

Aluminium Grilles

Aluminium Linear Grilles

Type AT • VAT • AH • AF • AGS



TROX[®] TECHNIK

TROX Malaysia Sdn. Bhd.
20 Persiaran Bunga Tanjung 1
Senawang Land Industrial Park
70400 Seremban
Negeri Sembilan Darul Khusus
Malaysia

Telephone + 606-678 8188
Telefax + 606-678 8288 / 388
E-mail enquiry@troxapo.com
www.troxapo.com

Contents · Description

Description_____	2	Installation sub-frame · Fixing Details_____	10
Construction, Dimensions and Materials For Type AT, VAT and AGS Grilles_____	3	Assembly and fixing details_____	11
For Type AH and AF Grilles_____	4	Nomenclature_____	12
Standard Sizes and Dimensions_____	5	Acoustic Data_____	13
Standard Dimensions for Linear Grilles_____	6	Aerodynamic Data_____	15
Selection Table for Type AF Grilles_____	7	Technical Data_____	17
Selection Table for Type AH Grilles_____	8	Aerodynamic Data_____	18
Rear Assemblies_____	9	Technical Data for 'AGS'_____	24
		Order Details_____	25

General Specification:

TROX Grilles and Linear Grilles are all made from extruded aluminium sections. They are designed to be mounted onto walls or, directly to ventilation ductwork for the purpose of supply or return air application. Other special grilles, such as the "AF" Type is designed to be mounted either to the floor or wall. There is also the "AGS" Type grille, which is designed for air transfer purpose between two rooms and it can be mounted onto partition walls or doors.

These grilles have been extensively tested to international standards ISO 5219 and ISO 3741 to determine their aerodynamics and acoustics performance respectively, which is published in this catalogue.

The grilles will be powder coated in matt white to RAL 9010 as standard supply. If required, volume control damper can be provided. This will be fitted to the back of the grille and, painted black to RAL 9005, The volume control damper is adjustable from the face of the grille with a screw driver as indicated on page 9.

Notes:

1. The dimensions given for the standard sizes (i.e., 'L' for length and 'H' for height) in this catalogue represent the connecting duct sizes or opening sizes in the wall where the grilles are meant to be intalled.
2. Special plastic grilles (Type 'KS') and stainless steel grilles (Type 'DGX') are also available upon request. Refer to TROX catalogue, Ref T 1.1/1/EN/ 2 on page 7 for the Type 'KS' and, Ref. L-02-1-13e for Type 'DGX' from HESCO respectively.

Construction Variants

Type AT

This is suitable for either supply or return air with individually adjustable horizontal aerofoil blades. The front border is 32 mm wide with counter punched holes for screw fixing (i.e., visible screw). Alternatively, concealed fixings with sub-frame are also available if required. Refer to page 26 for more detail.

Type VAT

This is suitable for either supply or return air with individually adjustable vertical aerofoil blades. The front border is 32 mm wide with counter punched holes for screw fixing (i.e., visible). Alternatively, concealed fixings with sub-frame are also available if required. Refer to page 26 for more detail.

Type AGS (Non-vision Air Transfer Grille)

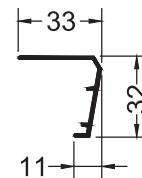
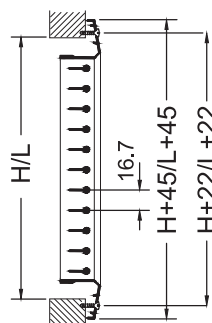
This is a non-vision grille suitable for supply or return air with fixed inverted V-shaped blades and 30 mm wide front border with counter punched holes for screw fixing (i.e., visible). This grille can be supplied with either a light baffle plate (i.e., Type AGS-L) or matching rear frame (i.e., Type AGS-T) or, both (i.e., Type AGT-TL) as optional extras. Refer to page 12 for more details. If required, a light baffle plate can be provided and painted in black (RAL 9005) to prevent reflection of light.

Material

The grilles are made from extruded aluminium sections (i.e., grille face only, but excluding the rear assemblies) and powder coated to RAL 9010 in matt white as standard supply.

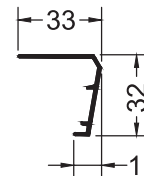
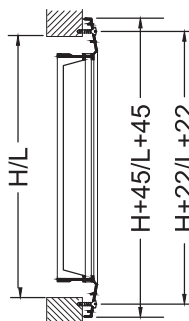
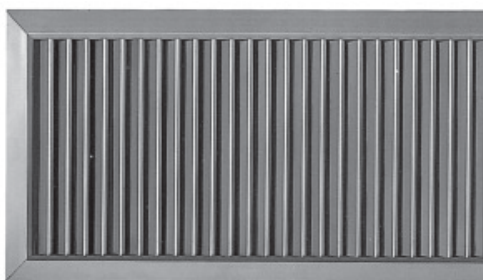
All rear assemblies are made from formed galvanised sheet steel, are painted black to RAL 9005 as standard supply.

Type AT



□ / □ FIXING SHOWN

Type VAT

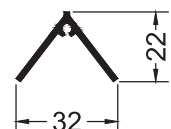
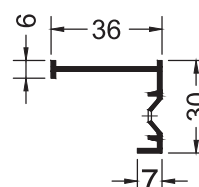
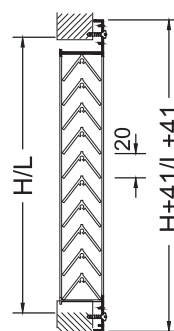


Blade pitch 16.7mm



□ / □ FIXING SHOWN

Type AGS



□ / □ FIXING SHOWN

Construction Variants

Type AH

This can be used as a supply or return grille with fixed horizontal blades. It can be supplied with either 0° or 15° deflection blade profile, identified as Type AH-0 or AH-15 respectively. It has a 30 mm wide front border with counter punched holes for screw fixing (i.e., visible). Alternatively concealed fixings with sub-frame can be provided if requested.

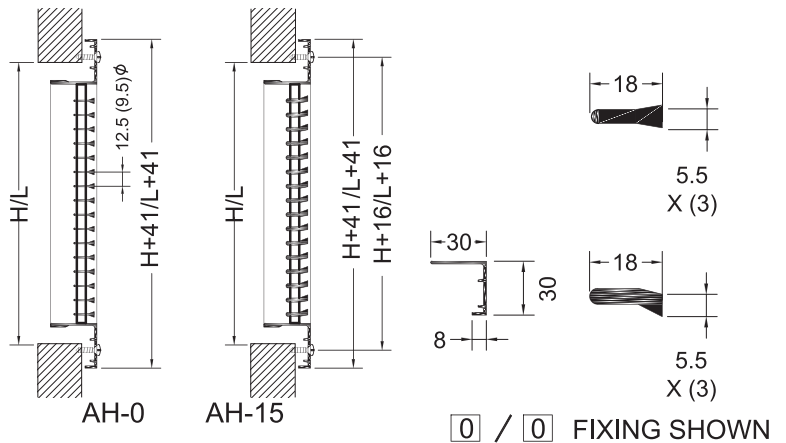
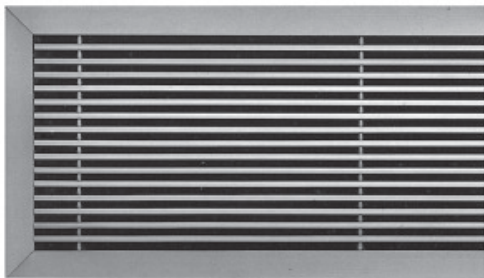
Type AF

This is designed for either supply or return air application with fixed horizontal blades, suitable for mounting on the wall or floor with recessed aluminium 'Z' frame. The grille face can be removed from the frame by releasing the 'W' clips. It can be supplied with either 0° or 15° deflection blade profile, identified as Type AF-0 or AF-15 respectively.

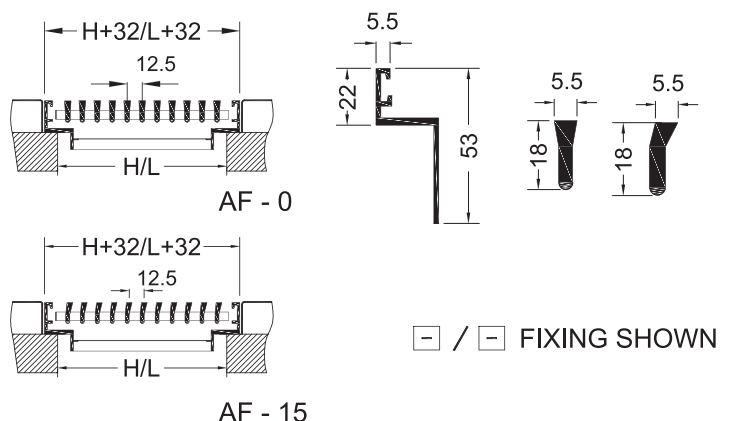
Type	Air Discharge	Blade pitch (mm)
AF-0 / AH-0	Straight	12.5
AF-15 / AH-15	15° angled	12.5

Note: Without the border, the grille core is referred to as Type 'EH' Grille with identical blade profile as Type 'AH' and 'AF' grilles.

Type AH



Type AF



Material

The grilles are made from extruded aluminium sections with the front section (i.e., just the grille and excluding rear assemblies) will be powder coated to RAL 9010 with matt finish as standard supply.

The blade width is 5.5 mm wide, viewing at the grille face. The blades are set at 12.5 mm pitch with 7 mm wide air gap between the blades.

All rear assemblies are made from steel and/or extruded aluminium painted in black to RAL 9005 as standard supply.

Notes:

- Only Type 'AH' and 'AF' grilles as presented in this catalogue can be supplied as linear grilles.
- The Type 'AF' grille will be supplied in mild finish as standard supply, if they are meant to be mounted to the floor.

Standard Sizes · Dimensions

Standard Sizes

Table 1: For Types AT · VAT · AGS · AH

L x H (mm)			
150 x 100	200 x 200	300 x 300	450 x 450
200	250	350	500
250	300	400	550
300	350	450	600
350	400	500	650
400	450	550	700
450	500	600	750
500	550	650	800
550	600	700	850
600	650	750	900
650	700	800	950
700	750	850	1000
750	800	900	1050
800	850	950	1100
850	900	1000	1150
900	950	1050	1200
950	1000	1100	1250
1000	1050	1150	500 x 500
1050	1100	1200	
1100	1150	1250	350 x 350
1150	1200	400	
1200	1250	450	700
1250	250 x 250	500	750
150 x 150		300	800
200	350	550	850
250	400	600	900
300	450	650	950
350	500	700	1000
400	550	750	1050
450	600	800	1100
500	650	850	1150
550	700	900	1200
600	750	950	1250
650	800	1000	600 x 600
700	850	1050	
750	900	1100	650
800	950	1150	700
850	1000	1200	750
900	1050	1250	800
950	1100	400 x 400	850
1000	1150	450	900
1050	1200	500	950
1100	1250	550	1000
1150		600	1050
1200		650	1100
1250		700	1150
		750	1200
		800	1250
		850	
		900	
		950	
		1000	
		1050	
		1100	
		1150	
		1200	
		1250	

Standard Sizes

Table 2: For Type AF

L x H (mm)		
150 x 100	200 x 200	300 x 300
200	250	350
250	300	400
300	350	450
350	400	500
400	450	550
450	500	600
500	550	650
550	600	700
600	650	750
650	700	800
700	750	850
750	800	900
800	850	950
850	900	1000
900	950	1050
950	1000	1100
1000	1050	1150
1050	1100	1200
1100	1150	1250
1150	1200	
1200	1250	
1250		
	250 x 250	300
		350
150 x 150	400	
200	450	
250	500	
300	550	
350	600	
400	650	
450	700	
500	750	
550	800	
600	850	
650	900	
700	950	
750	1000	
800	1050	
850	1100	
900	1150	
950	1200	
1000	1250	
1050		
1100		
1150		
1200		
1250		

Standard Sizes · Dimensions

Table 3 – Standard Heights for Grilles

Type	AT; VAT & AGS	AF; AH
H (mm)		
75		•
100	•	•
125		•
150	•	•
175		•
200	•	•
225		•
250	•	•
275		•
300	•	•
350	•	
400	•	
450	•	
500	•	
550	•	
600	•	
<u>Note:</u>		
Minimum, L	150 mm	300 mm
Maximum, L	1250 mm	2000 mm

Note: If rear assemblies are required (i.e., AG; D or DG), the minimum height for the grilles is 100 mm.

Table 4 – Standard End and Intermediate Sections for Linear Grilles

Intermediate section, M (mm)	End Section E (mm)
	AF; AH
2000	950
	1010
	1070
	1130
	1190
	1250
	1310
	1370
	1430
	1490
	1550
	1610
	1670
	1730
	1790
	1850
1910	
1970	

Selection Table for Linear Grille

Type AF

Selection example

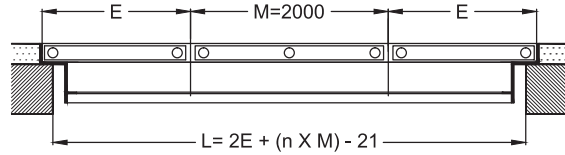
Data given;

Type AF Grille

Total length, L = 18910 mm long

From Table 5, select the next length, 'L' down, which is 18899 mm long (i.e., opening size).

According to Table 5 below, when L = 18899 mm long, the number of intermediate sections, M are 8, each measuring 2000 mm long and the two end sections (i.e., E1 and E2) are 1430 and 1490 mm long respectively.



L = inside dimensions of opening
n = number of M sections

Figure 1 – Typical Section of intermediate and end sections for Type 'AF' Linear Grille.

Table 5 – Opening length "L" for Type 'AF' Grille with associated intermediate and end sections.

E	E	L = 2E - 21	L = 2E + (n x M) - 21									
			1 x M	2 x M	3 x M	4 x M	5 x M	6 x M	7 x M	8 x M	9 x M	10 x M
			2000	4000	6000	8000	10000	12000	14000	16000	18000	20000
950	950	1879	3879	5879	7879	9879	11879	13879	15879	17879	19879	21879
950	1010	1939	3939	5939	7939	9939	11939	13939	15939	17939	19939	21939
1010	1010	1999	3999	5999	7999	9999	11999	13999	15999	17999	19999	21999
1010	1070	2059	4059	6059	8059	10059	12059	14059	16059	18059	20059	22059
1070	1070	2119	4119	6119	8119	10119	12119	14119	16119	18119	20119	22119
1070	1130	2179	4179	6179	8179	10179	12179	14179	16179	18179	20179	22179
1130	1130	2239	4239	6239	8239	10239	12239	14239	16239	18239	20239	22239
1130	1190	2299	4299	6299	8299	10299	12299	14299	16299	18299	20299	22299
1190	1190	2359	4359	6359	8359	10359	12359	14359	16359	18359	20359	22359
1190	1250	2419	4419	6419	8419	10419	12419	14419	16419	18419	20419	22419
1250	1250	2479	4479	6479	8479	10479	12479	14479	16479	18479	20479	22479
1250	1310	2539	4539	6539	8539	10539	12539	14539	16539	18539	20539	22539
1310	1310	2599	4599	6599	8599	10599	12599	14599	16599	18599	20599	22599
1310	1370	2659	4659	6659	8659	10659	12659	14659	16659	18659	20659	22659
1370	1370	2719	4719	6719	8719	10719	12719	14719	16719	18719	20719	22719
1370	1430	2779	4779	6779	8779	10779	12779	14779	16779	18779	20779	22779
1430	1430	2839	4839	6839	8839	10839	12839	14839	16839	18839	20839	22839
1430	1490	2899	4899	6899	8899	10899	12899	14899	16899	18899	20899	22899
1490	1490	2959	4959	6959	8959	10959	12959	14959	16959	18959	20959	22959
1490	1550	3019	5019	7019	9019	11019	13019	15019	17019	19019	21019	23019
1550	1550	3079	5079	7079	9079	11079	13079	15079	17079	19079	21079	23079
1550	1610	3139	5139	7139	9139	11139	13139	15139	17139	19139	21139	23139
1610	1610	3199	5199	7199	9199	11199	13199	15199	17199	19199	21199	23199
1610	1670	3259	5259	7259	9259	11259	13259	15259	17259	19259	21259	23259
1670	1670	3319	5319	7319	9319	11319	13319	15319	17319	19319	21319	23319
1670	1730	3379	5379	7379	9379	11379	13379	15379	17379	19379	21379	23379
1730	1730	3439	5439	7439	9439	11439	13439	15439	17439	19439	21439	23439
1730	1790	3499	5499	7499	9499	11499	13499	15499	17499	19499	21499	23499
1790	1790	3559	5559	7559	9559	11559	13559	15559	17559	19559	21559	23559
1790	1850	3619	5619	7619	9619	11619	13619	15619	17619	19619	21619	23619
1850	1850	3679	5679	7679	9679	11679	13679	15679	17679	19679	21679	23679
1850	1910	3739	5739	7739	9739	11739	13739	15739	17739	19739	21739	23739
1910	1910	3799	5799	7799	9799	11799	13799	15799	17799	19799	21799	23799
1910	1970	3859	5859	7859	9859	11859	13859	15859	17859	19859	21859	23859
1970	1970	3919	5919	7919	9919	11919	13919	15919	17919	19919	21919	23919

Note:

The opening size 'L' and the number of end and intermediate sections required (i.e., 'E' and 'M' respectively) and their associated lengths are given in the selection table above. All dimensions given in the table are in millimeters (mm).

Selection Table for Linear Grille

Type AH

Selection example

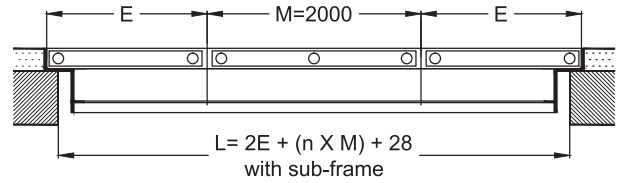
Data given;

Type AH Grille

Total length, L = 18930 mm long

From Table 6, select the next length, 'L' down, which is 18888 mm long (i.e., opening size).

From Table 6, when L = 18888 mm long, 8 number of intermediate sections, M are needed and, each end section (i.e., E1 and E2) is 1430 mm long.



L = inside dimensions of opening
n = number of M sections

Installation without installation subframe

$L = 2E + (n \times M) + 19$

for types AH

Figure 2 – Typical Section of intermediate and end sections for a Type 'AH' Linear Grille.

Table 6 – Opening length "L" for Type 'AH' Grille with associated intermediate and end sections.

E	E	L = 2E + 28	L = 2E + (n x M) + 28									
			1 x M	2 x M	3 x M	4 x M	5 x M	6 x M	7 x M	8 x M	9 x M	10 x M
			2000	4000	6000	8000	10000	12000	14000	16000	18000	20000
950	950	1928	3928	5928	7928	9928	11928	13928	15928	17928	19928	21928
950	1010	1988	3988	5988	7988	9988	11988	13988	15988	17988	19988	21988
1010	1010	2048	4048	6048	8048	10048	12048	14048	16048	18048	20048	22048
1010	1070	2108	4108	6108	8108	10108	12108	14108	16108	18108	20108	22108
1070	1070	2168	4168	6168	8168	10168	12168	14168	16168	18168	20168	22168
1070	1130	2228	4228	6228	8228	10228	12228	14228	16228	18228	20228	22228
1130	1130	2288	4288	6288	8288	10288	12288	14288	16288	18288	20288	22288
1130	1190	2348	4348	6348	8348	10348	12348	14348	16348	18348	20348	22348
1190	1190	2408	4408	6408	8408	10408	12408	14408	16408	18408	20408	22408
1190	1250	2468	4468	6468	8468	10468	12468	14468	16468	18468	20468	22468
1250	1250	2528	4528	6528	8528	10528	12528	14528	16528	18528	20528	22528
1250	1310	2588	4588	6588	8588	10588	12588	14588	16588	18588	20588	22588
1310	1310	2648	4648	6648	8648	10648	12648	14648	16648	18648	20648	22648
1310	1370	2708	4708	6708	8708	10708	12708	14708	16708	18708	20708	22708
1370	1370	2768	4768	6768	8768	10768	12768	14768	16768	18768	20768	22768
1370	1430	2828	4828	6828	8828	10828	12828	14828	16828	18828	20828	22828
1430	1430	2888	4888	6888	8888	10888	12888	14888	16888	18888	20888	22888
1430	1490	2948	4948	6948	8948	10948	12948	14948	16948	18948	20948	22948
1490	1490	3008	5008	7008	9008	11008	13008	15008	17008	19008	21008	23008
1490	1550	3068	5068	7068	9068	11068	13068	15068	17068	19068	21068	23068
1550	1550	3128	5128	7128	9128	11128	13128	15128	17128	19128	21128	23128
1550	1610	3188	5188	7188	9188	11188	13188	15188	17188	19188	21188	23188
1610	1610	3248	5248	7248	9248	11248	13248	15248	17248	19248	21248	23248
1610	1670	3308	5308	7308	9308	11308	13308	15308	17308	19308	21308	23308
1670	1670	3368	5368	7368	9368	11368	13368	15368	17368	19368	21368	23368
1670	1730	3428	5428	7428	9428	11428	13428	15428	17428	19428	21428	23428
1730	1730	3488	5488	7488	9488	11488	13488	15488	17488	19488	21488	23488
1730	1790	3548	5548	7548	9548	11548	13548	15548	17548	19548	21548	23548
1790	1790	3608	5608	7608	9608	11608	13608	15608	17608	19608	21608	23608
1790	1850	3668	5668	7668	9668	11668	13668	15668	17668	19668	21668	23668
1850	1850	3728	5728	7728	9728	11728	13728	15728	17728	19728	21728	23728
1850	1910	3788	5788	7788	9788	11788	13788	15788	17788	19788	21788	23788
1910	1910	3848	5848	7848	9848	11848	13848	15848	17848	19848	21848	23848
1910	1970	3908	5908	7908	9908	11908	13908	15908	17908	19908	21908	23908
1970	1970	3968	5968	7968	9968	11968	13968	15968	17968	19968	21968	23968

Note: The opening size "L" and the number of end and intermediate sections required (i.e., 'E' and 'M' respectively) and their associated lengths are given in the selection table above. All dimensions given in the table are in millimeters (mm).

Rear Assemblies

The rear assemblies as described below are factory fitted. They are available in different combinations for Types AT; VAT; AF and AH grille as indicated in tables below.

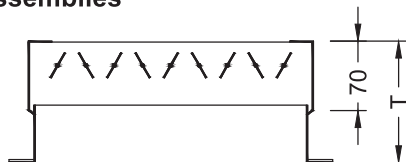
Materials

The rear assemblies are made from formed sheet steel, painted in black to RAL 9005.

Table 7 – Installation depth

Code for Rear Assemblies	Installation Depth, T (mm)		
	AF	AT & VAT	AH
AG	123	103	100
D	85	65	62
DG	123	103	100

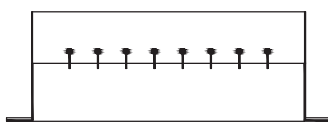
Rear Assemblies



...-AG

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

'AG' is for opposed blade action volume control damper (OBD). This is adjustable from the face of the grille.



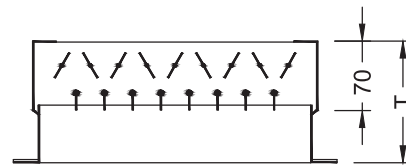
...-D

A set of individually adjustable vertical air pattern control blades. For type VAT, these blades are horizontal.

'D' is for a second set of individually adjustable deflection blades located behind the grille face, available only for Type 'AT' and 'VAT' grilles to provide double deflection. For the Type 'AT' grille, these second set of deflection blades will be set in the vertical position. As for Type 'VAT' grille, they will be set in the horizontal position.

Table 8 – Accessories and options available

Options for rear assemblies		Grilles			Linear Grilles	
		AT & VAT	AH-0 / AH-15	AF-0 / AF-15	AH-0 / AH-15	AF-0 / AF-15
Grille Face only	A	•	•	•	•	•
Grille with OBD	AG	•	•	•	•	•
Grille with deflection blades	D	•	•	•	•	•
Grille with OBD and deflection blades	DG	•	•	•	•	•
Grille with filter media	A-EF	•	•	•	•	•

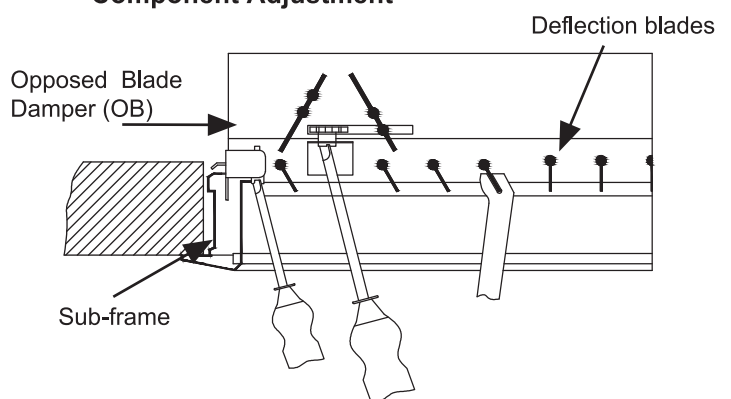


...-DG

Volume control damper as...-AG plus a set of individually adjustable vertical air pattern control blades. For type VAT these blades are horizontal.

'DG' will include both opposed blade damper and a second set of deflection blades, available only for Type 'AT' and 'VAT' grilles.

Component Adjustment



Rear Assemblies ...-D, ...-AG, ...-DG concealed fixing

The rear assemblies as described on this page (i.e., 'AG', 'D' and 'DG') including the latch fixing can be adjusted from the face of the grille as shown above.

Installation Sub-frame · Fixing Details

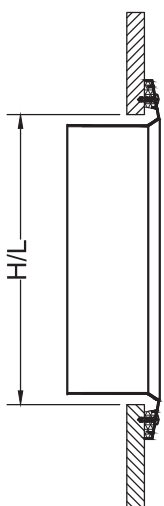
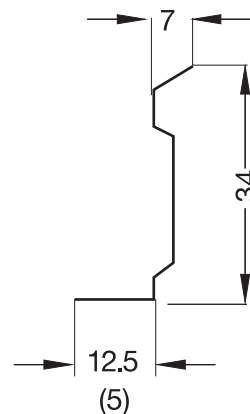
Materials

The installation sub-frame is manufactured from formed galvanized sheet steel.

Installation sub-frame for types AT, VAT and AH grille.

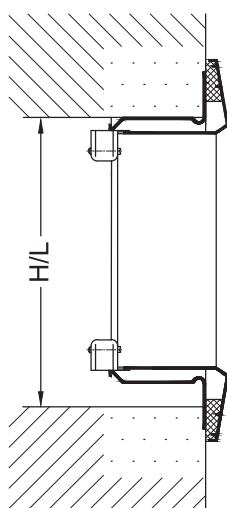
Installation Guide

The installation sub-frame will be supplied loose with four small sections for each grille to be installed by others in rectangular duct opening. The location of the sub-frame should match the position of the concealed fixing fitted to the back of the grille.



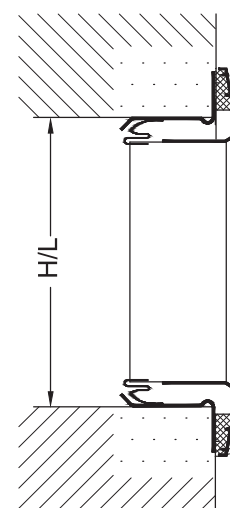
0 / 0 Fixing Shown

All counter punched holes suitable for sheet metal raised countersunk head screws 4.2 x 16

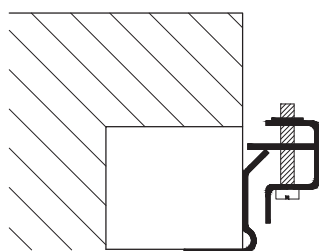


With latch fixing

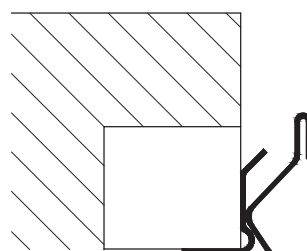
$L_{max} = 1250$
mounting in
a ceiling
is
not possible



With spring clip fixing



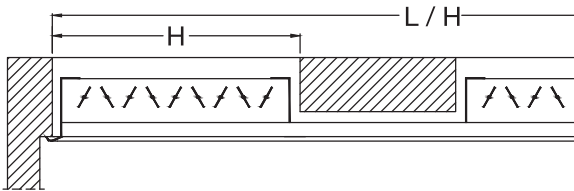
with latch fixing



with spring clip fixing

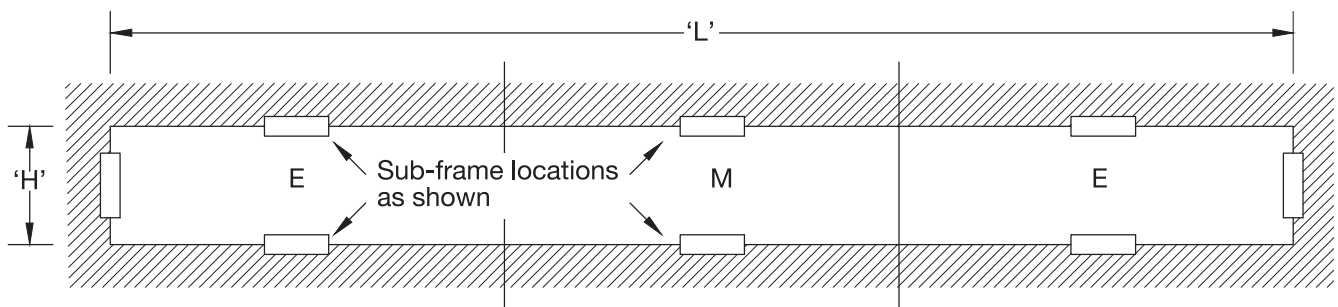
Assembly and Fixing Details

Installation sub-frame for Linear Grilles



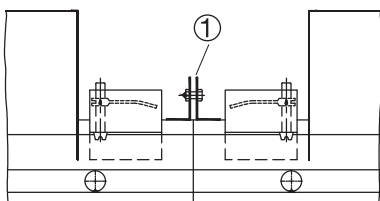
L/H = internal dimension of opening

When a linear grille is required with non-active sections, the rear sections are supplied loose for site assembly to meet the local requirements.

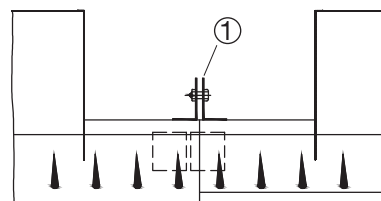


“E” and “M” sections corresponding to the face grille lengths for grille arrangement with sub-frame fixing positions to the opening.

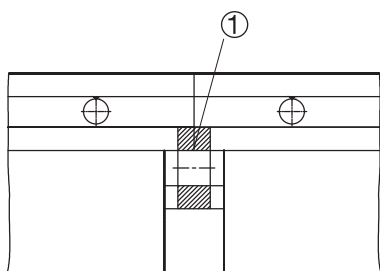
Joining Details



Type AH
① Bolt connection of installation subframes



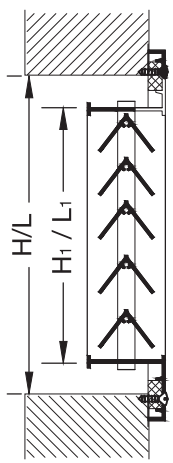
Type VAT
① Bolt connection of installation subframes



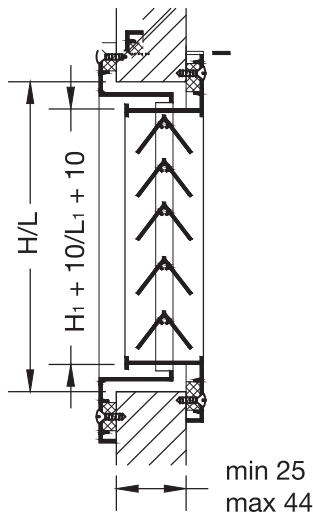
Type AF
① Bolt connection of grille face sections

Fixing Details · Nomenclature

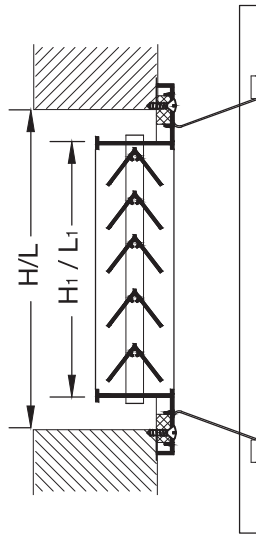
Type AGS



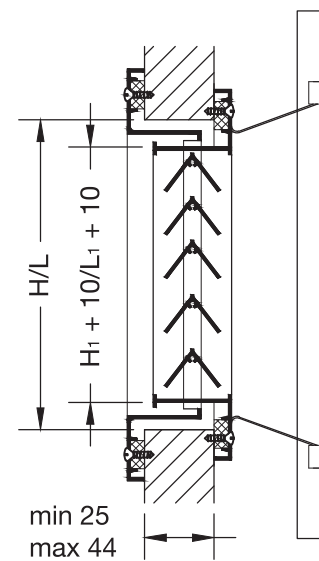
AGS



AGS - T



AGS - T

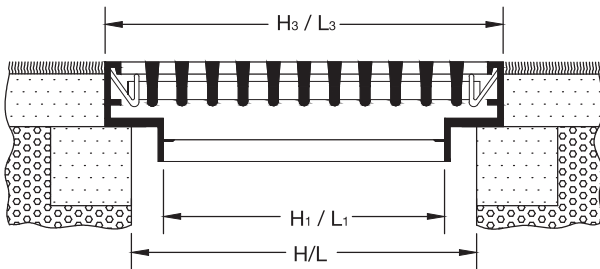


AGS - TL

For all constructions : $H_1 = H - 19$
 $L_1 = L - 19$

The light baffle plate and bracket for types AGS - L and AGS - TL are supplied loose and must be fitted on site by others.

Type AF



$H_1 + H - 20$ $H_3 + H + 32$
 $L_1 = L - 20$ $L_3 = L + 32$

Nomenclature

\dot{V} in l/s/m : Volume flow per metre length	Δt_L in K : Difference between core and room temperature at distance L
\dot{V} in m ³ /h/m : Volume flow per metre length	L_1 in m : Grille core size (length)
\dot{V}_t in l/s : Total volume flow	H_1 in m : Grille core size (height)
\dot{V}_t in m ³ /h : Total volume flow	Δp_t in Pa : Total pressure drop
L in m : Distance from the grille pr linear grille (throw)	L_{wa} in dB(A) : A - weighted sound power level, based on $A_{eff} = 0.1 \text{ m}^2$ (see table for corrections)
B in m : Spacing between two grilles	L_{WNC} : NC rating of sound power
\bar{v}_k in m/s : Air velocity in the duct	L_W in dB/Oct : Octave sound power level of regenerated noise based on $A_{eff} = 0.1 \text{ m}^2$ (see table for corrections)
\bar{v}_L in m/s : Time average air velocity at distance L	L_{pA}, L_{pNC} : A - weighting and NC rating respectively of room sound pressure level
$b_{0.2}$ in m : Distance from the centre of the airstream at which the velocity is maximum of 0.2 m/s	$L_{pA} \approx L_{WA} - 8\text{dB}$
y in m : Airstream drop or rise	$L_{pNC} \approx L_{WNC} - 8\text{dB}$
i : Induction ratio	
V_{eff} in m/s : Effective jet velocity	
A_{eff} in m ² : Effective outlet area	
h_{eff} in m : Effective outlet height ($A_{eff} = h_{eff} \times L_1/1000$)	
α in ° : Airstream discharge angle	
β in ° : Blade angle in the case of divergent setting	
Δt_z in K : Temperature difference between supply and room air	

Acoustic Data for Supply Air Application

Table 9 - 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

The sound power and pressure drop data given in the graphs below are based on an effective outlet area of 0.1 m^2 (i.e., $A_{eff} = 0.1 m^2$) with zero blade divergence.

Table 10 - Correction values for other blade setting.

Grille Face	0°	45°	90°	45°	90°
Pattern Control Blades	0°	0°	0°	45°	90°
ΔP_t	x 1,0	x 1,1	x 1,2	x 1,1	x 1,5
L_{WA} / L_{WNC}	-	+1	+3	+1	+6

- Grilles can have horizontal / vertical divergence
- Linear grilles can only have vertical divergence

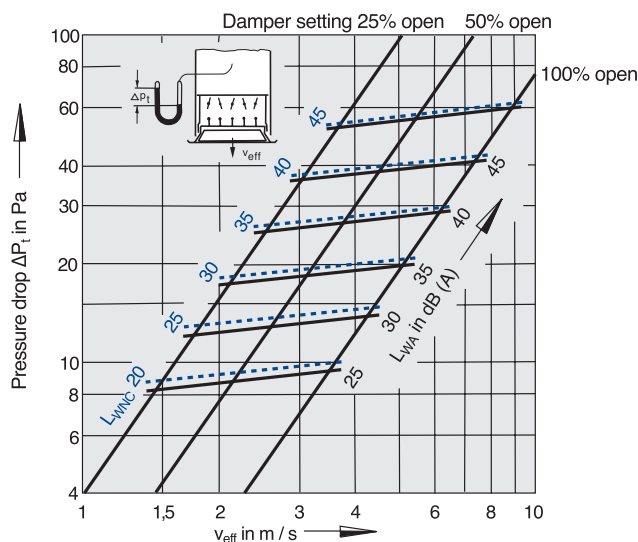
Table 11 - Correction values for $heff$

$heff$ in m	Linear grilles length L_1 in mm			
	2000	4000	4000	4000
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

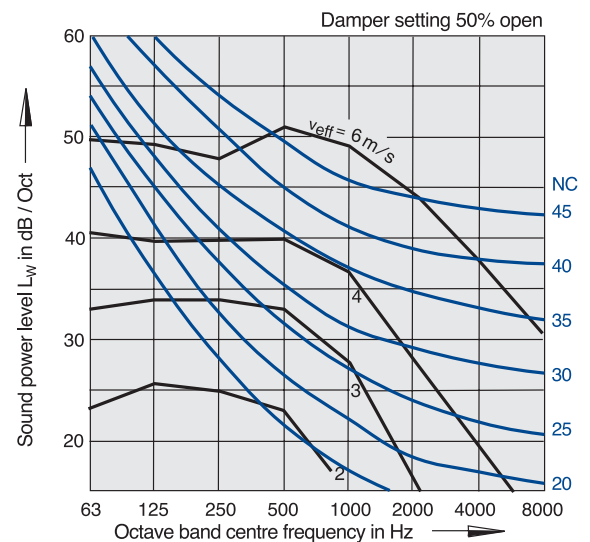
The values given in the graphs below are based on $heff = 0.1 m^2$ with zero blade divergence.

Note: Values given in Graph 1 for 100% damper open setting is also valid for grilles without opposed blade damper.

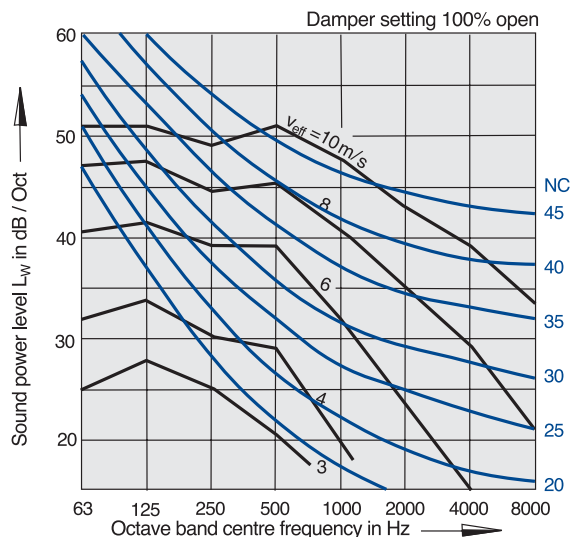
Graph 1: Sound Power and Pressure Drop for opposed blade damper with opposed blade damper (-AG or -DG).



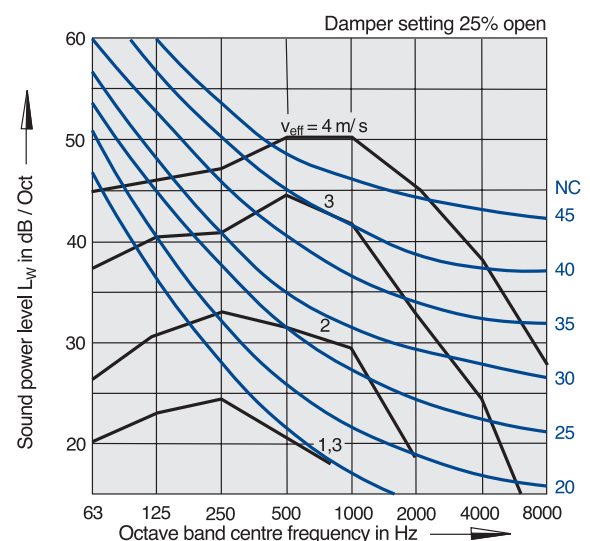
Graph 3: Octave band sound power levels with opposed blade damper with opposed blade damper (-AG or -DG) at 50% open.



Graph 2: Octave band sound power levels with opposed blade damper with opposed blade damper (-AG or -DG) at 100% open.



Graph 4: Octave band sound power levels with opposed blade damper with opposed blade damper (-AG or -DG) at 25% open.



Acoustic Data for Return Air Application

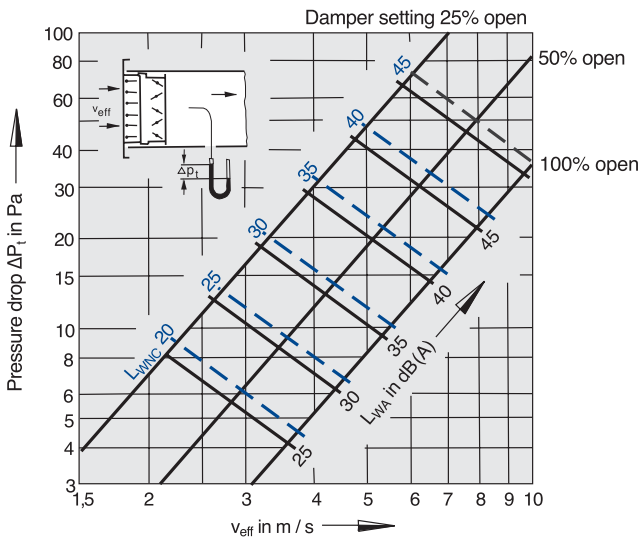
Table 12 - Correction values for A_{eff}

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

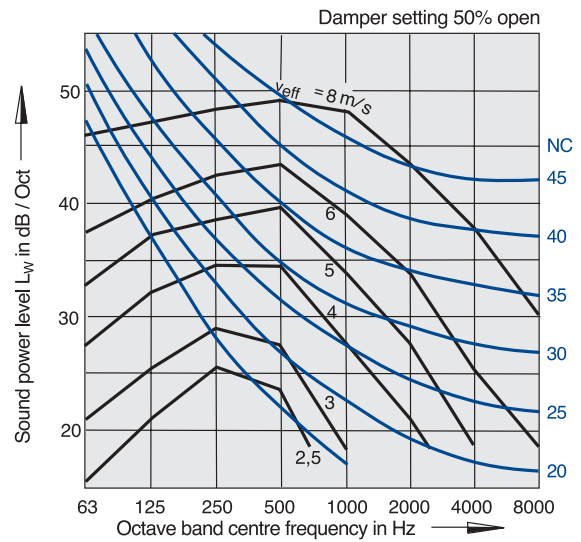
The sound power and pressure drop data given in the graphs below are based on an effective outlet area of $0.1 m^2$ (i.e., $A_{eff} = 0.1 m^2$) with zero blade divergence.

Note: Values given in Graph 5 for 100% damper open setting is also valid for grilles without opposed blade damper.

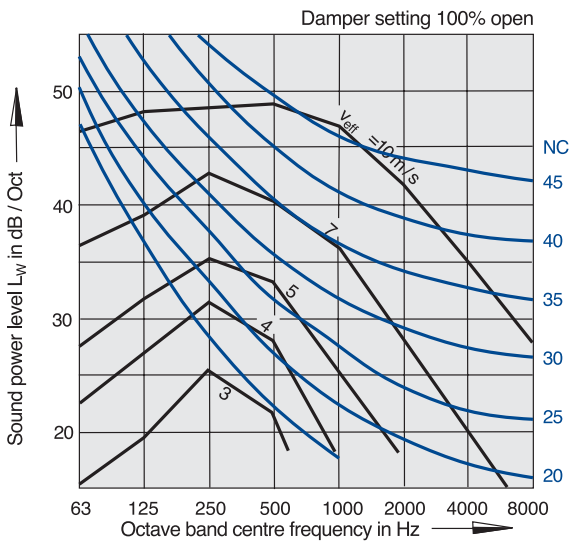
Graph 5: Sound Power and Pressure Drop for opposed blade damper with opposed blade damper (-AG).



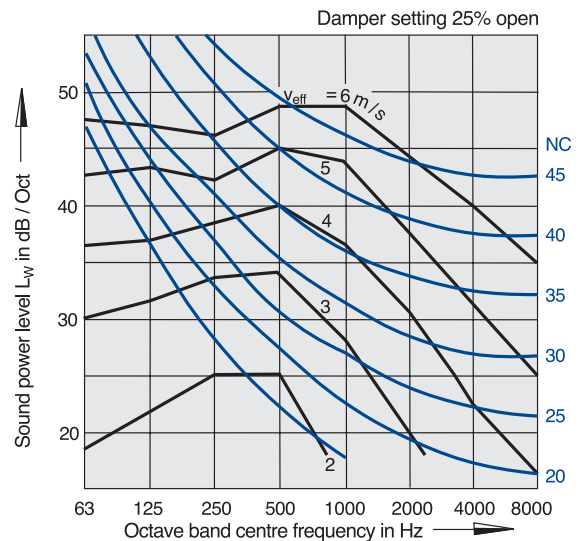
Graph 7: Octave band sound power levels with opposed blade damper with opposed blade damper (-AG) at 50% open.



Graph 6: Octave band sound power levels with opposed blade damper with opposed blade damper (-AG) at 100% open.



Graph 8: Octave band sound power levels with opposed blade damper with opposed blade damper (-AG) at 25% open.



For Grilles

Example

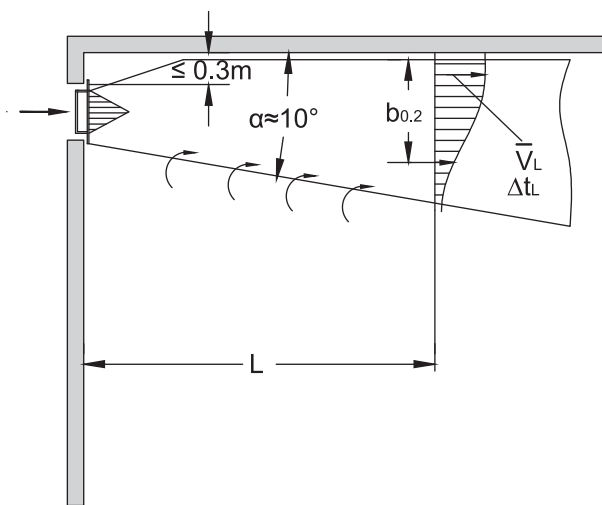
Data given:

Type of Grille selected: AT-A with ceiling effect.
 Total air flow rate, $\dot{V}_t = 150$ l/s.
 Maximum permissible jet velocity, $\bar{v}_L = 0.5$ m/s.
 Throw required, $L = 10$ m.
 Temperature differential, $\Delta t_z = 4$ K.

From Graph 9 on page 16

$A_{eff} = 0.41$ m²
 $v_{eff} = 3.8$ m/s
 $b_{0.2} = 1.2$ m
 $i = 15$
 $\Delta t_L / \Delta t_z = 0.13$
 Hence, Δt_L is;
 $\rightarrow 4 \times 0.13 = 0.52$ K.

Installation with ceiling effect.



From Table 14 on page 17 of this catalogue, the possible grille options for $A_{eff} = 0.041$ m² are;
 a. $L \times H = 700 \times 100$; $A_{eff} = 0.042$ m² or;
 b. $L \times H = 450 \times 150$; $A_{eff} = 0.041$ m²

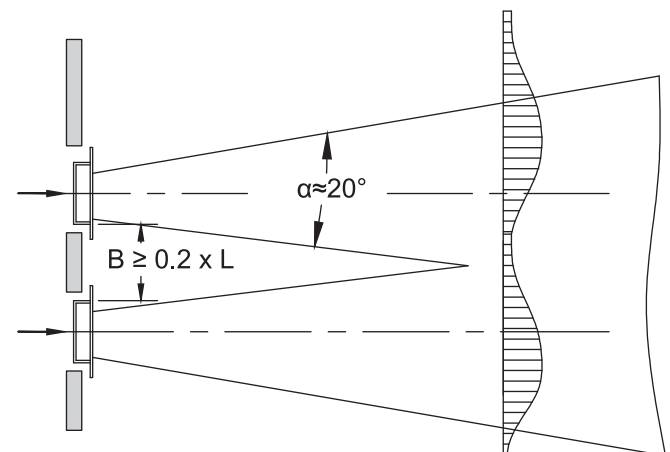
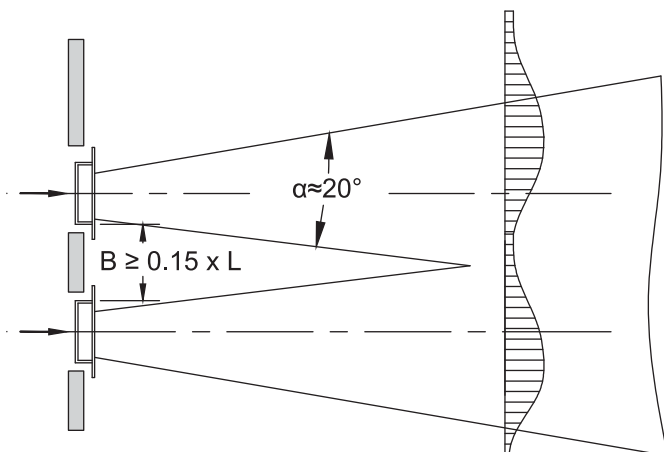
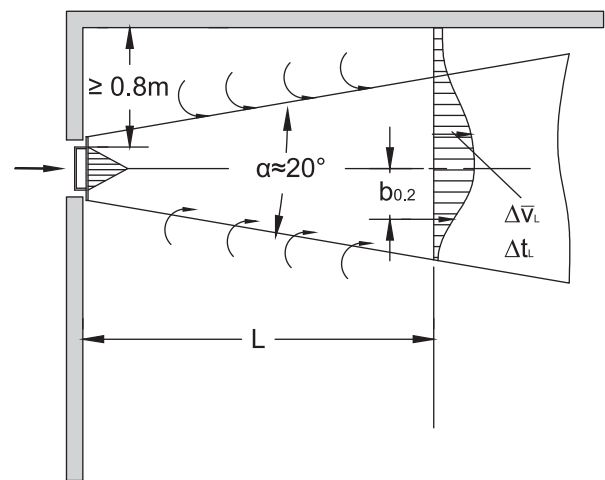
Hence, the minimum spacing between the grilles with ceiling effect for both options are as follow;

- a. $L \times H = 700 \times 100$; $B \geq 0.11$ m or;
- b. $L \times H = 450 \times 150$; $B \geq 0.07$ m.

Correction factors for installation without ceiling effect:

If the distance of the grille to the ceiling is ≥ 0.8 m, then the values given in Graph 9 for \bar{v}_L , $b_{0.2}$ and $\Delta t_L / \Delta t_z$ should be multiplied by a factor of 0.71.

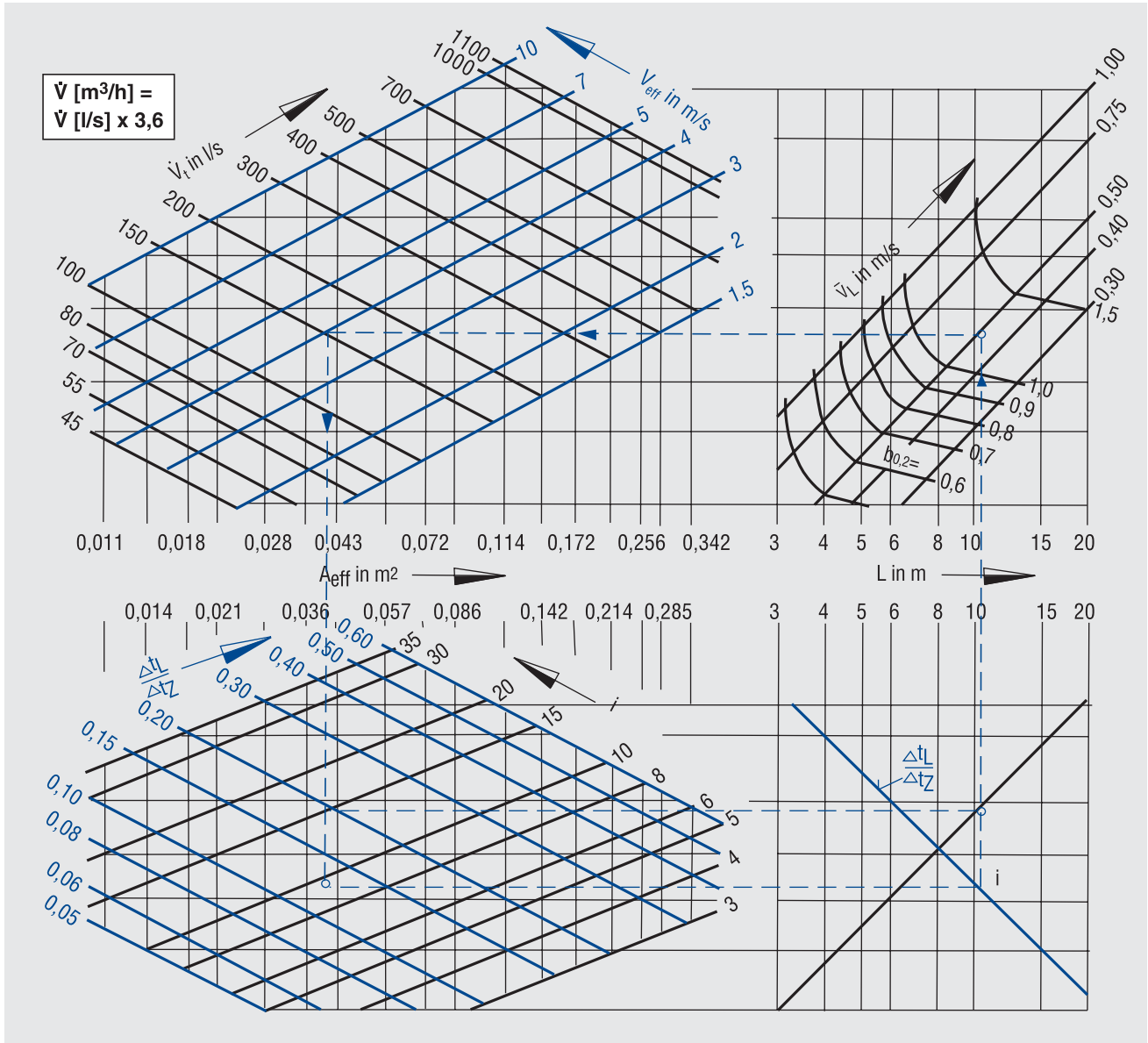
Installation without ceiling effect.



Effective Outlet Area · Aerodynamic Data

Grilles with ceiling effect

Graph 9



Technical Data · Effective Outlet Area

For Supply Air Application

Table 13 - Effective Outlet Area, A_{eff} of grilles (m^2) for Supply Air

H in mm	Type	L Length in mm														
		150	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200
100	AT · VAT	0.008	0.011	0.015	0.018	0.021	0.024	0.027	0.030	0.036	0.042	0.048	0.055	0.060	0.067	0.073
	AH · AF	0.006	0.008	0.010	0.012	0.014	0.017	0.019	0.021	0.026	0.030	0.035	0.039	0.044	0.048	0.053
150	AT · VAT	0.013	0.017	0.023	0.027	0.032	0.036	0.041	0.045	0.055	0.064	0.074	0.084	0.092	0.102	0.111
	AH · AF	0.009	0.013	0.016	0.020	0.023	0.027	0.030	0.034	0.041	0.048	0.056	0.063	0.070	0.077	0.084
200	AT · VAT	-	0.023	0.030	0.036	0.043	0.049	0.055	0.061	0.074	0.087	0.099	0.112	0.124	0.137	0.150
	AH · AF	-	0.017	0.022	0.027	0.032	0.037	0.042	0.047	0.056	0.066	0.076	0.085	0.095	0.105	0.114
250	AT · VAT	-	-	0.038	0.047	0.055	0.063	0.071	0.079	0.095	0.112	0.129	0.145	0.161	0.178	0.194
	AH · AF	-	-	0.028	0.035	0.041	0.047	0.053	0.059	0.072	0.084	0.096	0.109	0.121	0.133	0.146
300	AT · VAT	-	-	-	0.056	0.066	0.076	0.085	0.095	0.114	0.134	0.154	0.174	0.193	0.213	0.233
	AH · AF	-	-	-	0.042	0.049	0.057	0.064	0.072	0.087	0.102	0.117	0.132	0.147	0.162	0.177
350	AT · VAT	-	-	-	-	0.077	0.088	0.099	0.110	0.133	0.157	0.180	0.203	0.225	0.248	0.271
400	AT · VAT	-	-	-	-	-	0.103	0.116	0.128	0.155	0.182	0.209	0.236	0.262	0.289	0.316
450	AT · VAT	-	-	-	-	-	-	0.131	0.144	0.174	0.204	0.235	0.265	0.293	0.324	0.354
500	AT · VAT	-	-	-	-	-	-	-	0.160	0.193	0.227	0.260	0.294	0.325	0.359	0.393
600	AT · VAT	-	-	-	-	-	-	-	-	0.234	0.275	0.315	0.356	0.394	0.435	0.476

Aerodynamic Data

For Grilles

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 $v_{\text{eff mean}}$.

The volume flow is then calculated as follows :

$$\dot{V}_t \text{ (l/s)} = v_{\text{eff mean}} \text{ (m/s)} \times A_{\text{eff}} \text{ (m}^2\text{)} \times 1000$$

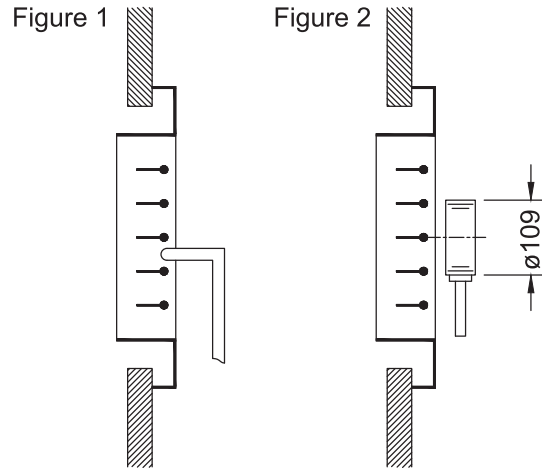
Rotating Vane Anemometer (figure 2) :

The measurement instrument should be evenly transversed across the entire grille face to determine a value of v_{mean}

The volume flow is then calculated as follows:

$$\dot{V}_t \text{ (l/s)} = v_{\text{mean}} \text{ (m/s)} \times A_{\text{eff}} \text{ (m}^2\text{)} \times 1.33 \times 1000$$

Volume Flow Measurement



Correction Factors (where L = constant)

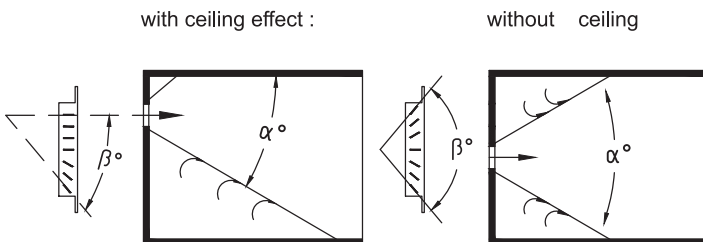
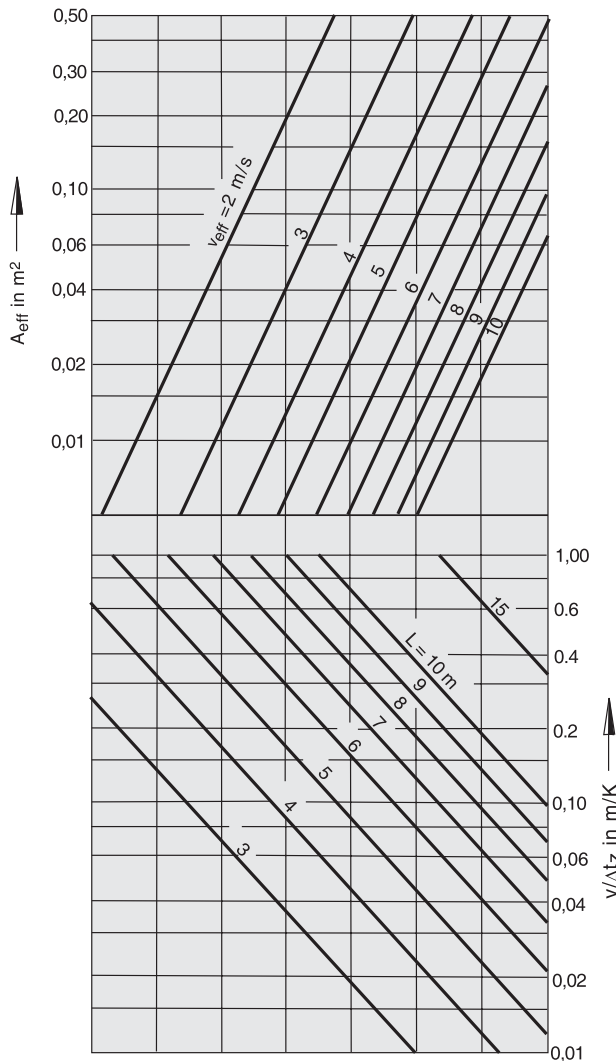


Table 14 – Correction for graphs 10 and 11 on page 20 for setting of blade divergence

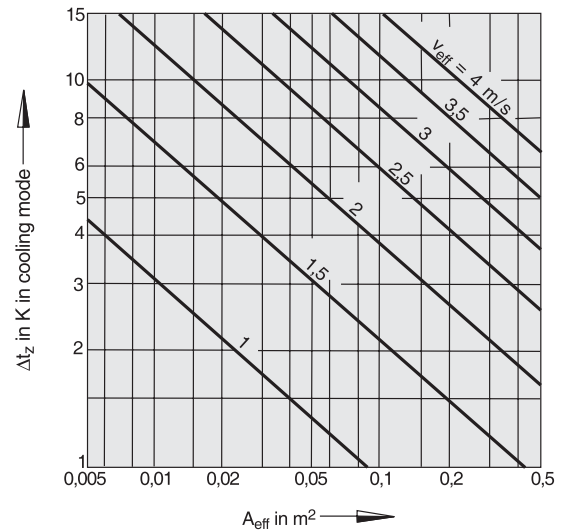
β	45°	90°
α	35°	60°
\bar{v}_L	x 0,7	x 0,5
$\Delta t_L / \Delta t_z$	x 0,7	x 0,5
i	x 1,4	x 2,0
γ	x 1,4	x 2,0
with ceiling effect B ≥	L x 0,2	L x 0,3
without ceiling effect B ≥	L x 0,25	L x 0,3

For Grilles

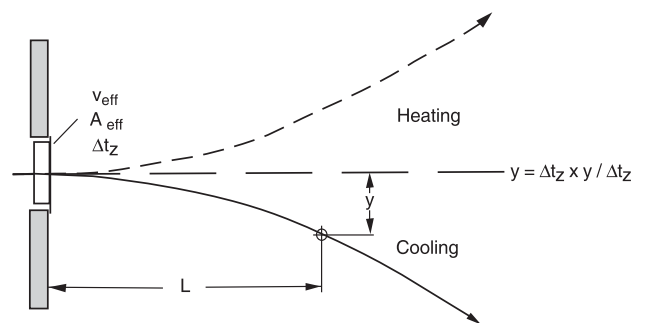
Graph 10: Without ceiling effect
Airstream drop or rise 'y' in metres due to temperature difference.



Graph 11: With ceiling effect
Maximum temperature difference Δt_z in the cooling mode.



Note: To prevent the airstream from dropping into the occupied zone, reference should be made to Graph 11 above. This shows the maximum temperature differential which can be related to the effective outlet area and effective outlet velocity.



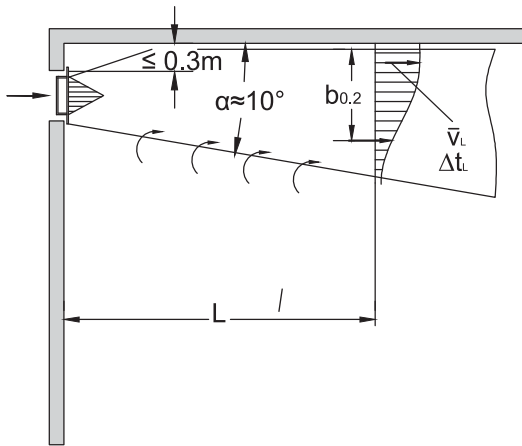
Aerodynamic Data

For Linear Grilles

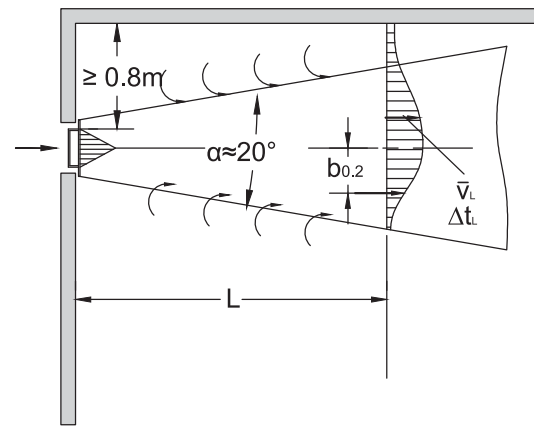
Note: Apply the correction factors for installation without ceiling effect if the distance of the air outlet to the ceiling is ≥ 0.8 m as shown in the diagram below.

The values \bar{v}_L , $b_{0.02}$, $\Delta t_i / \Delta t_z$ should be multiplied by a factor of 0.71.

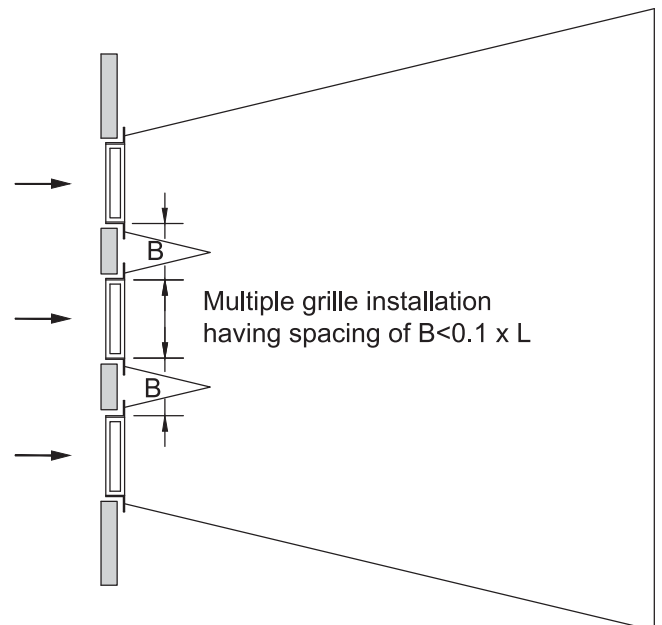
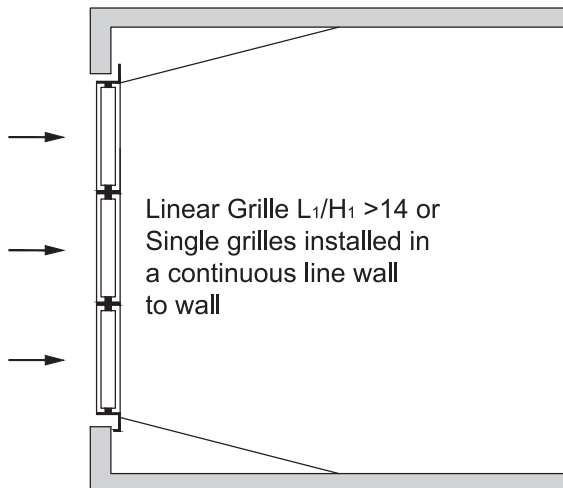
Installation with ceiling effect.



Installation without ceiling effect.



Installation of Linear Grilles :



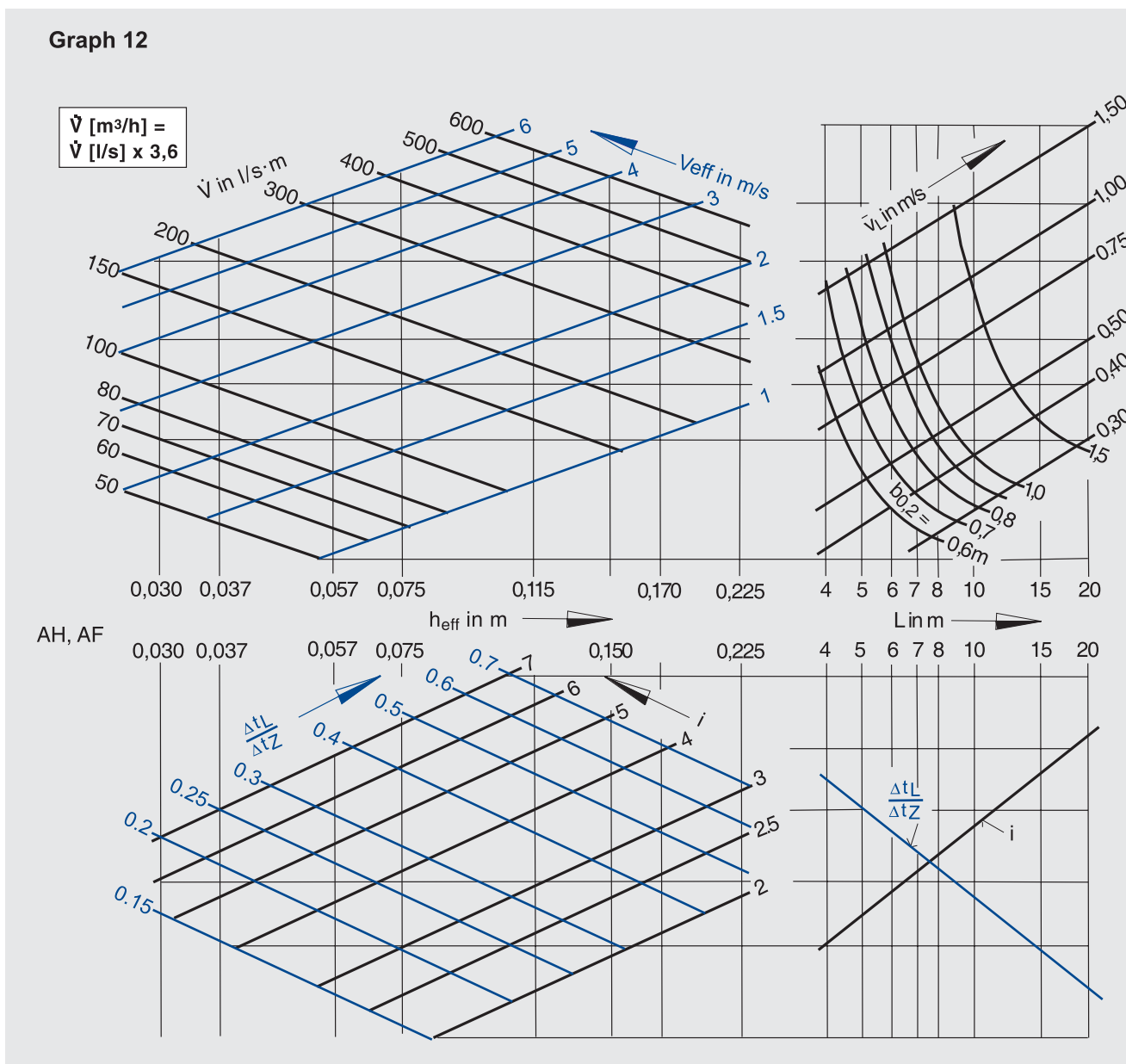
For Linear Grilles with ceiling effect

Table 15: Effective Outlet Height (h_{eff})

Type	h_{eff} in mm									
	75	87.5	100	125	150	200	225	250	300	325
AH•AF	0.030	0.040	0.047	0.057	0.075	0.102	0.115	0.130	0.158	0.170
VAT	-	-	0.057	-	0.093	0.129	-	0.167	0.202	-

Note: Data for VAT will be deleted if it is agreed that this should NOT be offered as a linear grille.

Graph 12



Aerodynamic Data

For Linear Grilles

Determination of Volume Flow

The air flow rate through the grille can be determined by using either a pitot tube or a rotating vane anemometer with deflection blades set at 0°. Air velocity measurements should be taken in different locations at equal distance across the grille face. Then, determine the arithmetic mean for the air velocity, V_{eff} and use the following formulae to calculate the air flow rate;

a. For Pitot Tube Method

$$V \text{ (l/s)} = V_{eff} \text{ (m/s)} \times h_{eff} \text{ (m)} \times L1 \text{ (m)} \times 1000$$

$$V \text{ (m}^3\text{/h)} = V_{eff} \text{ (m/s)} \times h_{eff} \text{ (m)} \times L1 \text{ (m)} \times 3600$$

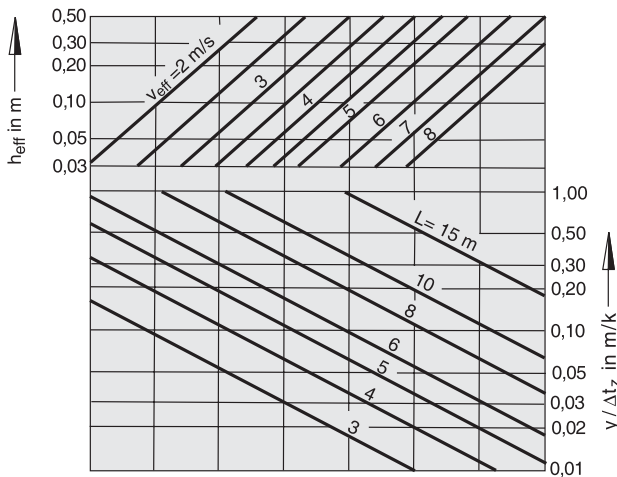
b. For Vane Anemometer Method

$$V \text{ (l/s)} = V_{eff} \text{ (m/s)} \times h_{eff} \text{ (m)} \times L1 \text{ (m)} \times 1.33 \times 1000$$

$$V \text{ (m}^3\text{/h)} = V_{eff} \text{ (m/s)} \times h_{eff} \text{ (m)} \times L1 \text{ (m)} \times 1.33 \times 3600$$

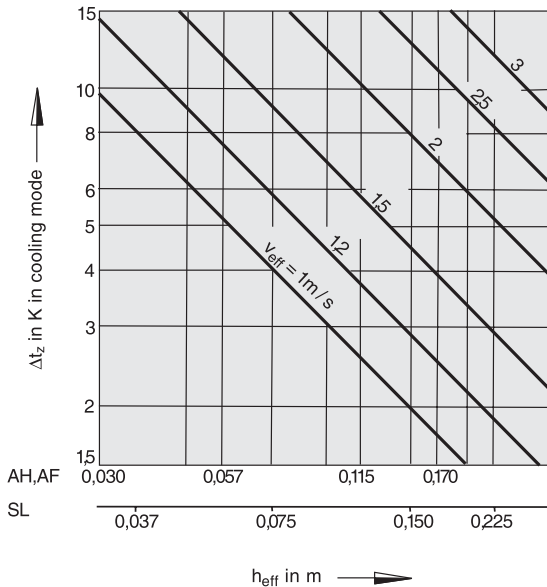
Graph 13: Without ceiling effect

Airstream drop or rise 'y' due to temperature difference.

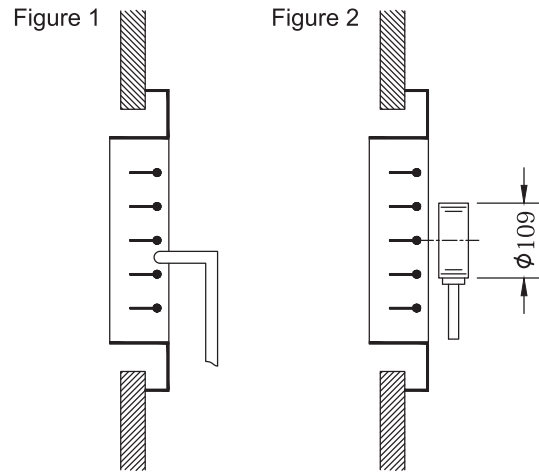


Graph 14: With ceiling effect.

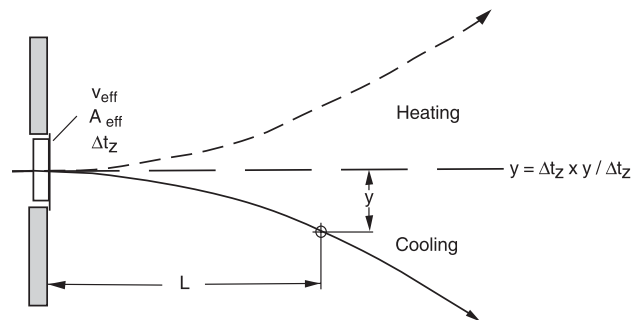
Maximum temperature difference Δt_z in cooling mode.



Volume Flow Measurement



Note: To prevent the airstream from dropping into the occupied zone, reference should be made to Graph 11 above. This shows the maximum temperature differential which can be related to the effective outlet area and effective outlet velocity.



Correction Factors (where L = constant)

with ceiling effect :

without ceiling effect :

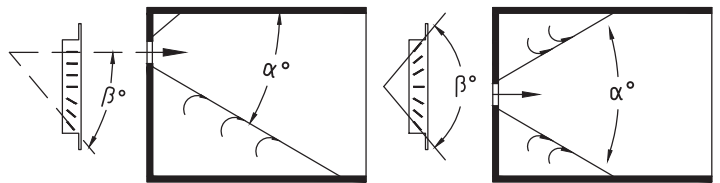


Table 16: Correction factors for graphs 13 and 14 for setting blade divergence.

β	45°	90°
α	35°	60°
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

Aerodynamic Data for Return Air Grilles

Table 17: Corrective factor, f

Type	f
AT•VAT	1.6
AH•AF	1.9

Airflow measurement method:

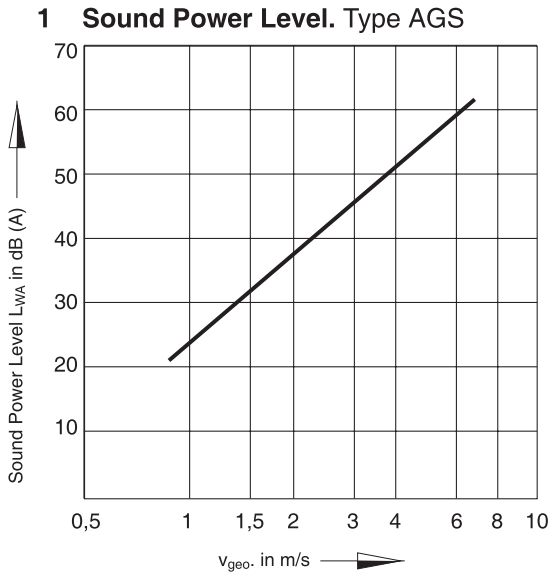
Use a rotating vane anemometer to measure the velocity evenly across the entire face of the grille and then calculate the average velocity (i.e., v_{mean}) across the face. The air flow rate is determined using either one of the following formulas;

- a. \dot{V} (l/s) = v_{mean} (m/s) x A_{eff} (m²) x f x 1000
- b. \dot{V} (m³/hr) = v_{mean} (m/s) x A_{eff} (m²) x f x 3600

Table 18: Effective Inlet Area - A_{eff} (m²)

H (mm)	Type	Length in mm														
		150	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200
100	AT.VAT	0.006	0.008	0.010	0.013	0.015	0.017	0.020	0.022	0.026	0.031	0.036	0.040	0.045	0.049	0.054
	AH.AF	-	0.006	0.008	0.010	0.012	0.013	0.015	0.017	0.020	0.024	0.028	0.031	0.035	0.039	0.042
150	AT.VAT	0.010	0.014	0.018	0.022	0.026	0.029	0.033	0.037	0.044	0.052	0.060	0.067	0.075	0.082	0.089
	AH.AF	0.006	0.009	0.012	0.015	0.018	0.021	0.024	0.026	0.032	0.038	0.044	0.050	0.055	0.061	0.067
200	AT.VAT	-	0.019	0.024	0.029	0.034	0.039	0.045	0.050	0.060	0.070	0.080	0.091	0.101	0.112	0.122
	AH.AF	-	0.012	0.016	0.021	0.025	0.029	0.032	0.036	0.044	0.052	0.060	0.068	0.076	0.084	0.092
250	AT.VAT	-	-	0.031	0.038	0.044	0.051	0.057	0.064	0.078	0.091	0.105	0.118	0.132	0.147	0.158
	AH.AF	-	-	0.022	0.027	0.032	0.037	0.042	0.046	0.056	0.066	0.077	0.086	0.096	0.106	0.117
300	AT.VAT	-	-	-	0.045	0.053	0.061	0.069	0.077	0.094	0.110	0.126	0.141	0.153	0.174	0.190
	AH.AF	-	-	-	0.032	0.038	0.045	0.051	0.056	0.068	0.080	0.093	0.104	0.117	0.129	0.136
350	AT.VAT	-	-	-	-	-0.063	0.072	0.081	0.090	0.109	0.128	0.147	0.165	0.186	0.203	0.221
400	AT.VAT	-	-	-	-	-	0.082	0.094	0.106	0.127	0.148	0.167	0.192	0.215	0.230	0.258
450	AT.VAT	-	-	-	-	-	-	0.103	0.117	0.142	0.167	0.191	0.215	0.240	0.265	0.289
500	AT.VAT	-	-	-	-	-	-	-	0.130	0.158	0.185	0.211	0.239	0.266	0.296	0.323
600	AT.VAT	-	-	-	-	-	-	-	-	0.192	0.211	0.256	0.281	0.324	0.357	0.388

Graph 15: Sound Power Level for AGS



Graph 16: Pressure Drop for AGS

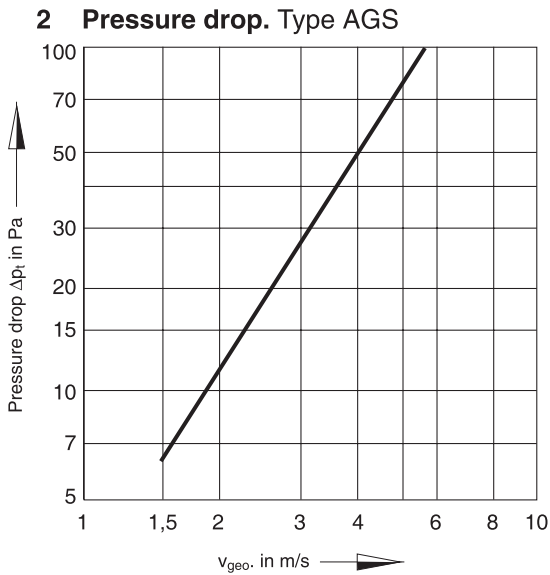


Table 19: 'Free area' for AGS

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

Table 20: Correction factor for AGS

Correction Values for AGS						
A_{geo} (m^2)	0.0075	0.015	0.03	0.06	0.12	0.24
L_{WA}	-6	-3	0	+3	+6	+9

General Specification

TROX offers a wide variety of grilles and linear grilles that are suitable for supply air or return air application. Some of these are designed to be fitted onto walls or, directly to sheet metal ducting. Others are meant to be mounted onto the wall or floor.

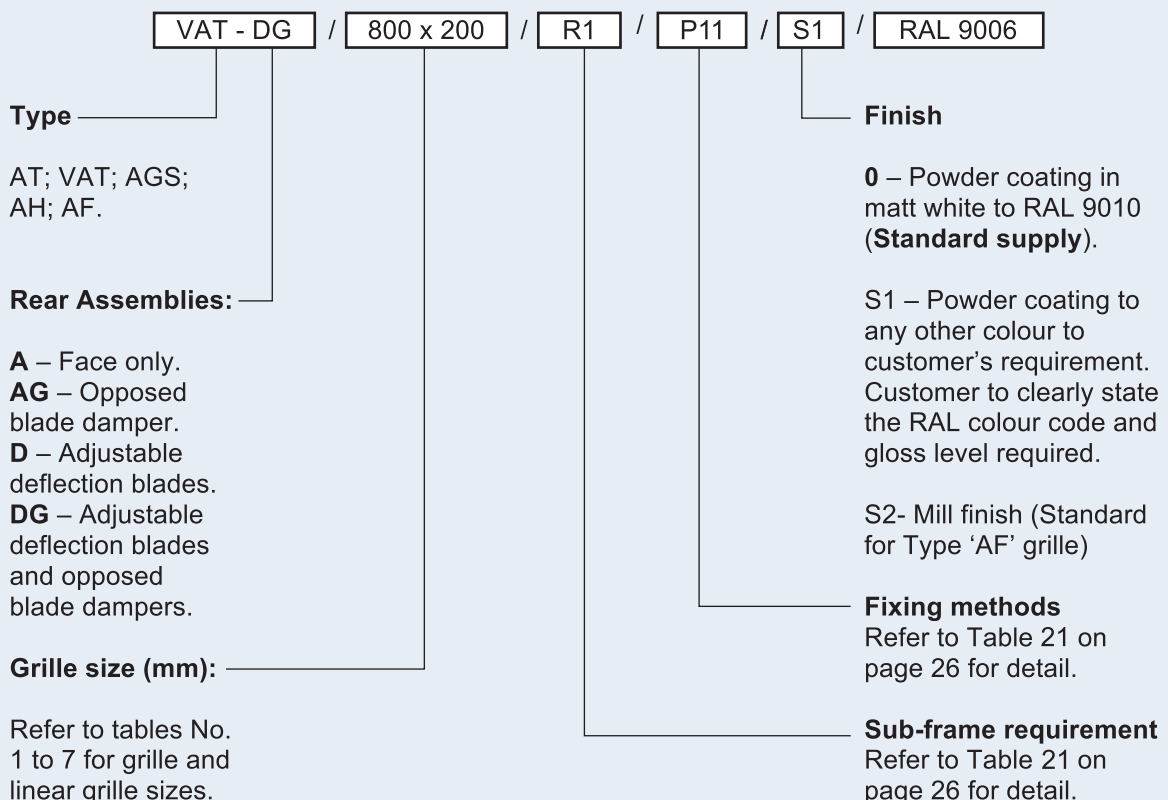
One in particular, The Type 'AGS' grille is designed for air transfer application only and, it is meant to be installed onto partition walls or doors.

All of these TROX grilles and linear grilles as described in this catalogue are made from extruded aluminium sections.

These aluminium grilles are generally powder coated to RAL 9010 in matt white and the rear assemblies will be painted black to RAL 9005.

NOTE: If other colour is needed for the grilles, customer should state the RAL colour code and the level of gloss needed for TROX to provide a timely respond to your requirement.

Special stainless steel or plastic grilles are available, if requested. Delivery lead-time for such item can long.



Order Examples:

a. For Grilles

Make: TROX
Type: AT-AG/ 800 x 200/ 0/ 0/ 0
Quantity: 20 nos.

b. For Linear Grilles with sub-frame

Make: TROX
Type & Qty: AF-A/2000M x 150/ S2, Qty. -1 No.
AF-A/1910E x 150/S2, Qty. - 1 No.
AF-A/1910E x 150/S2, Qty. - 1 No.
Total opening length, L – 5799 mm

Rear Assemblies

The rear assemblies are largely made from formed galvanized sheet steel, painted in black to RAL 9005.

Table 21: Sub-frame and Fixing Options

Type		No sub-frame as standard	With sub-frame	Visible border width (mm)	Fixing Options			
					Screw fixings	Concealed Fixing		
						Spring clip fastening	Latch fastening	
Grilles	AT • VAT	0	R1	32	0	P11	S11	
	AH	0	R1	30	0	P11	S11	
	AF			5.5 (Note 2)	0			
	AGS	0	R1	30	0	P11	S11	
Linear Grilles	End section	VAT	0	T1	32	0	P11	S11
		AH	0	V1	30	0		
		AF			5.5 (Note 2)	0		
	Intermediate section	VAT	0	W1	32	0	P11	S11
		AH	0	W1	30	0	P11	S11
		AF			5.5 (Note 2)	0		

Notes:

1. '0' is for standard construction.
2. The Type 'AF' grille has 'Z' shaped border that is suitable for screw fixings and, which is concealed. The visible part of the border is of the same width as the blades, giving the appearance that there is no visible border around the grille.