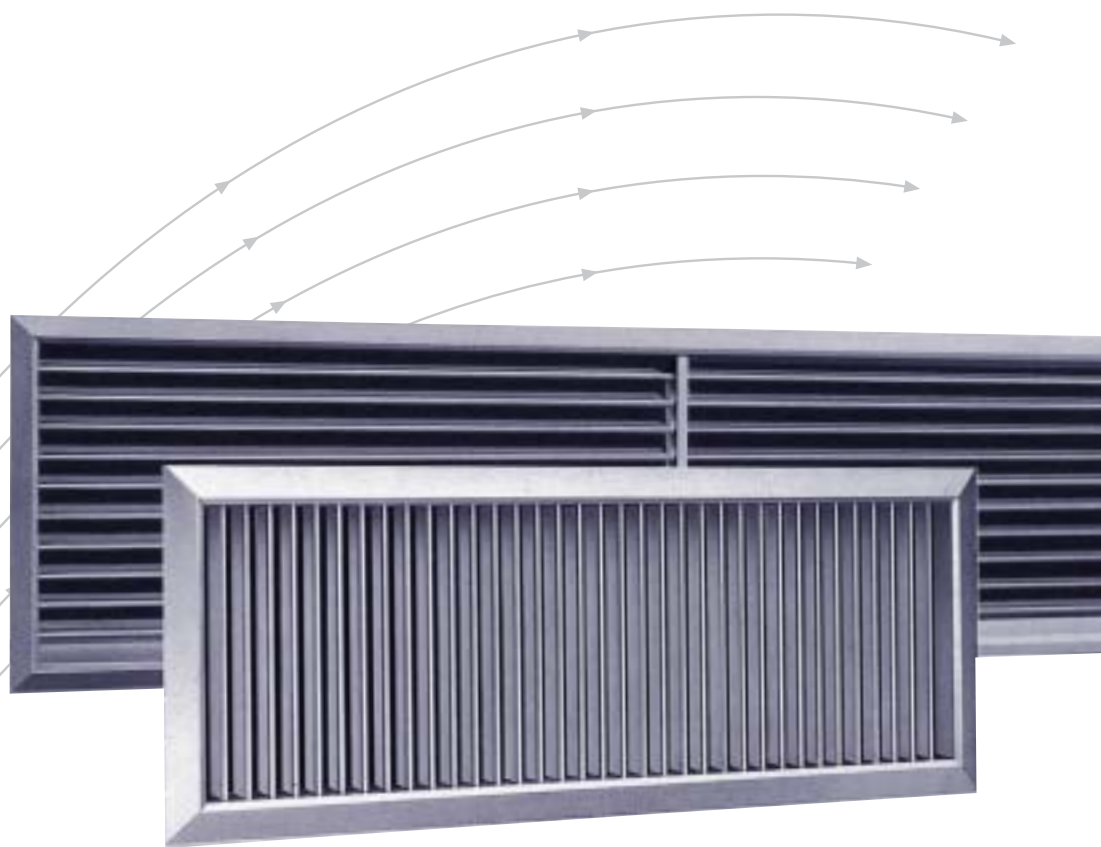


# Grilles

## Linear Grilles

for Walls, Floors, Doors,  
Rectangular and Circular Ducts



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Grilles and linear grilles can be used as air terminal devices for the ventilation of buildings and spaces in terms of supply air and extract (exhaust) air.

They are suitable for installation in walls, floors, doors, rectangular and circular ducts. The installation can be carried out directly into a duct cut-out or into a subframe, e.g. builders work.

The various constructions of grilles in aluminium, steel or plastic with vertical or horizontal, adjustable or fixed blades are shown and described on pages 3 – 7.

To optimise air distribution, it is possible to choose from various types of rear assemblies, see pages 8 and 9.



You will find alternative types of grilles, especially in stainless steel and automatic or motor-driven options in the HESCO sales programme (separate catalogue).

# Aluminium Grilles

Construction · Dimensions · Materials

## Type ASL

The grilles type ASL consist of a diffuser-type front border with horizontal, individually adjustable front blades and concealed screw fixing. They are also available on request with spring clip fixing.

## Type AT · Type VAT

The grilles type AT have horizontal aerofoil blades, whilst type VAT has vertical aerofoil blades with a border that is either 23 or 27 mm wide. The front blades can be individually adjusted. In addition to the concealed fix the grilles can also be supplied with spring clip fixing on request. In the 27 mm wide frame version, the grilles are also available with visible screw fixing (border counter punched).

## Type AGS (non-vision grille/door grille)

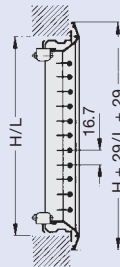
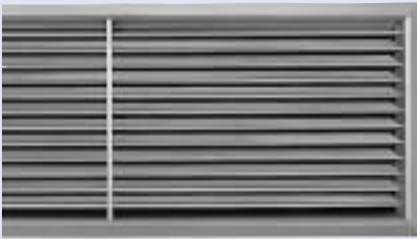
Non-vision grilles type AGS are suitable for air transfer and exhaust air. They consist of a surrounding front border with horizontal, fixed inverted vee blades and are suitable for visible screw fixing (border counter punched).

The grille can be supplied on request with a matching rear frame for door installation (type AGS-T, see also page 11).

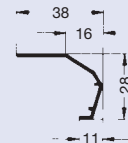
## Materials

The grilles are made from aluminium extruded sections. The standard finish is natural anodised (E6-C-0) or powder-coated with a colour from the RAL range.

### Type ASL



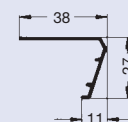
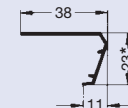
Front border



Blade



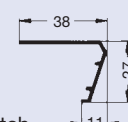
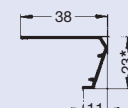
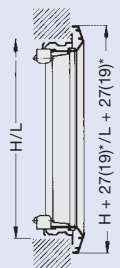
### Type AT



\* ( ) - Dimensions for the 23 mm front border



### Type VAT

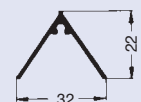
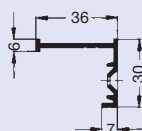
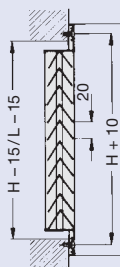


\* ( ) - Dimensions for the 23 mm front border



Blade pitch 16.7 mm

### Type AGS



L = Grilles - Nominal length  
H = Grilles - Nominal height

# Aluminium Grilles/Linear Grilles

Construction · Dimensions · Materials

**Type AH** – can also be supplied as linear grille (see page 11)

The front border can be supplied in either 28 mm or 20 mm widths with horizontal, fixed profiled blades and concealed fixing. The air discharge can either be at an angle of 0° or 15°. It can also be supplied with spring clip fixing on request. In the version with the 28 mm wide frame, the grilles are also available with a visible screw fixing (border counter punched).

**Type AF** – can also be supplied as linear grille (see page 11)

For floor and wall installation with perimeter front border and horizontal, fixed profiled blades. The air discharge can either be at right angles to the grille or at an angle of 15°. The grille core is held in place with spring clips and can be removed. In builders work, the installation can be made using builder's cleats.

Can also be supplied as mitred corner (see page 11).

**Type EF · EFG**

Grille cores for wall and sill installations with horizontal, fixed profiled blades, blade pitch (t) 12.5 mm (EF) or 16.7 mm (EFG). The air discharge can be at right angles to the grille or at an angle of 15°.

Construction and dimensions correspond to the grille cores for the type AF.

**Type AWT**

Grille for installation in gymnasias and sports halls has a ball impact resistance conforming to DIN 18032 Part 3. Robustly constructed supply or return air grille with fixed horizontal profiled blades with visible screw fixing (border counter punched). Standard finish: Natural anodised to E6-C-0.

**Materials**

The grilles and linear grilles are manufactured from aluminium extruded sections. The standard finish is natural anodised (E6-C-0) or powder coated with a colour from the RAL range.

Type	Air discharge	Blade pitch t (mm)
EF-0 / AF-0 / AH-0	straight	12.5
EF-15 / AF-15 / AH-15	15° angled	12.5
EFG-0	straight	16.7
EFG-15	15° angled	16.7

**Type AH** – can also be supplied as linear grille



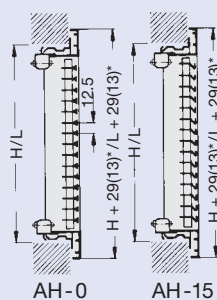
**Type AF** – can also be supplied as linear grille



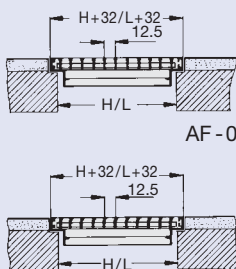
**Type EF · EFG**



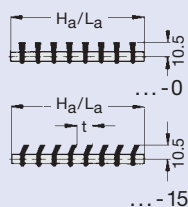
**Type AWT**



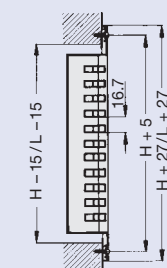
AH-0 AH-15



AF-0 AF-15

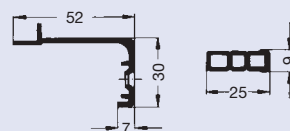
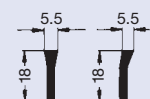
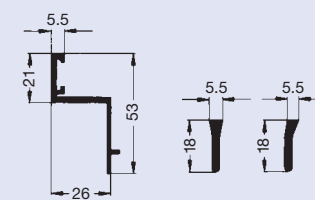
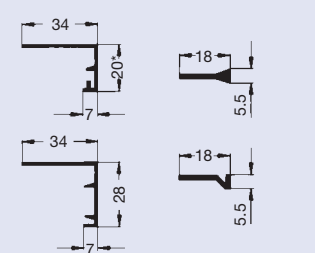


... - 0 ... - 15



Front border Blade

\* ( ) - Dimensions for the 20 mm front border



L = Grilles – Nominal length  
H = Grilles – Nominal height

# Steel Grilles/Linear Grilles

Construction · Dimensions · Materials

**Type SL** – can also be supplied as linear grille (see page 11)

The front border has a diffuser type section with individually adjustable front blades and concealed fixings.

## Type TR · TRS

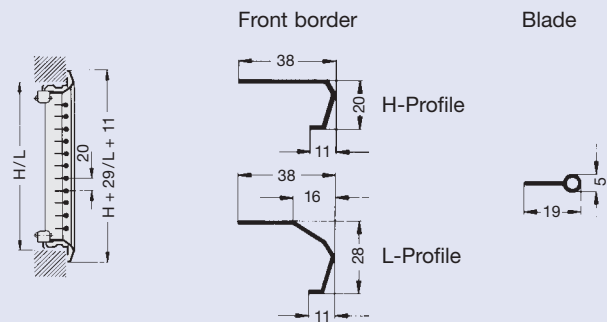
Consisting of a front border with horizontal (TR) or vertical (TRS), individually adjustable front blades, for visible screw fixing (counter punched holes).

These can also be supplied with concealed screw fixing on request.

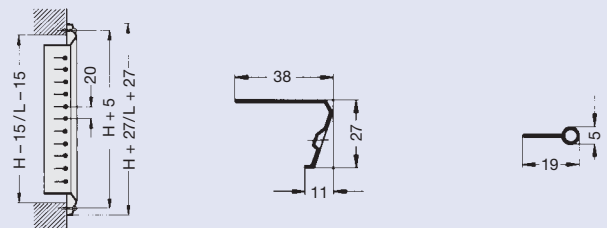
## Materials

The front grille is manufactured from formed sheet steel, the surface is pre-treated and powder coated pure white (RAL 9010). Alternatively they can be supplied in a colour from the RAL range. TR types are also available in galvanised steel finish.

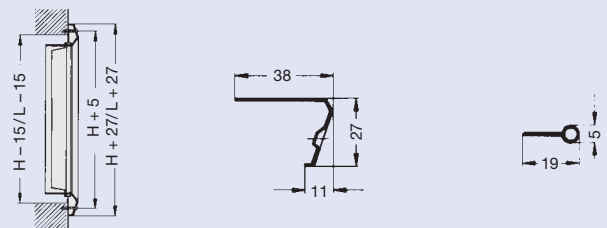
**Type SL** – can also be supplied as linear grille



**Type TR**



**Type TRS**



L = Grilles – Nominal length  
H = Grilles – Nominal height

# Grilles for Circular and Rectangular Duct Installation

Construction · Dimensions · Materials · Assembly

## Type TRS-R (circular duct installation)

The type TRS-R grille consists of an angled front border to match circular duct profiles, with counter punched holes and individually adjustable vertical blades.

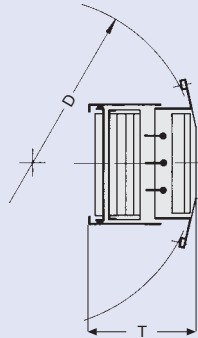
## Type TRS-K (duct installation)

The type TRS-K consists of the front border with counter punched holes and individually adjustable vertical blades.

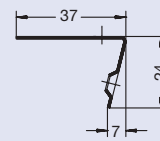
## Materials

The grille face is manufactured from galvanised steel sheet. Alternatively can be supplied powder coated in a colour from the RAL range.

### Type TRS-R



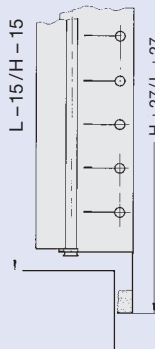
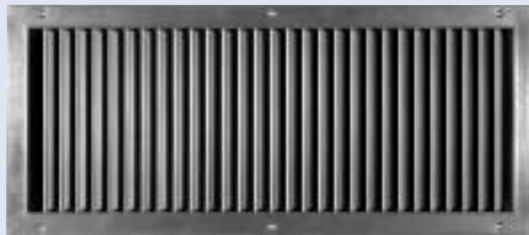
L-Profile



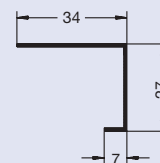
Blade



### Type TRS-K



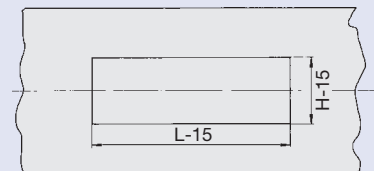
L-Profile



Blade



Duct opening



Type TRS-R		Type TRS-K		
L x H in mm	D in mm	T <sup>2)</sup>		
225 x 75	150	95		
		107		
		119		
		131		
		143		
		162 <sup>1)</sup>		
		191 <sup>1)</sup>		
		215 <sup>1)</sup>		
		225 x 125	300	99
				111
123				
135				
147				
171				
195				
211				
225 x 225	600			123
				136
		147		
		159		
		183		
		207		
		225 x 325	2400	231

1) Not suitable for D=150...200 mm  
2) see page 8

If the grilles type TRS-R are installed into spiral ducting, the duct seams must be riveted for the larger sizes.

L = Grilles – Nominal length  
H = Grilles – Nominal height

# Plastic Grilles · Grilles with Filter

## Construction · Dimensions · Materials

### Type KS (Plastic Grilles)

Type KS grilles suitable for supply and extract use. The grille has an injection moulded border with holes ( $\varnothing$  4.5 mm) for site fixing with suitable screws.

Type KS-A with horizontal face blades which are individually adjustable.

Type KS-C as Type KS-A but with additional individually adjustable vertical curved blades at rear for volume control.

### Materials

Grille face and rear assemblies manufactured from plastic extrusions (hard PVC) with high corrosion resistance, temperature resistant up to 50 °C. Dark grey grille face (similar to RAL 7011) curved blades for volume control in black or dark grey.

### Type ...-EF (with filter)

For wall installation, the standard ...-A construction in the types AT, VAT, AH, SL, TR and TRS grilles are available with the ...-A-EF special border with filter pad or, alternatively, with an additional special hit and miss damper, type ...-AS-EF (see page 9).

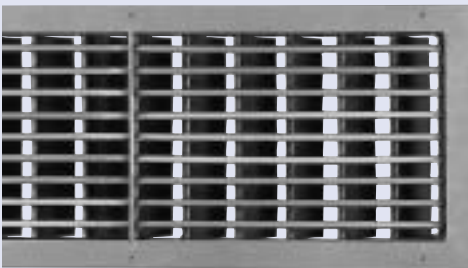
The grille and special frame with filter pad are connected by spring clip fixing. The special frame with filter pad is available with  $H = 125$  mm to  $H = 525$  mm.

Spare E-EF filter media is available on request.

### Materials

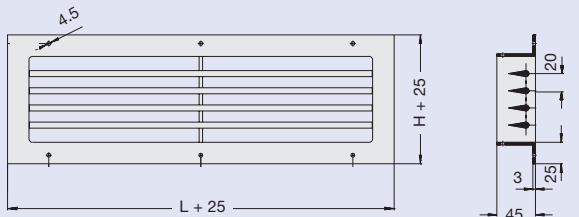
The special filter frame is manufactured from formed sheet steel. The surface is phosphate treated and stove enamelled black (RAL 9005) using electro-dipcoat process. The filter pad consists of synthetic chemical fibres, quality grade G4 to EN 779 (F711).

### Type KS

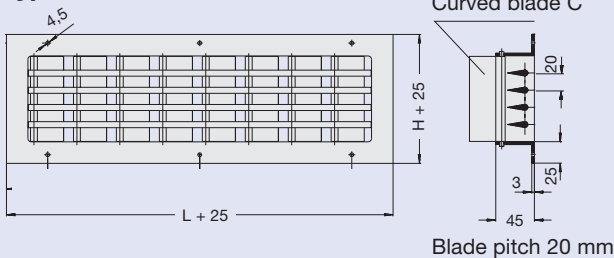


Installation details, see page 11

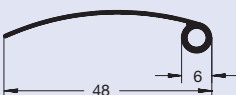
### Type KS-A



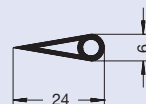
### Type KS-C



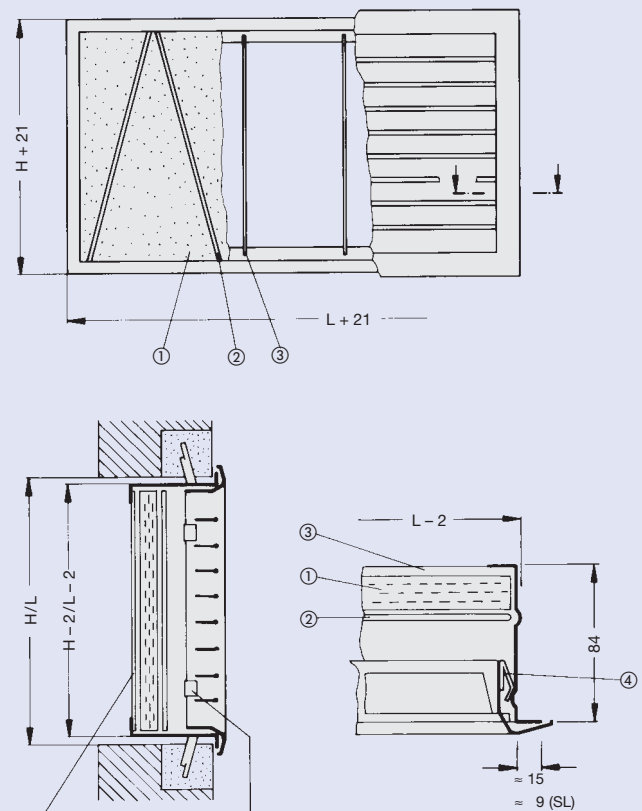
### Vertical curved blade C



### Horizontal face blade



### Type ...-EF



- ① Filter F 711
- ② Support wire only required on ...-A-EF... grilles, removable for filter pad change
- ③ Rear support wire, not removable
- ④ Spring clip fixing

(The filter pad can only be changed after the grille has been removed)

L = Grilles - Nominal length  
H = Grilles - Nominal height

# Rear Assemblies · Flow Rate Control Dampers

The rear assemblies are permanently fitted at the factory to the various types of grille face. The possible combinations – grille plus rear assemblies – are shown in the table on page 9.

Flow rate control dampers with angled border are supplied loose and suitable for direct duct installation.

## Materials

The ancillary sets and volume control dampers are made from formed sheet steel. The surface is phosphate treated and stove enamelled black (RAL 9005) using an electro dipcoat process.

Rear Assemblies	Installation depth dimension T					
	ASL · AT SL · TR TRS	AH	AWT	AF	TRS-K	TRS-R
(without) ...-A	37	34	52	53	37	35/39/50 <sup>1)</sup>
...-AG	108	105	123	123	-	-
...-D	70	67	85	85	45	45/49/60 <sup>1)</sup>
...-DG	108	105	123	123	-	-
...-AS	80...100	70...90	-	-	-	-
...-KS/...-RS	-	-	-	-	70	70/74/86 <sup>1)</sup>
...-K5/...-R5	-	-	-	-	94...217	95...231 <sup>2)</sup>

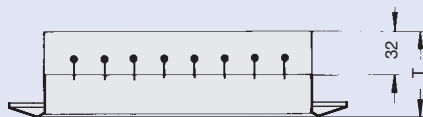
1) Depends on grille H-dimension (75/125/225)

2) Depends on grille L-dimension (see table page 6)

## Rear Assemblies



**... - A**  
Grille  
without rear assembly



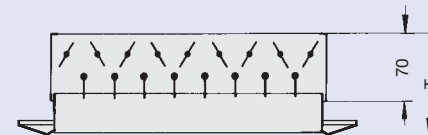
**... - D**  
Double deflection with vertical, individually adjustable blades.  
The VAT and TRS types with horizontal blades.



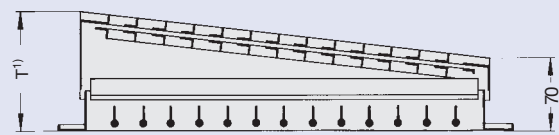
**... - AS, -KS, -RS**  
Volume control of hit and miss construction with stamped vertical blades, adjustable from the front face.



**... - AG**  
Opposed blade action volume control damper, adjustable from the front face.



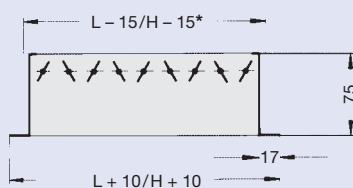
**... - DG**  
Volume control damper as ...-AG, additionally with vertical, individually adjustable blades.  
The VAT and TRS types with horizontal blades.



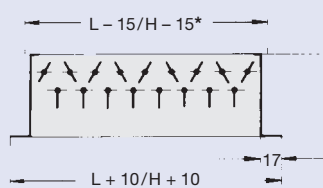
1) T depending on grille length (see page 6)

**... - K5/...R5**  
Angled, special hit and miss flow control with air flow straightener, adjustable from the front. For optimum air flow equalisation and volume flow regulation.

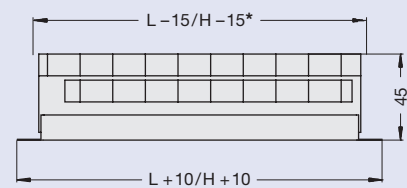
## Flow rate control dampers for duct installation



**AGW**  
Type AGW with perimeter angle border and opposed blade action, blades adjustable from the front.



**DGW**  
Type DGW, as AGW but additionally with vertically arranged, individually adjustable blades.



**ASW**  
Type ASW hit and miss control with air flow straightener and perimeter angle border.

\* Dimensions for duct opening

L = Grilles – Nominal length  
H = Grilles – Nominal height

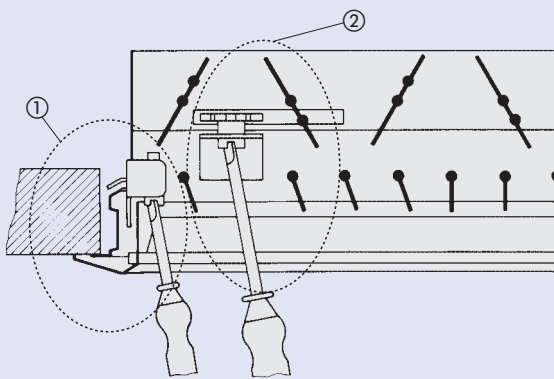


# Rear Assemblies · Component Adjustment

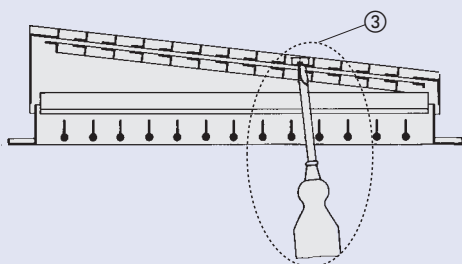
Types		Grilles								Linear Grilles		
		ASL	AT / VAT	AH-0 / AH-15	AF-0 / AF-15	AWT	SL	TR / TRS	TRS-K / TRS-R	AH-0 / AH-15	AF-0 / AF-15	SL
Grille face only	-A	●	●	●	●	●	●	●	●	●	●	●
	-AG <sup>1)</sup>	●	●	●	●	●	●	●	●	●	●	●
	-D	●	●	●	●	●	●	●	●	●	●	●
Grille face with rear assemblies	-DG <sup>1)</sup>	●	●	●	●	●	●	●	●	●	●	●
	-KS/RS/AS <sup>1)</sup> · -AS <sup>1)</sup>	●	●				●	●	●			
	-K5/R5 <sup>2)</sup>								●			
Grille face with filter	-A-EF <sup>2)</sup>		●	●			●	●				
Grille face with rear assembly and filter	-AS-EF <sup>2)</sup>		●	●			●	●				

- 1) For duct installation with angle border (type AGW · DGW) supplied loose! (see page 8)  
 2) Not available with concealed fixing!

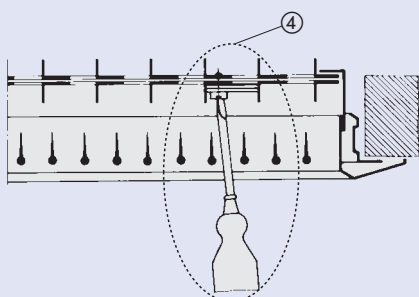
## Component Adjustment



- ① Installation with concealed screw fastening  
 ② Adjustment of the rear assemblies -AG / -DG

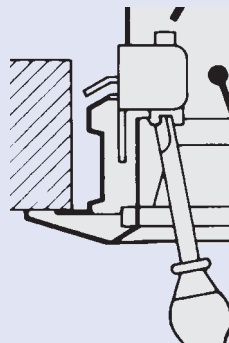


- ③ Adjustment of the rear assemblies ...-K5/-R5

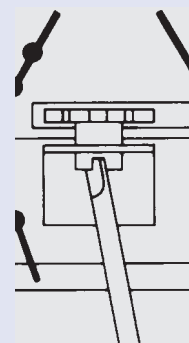


- ④ Adjustment of the rear assemblies ...-AS, ...-KS, RS

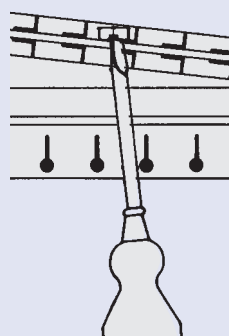
Detail 1



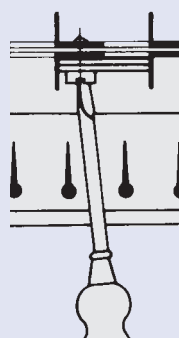
Detail 2



Detail 3



Detail 4



# Installation Details · Fixing Details

## Installation Subframe ER

The installation subframes are supplied as individual components, tied together with different coloured banding, using the tongue and spigot connection.

Brown banding – Types AT, VAT, AH with 23 mm or 20 mm wide front (ER 5)

Red banding – Type SL (ER 12.5/5)

Transparent banding – All other types (ER 12.5)

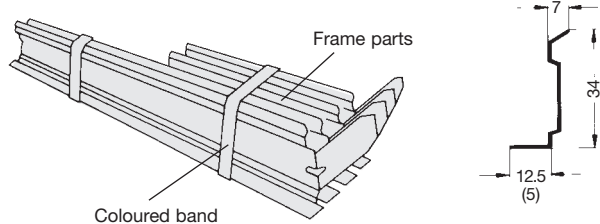
If necessary, the preformed builder's cleat can be bent, e. g. for wall installation.

For grilles or linear grilles with secret fixing, an installation subframe is essential.

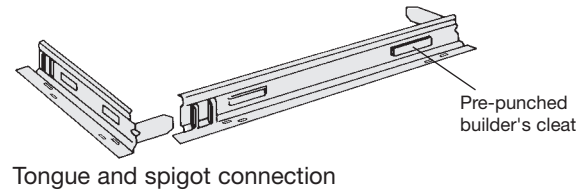
## Materials

The installation subframes are manufactured from formed, galvanised sheet steel.

## Installation Subframe for Grilles (ER)

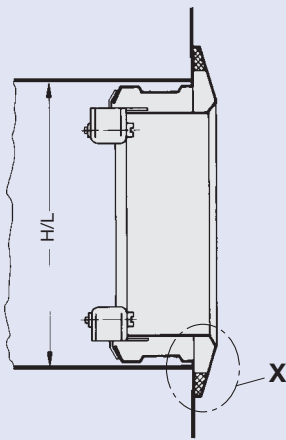


( ) - Dimension for types AT, VAT, AH, front border 23 mm or 20 mm wide and SL/H profil

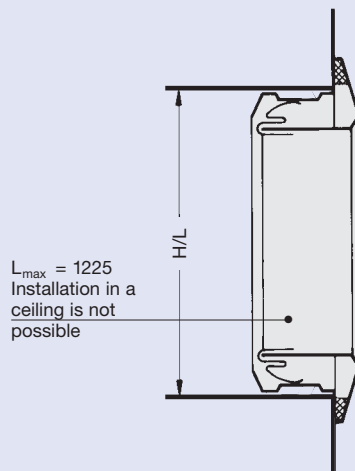


Tongue and spigot connection

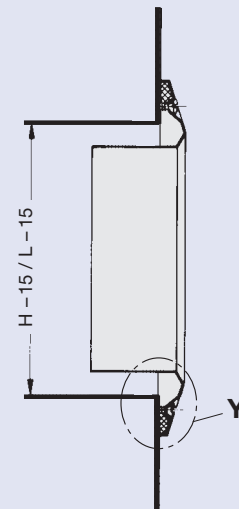
### Installation with concealed screw fixing (with installation subframe)



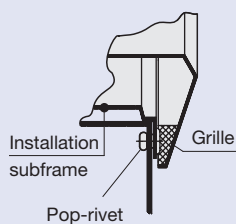
### Installation using spring clip fixing (with installation subframe)



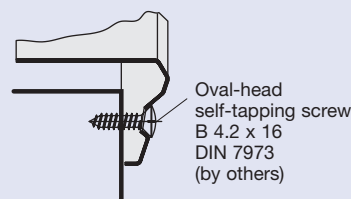
### Installation with screw fixing/counter punched hole (without installation subframe)



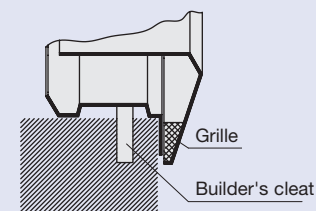
### Detail X



### Detail Y



### Fixing the installation subframe with builder's cleats

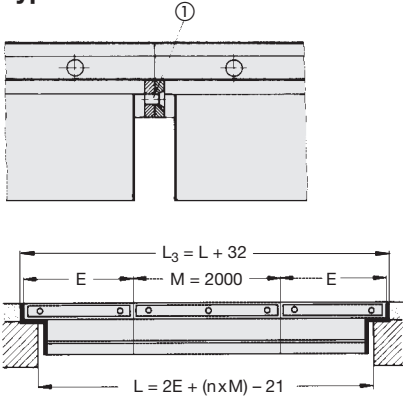


L = Grilles – Nominal length  
H = Grilles – Nominal height

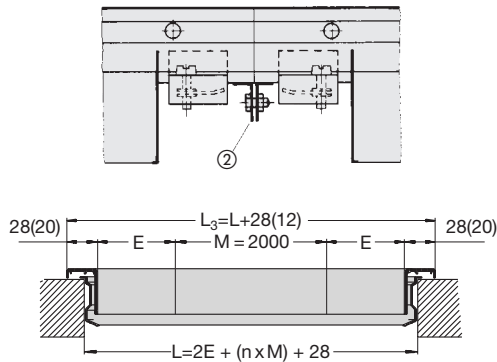
# Installation Details · Fixing Details

## Jointing Details Linear Grilles

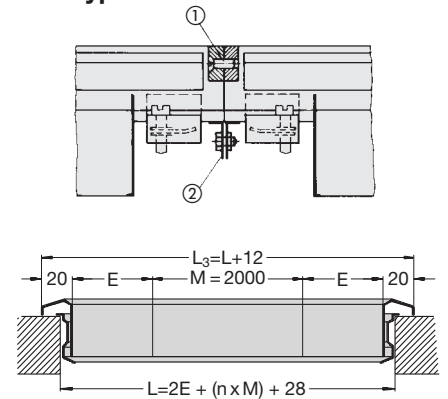
### Type AF



### Type AH



### Type SL



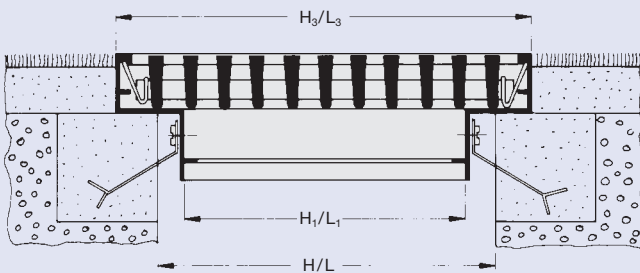
L = Inside dimension of opening  
L<sub>3</sub> = External length

E = End sections required (see page 24)  
M = Middle section  
n = Number of M-sections

① Screw connection for grille face sections  
② Bolt connection of installation subframes

## Installation of special grilles / duct openings

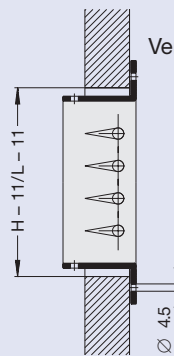
### Type AF



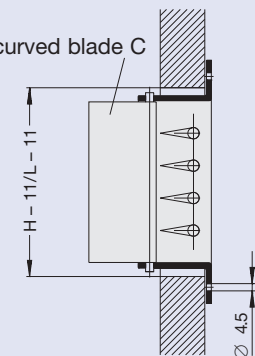
$$\begin{aligned} H_1 &= H - 20 & H_3 &= H + 32 \\ L_1 &= L - 20 & L_3 &= L + 32 \end{aligned}$$

### Type KS

#### Type KS-A

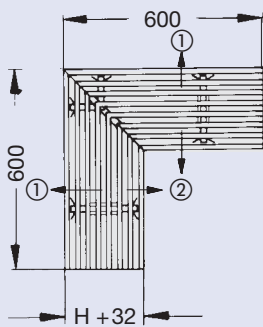


#### Type KS-C



Screw fixing with suitable screws (by others)

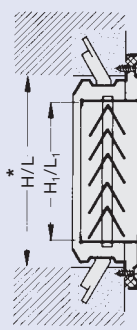
### 90° mitre



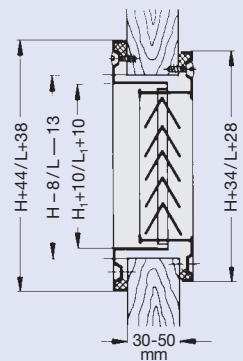
for AF-15:  
discharge direction 15°

① Outwards  
② Inwards

### Type AGS



#### AGS



#### AGS-T

\* Without installation subframe L - 15 / H - 15

For all constructions: H<sub>1</sub> = H - 23  
L<sub>1</sub> = L - 28

L = Grilles - Nominal length  
H = Grilles - Nominal height

# Nomenclature · Quick Selection

## Nomenclature

$\dot{V}$  in l / (s · m): Volume flow per metre grille length  
 $\dot{V}$  in m<sup>3</sup> / (h · m): Volume flow per metre grille length

$\dot{V}_t$  in l/s: Total volume flow  
 $\dot{V}_t$  in m<sup>3</sup>/h: Total volume flow

$L_S$  in m: Distance from the grille or linear grille (throw/stream path)

$B$  in m: Spacing between two grilles

$v_{geo}$  in m/s: Air velocity related to the geometric free area (AGS)

$v_k$  in m/s: Air velocity in the duct

$\bar{v}_L$  in m/s: Max. time average air velocity at distance  $L_S$

$b_{0,2}$  in m: Distance from the centre of the airstream at which the velocity is a maximum of 0.2 m/s

$y$  in m: Airstream drop or rise

$i$  : Induction ratio =  $\frac{\text{Total airstream volume flow}}{\text{Volume flow at grille discharge}}$

$v_{eff}$  in m/s: Effective jet velocity

$A_{eff}$  in m<sup>2</sup>: Effective outlet area

$A_{geo}$  in m<sup>2</sup>: Geometric outlet area (AGS)

$h_{eff}$  in m: Effective outlet height  
 $(A_{eff} = h_{eff} \times L_1/1000)$

$\alpha$  in °: Airstream discharge angle

$\beta$  in °: Blade angle in the case of divergent setting

$\Delta t_Z$  in K: Temperature difference between supply and room air

$\Delta t_L$  in K: Difference between core and room temperature at distance  $L_S$

$L$  in mm: Grille nominal length

$H$  in mm: Grille nominal height

$L_1$  in m: Grille core size (length)

$H_1$  in m: Grille core size (height)

$\Delta p_t$  in Pa: Total pressure drop

$L_{WA}$  in dB(A): A-weighted sound power level

$L_{WNC}$  : NC rating of sound power level

$L_{pA}$ ,  $L_{pNC}$  : A-weighting NC rating respectively of room sound pressure level

$L_{pA} \approx L_{WA} - 8 \text{ dB}$

$L_{pNC} \approx L_{WNC} - 8 \text{ dB}$

$L_{WA}$ , S : A-weighted sound power level (Quick Selection)

## Quick Selection

Supply air grille types ASL, AT, VAT, SL, TR, TRS, TRS-R, TRS-K

### Volume flow and throw distance

Type	H (mm)	Volume flow Throw distance	L (mm)							
			225	325	425	525	625	825	1025	1225
VAT, TRS TRS-K, TRS-R	75	$\dot{V}$ (m <sup>3</sup> /h) $L_S$ (m)	45...90 1.5...3	70...140 2...4	90...180 2...4	120...240 2.5...5	140...280 2.5...5	190...380 3...6	230...460 3.5...7	280...560 4...8
ASL, AT, VAT, SL, TR, TRS, TRS-K, TRS-R	125	$\dot{V}$ (m <sup>3</sup> /h) $L_S$ (m)	90...180 2...4	140...280 2.5...5	190...380 3...6	230...460 3.5...7	280...560 4...8	370...740 4...8	470...940 5...10	560...1120 6...12
ASL, AT, VAT, SL, TR, TRS, TRS-K, TRS-R	225	$\dot{V}$ (m <sup>3</sup> /h) $L_S$ (m)	190...380 3...4	280...560 4...8	370...740 4...8	470...940 5...10	560...1120 6...12	740...1480 7...14	920...1840 8...16	1110...2220 10...18
ASL, AT, VAT, SL, TR, TRS TRS-K	325	$\dot{V}$ (m <sup>3</sup> /h) $L_S$ (m)		410...820 5...10	560...1120 6...12	700...1400 7...14	840...1680 8...16	1110...2220 9...18	1390...2780 10...20	1660...3320 10...20
ASL, AT, VAT, SL, TR,	425	$\dot{V}$ (m <sup>3</sup> /h) $L_S$ (m)					1110...2220 9...18	1480...2960 10...20	1850...3700 10...20	2220...4440 10...20
ASL, AT, VAT, SL, TR,	525	$\dot{V}$ (m <sup>3</sup> /h) $L_S$ (m)							2300...4600 10...20	2770...5540 10...20

The grille length 1025 can be used for linear grilles in an approximation for volume flow per linear metre.

See page 20 for the standard sizes and options for individual types.

The same grille sizes can also be used for the extract air.

Correction values for $A_{eff}$							
$A_{eff}$ in $m^2$	0.005	0.01	0.02	0.05	0.1	0.2	0.4
$L_{WA} / L_{WNC}$	-13	-10	-7	-3	-	+3	+6

Diagram values based on  $A_{eff} = 0.1 m^2$ ,  
(zero blade divergence).

Correction values for other blade settings					
Grilles and Linear Grilles					
Grille face	0°	45°	90°	45°	90°
Pattern	0°	0°	0°	45°	90°
control blade					
$\Delta p_t$	x 1.0	x 1.1	x 1.2	x 1.1	x 1.5
$L_{WA} / L_{WNC}$	-	+1	+3	+1	+6

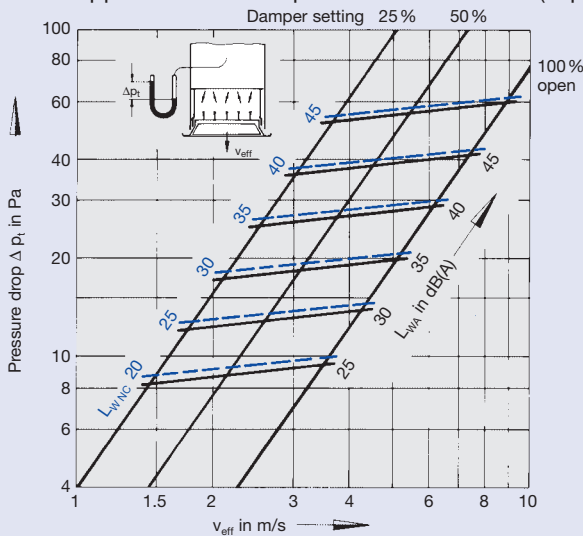
Correction values for $h_{eff}$				
$h_{eff}$ in m	Grille length $L_1$ in mm			
	2000	2500	3000	4000
	$L_{WA} / L_{WNC}$			
0.030	-2	-1	-	+1
0.050	-	+1	+2	+3
0.075	+1	+2	+3	+4
0.100	+3	+4	+5	+6
0.150	+5	+6	+7	+8
0.200	+6	+7	+8	+9
0.250	+7	+8	+9	+10

Diagram values based on  $h_{eff} \times L_1 = 0.1 m^2$   
(zero blade divergence).

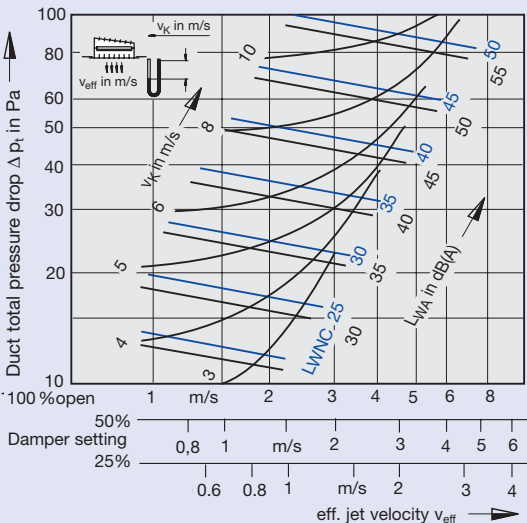
On diagram 1 and 3:  
Diagram values for 100 % open damper setting are also valid for grilles without rear assemblies (-A).

## Supply air

- 1 Sound power level and pressure drop with opposed blade damper ...-AG and ...-DG (supply air)

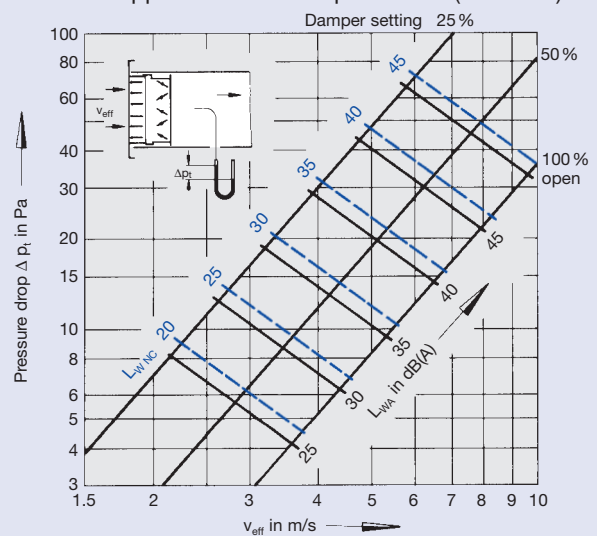


- 2 Sound power level and pressure drop with opposed blade damper ...-K5/R5 (supply air)

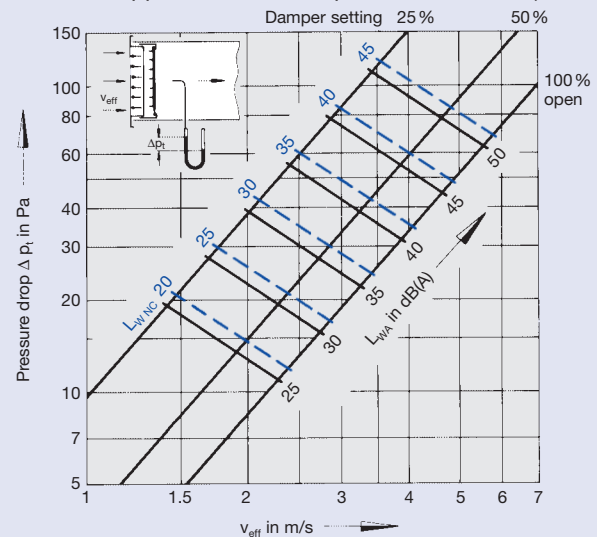


## Return Air

- 3 Sound power level and pressure drop for opposed blade damper ...-AG (return air)



- 4 Sound power level and pressure drop for opposed blade damper ...-AS/KS/RS (return air)



# Aerodynamic Data for Supply Air

## Grilles · Linear Grilles

### Example

Data given:

Type AT-A, with ceiling effect

Distance from the grille

$$L_S = 10 \text{ m}$$

Maximum jet velocity

$$\bar{v}_L = 0.5 \text{ m/s}$$

Total volume flow

$$\dot{V}_t = 150 \text{ l/s}$$

Temperature differential between supply and room air

$$\Delta t_z = -4 \text{ K}$$

Diagram 5 (page 15):

$$A_{\text{eff}} = 0.041 \text{ m}^2$$

$$v_{\text{eff}} = 3.8 \text{ m/s}$$

$$b_{0,2} = 1.2 \text{ m}$$

$$i = 15$$

$$\Delta t_L / \Delta t_z = 0.13$$

$$\Delta t_L = -4 \times 0.13 = -0.52 \text{ K}$$

The diagram values are valid for

$$B \geq 1.5 \text{ m} (0.15 \times L_S)$$

If the spacing between 2 grilles is smaller, multiply  $\bar{v}_L$  and  $\Delta t_L$  by 1.4.

Table page 15:

Grille size selected

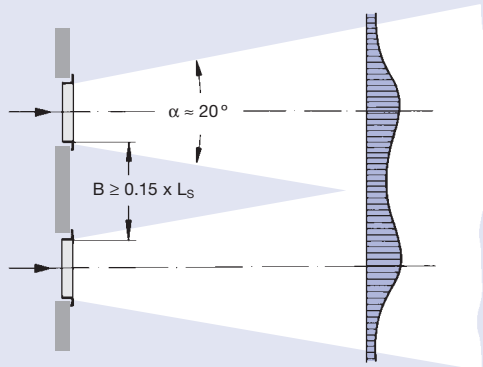
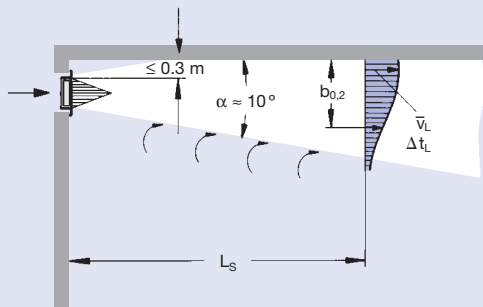
$$L \times H = 625 \times 125 \text{ or } 325 \times 225$$

$$A_{\text{eff}} \approx 0.043 \text{ m}^2$$

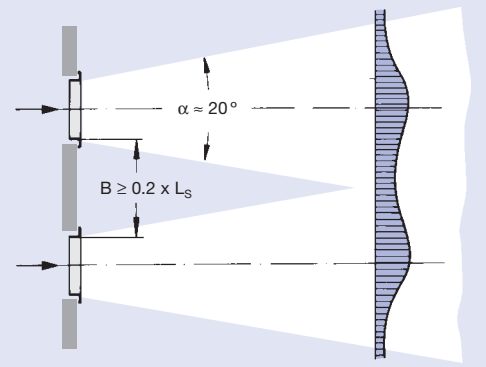
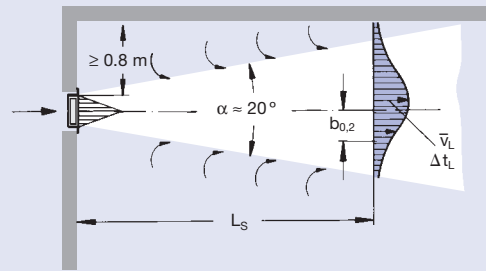
### Correction factors for installation without ceiling effect (free stream)

If the distance to the ceiling is  $\geq 0.8 \text{ m}$ , the diagram values  $\bar{v}_L$ ,  $b_{0,2}$ ,  $\Delta t_L / \Delta t_z$  should be multiplied by a factor of 0.71.

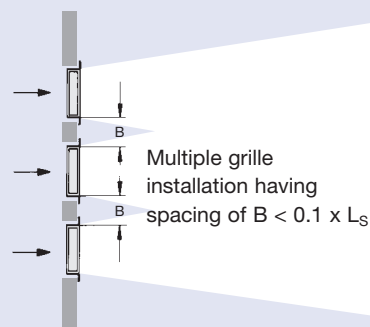
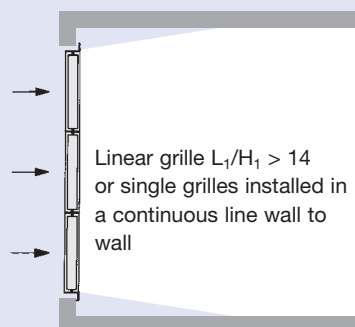
### Installation with ceiling effect



### Installation without ceiling effect



### Linear Grille arrangement

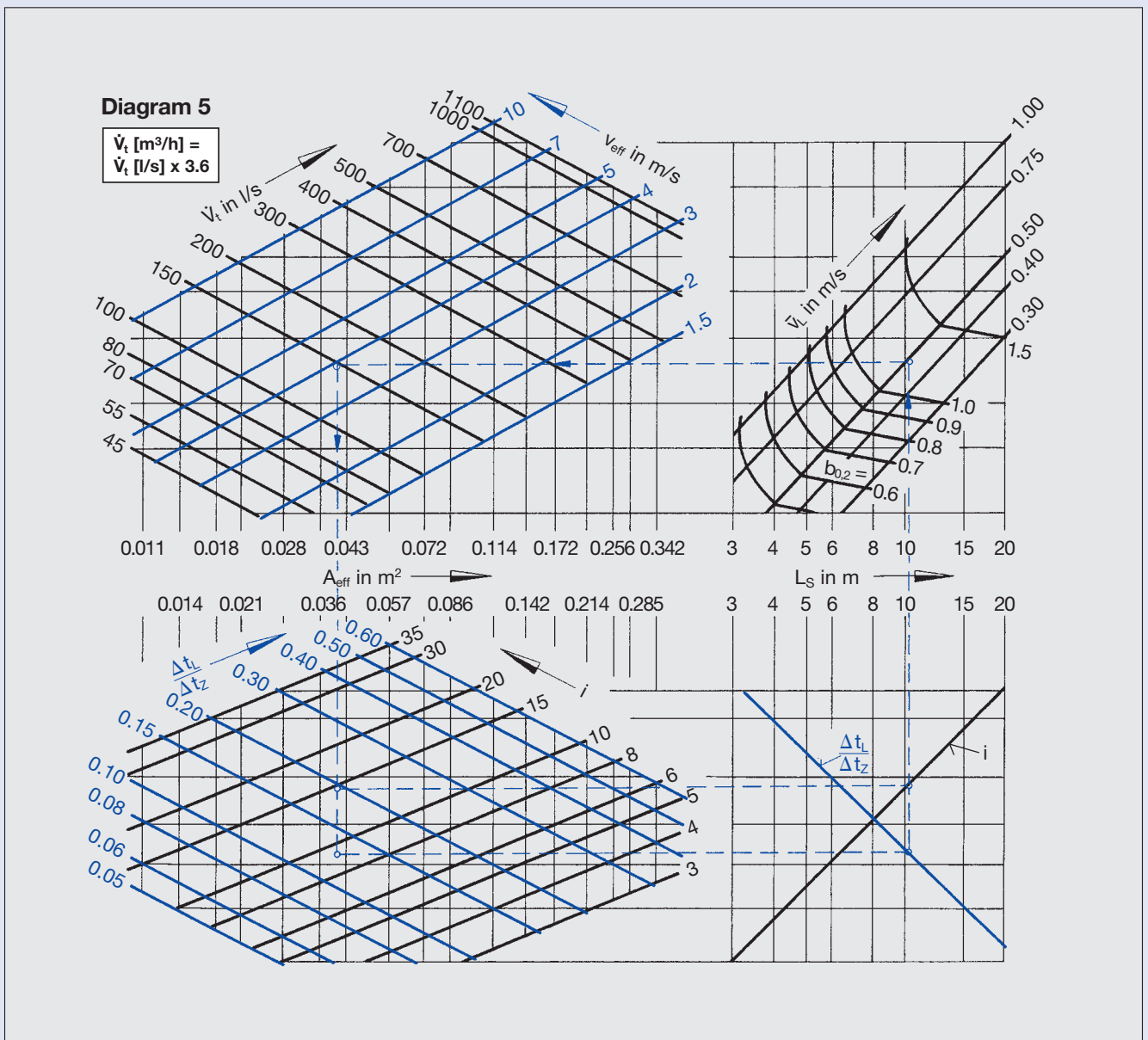


# Aerodynamic Data for Supply Air

## Grilles with Ceiling Effect

Effective outlet area $A_{eff}$ in $m^2$									
H in mm	Types	L in mm							
		225	325	425	525	625	825	1025	1225
75	AH · AF	0.006	0.009	0.011	0.014	0.017	0.022	0.028	0.034
	VAT · TRS · TRS-R · TRS-K	0.007	0.011	0.014	0.018	0.021	0.029	0.036	0.043
125	AT · VAT · ASL · SL · TR · TRS · TRS-R · TRS-K · KS	0.014	0.021	0.029	0.036	0.043	0.057	0.072	0.086
	AH · AF	0.011	0.017	0.022	0.028	0.034	0.044	0.055	0.066
225	AWT	0.010	0.015	0.020	0.025	0.031	0.040	0.050	0.060
	AT · VAT · ASL · SL · TR · TRS · TRS-R · TRS-K · KS	0.029	0.043	0.057	0.072	0.086	0.114	0.142	0.172
325	AH · AF		0.034	0.044	0.055	0.066	0.087	0.108	0.129
	AWT		0.031	0.040	0.050	0.060	0.078	0.097	0.116
425	AT · VAT · ASL · SL · TR · TRS · TRS-K		0.064	0.086	0.108	0.129	0.172	0.214	0.256
	AH · AF			0.066	0.081	0.096	0.129	0.169	0.193
525	AWT			0.060	0.073	0.086	0.116	0.152	0.174
	AT · VAT · ASL · SL · TR					0.172	0.228	0.285	0.342
	AH · AF					0.129	0.169	0.214	0.256
	AT · VAT · ASL · SL · TR							0.355	0.427

Aerodynamic Data for extract air see page 18.



# Aerodynamic Data Supply Air

## Grilles · Flow Volume Determination · Air Stream Deflection

### Determination of volume flow

The volume flow can be determined by measuring the air velocity with zero blade divergence using either a pitot tube or a rotating vane anemometer.

Pitot tube (Figure 1):

Measurements of air velocity should be made between the blades at a number of positions to determine an arithmetic mean value  $v_{eff,mean}$ .

The volume flow is then calculated as follows:

$$\dot{V}_t [l/s] = v_{eff,mean} [m/s] \times A_{eff} [m^2] \times 1000$$

$$\dot{V}_t [m^3/h] = v_{eff,mean} [m/s] \times A_{eff} [m^2] \times 3600$$

Rotating Vane Anemometer (Figure 2):

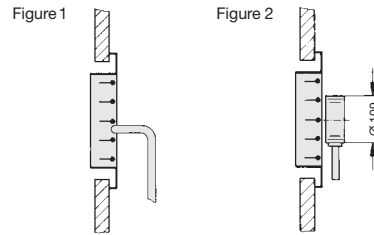
The measurement instrument should be evenly traversed across the entire grille face to determine a value of  $v_{eff,mean}$ .

The volume flow is then:

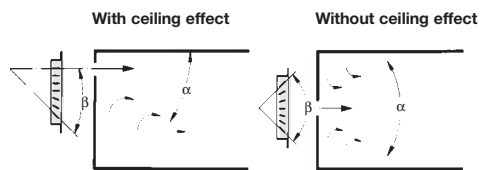
$$\dot{V}_t [l/s] = v_{eff,mean} [m/s] \times A_{eff} [m^2] \times 1.33 \times 1000$$

$$\dot{V}_t [m^3/h] = v_{eff,mean} [m/s] \times A_{eff} [m^2] \times 1.33 \times 3600$$

### Volume Flow Measurement



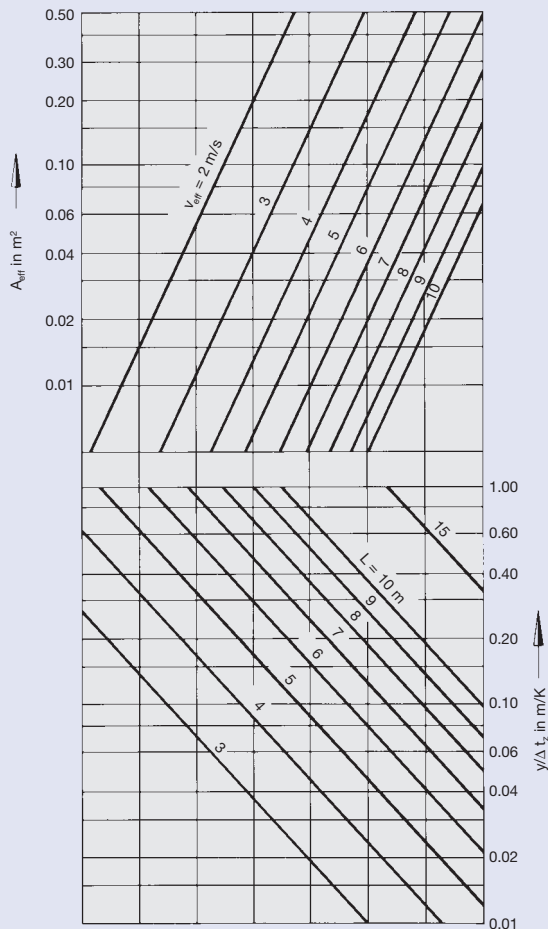
### Correction Factors (where L = const.)



### Stream Deflection

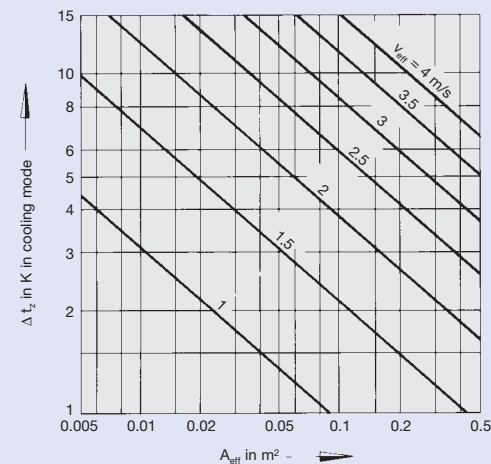
#### 6 Without ceiling effect

Airstream drop or rise y



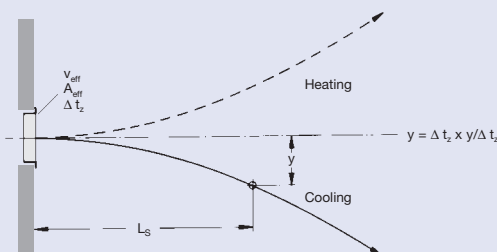
#### 7 With ceiling effect

Maximum temperature difference  $\Delta t_z$  in cooling mode



On diagram 7:

To prevent the airstream dropping into the occupied zone reference should be made to the graph above. This shows the maximum cooling differential which may be used related to the effective outlet area and effective outlet velocity.



### Correction for diagrams 5...10

(for setting of blade divergence)

$\beta$		45°	90°
$\alpha$		35°	60°
$\bar{v}_L$		x 0.7	x 0.5
$\Delta t_L / \Delta t_z$		x 0.7	x 0.5
i		x 1.4	x 2.0
y		x 1.4	x 2.0
<b>With ceiling effect</b>	<b>B III</b>	$L_S \times 0.2$	$L_S \times 0.3$
<b>Without ceiling effect</b>	<b>B III</b>	$L_S \times 0.25$	$L_S \times 0.3$



# Aerodynamic Data for Supply Air

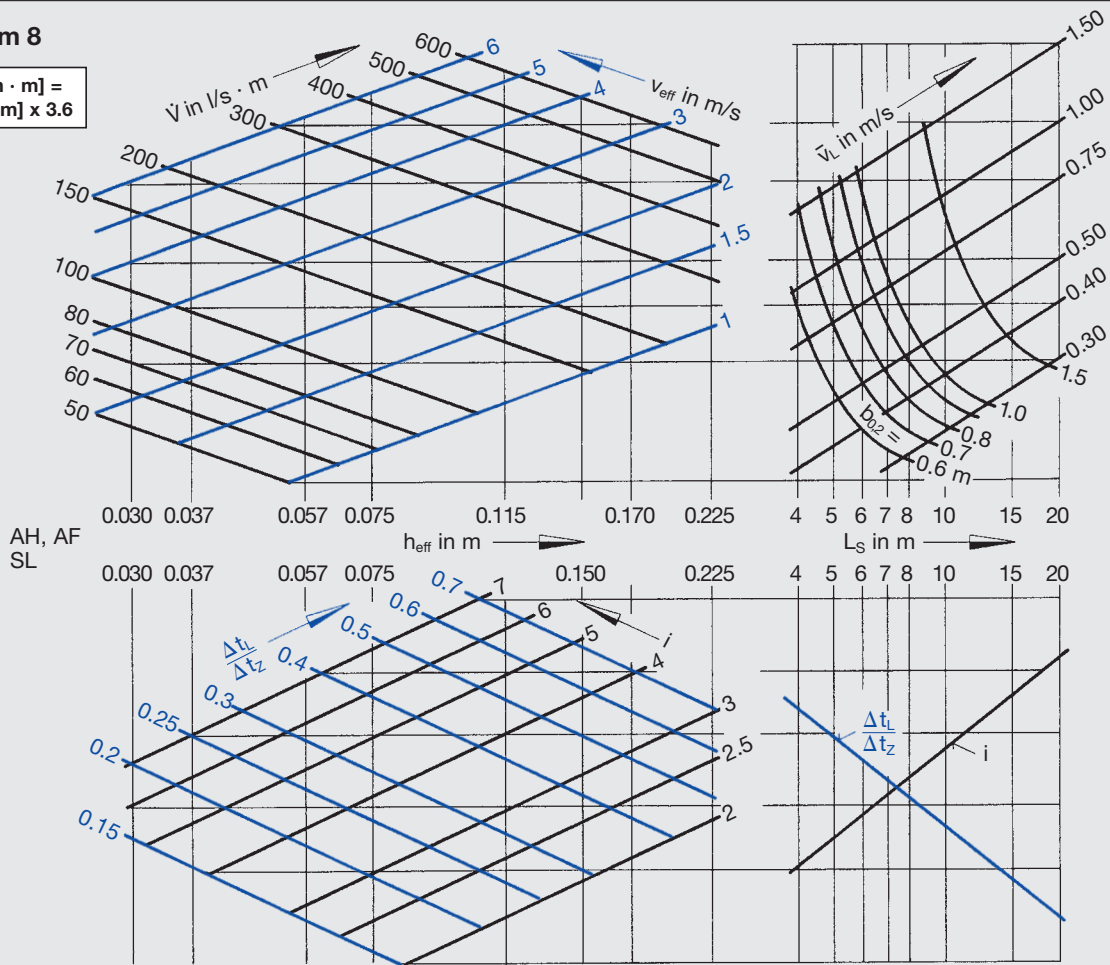
## Linear Grilles with Ceiling Effect · Air Stream Deflection

### Effective outlet height

H in mm	$h_{eff}$ in m		H in mm	$h_{eff}$ in m	
	SL	AH · AF		SL	AH · AF
75	-	0.030	225	0.150	0.115
125	0.075	0.057	325	0.225	0.170

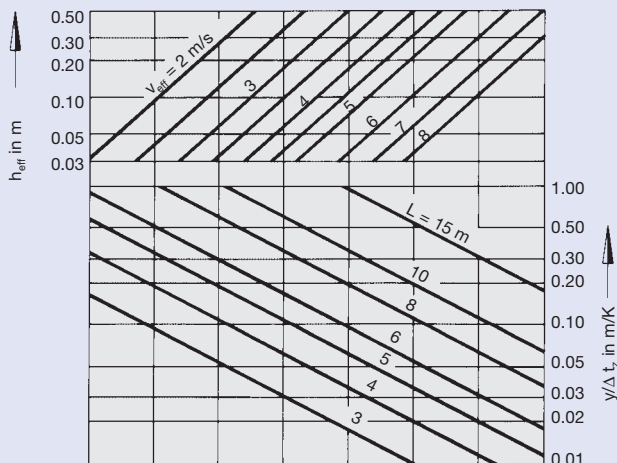
Diagram 8

$$\dot{V} \text{ [m}^3\text{/h} \cdot \text{m]} = \dot{V} \text{ [l/s} \cdot \text{m]} \times 3.6$$



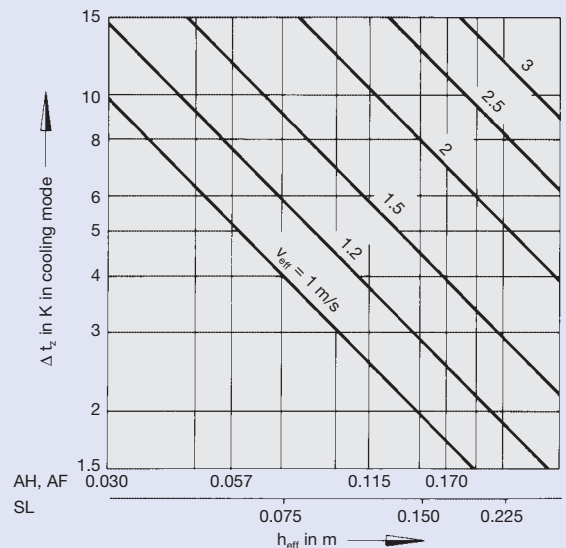
### 9 Without ceiling effect

airstream drop or rise  $y$  due to temperature difference



### 10 With ceiling effect

maximum temperature difference  $\Delta t_z$  in cooling mode



# Aerodynamic Data for Return Air

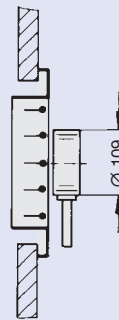
## Aerodynamic Data for Return Air · Grilles

L x H in mm		Effective outlet area			
		A <sub>eff</sub> in m <sup>2</sup>			
		AH · AF	AWT	AT · VAT TR · TRS TRS-R · KS	ASL · SL
225	75	0.004	0.003	0.006	
325		0.006	0.005	0.009	
425		0.009	0.008	0.011	
525		0.011	0.010	0.014	
625		0.013	0.011	0.016	
825		0.017	0.015	0.022	
1025		0.021	0.018	0.028	
1225	0.026	0.023	0.033		
225	125	0.009	0.008	0.011	0.013
325		0.013	0.011	0.016	0.019
425		0.017	0.015	0.022	0.026
525		0.021	0.018	0.028	0.033
625		0.026	0.023	0.033	0.040
825		0.033	0.029	0.044	0.053
1025		0.041	0.036	0.055	0.066
1225	0.049	0.043	0.066	0.080	
325	225	0.026	0.023	0.033	0.040
425		0.033	0.029	0.044	0.053
525		0.041	0.036	0.055	0.066
625		0.049	0.043	0.066	0.080
825		0.066	0.057	0.090	0.105
1025		0.082	0.071	0.110	0.133
1225		0.090	0.078	0.134	0.160
425	325	0.049	0.043	0.066	0.080
525		0.060	0.052	0.083	0.100
625		0.072	0.063	0.100	0.120
825		0.095	0.083	0.134	0.160
1025		0.120	0.104	0.170	0.200
1225		0.140	0.122	0.200	0.240
625		425	0.095		0.134
825	0.122			0.180	0.220
1025	0.155			0.220	0.270
1225	0.185			0.270	0.320
1025	525			0.280	0.330
1225				0.340	0.400

## Correction Factor – f –

Types	f
ASL · AT · VAT · SL · TR · TRS	1.6
AH · AF · AWT	1.9

## Volume Flow Measurement



### Rotating Vane Anemometer:

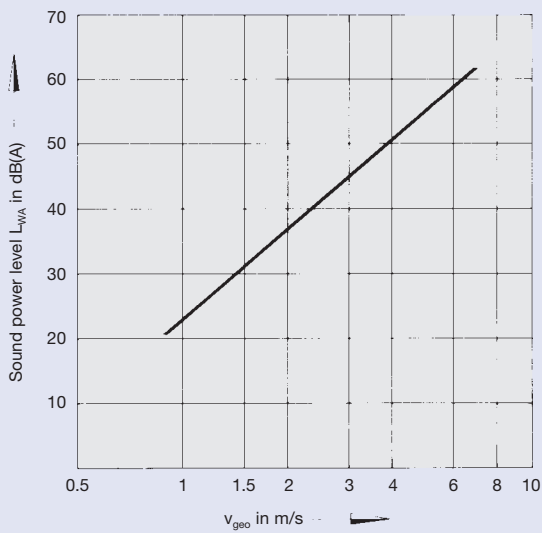
The measurement instrument should be evenly traversed across the entire grille face to determine a value of  $v_{\text{eff.mean}}$ .

The volume flow is then:

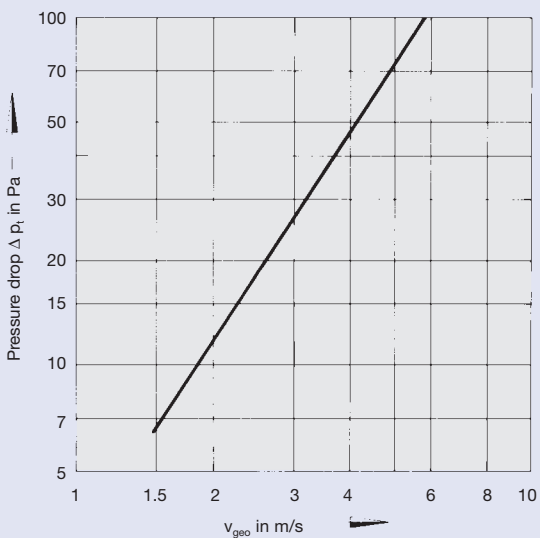
$$\begin{aligned} \dot{V}_t \text{ [l/s]} &= v_{\text{eff.mean}} \text{ [m/s]} \times A_{\text{eff}} \text{ [m}^2\text{]} \times f \times 1000 \\ \dot{V}_t \text{ [m}^3\text{/h]} &= v_{\text{eff.mean}} \text{ [m/s]} \times A_{\text{eff}} \text{ [m}^2\text{]} \times f \times 3600 \end{aligned}$$

## Technical Data AGS

### 11 Sound power level



### 12 Pressure drop



### Geometric outlet area AGS

L x H in mm		$A_{geo}$ in $m^2$
225	125	0.008
325	125	0.012
425	125	0.016
525	125	0.020
625	125	0.024
825	125	0.032
1025	125	0.040
1225	125	0.048
325	225	0.027
425	225	0.036
525	225	0.045
625	225	0.054
825	225	0.072
1025	225	0.090
1225	225	0.108
425	325	0.056
525	325	0.070
625	325	0.084
825	325	0.112
1025	325	0.140
1225	325	0.168
625	425	0.114
825	425	0.152
1025	425	0.190
1225	425	0.228
1025	525	0.240
1225	525	0.288

### Correction values for AGS

$A_{geo}$ in $m^2$	0.0075	0.015	0.03	0.06	0.12	0.24
$L_{WA}$	-6	-3	0	+3	+6	+9

# Standard Sizes

L x H in mm	Aluminium					Steel					Plastic KS	Flow rate control dampers	
	ASL AT	VAT	AH AF	AWT	AGS	SL	TR	TRS	TRS -K	TRS -R		ASW DGW	ASW
225	75												
325	75												
425	75												
525	75												
625	75												
825	75												
1025	75												
1225	75												
225	125												
325	125												
425	125												
525	125												
625	125												
825	125												
1025	125												
1225	125												
225	225												
325	225												
425	225												
525	225												
625	225												
825	225												
1025	225												
1225	225												
325	325												
425	325												
525	325												
625	325												
825	325												
1025	325												
1225	325												
625	425												
825	425												
1025	425												
1225	425												
1025	525												
1225	525												

Standard Sizes

Type		Installation Subframe (ER)		Installation Subframe with filter frame	Fixing options					
		Front frame width in mm			Front frame width in mm					
		27 (28)	23 (20)	27 / 28	Concealed screw fixing		Counter punched	Spring clip fixing		
					27 (28)	23 (20)	27 (28) (and KS)	27 (28)	23 (20)	
Grilles	ASL	A 1			0				B 11	
	AT	A 1	B 1	EF	0	G 11	A 11	B 11	H 11	
	VAT	A 1	B 1	EF	0	G 11	A 11	B 11	H 11	
	AH-0 / AH-15	A 1	B 1	EF	0	E 11	A 11	B 11	F 11	
	AF-0 / AF-15									
	AWT	A 1						0		
	AGS	A 1						0		
	SL	M 1		EF	0					
	TR	A 1		EF	C 11			0		
	TRS	A 1		EF	C 11			0		
	TRS-R / TRS-K	A 1 <sup>1)</sup>						0		
	KS							0 <sup>2)</sup>		
Linear Grilles	End section	E-AH-0 / AH-15	C 1	D 1		0	E 11			
		E-AF-0 / AF-15								
	Intermediate section	E-SL	N 1			0				
		M-AH-0 / AH-15	E 1	F 1		0	E 11			
		M-AF-0 / AF-15								
M-SL	E 1			0						

1) Only for TRS-K

2) Hole size Ø 4.5 mm

0 = Standard construction

**Grilles**, are suitable for supply or extract air, preferably in walls, sills and ducts, consisting of the perimeter front border (border sections mitre-cut, seamlessly joined together) with peripheral seal and front blades.

**ASL** and **SL** types with stylish diffuser-type border design.  
**AT**, **VAT**, **TR** and **TRS** types with stylish border incorporating an inside edge bevel and angled section to the outside.

**ASL**, **AT**, **SL**, **TR** and **KS** types:  
individually adjustable, horizontal front blades.

**VAT**, **TRS**, **TRS-K** and **TRS-R** types:  
individually adjustable, vertical front blades.

**AH** and **AGS** types with fixed, horizontal front blades.

**AWT** types with fixed, horizontal front blades; for use in gymnasiums and sports halls, ball-impact resistant according to DIN 18032/part 3.

**AGS-T** types with matching rear border for installation in doors with a thickness of 30...50 mm.

**AF** types suitable for installation in floors, fixed horizontal blades, core completely removable by use of the special spring clips, subframe with builder's cleats.

**TRS-K** types suitable for direct installation in the duct.

**TRS-R** types suitable for direct installation in circular ducts of various diameters.  
The ducts and circular ducts do not have to be graded.

With special hit and miss flow control with air flow straightener (**-K5/R5**), for optimum air flow equalization and flow volume regulation.

**Grille cores** in **EF/EFG** types consisting of fixed horizontal blade profiles located with spacer tubes, suitable for infill of openings in sills and walls. **EF** with 12.5 mm blade pitch, **EFG** with 16.7 mm blade pitch, ...-0 straight blades, ...-15 with blades inclined at 15°.

**Linear grilles** consist of end sections with a border at one end and on both sides and intermediate sections with borders only on both sides. The required linear length is either made up with two end sections or two end sections and the required number of intermediate sections.

**AH** types with fixed, and **SL** types with individually adjustable, horizontal front blades, installation with subframe and concealed screw fixing, duct opening equals nominal size (L x H).

**AF** types with fixed horizontal blades, core completely removable by use of the special spring clips, subframe with builder's cleats.

## Rear assemblies/volume flow adjustment components

To optimise the air distribution, rear assemblies are fitted. These can be adjusted from the grille face without its removal.

- D:** Set of adjustable rear air pattern control blades which are installed at 90° to the front blades.
- AG:** Opposed blade action flow rate controller with screw driver adjustment.
- DG:** as in **-D** in combination with **-AG**.
- AS:** Hit and miss control with air flow straightener for flow volume regulation. Adjustment via two screws and sliding the lower slotted plate.
- R5/K5:** Angled hit and miss control with air flow straightener for flow volume regulation. Adjustment via two screws and sliding the lower slotted plate.  
With optimum configuration for flow rate control and flow equalisation when grilles are directly installed into rectangular or circular ducts.

**ASW**, **AGW**, **DGW** flow volume control dampers for duct installation with surrounding angle border.  
Otherwise, construction and function as **-AS**, **-AG** and **-DG**.

## Materials

Aluminium: **ASL**, **AT**, **VAT**, **AGS**, **AH**, **AF**, **AWT**  
Grille face from aluminium extruded section, natural anodised finish, E6-C-0.

Steel: **SL**, **TR**, **TRS**  
Grille face from formed sheet steel, the surface is pre-treated and then powder coated in pure white (RAL 9010).

Galvanised steel: **TRS-R**, **TRS-K**  
Grille face from formed, galvanised sheet steel.

Rear assemblies made from formed or profiled steel sheet, phosphate treated, stove enamelled black (RAL 9005) using electro-dipcoat process, resistant to saturated environment for a minimum of 100 hours without deterioration (DIN 50017).

**ER** subframe from formed and profiled, galvanised sheet steel.

Plastic: **KS**  
Front grille and rear assemblies in extruded plastic section (hard PVC), dark grey (similar to RAL 7011), temperature resistant up to 50 °C. Curved blades for flow control in black or dark grey.

## Installation:

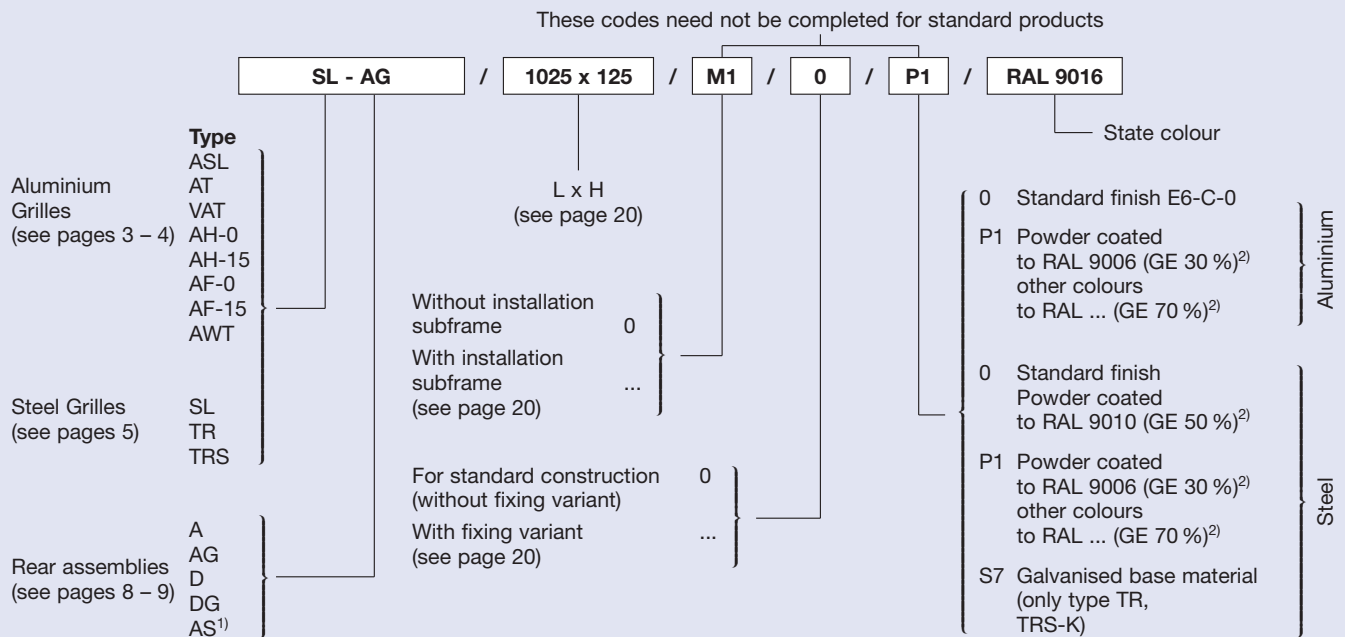
**ASL**, **AT**, **VAT**, **AH** and **SL** types using an **ER** subframe and concealed screw fix, duct opening equals nominal size (L x H).

**AWT**, **AGS**, **TR**, **TRS**, **TRS-K** and **TRS-R** types with visible self-tapping screws (counter punched in front border), duct opening equals nominal size – 15 mm (L – 15 mm/ H – 15 mm).

**KS** types as before, however front border with screw fixing holes.

# Order Details

## Grilles Aluminium and Steel

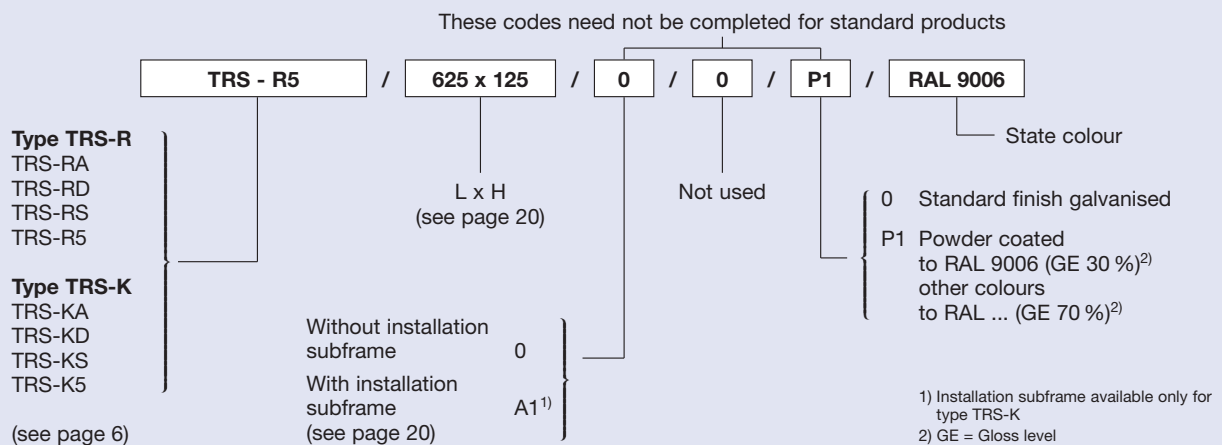


### Example

Make: TROX  
 Type: SL-AG / 1025 x 125 / M1 / P1 / RAL 9016

1) Not for types AH, AF, AWT  
 2) GE = Gloss level

## Grilles galvanised sheet for rectangular and circular duct installation

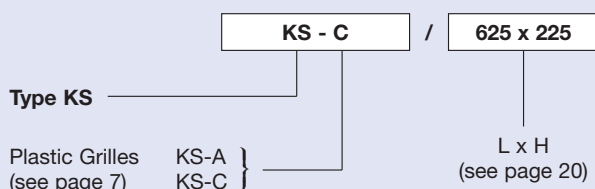


1) Installation subframe available only for type TRS-K  
 2) GE = Gloss level

### Example

Make: TROX  
 Type: TRS-R5 / 625 x 225 / P1 / RAL 9006

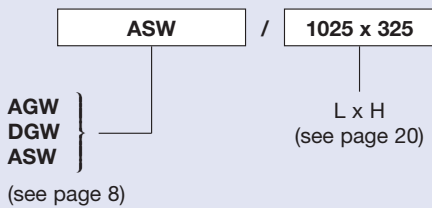
## Plastic Grilles



### Example

Make: TROX  
 Type: KS-C / 625 x 225

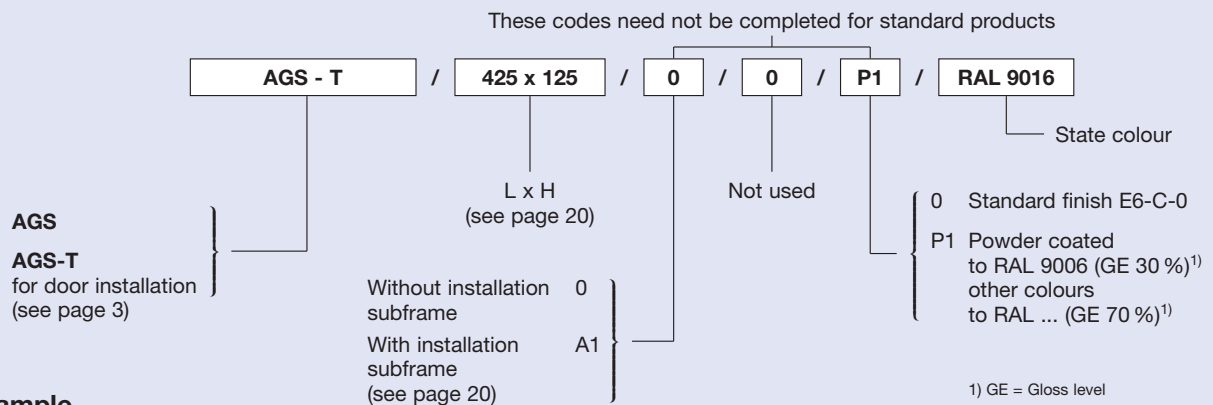
## Separate flow rate control dampers with angle border



### Example

Make: TROX  
Type: ASW / 1025 x 325

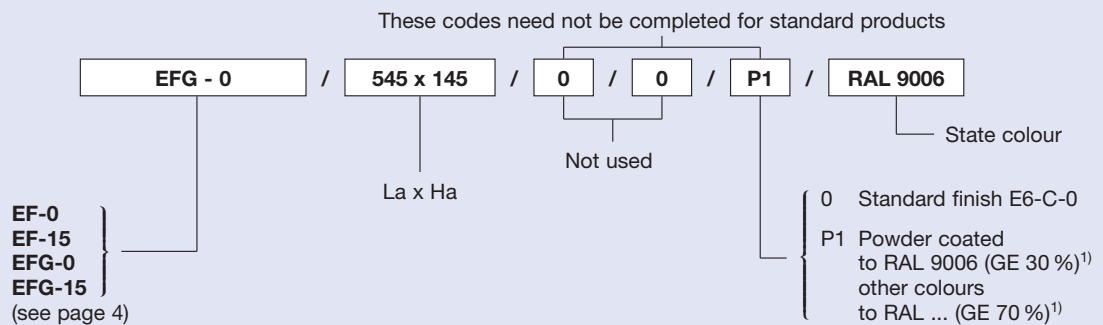
## Aluminium Transfer Grille



### Example

Make: TROX  
Type: AGS-T / 425 x 125 / P1 / RAL 9016

## Aluminium grille cores



### Example

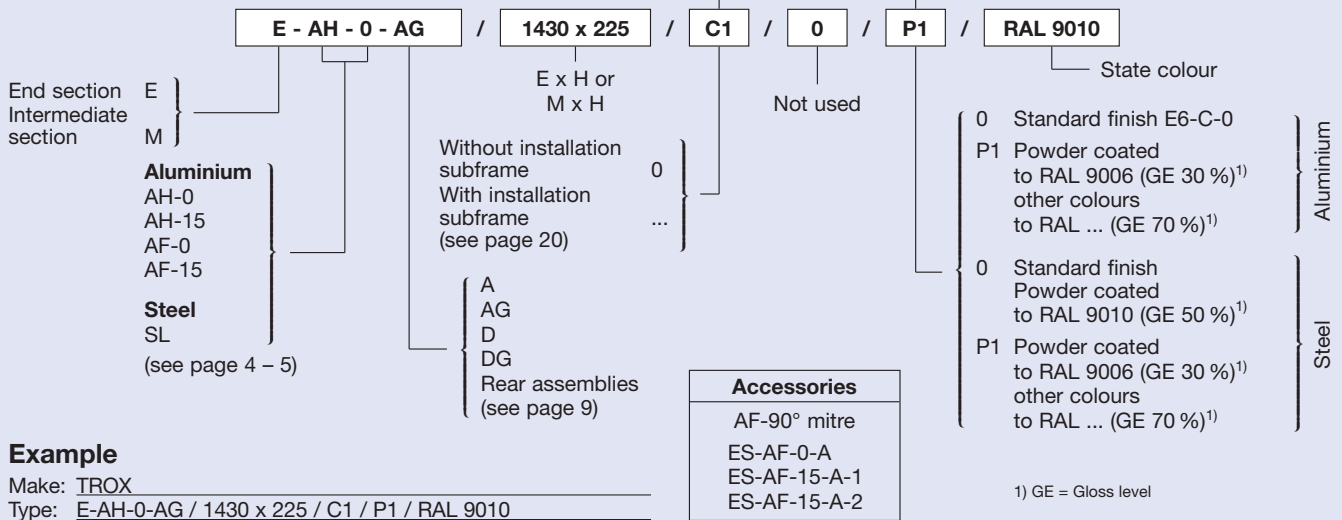
Make: TROX  
Type: EFG-0 / 545 x 145 / P1 / RAL 9006

Standard sizes					
La \ Ha	95	145	245	345	445
245	●	●			
345	●	●	●		
445	●	●	●	●	
545	●	●	●	●	
645	●	●	●	●	●
845	●	●	●	●	●
1045	●	●	●	●	●
1245	●	●	●	●	●

# Order Details

## Aluminium and Steel Linear Grilles

These codes need not be completed for standard products



### Example

Make: TROX  
Type: E-AH-0-AG / 1430 x 225 / C1 / P1 / RAL 9010

Standard Heights					
Type	H	75	125	225	325
AH		●	●	●	●
AF		●	●	●	●
SL			●	●	●

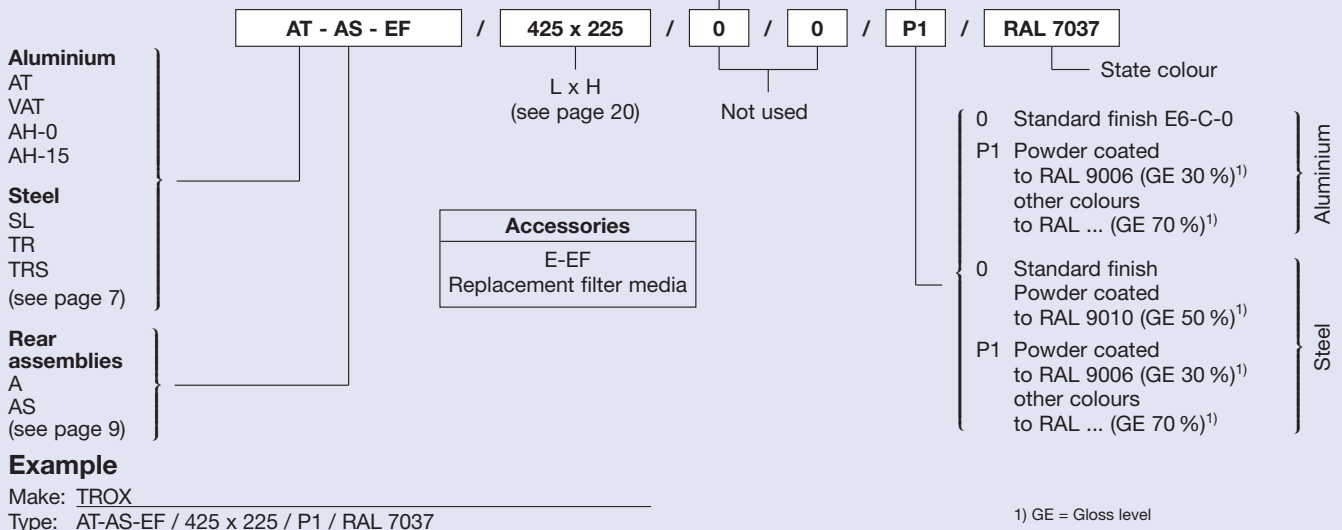
Intermediate Sections
M in mm
2000

Standard End Sections					
E in mm					
950	1130	1310	1490	1670	1850
1010	1190	1370	1550	1730	1910
1070	1250	1430	1610	1790	1970

Number of end and intermediate sections based on the opening size "L"  
Type AF L = 2E + (n x M) - 21  
Types AH, SL L = 2E + (n x M) + 28 with installation subframe  
(... + 14 without installation subframe)

## Grilles with Filter

These codes need not be completed for standard products



You will find alternative types of grilles, especially in stainless steel and automatic or motor-driven options in the HESCO sales programme (separate catalogue).