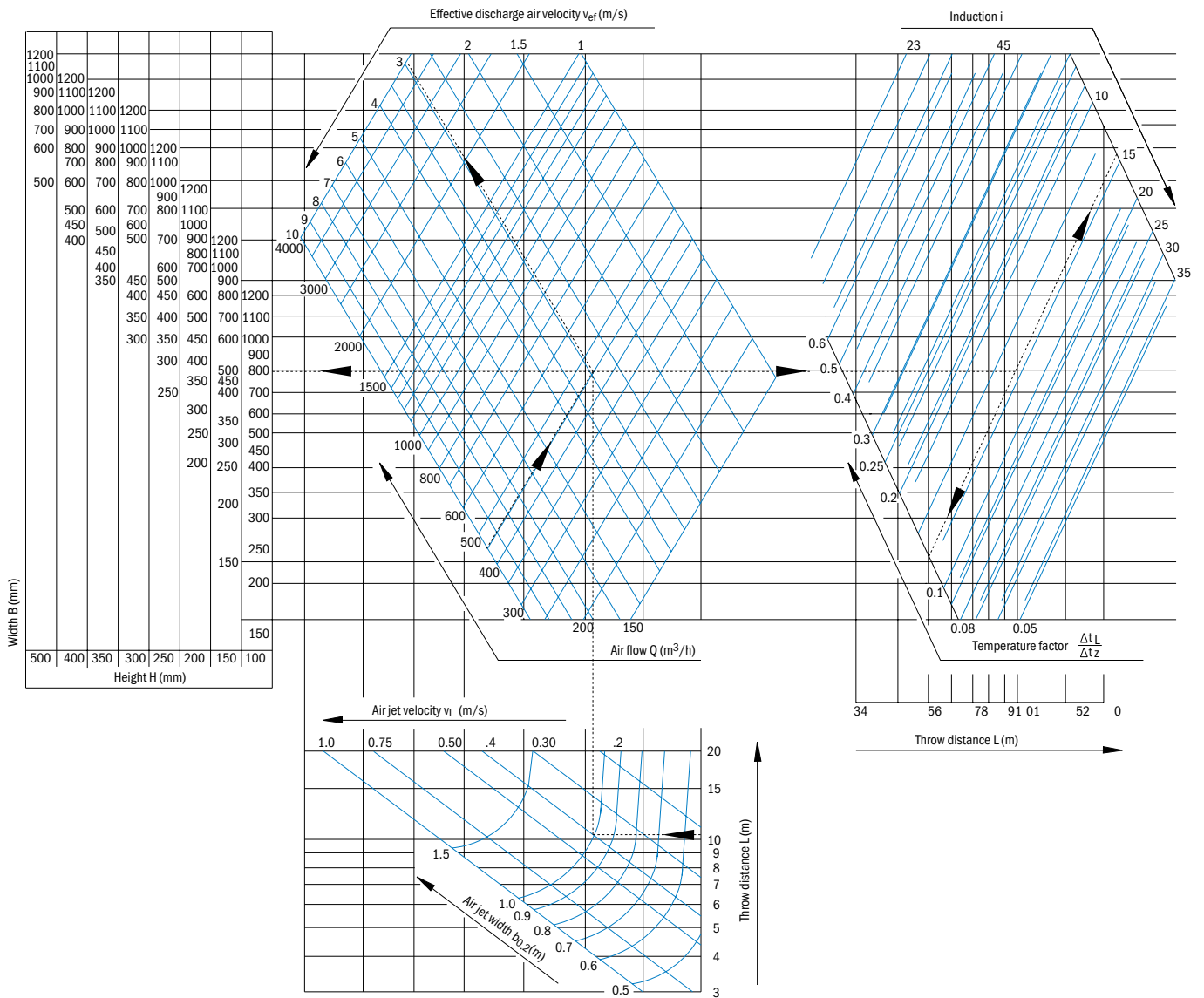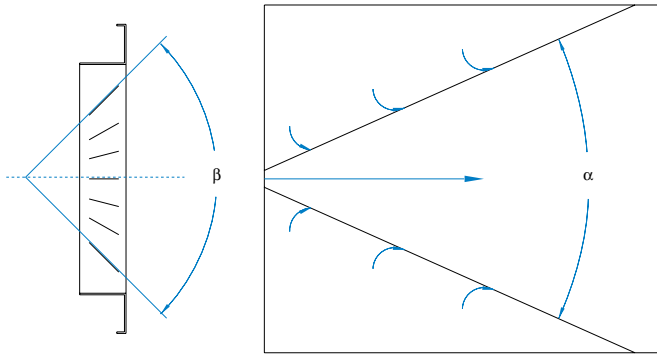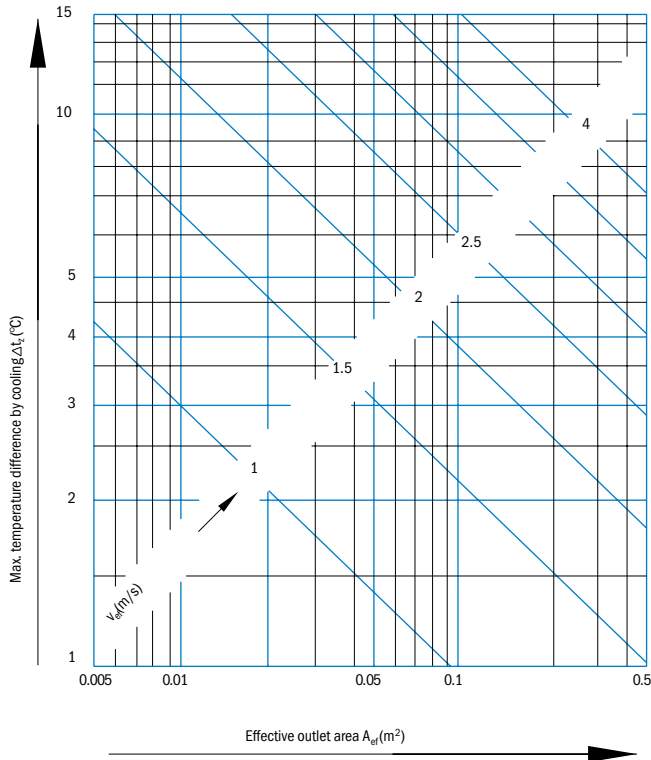valid for B/H ≤ 12 – fully opened blades

Effective discharge air velocity v_{ef} (m/s)

Induction i

Width B (mm)

Height H (mm)

Air jet velocity v_L (m/s)

Air jet width $b_{0.2}$ (m)

Throw distance L (m)

Air flow Q (m³/h)

Temperature factor $\dfrac{\Delta t_L}{\Delta t_Z}$

Throw distance L (m)

Table with correcting factors for horizontal air jet deflection

Blade adjusting angle	β	45°	90°
Air jet spread angle	α	35°	60°
Air flow velocity	V_L	V_L diag. x 0.7	x 0.5
Temperature factor $\Delta t_L/\Delta t_Z$	$(\Delta t_L/\Delta t_Z$ diag.)	x 0.7	x 0.5
Induction	i	i diag. x 1.4	x 2.0
Air jet drop	y	y diag. x 1.4	x 2.0
Distance between grilles	A	0.25 L	0.3 L

Chart for determining air jet deflection

Effective outlet area A_{ef} (m²)

Example

Given:

Air flow:	$Q = 460$ m³/h, L = 10m
Air flow velocity:	$V_L = 0.4$ m/s
Temperature difference:	$\Delta t_Z = 5$ °C

Solution:

Use the chart, distance from ceiling ≤ 0.3 m
and select the grille type JR-3 size B = 625, H = 125

Effective outlet air velocity	$V_{ef} = 2.8$ m/s
Temperature factor	$\Delta t_L/\Delta t_Z = 0.13$
Temperature difference	$\Delta t_L = 0.13 \times 5 = 0.65$ °C
Induction	i = 15
Width of the air jet	$b_{0.2} = 1.0$ m
Min. distance between grilles	A = 1.5 m

Technical data for ventilating grilles

Pressure drop and sound power level diagram for grilles RR-1, 3, 5, 6 with volume control damper F
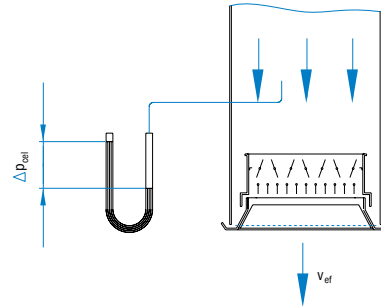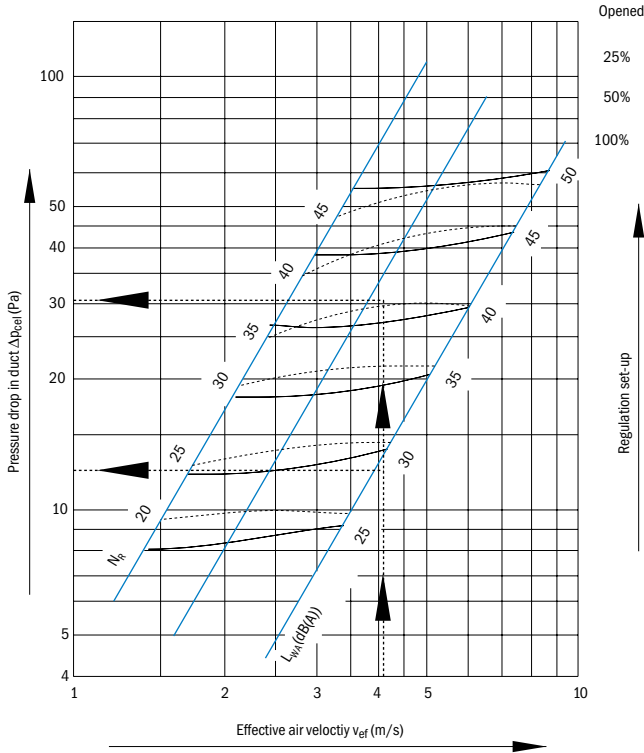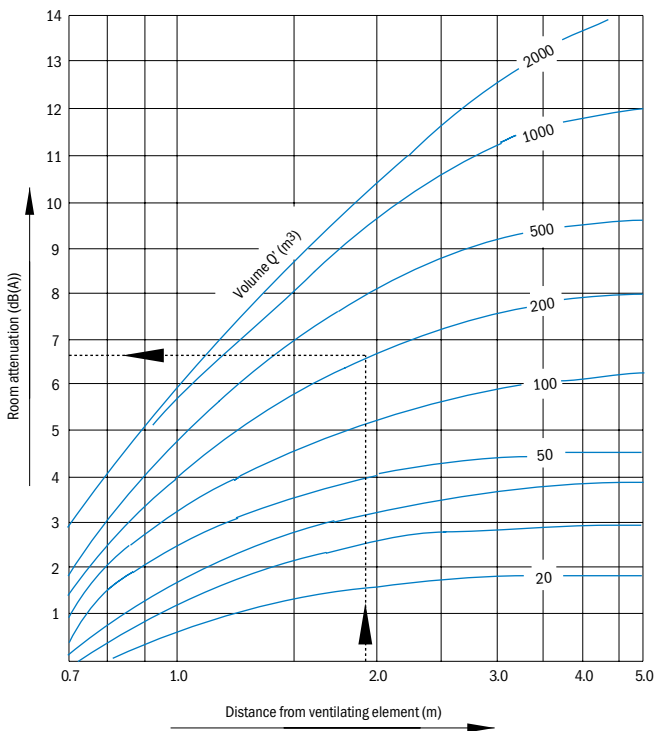
Fully opened blades

Table of correction factors for acoustic data

A_{ef} (m²)	0.01	0.02	0.05	0.1	0.2	0.4
Correction (dB(A)) N_R	-10	-7	-3	0	+3	+6

Definition of symbols

A_{ef}	Effective outlet area
Δp_{cel} (Pa)	Pressure drop
L_{WA} (dB(A))	Sound power level
N_R	Max. value acc. to ISO

Room sound attenuation diagram

The following data are necessary to calculate the volume Q':

1. Normal rooms	Q' = Q
2. Rooms with highly reflective walls	Q' = 0.5Q
3. Rooms with absorption walls	Q' = 2Q

Definition of symbols

Q' (m³)	Calculated volume, depending on room reflectance
Q (m³)	Actual room volume

Technical data for extracting grilles

Presure drop and sound power level for grilles RR-1, 3, 5, 6 with volume control damper F
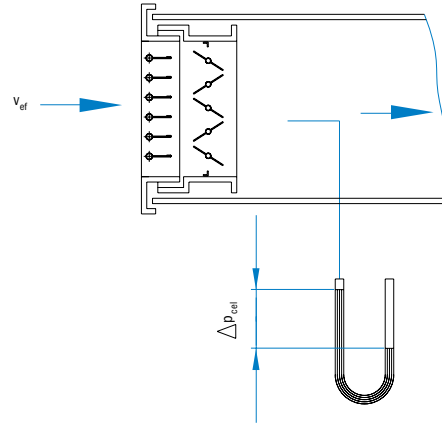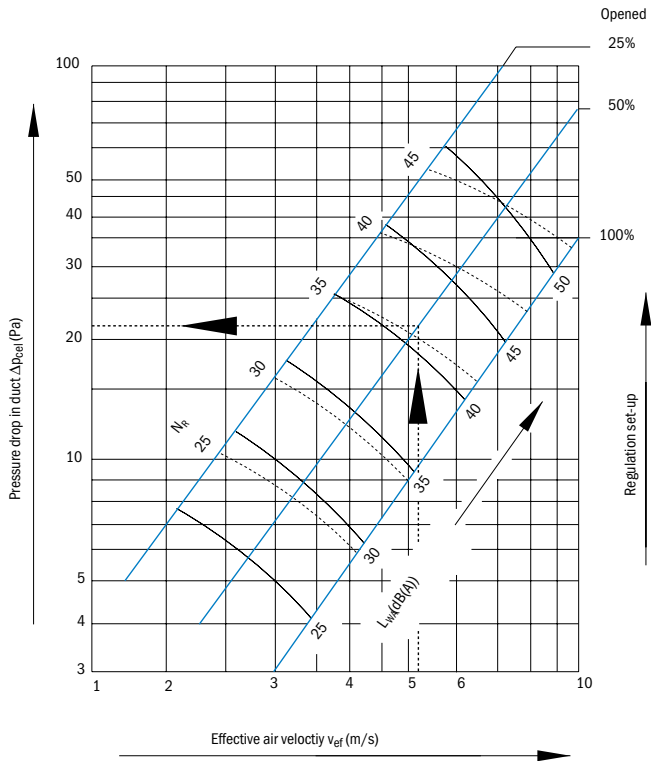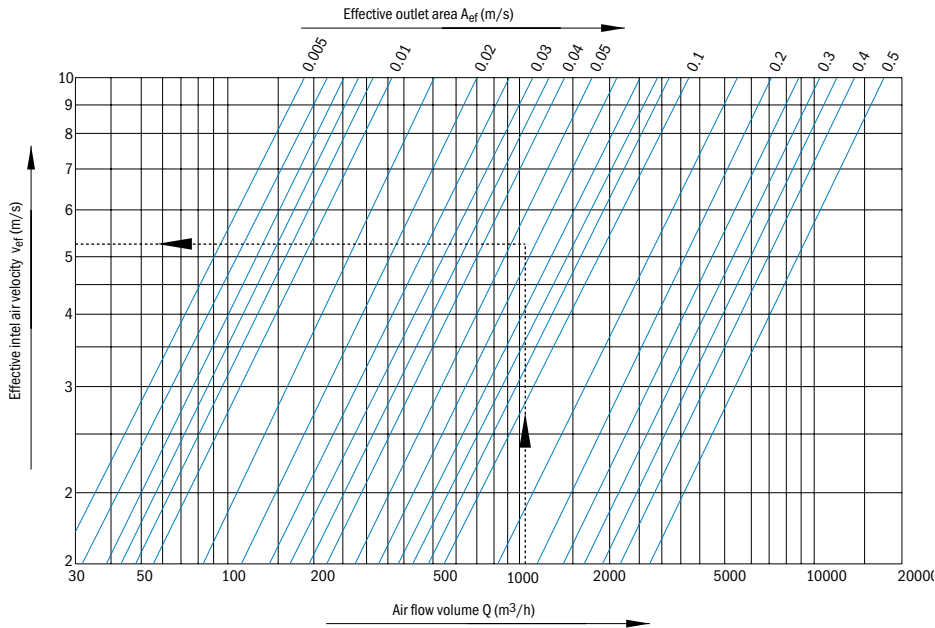Fully opened blades

Opened

25%

50%

100%

N_R

L_{WA}(dB(A))

Pressure drop in duct Δp_{cel} (Pa)

Regulation set-up

Effective air veloctiy v_{ef} (m/s)

v_{ef}

Δp_{cel}

Table of correction factors for acoustic data

A_{ef} (m²)	0.005	0.01	0.02	0.05	0.1	0.2	0.4
Correction (dB(A)) N_R	-13	-10	-7	-3	0	+3	+6

Definition of symbols

Δp_{cel} (Pa)	Pressure drop
L_{WA} (dB(A))	Sound power level
N_R	Max. value acc. to ISO

Effective supply air velocity diagram

Effective outlet area A_{ef} (m/s)

0.005 0.01 0.02 0.03 0.04 0.05 0.1 0.2 0.3 0.4 0.5

Effective intel air velocity v_{ef} (m/s)

Air flow volume Q (m³/h)

Example

Q = 1000 m³/h

A_{ef} = 0.05 m³ (from the Effective area table)

As follows from the diagram.

V_{ef} = 5.3 m/s

Room sound attenuation diagram

Room attenuation (dB(A))

Volume Q (m³)

2000
1000
500
200
100
50
20

Distance from ventilating element (m)

The following data are necessary to calculate the volume Q':

1. Normal rooms	Q' = Q
2. Rooms with highly reflective walls	Q' = 0.5Q
3. Rooms with absorption walls	Q' = 2Q

Definition of symbols

Q' (m³)	Calculated volume, depending on room reflectance
Q (m³)	Actual room volume