K1÷K4
grilles

περισσότερα
learn more

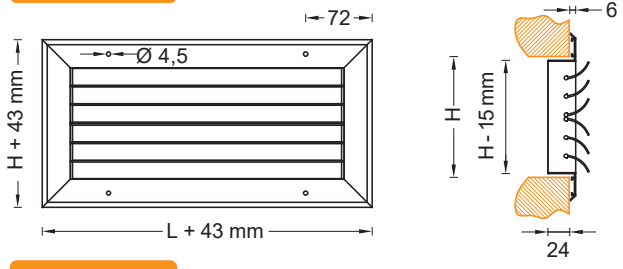
K1÷K4 grilles

K1 ÷ K4 (curved) ceiling grilles have independent, manually adjustable curved blades configured for air supply in 1 ÷ 4 directions respectively. They are suitable for use in air-conditioning and ventilation systems and for installation on a ceiling or duct.

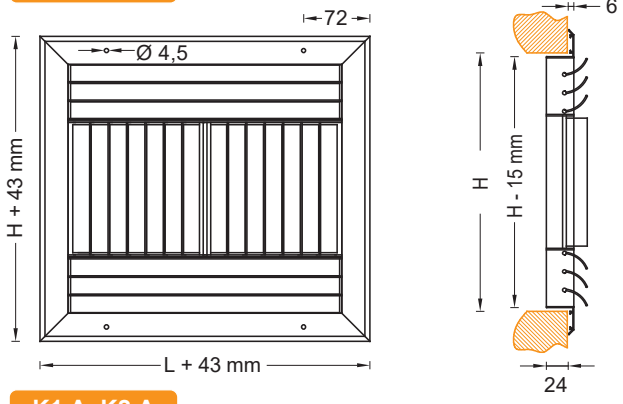
K1 ÷ K4 ceiling grilles are made of aluminium or aluminium painted in RAL color. It is possible to manufacture in galvanized or stainless steel and copper on request :
K1 ÷ K4... : Aluminium or **aluminium painted in RAL colour**.

They can be installed in spaces up to 5 m high and are ideal for systems with variable flow rate as the blade configuration achieves a constant morphology supply at high speeds. The high velocity intake capability makes the grilles **K1 ÷ K4** suitable for installation in areas with a large temperature difference between the room air and the supply air.

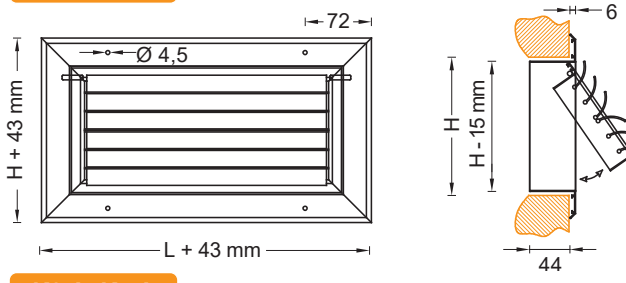
K1, K2



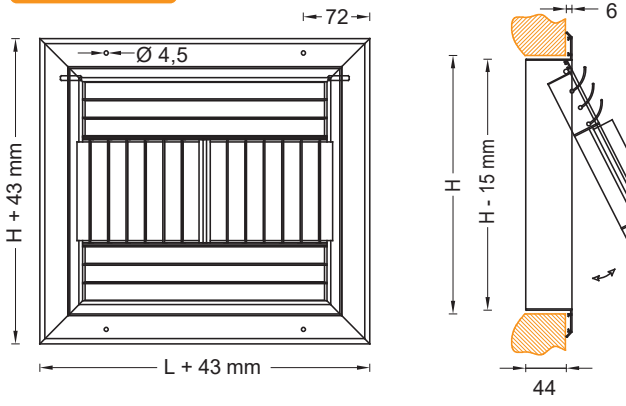
K3, K4



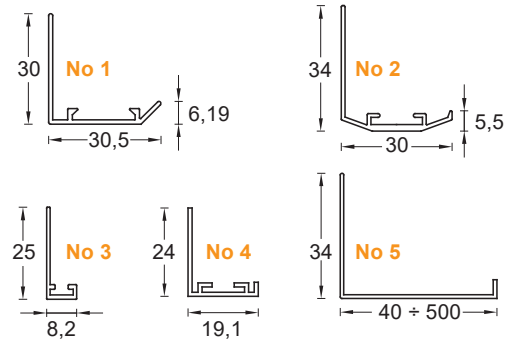
K1.A, K2.A



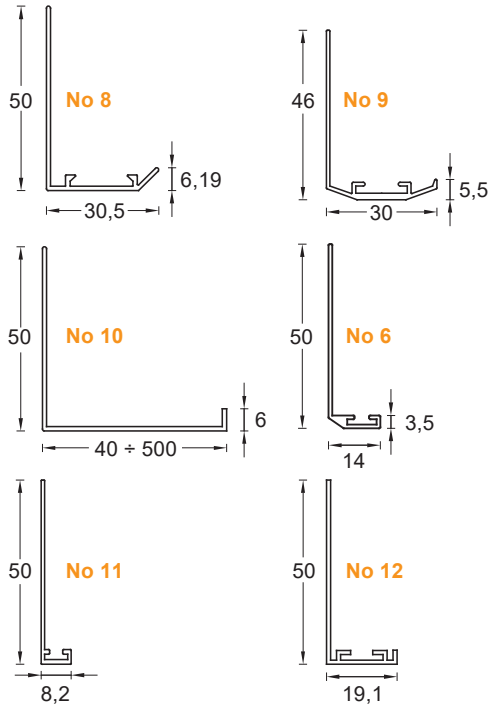
K3.A, K4.A



Available frames



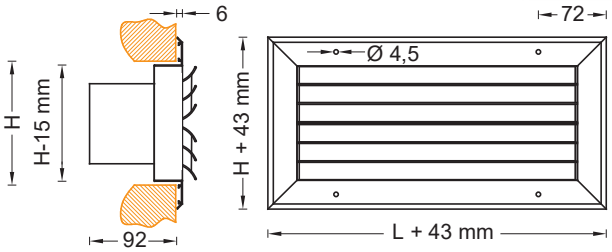
Available frames — Accessible



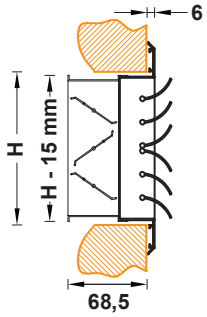
T: ATHENS +30 211 70.55.500 / THES/NIKI +30 2311 82.40.00

K1 & K2 GRILLES WITH AUTOMATIC BLADE MOVEMENT

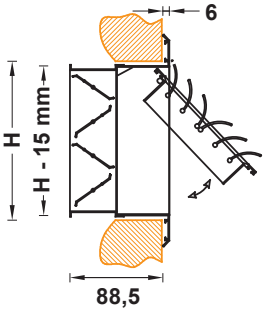
K1+TP and **K2+TP** ceiling grilles have grouped adjustable curved blades configured for air intake in 1 and 2 directions respectively. Adjustment is automatic via thermodynamic piston. They are suitable for use in air-conditioning and ventilation systems and for installation on a ceiling or duct. They are made of **aluminium**.



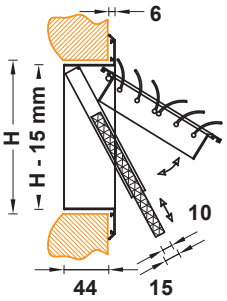
K1, K2+D



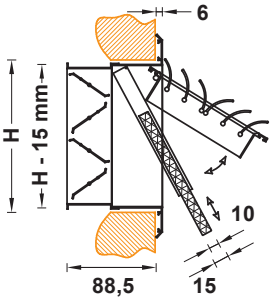
K1.A, K2.A+D



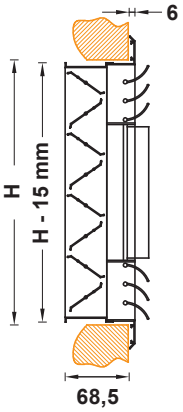
K1.A, K2.A+F



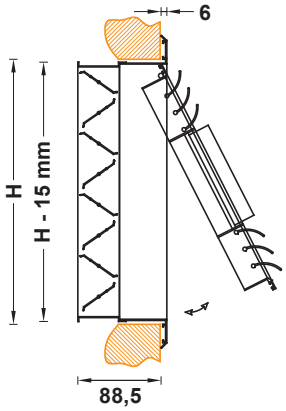
K1.A, K2.A+D+F



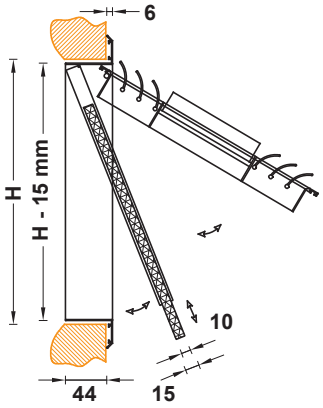
K3, K4+D



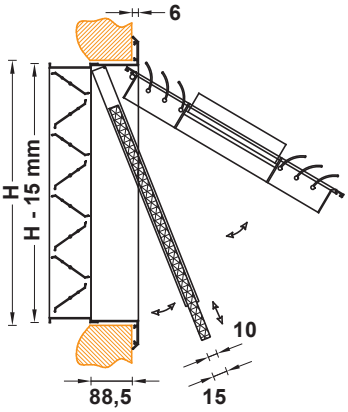
K3.A, K4.A+D



K3.A, K4.A+F



K3.A, K4.A+D+F



K1 ÷ K4 GRILLES - TYPES

K1	From **aluminium**. Independent, manually adjustable curved blades configured for air discharge in **1 direction**.
K2	From **aluminium**. Independent, manually adjustable curved blades configured for air discharge in **2 directions**.
K3	From **aluminium**. Independent, manually adjustable curved blades configured for air discharge in **3 directions**.
K4	From **aluminium**. Independent, manually adjustable curved blades configured for air discharge in **4 directions**.
K1 ÷ K4 +D	From **aluminium**. Grille K1 ÷ K4 with **volume damper**.
K1 ÷ K4 +E	From **aluminium**. Grille K1 ÷ K4 with **equalizing grid**.
K1 ÷ K4 +D+E	From **aluminium**. Grille K1 ÷ K4 with **volume damper and equalizing grid**.
K1.A ÷ K4.A	From **aluminium**. Grille K1 ÷ K4 **accessible**.
K1.A ÷ K4.A + F	From **aluminium**. Grille K1 ÷ K4 a**ccessible with G3 filter**.

Upon request, it is possible to manufacture **K1 ÷ K4** grilles with manually adjustable curved blades configured in groups.

K1 ÷ K4 INSTALLATION OPTIONS

1. Visible installation with screws
For easy, quick and secure installation. The number of screws required depends on the size of the grille. Bigger grilles require greater number of screws. In case the grille is extremely big, it can be fragmented according to specifications. **For all K1 ÷ K4 types**.

3. Concealed installation with Π-shaped subframe
For situations that require both an aesthetically better result and a secure installation. A Π-shaped frame is mounted in the hole in which the grille is to be installed and supported by visible screws. The grille is secured on the frame with internal screw located at the back of the grille. This screw is accessible by screwdriver through the front face of the grille. **Not used for K1.A ÷ K4.A accessible grilles**.

4. Concealed installation with internal screws at the side of the grille
For K1.A ÷ K4.A accessible grilles that require both an aesthetically better result and a secure installation. The grille is secured in the hole with internal screws placed in both sides of the grilles. The screws are accessible through the accessible face of the grille.

K1 ÷ K4 GRILLES SELECTION

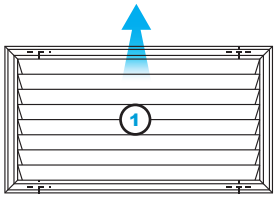
The selection of **K1 ÷ K4** grilles will be made using the following diagrams and in accordance with the guideline **CR 1752:1998** (Ventilation for buildings - Design criteria for the indoor environment).

The technical specifications for **K1 ÷ K4** grilles are the following :

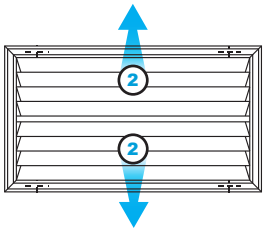
Grille width	**W**	[mm]
Grille height	**H**	[mm]
Grille Surface Factor	**Af**	
Pressure drop inside the grille	**ΔP**	[Pa]
Max air velocity inside the grille	U_o	[m/s]
Noise level	**Θ**	dB[A]
Temperature difference Supply / Room	**ΔT**	^{0}C
Horizontal stream range	X_o	[m]
Horizontal stream vertical drop	Y_o	[m]
Horizontal stream velocity at distance X	u_T	[m/s]
Horizontal air-stream temperature	T_T	^{0}C
Distance between grille and point of stream collision	A_S	[m]
Vertical stream range	Y_K	[m]
Vertical stream velocity at distance Y	u_K	[m/s]
Vertical air-stream temperature	T_K	^{0}C
Vertical stream displacement angle	γ	
Displaced vertical stream range	y_K	[mm]
Vertical stream horizontal deflection for angle “c”	x_K	[mm]

AIR DISCHARGING DIRECTIONS

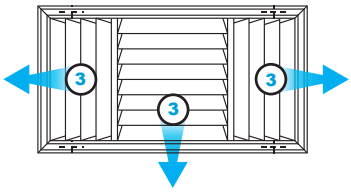
K1
Air discharge
in 1 direction



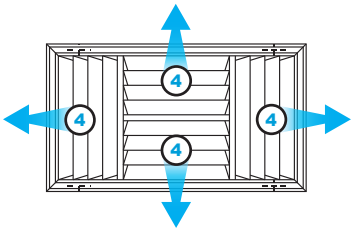
K2
Air discharge
in 2 directions



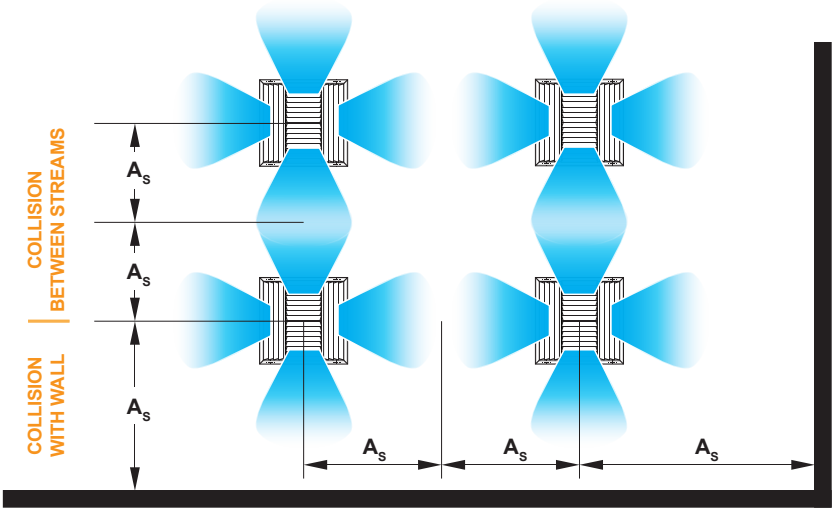
K3
Air discharge
in 3 directions

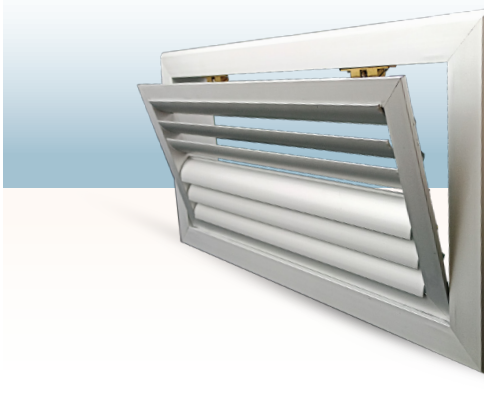


K4
Air discharge
in 4 directions

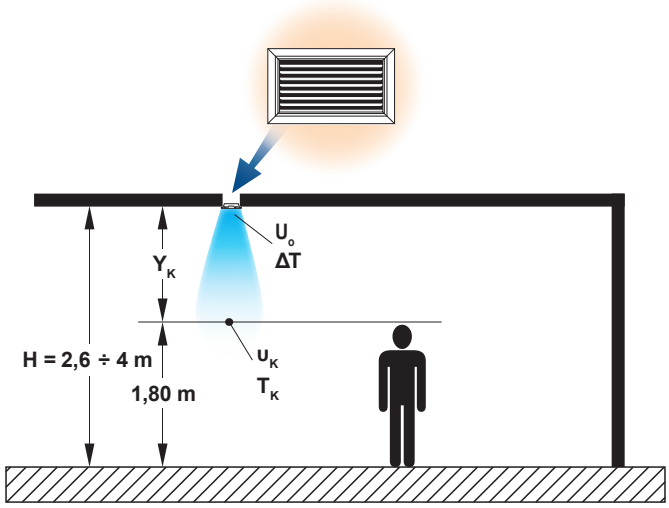


K1 ÷ K4 CEILING GRILLES ROOM PLACEMENT

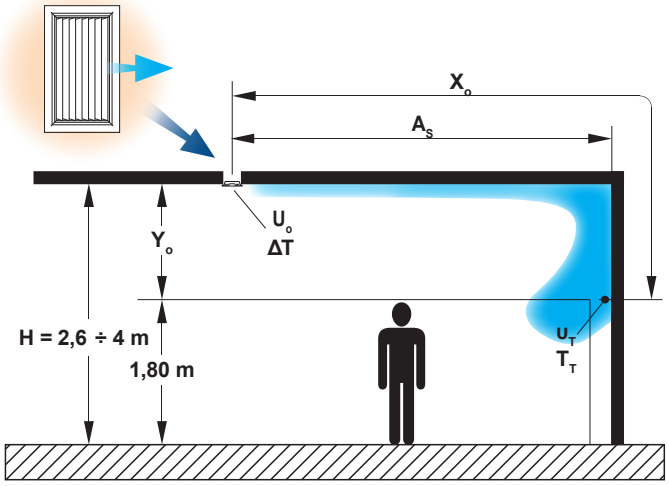




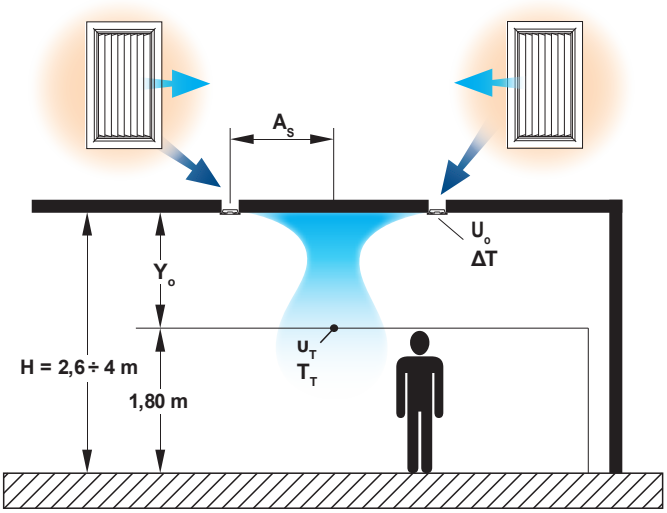
AIR DISCHARGE OPTIONS



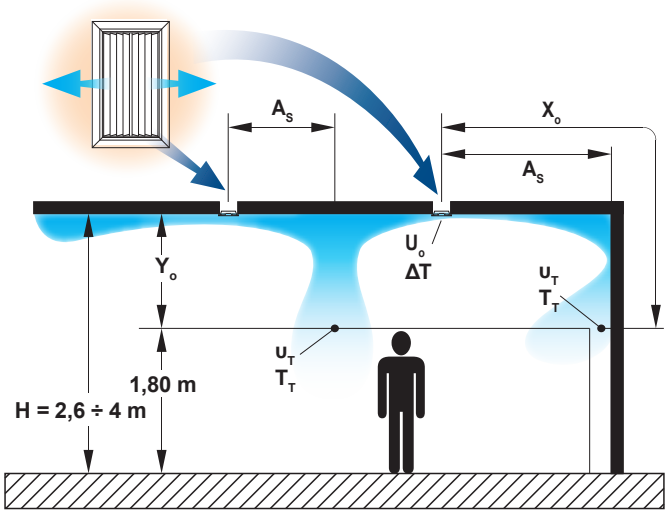
Vertical discharge



Horizontal discharge to 1 direction & stream collision with wall



Horizontal discharge to 1 direction & collision between streams



Horizontal discharge to 2 directions & collision between streams and between stream and wall

The standard production dimensions for **K1 ÷ K4** grilles are given in the surface factor selection table which follows, but it is possible to produce any custom dimension under request.

PRESSURE DROP & NOISE CALCULATION OF K1 ÷ K4 GRILLES

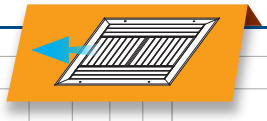


DIAGRAM 1.3

Noise Level Θ [dB(A)]

100 90 80 70 60 50 40 30 20 10

100 m³/h · 200 m³/h · 400 m³/h · 600 m³/h · 800 m³/h · 1.000 m³/h · 1.500 m³/h · 2.000 m³/h · 3.000 m³/h · 4.000 m³/h · 5.000 m³/h · 6.000 m³/h

2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 100 150

DIAGRAM 1.2

Pressure Drop ΔP [Pa]

100 80 60 50 40 30 20 10 8 6 5 4 3 2 1

100 m³/h · 200 m³/h · 400 m³/h · 600 m³/h · 800 m³/h · 1.000 m³/h · 1.500 m³/h · 2.000 m³/h · 3.000 m³/h · 4.000 m³/h · 5.000 m³/h · 6.000 m³/h

2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 100 150

DIAGRAM 1.1

Maximum Air Velocity U_0 [m/sec]

10 8 7 6 5 4 3 2 1

100 m³/h · 200 m³/h · 400 m³/h · 600 m³/h · 800 m³/h · 1.000 m³/h · 1.500 m³/h · 2.000 m³/h · 3.000 m³/h · 4.000 m³/h · 5.000 m³/h · 6.000 m³/h

2 3 4 5 6 7 8 9 10 20 30 40 50 60 70 80 100 150

Surface Factor Af *(from page 8)*

T: ATHENS +30 211 70.55.500 / THES/NIKI +30 2311 82.40.00

PRESSURE DROP & NOISE CALCULATION OF K1 ÷ K4 GRILLES

DIAGRAM 2.3

Noise Level Θ [dB(A)]

DIAGRAM 2.2

Pressure Drop ΔP [Pa]

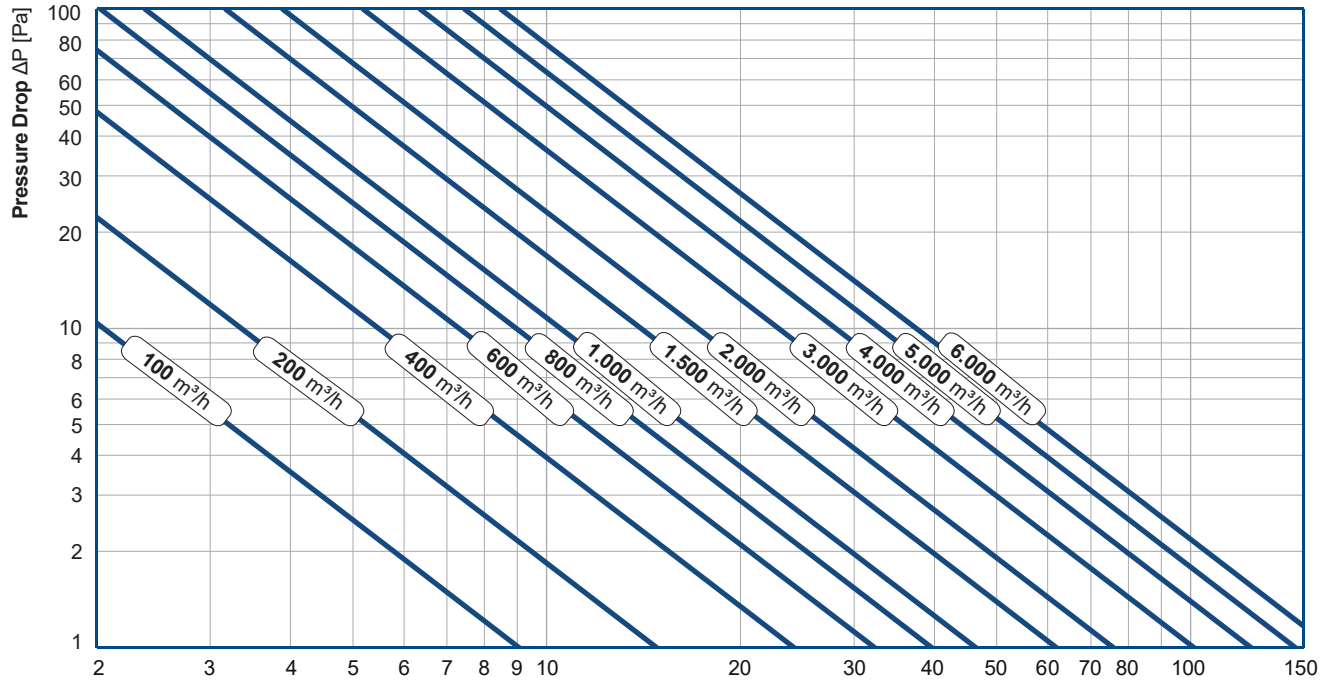
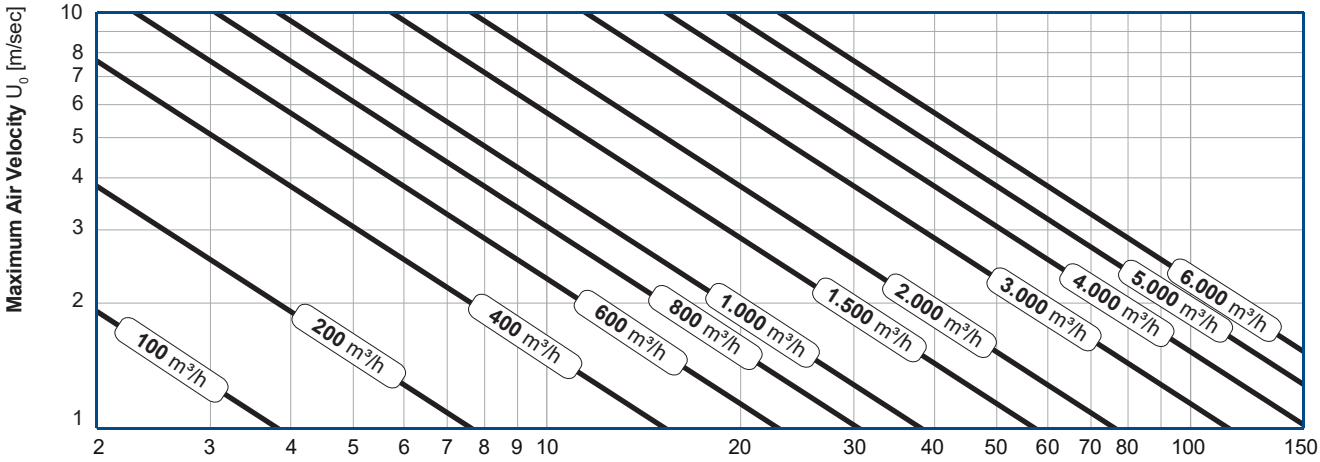


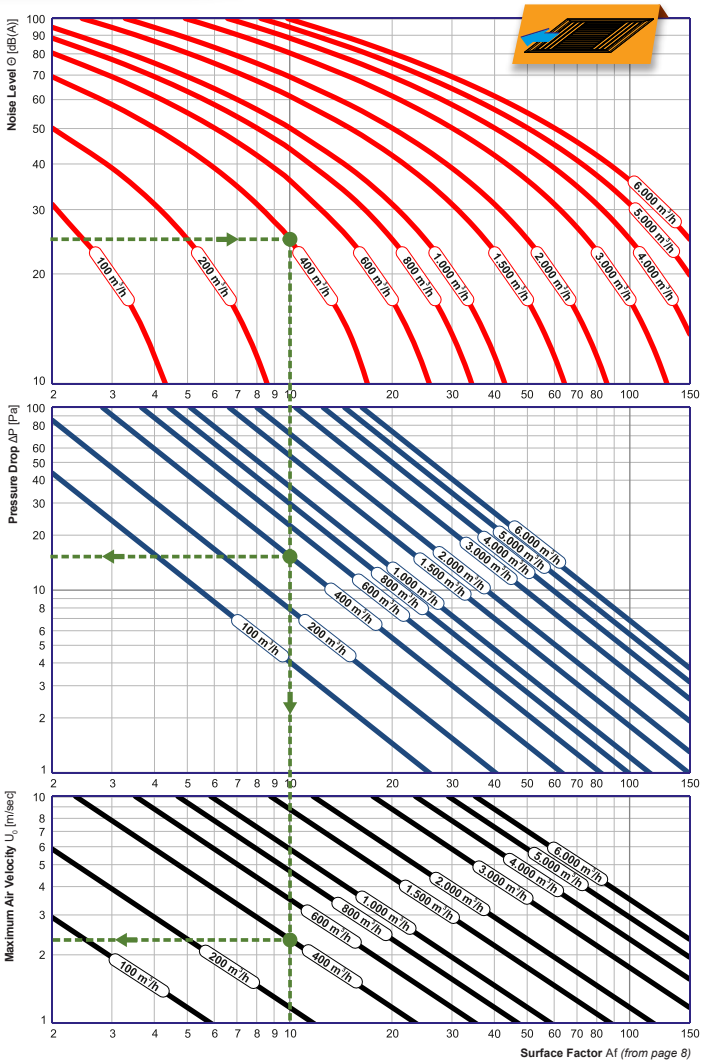
DIAGRAM 2.1

Maximum Air Velocity U_0 [m/sec]



Surface Factor Af *(from page 8)*

T: ATHENS +30 211 70.55.500 / THES/NIKI +30 2311 82.40.00



Selection example 1 :

Which are the dimensions of a K4 grille if we have horizontal air discharge with total air flow of 400 m³/h and the installation is in an office building?

From diagram 1.3 we notice that for 400 m³/h the range of the Noise level is from 15 to 70 dB(A), using surface factors from 2 to 16. The grille will be installed in an office building. From the normative document **CR 1752:1998** (types of spaces & permissible sound pressure levels) we establish that the maximum permissible noise level must be 30 dB(A). Therefore a produced noise level of 25 dB(A) is acceptable and from diagram 1.3 we determine that the surface factor is 10. If one dimension, for construction reasons, is 200 mm then from the surface factor selection table we have that for grille height equal to 200 mm the grille width must be 500 mm. The maximum air velocity inside the grille **500 x 200**, is estimated from diagram 1.1 and it's equal to 2,35 m/s, while from diagram 1.2 we calculate that the pressure drop is 15,3 Pa.

Selection example 2 :

Which is the pressure drop and the produced noise level in a K2 grille, 400 x 200 mm, if we have vertical air discharge with total air flow of 400 m³/h?

From the surface factor selection table we establish that according to the grille's dimensions the surface factor is equal to 8. From diagrams 2.1, 2.2 και 2.3 of page 7, for air flow of 400 m³/h and surface factor 8 we calculate that the maximum air velocity inside the grille is equal to 1,9 m/s, the pressure drop is equal to 5,6 Pa and the produced noise level is equal to 19,2 dB(A).

The following diagrams, are an approximate selection method for selecting grilles. For more precise calculation, please use the air-grilles calculation software KlimaCalc by AIRTECHNIC or contact us.

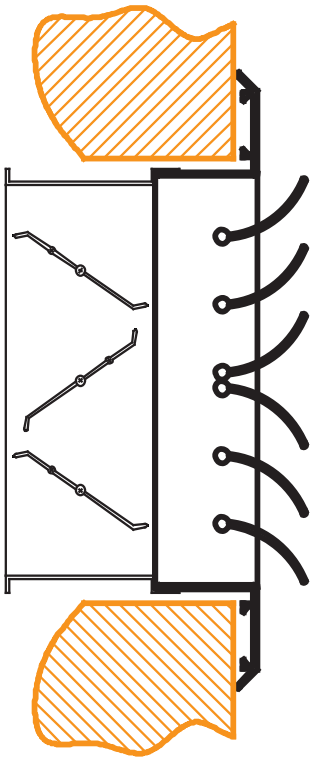
SURFACE FACTOR SELECTION TABLE K1 ÷ K4

	100	125	150	200	250	300	350	400	450	500	550	600	800	1.000
200	2,0	**2,5**	3,0	**4,0**	5,0	**6,0**	7,0	**8,0**	9,0	**10,0**	11,0	**12,0**	16,0	**20,0**
250	2,5	**3,1**	3,8	**5,0**	6,3	**7,5**	8,8	**10,0**	11,3	**12,5**	13,8	**15,0**	20,0	**25,0**
300	3,0	**3,8**	4,5	**6,0**	7,5	**9,0**	10,5	**12,0**	13,5	**15,0**	16,5	**18,0**	24,0	**30,0**
350	3,5	**4,4**	5,3	**7,0**	8,8	**10,5**	12,3	**14,0**	15,8	**17,5**	19,3	**21,0**	28,0	**35,0**
400	4,0	**5,0**	6,0	**8,0**	10,0	**12,0**	14,0	**16,0**	18,0	**20,0**	22,0	**24,0**	32,0	**40,0**
450	4,5	**5,6**	6,8	**9,0**	11,3	**13,5**	15,8	**18,0**	20,3	**22,5**	24,8	**27,0**	36,0	**45,0**
500	5,0	**6,3**	7,5	**10,0**	12,5	**15,0**	17,5	**20,0**	22,5	**25,0**	27,5	**30,0**	40,0	**50,0**
550	5,5	**6,9**	8,3	**11,0**	13,8	**16,5**	19,3	**22,0**	24,8	**27,5**	30,3	**33,0**	44,0	**55,0**
600	6,0	**7,5**	9,0	**12,0**	15,0	**18,0**	21,0	**24,0**	27,0	**30,0**	33,0	**36,0**	48,0	**60,0**
650	6,5	**8,1**	9,8	**13,0**	16,3	**19,5**	22,8	**26,0**	29,3	**32,5**	35,8	**39,0**	52,0	**65,0**
700	7,0	**8,8**	10,5	**14,0**	17,5	**21,0**	24,5	**28,0**	31,5	**35,0**	38,5	**42,0**	56,0	**70,0**
750	7,5	**9,4**	11,3	**15,0**	18,8	**22,5**	26,3	**30,0**	33,8	**37,5**	41,3	**45,0**	60,0	**75,0**
800	8,0	**10,0**	12,0	**16,0**	20,0	**24,0**	28,0	**32,0**	36,0	**40,0**	44,0	**48,0**	64,0	**80,0**
850	8,5	**10,6**	12,8	**17,0**	21,3	**25,5**	29,8	**34,0**	38,3	**42,5**	46,8	**51,0**	68,0	**85,0**
900	9,0	**11,3**	13,5	**18,0**	22,5	**27,0**	31,5	**36,0**	40,5	**45,0**	49,5	**54,0**	72,0	**90,0**
950	9,5	**11,9**	14,3	**19,0**	23,8	**28,5**	33,3	**38,0**	42,8	**47,5**	52,3	**57,0**	76,0	**95,0**
1.000	10,0	**12,5**	15,0	**20,0**	25,0	**30,0**	35,0	**40,0**	45,0	**50,0**	55,0	**60,0**	80,0	**100,0**
1.050	10,5	**13,1**	15,8	**21,0**	26,3	**31,5**	36,8	**42,0**	47,3	**52,5**	57,8	**63,0**	84,0	**105,0**
1.100	11,0	**13,8**	16,5	**22,0**	27,5	**33,0**	38,5	**44,0**	49,5	**55,0**	60,5	**66,0**	88,0	**110,0**
1.150	11,5	**14,4**	17,3	**23,0**	28,8	**34,5**	40,3	**46,0**	51,8	**57,5**	63,3	**69,0**	92,0	**115,0**
1.200	12,0	**15,0**	18,0	**24,0**	30,0	**36,0**	42,0	**48,0**	54,0	**60,0**	66,0	**72,0**	96,0	**120,0**
1.250	12,5	**15,6**	18,8	**25,0**	31,3	**37,5**	43,8	**50,0**	56,3	**62,5**	68,8	**75,0**	100,0	**125,0**
1.300	13,0	**16,3**	19,5	**26,0**	32,5	**39,0**	45,5	**52,0**	58,5	**65,0**	71,5	**78,0**	104,0	**130,0**
1.350	13,5	**16,9**	20,3	**27,0**	33,8	**40,5**	47,3	**54,0**	60,8	**67,5**	74,3	**81,0**	108,0	**135,0**
1.400	14,0	**17,5**	21,0	**28,0**	35,0	**42,0**	49,0	**56,0**	63,0	**70,0**	77,0	**84,0**	112,0	**140,0**
1.450	14,5	**18,1**	21,8	**29,0**	36,3	**43,5**	50,8	**58,0**	65,3	**72,5**	79,8	**87,0**	116,0	**145,0**
1.500	15,0	**18,8**	22,5	**30,0**	37,5	**45,0**	52,5	**60,0**	67,5	**75,0**	82,5	**90,0**	120,0	**150,0**

GRILLES PRESSURE DROP & NOISE LEVELS

Selection example 1 :

Pressure drop and Noise Level calculation in K4 + Damper grille with blade angle 15º.



We have a K4 + Damper grille with dimensions **400 x 400** and horizontal air discharge with total air flow 600 m³/h. A K4 grille with dimensions **400 x 400** has, according to page 5 diagrams, for horizontal air discharge and air flow equal to 600 m³/h, pressure drop equal to 11,3 Pa and produces noise equal to 23,1 dB. A Damper with dimensions **400 x 400** has, according it's respective selection diagrams, for blade angle 15º and air flow of 600 m³/h, pressure drop equal to 5,4 Pa and produces noise equal to 9 dB.

The total pressure drop inside the K4 + Damper grille **400 x 400** is the algebraic sum of the pressure drop inside the grille & the pressure drop inside the Damper : $\Delta p_{K4} + \Delta p_{Damper}$ = 11,3 + 5,4 = 16,7 **Pa**.

The total noise level is calculated by using the following equation : $L_{tot} = L_{K4} \oplus L_{Damper}$ = Lmax + C(ΔL). The difference between the noise levels of the 2 independent sound sources (the K4 grille and the Damper) is ΔL = 14,1 dB. Therefore from the following diagram we determine that for ΔL = 14,1 dB the correction factor C(ΔL) is equal to 0,1. So, the total noise level is L_{tot} = Lmax + C(ΔL) = 23,1 + 0,1 = 23,2 **dB**.

Selection example 2 :

Pressure drop and Noise Level calculation in K4 + Damper grille with blade angle 45º.

We have a K4 + Damper grille with dimensions **400 x 400** and horizontal air discharge with total air flow 600 m³/h. A K4 grille with dimensions **400 x 400** has, according to page 5 diagrams, for horizontal air discharge and air flow equal to 600 m³/h, pressure drop equal to 11,3 Pa and produce noise equal to 23,1 dB. A Damper with dimensions **400 x 400** has, according it's respective selection diagrams, for blade angle 45º and air flow of 600 m³/h, pressure drop equal to 44 Pa and produce noise equal to 33,4 dB.

The total pressure drop inside the K4 + Damper grille **400 x 400** is the algebraic sum of the pressure drop inside the grille & the pressure drop inside the Damper : $\Delta p_{K4} + \Delta p_{Damper}$ = 11,3 + 44 = 55,3 **Pa**.

The total noise level is calculated by using the following equation : $L_{tot} = L_{K4} \oplus L_{Damper}$ = Lmax + C(ΔL). The difference between the noise levels of the 2 independent sound sources (the K4 grille and the Damper) is ΔL = 10,3 dB. Therefore from the following diagram we determine that for ΔL = 10,3 dB the correction factor C(ΔL) is equal to 0,4. So, the total noise level is L_{tot} = Lmax + C(ΔL) = 33,4 + 0,4 = 33,8 **dB**.

CALCULATING THE TOTAL NOISE LEVEL BETWEEN 2 INDEPENDENT SOUND SOURCES

Since noise in [dB] is a quantity that is defined in logarithmic scale, when we have 2 (or more) independent sound sources, the total noise is not calculated by the algebraic sum of the 2 sources. The "sum" of 2 sound sources L1, L2 is symbolized by the internationaly defined symbol ⊕ and is calculated by using the following equation :

$L_{tot} = L1 \oplus L2 = 10 \times \log(10^{0,1 \times L1} + 10^{0,1 \times L2})$

Because of the previous equation requiring some complex calculations, we can define the sum of 2 sound sources with sufficient accuracy using the following approximate equation :

$L_{tot} = L1 \oplus L2 = Lmax + C(\Delta L)$,

where Lmax is the largest noise level between L1 and L2 and C(ΔL) a correction factor (in dB) which depends on the difference ΔL = | L2 - L1 | and is calculated by using the following diagram.

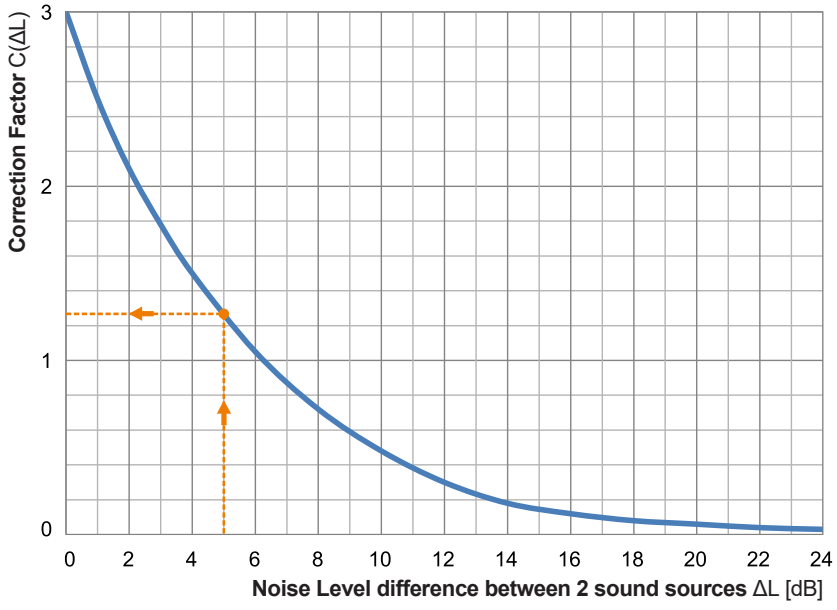
Calculation example

We have a grille which produces noise L1 = 25 dB in an area. If, in the same area, the noise produced from a 2nd independent grille is L2 = 30 dB, then the total noise level is calculated as follows :
L_{tot} = L1 ⊕ L 2 = Lmax + C(ΔL).

We have **Lmax** = L2 = 30 dB and
ΔL = L2 - L1 = 5 dB

From the adjacent diagram we define that for ΔL equal to 5 dB the correction factor is C(ΔL) = 1,2 dB.

Therefore the total noise level is:
L_{tot} = 25 ⊕ 30 =
= 30 + C(5) ≅ 30 +1,2 = **31,2 dB.**

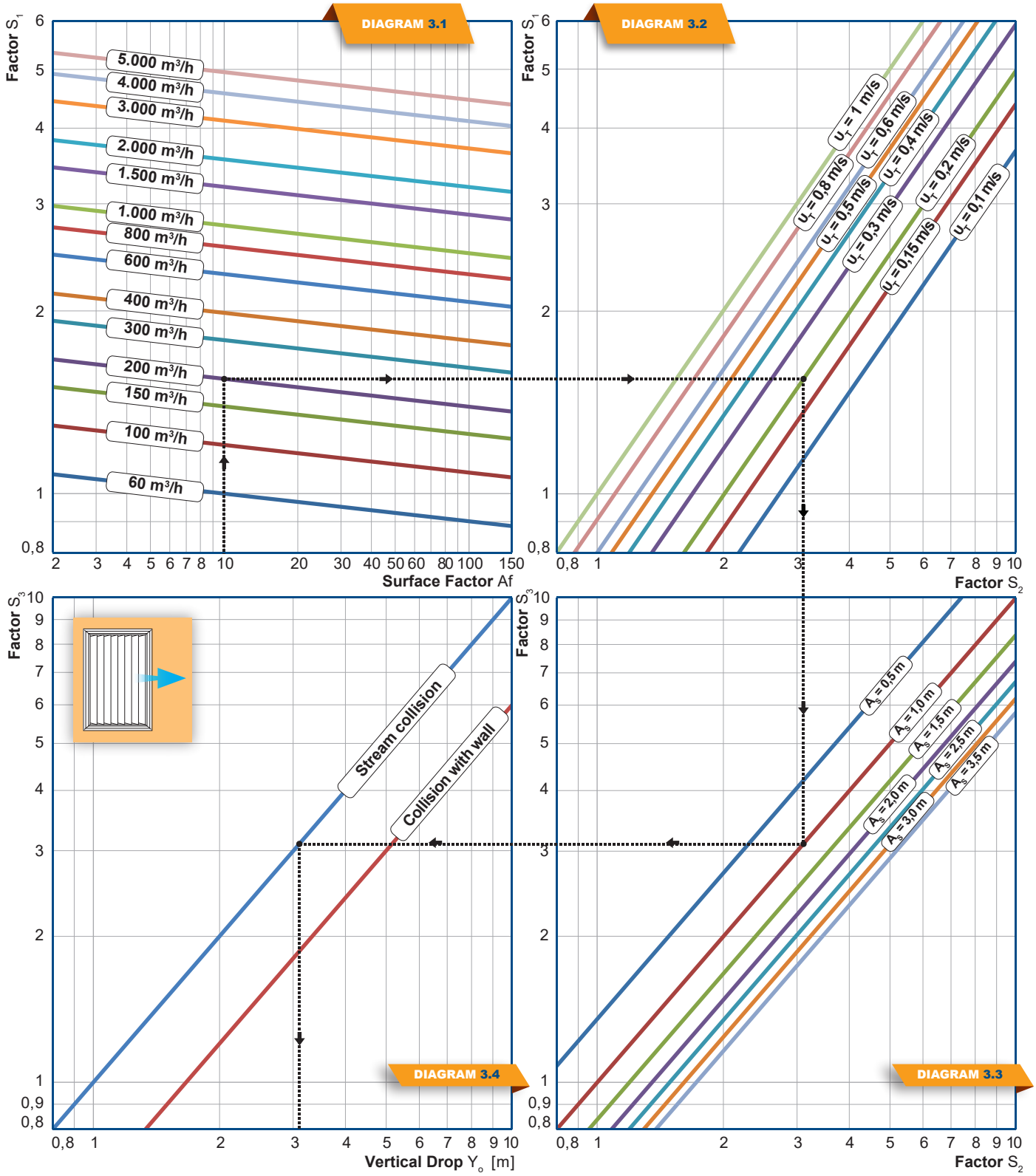


HORIZONTAL RANGE CALCULATION - K1

Selection example 3 :

Which is the total horizontal range of a K1 grille 500 x 200 if the air flow is 200 m³/h, we have collision between the air stream of this grille with an other's, at a distance of 1 m from each grille and the stream velocity at total range is 0,2 m/s?

From the surface factor selection table (page 8) we establish that, according to the grille's dimensions, the surface factor is equal to 10. Therefore, from diagram 3.1, for air flow of 200 m³/h and surface factor equal to 10, we calculate the factor S_1 = 1,65. We continue to diagram 3.2 where, for factor S_1 = 1,65 and stream velocity at total range equal to 0,2 m/s, we determine the factor S_2 = 3,15. From diagram 3.3, for factor S_2 = 3,15 and the curve for collision distance equal to A_S = 1 m from each grille, we calculate the factor S_3 = 3,15. Finaly, from diagram 3.4 for factor S_3 = 3,15 and the curve for collision between streams, we determine that the stream vertical drop Y_o is equal to 3,2 m. The total range is calculated by using the following equation : $X_o = A_S + Y_o = 1 + 3,15 = 4,15$ m.



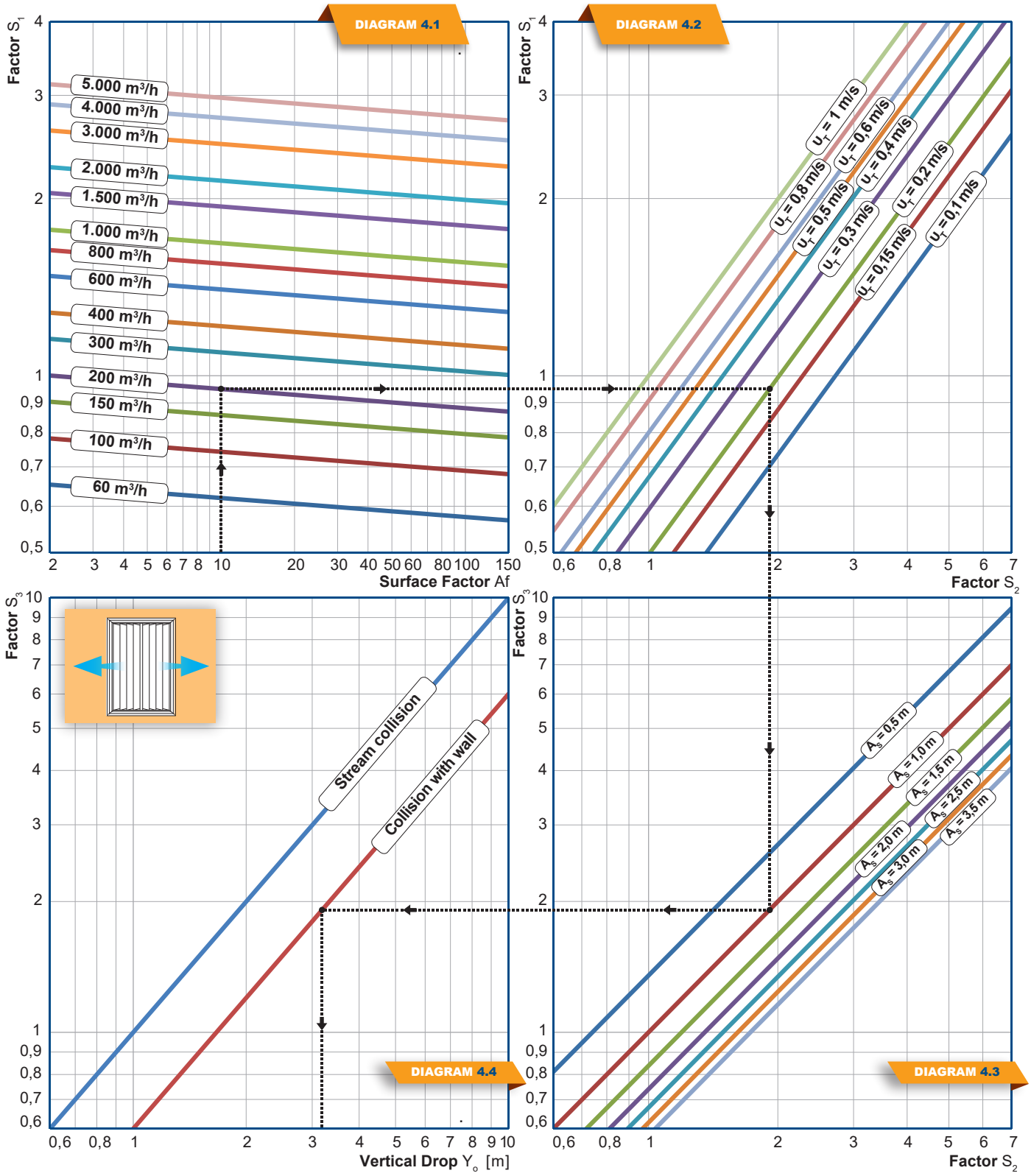
T: ATHENS +30 211 70.55.500 / THES/NIKI +30 2311 82.40.00

HORIZONTAL RANGE CALCULATION - K2

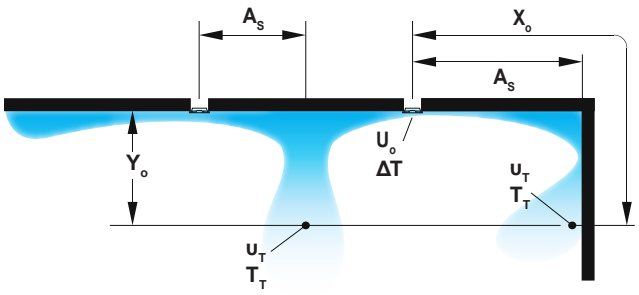
Selection example 4 :

Which is the total horizontal range of a K2 grille 500 x 200 if the total air flow is 200 m³/h, we have collision between the air stream of the grille and a wall, at a distance of 1 m from the grille and the stream velocity at total range is 0,2 m/s?

From the surface factor selection table (page 8) we establish that, according to the grille's dimensions, the surface factor is equal to 10. Therefore, from diagram 4.1, for air flow of 200 m³/h and surface factor equal to 10, we calculate the factor $S_1 = 0,95$. We continue to diagram 4.2 where, for factor $S_1 = 0,95$ and stream velocity at total range equal to 0,2 m/s, we determine the factor $S_2 = 1,9$. From diagram 4.3, for factor $S_2 = 1,9$ and the curve for collision distance equal to $A_S = 1$ m from the grille, we calculate the factor $S_3 = 1,9$. Finally, from diagram 4.4 for factor $S_3 = 1,9$ and the curve for collision between stream and wall, we determine that the stream vertical drop Y_o is equal to 3,25 m. The total range is calculated by using the following equation : $X_o = A_S + Y_o = 1 + 3,25 = 4,25$ m.



HORIZONTAL RANGE CALCULATION - K3



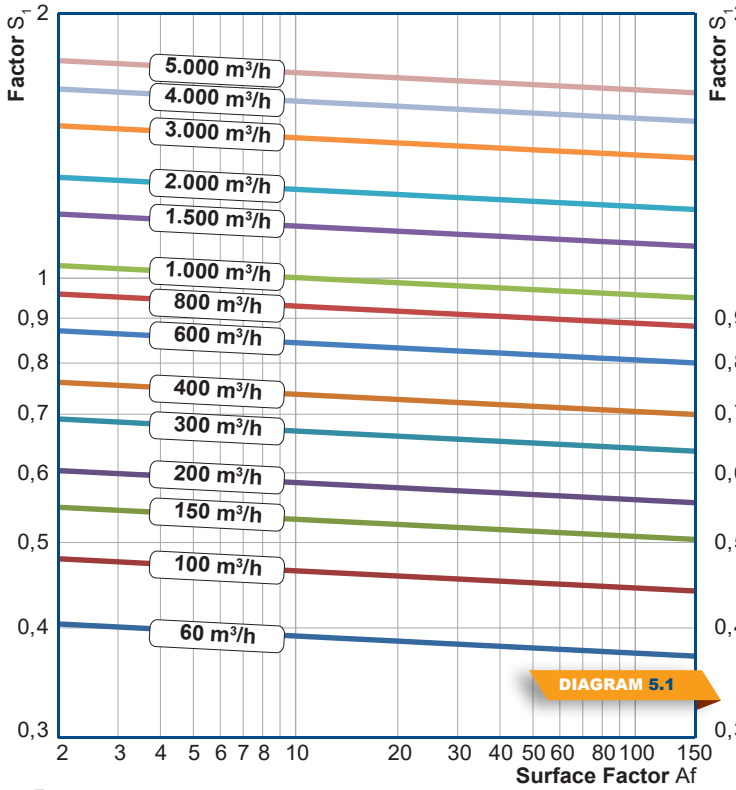


DIAGRAM 5.1

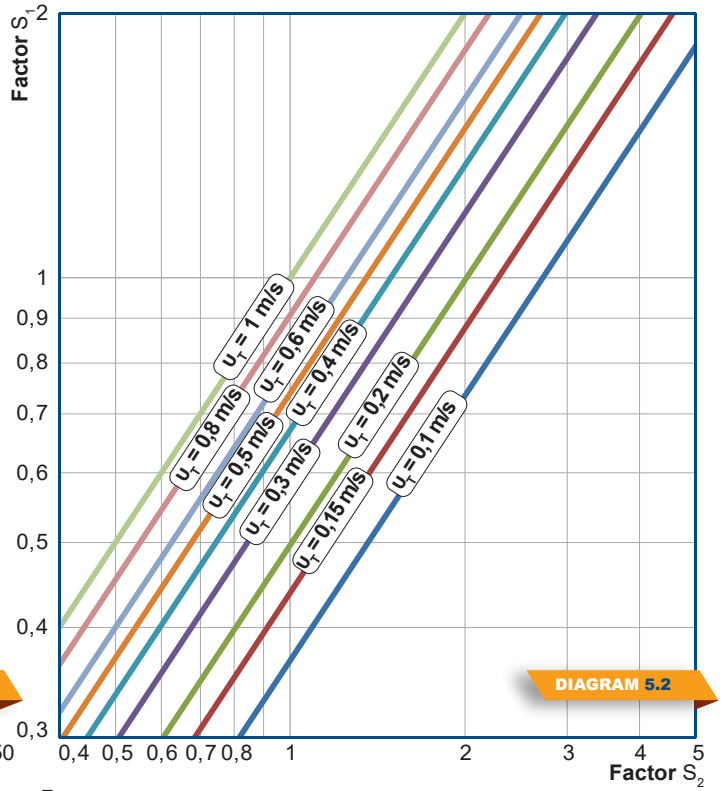


DIAGRAM 5.2

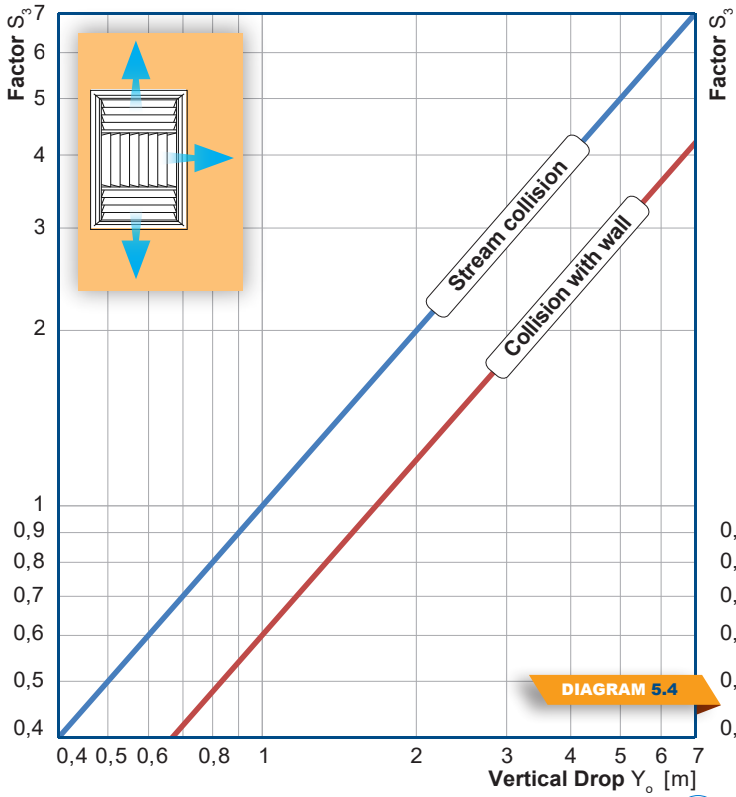


DIAGRAM 5.4

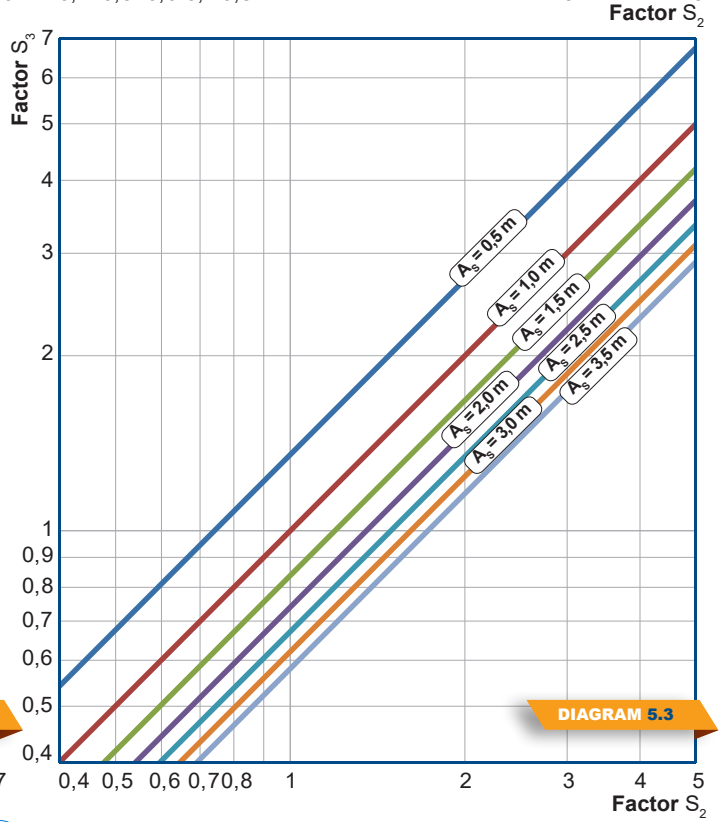
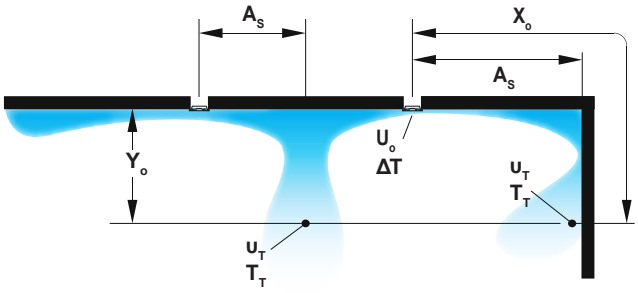
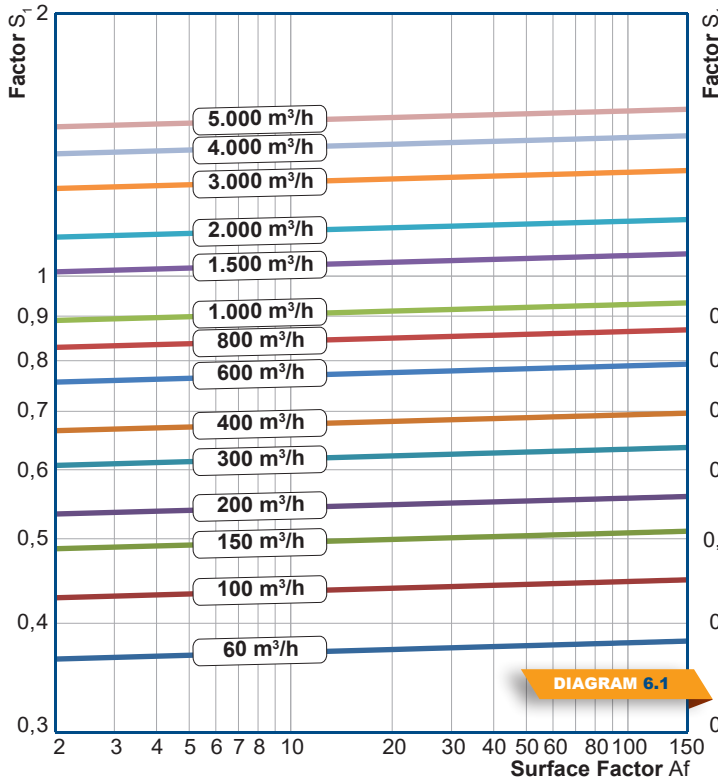
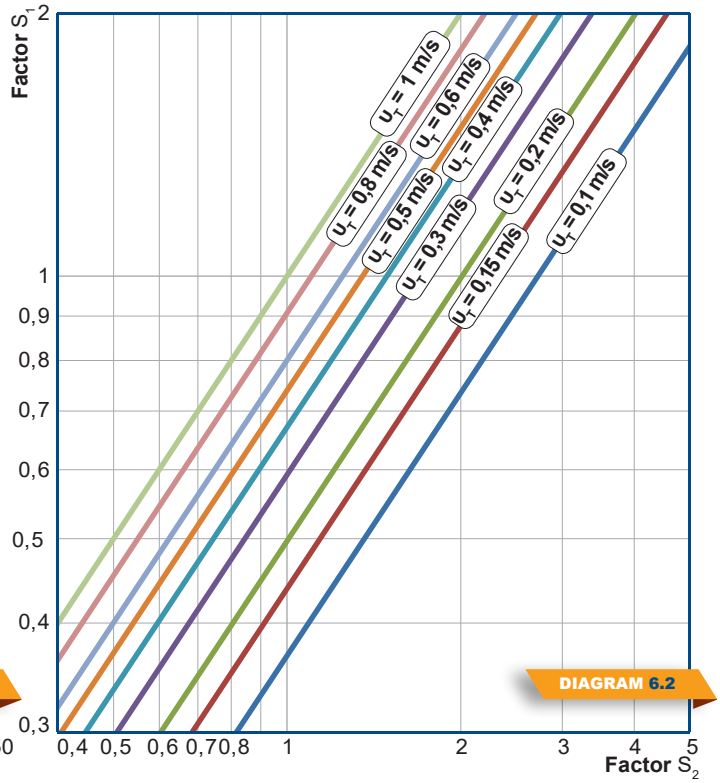


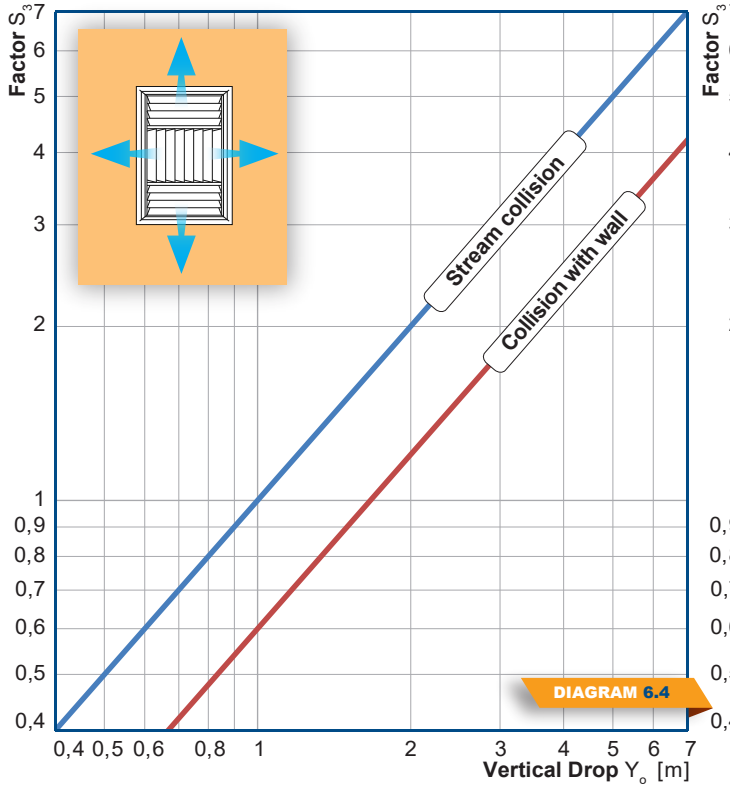
DIAGRAM 5.3

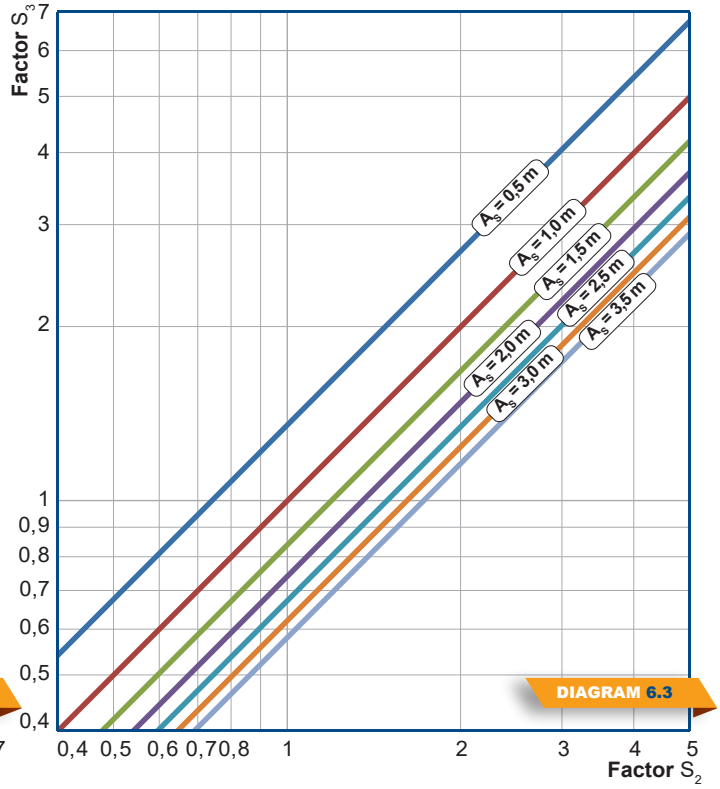
HORIZONTAL RANGE CALCULATION - K4











ΒΕΛΗΝΕΚΕΣ ΚΑΤΑΚΟΡΥΦΗΣ ΔΕΣΜΗΣ - K1

Vertical Stream Deflection

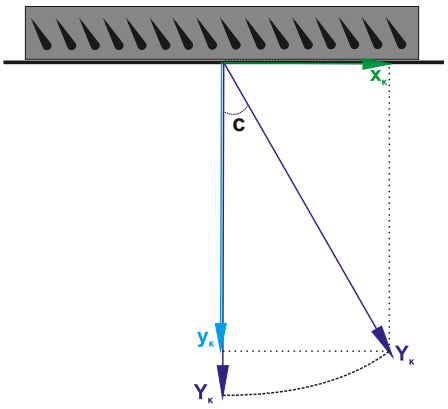


DIAGRAM 7.4

Curve ①: c = 0°
Curve ②: $y_κ$ for c = 15°, $x_κ$ for c = 75°
Curve ③: $y_κ$ for c = 30°, $x_κ$ for c = 60°
Curve ④: $y_κ$ for c = 45°, $x_κ$ for c = 45°
Curve ⑤: $y_κ$ for c = 60°, $x_κ$ for c = 30°
Curve ⑥: $y_κ$ for c = 75°, $x_κ$ for c = 15°

Correction Factors
for pressure drop and noise level
due to air stream deflection

	45°	60°	75°
U_o	x 1,1	x 1,2	x 1,3
Δp	x 1,4	x 1,8	x 2,1
Θ	+ 4	+ 5	+ 6

Vertical Air Stream

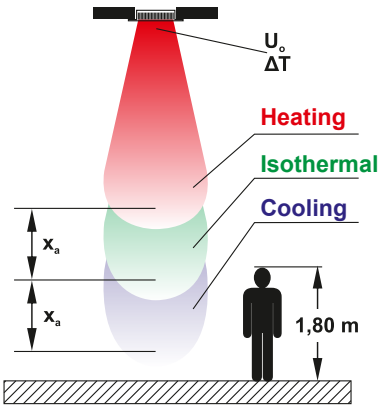


DIAGRAM 7.1

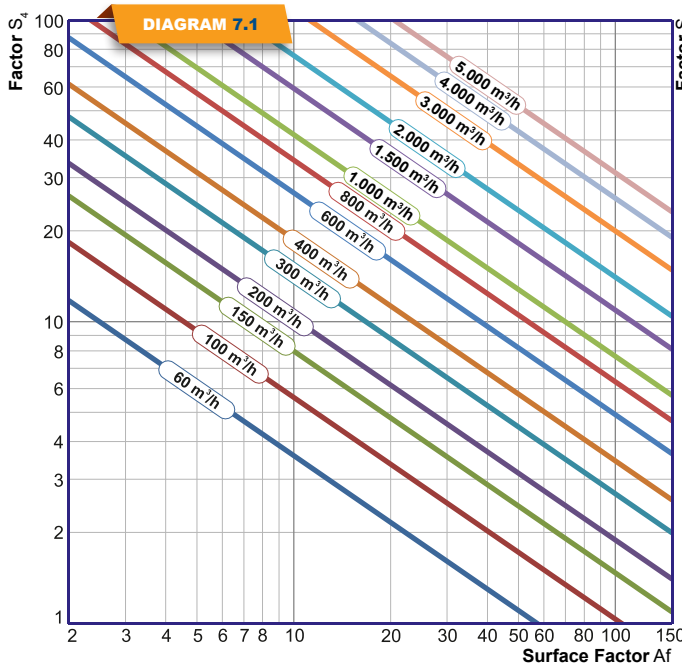
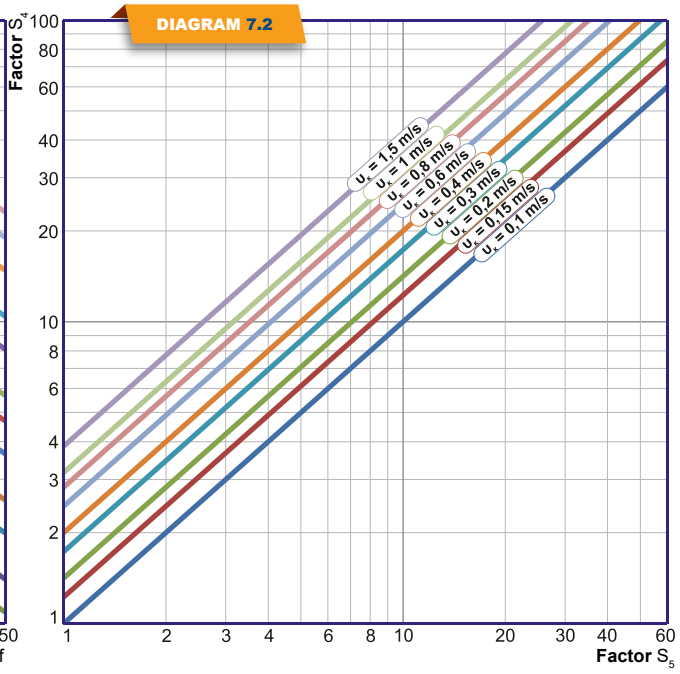


DIAGRAM 7.2



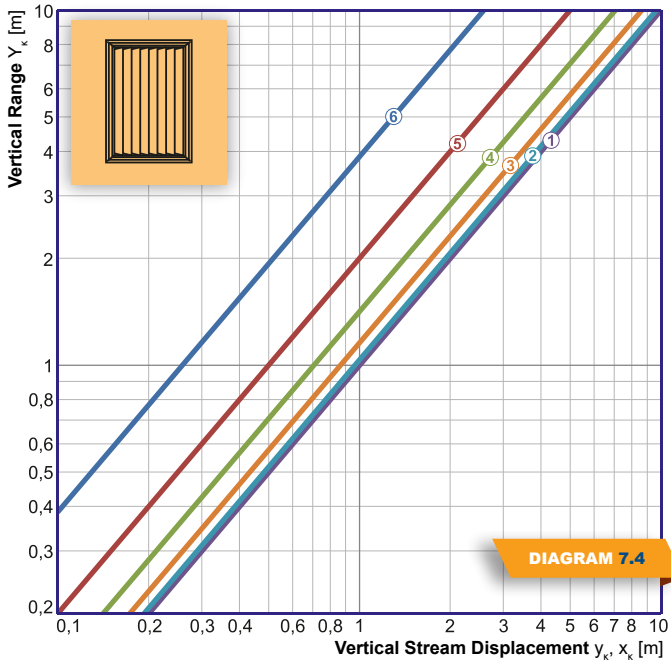


DIAGRAM 7.4

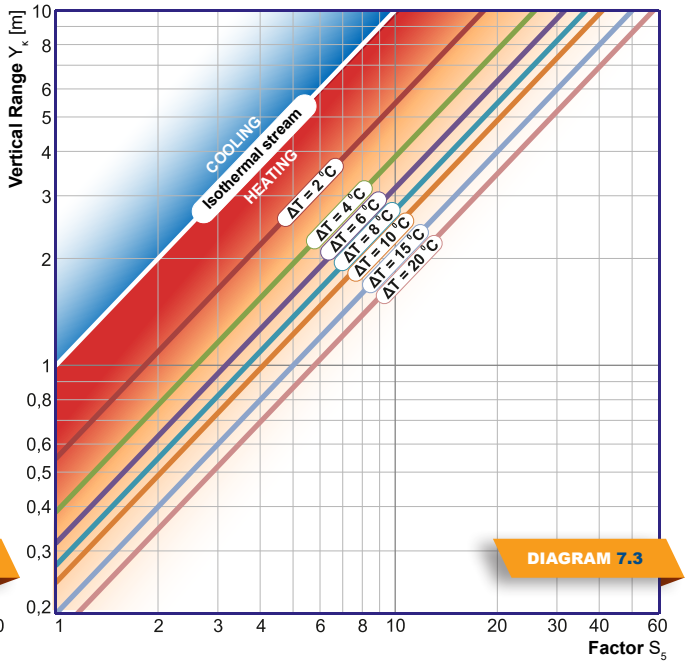


DIAGRAM 7.3

T: ATHENS +30 211 70.55.500 / THES/NIKI +30 2311 82.40.00

VERTICAL RANGE CALCULATION - K2

Selection example 5 :

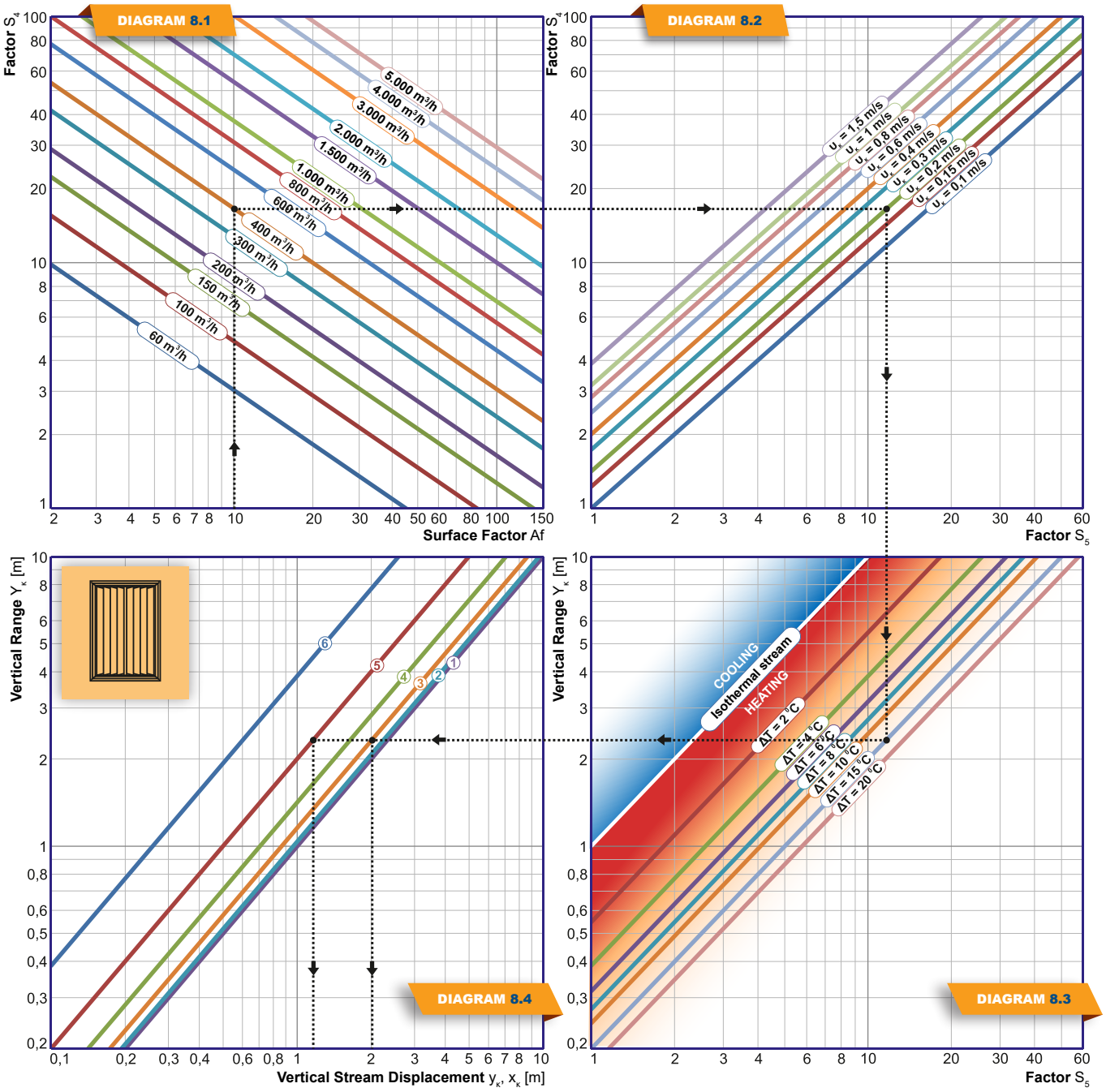
Which is the vertical range of a K2 grille 500 x 200 if the total air flow is 400 m³/h, the heating stream velocity at total range is 0,2 m/s and the temperature difference between the air stream and the room in which the stream is supplied, is ΔT = 15 ºC?

From the surface factor selection table (page 8) we establish that, according to the grille's dimensions, the surface factor is equal to 10. Therefore, from diagram 8.1, for air flow of 400 m³/h and surface factor equal to 10, we calculate the factor S_4 = 17,5. We continue to diagram 8.2 where, for factor S_4 = 17,5 and stream velocity at total range equal to 0,2 m/s, we determine the factor S_5 = 12,5. From diagram 8.3, for factor S_5 = 12,5 and the curve for temperature difference ΔT = 15 ºC, we determine that the vertical air stream range is equal to 2,4 m.

Example 6 :

Variation of the vertical stream's range due to deflection :

In example 5, we established that the vertical air stream range of the K2 grille **500 x 200** is 2,4 m, when the total air flow is 400 m³/h. If we alter the blade angle "c" of the grille, from 0º to 30º then, from diagram 8.4, for vertical air stream range equal to 2,4 m, curve 3 gives us the new vertical range y_k equal to 2,05 m, while curve 5 gives us the horizontal stream deflection x_k equal to 1,2 m.



VERTICAL RANGE CALCULATION - K3

Vertical Stream Deflection

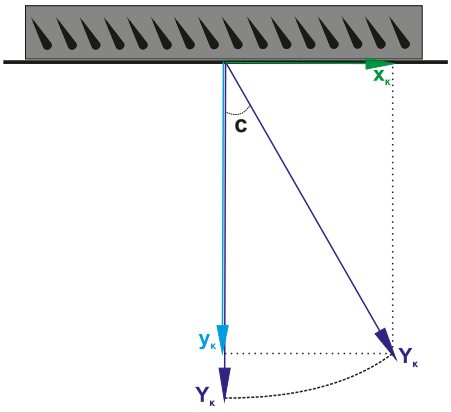


DIAGRAM 9.4

Curve ①: c = 0°
Curve ②: y_κ for c = 15°, x_κ for c = 75°
Curve ③: y_κ for c = 30°, x_κ for c = 60°
Curve ④: y_κ for c = 45°, x_κ for c = 45°
Curve ⑤: y_κ for c = 60°, x_κ for c = 30°
Curve ⑥: y_κ for c = 75°, x_κ for c = 15°

Correction Factors
for pressure drop and noise level due to air stream deflection

	45°	60°	75°
U_o	x 1,1	x 1,2	x 1,3
Δp	x 1,4	x 1,8	x 2,1
Θ	+ 4	+ 5	+ 6

Vertical Air Stream

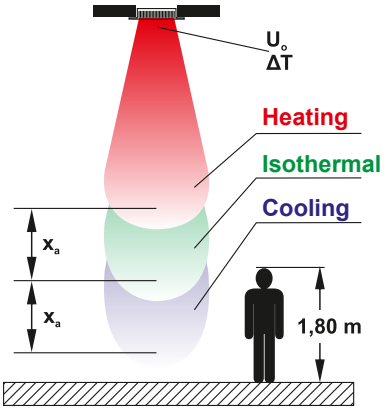


DIAGRAM 9.1

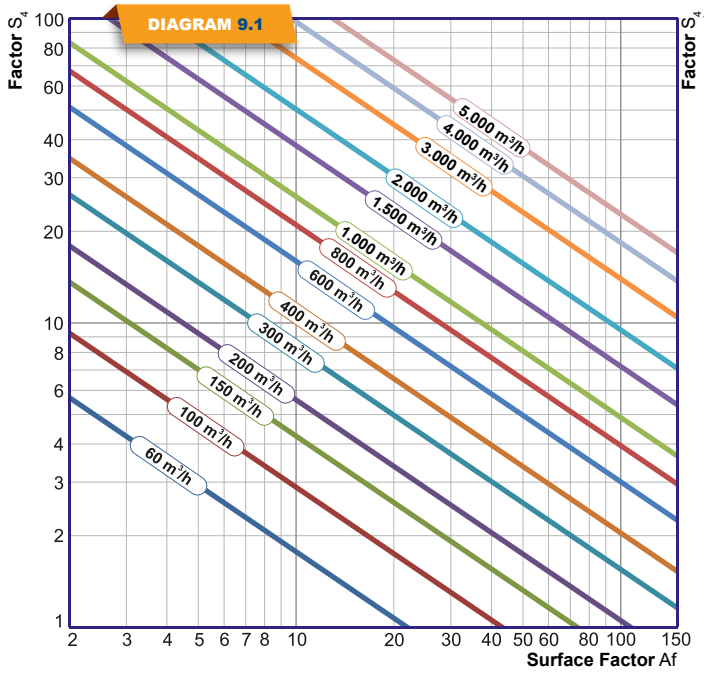


DIAGRAM 9.2

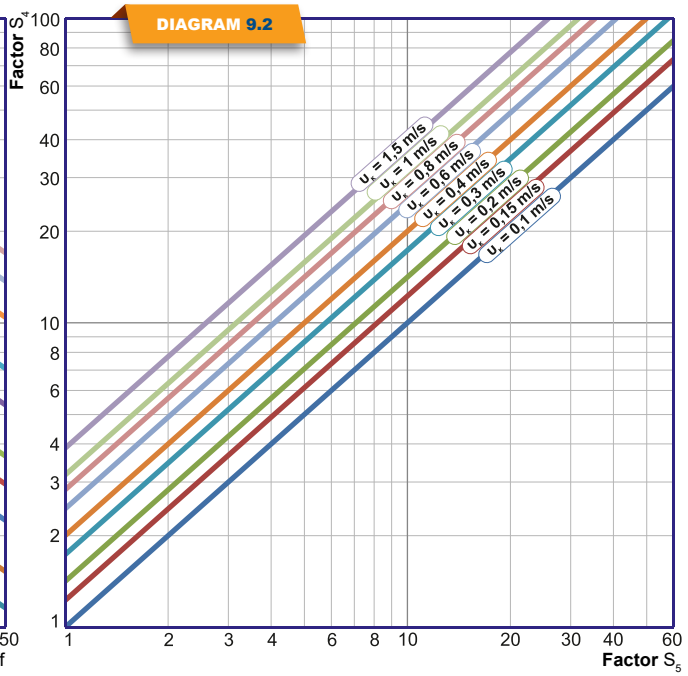


DIAGRAM 9.4

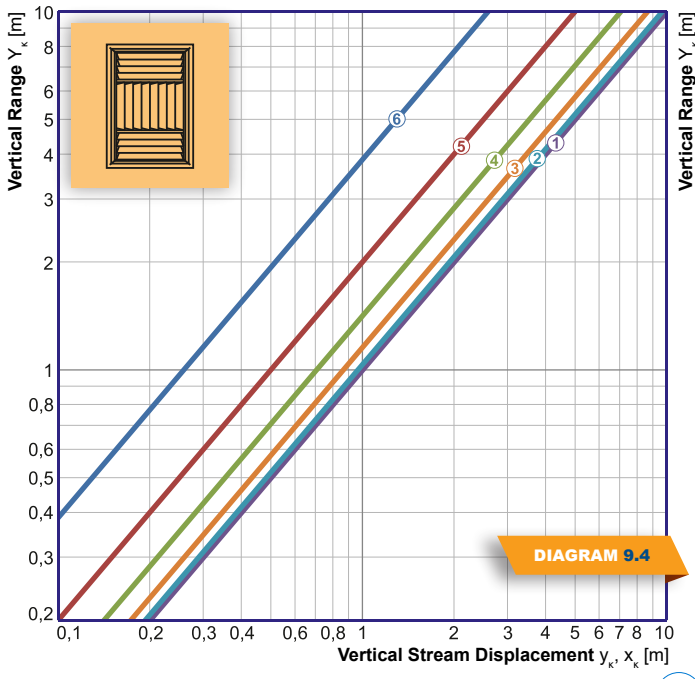
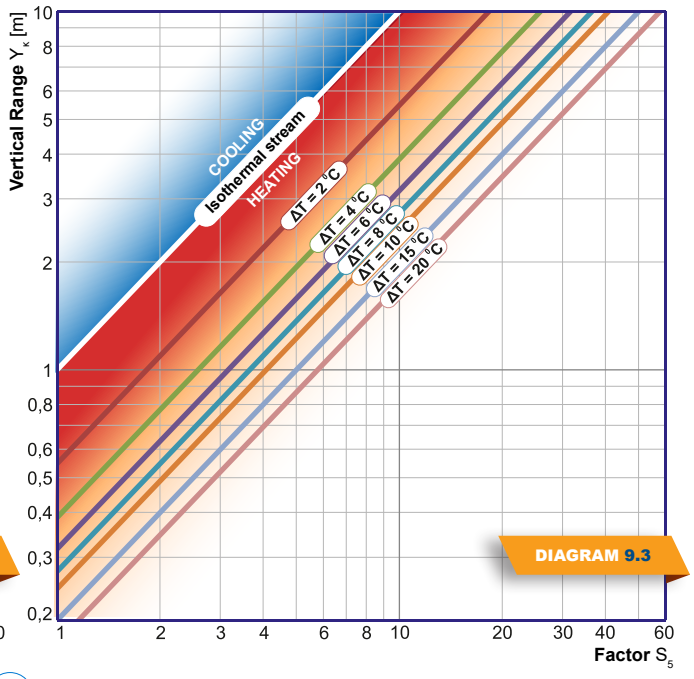


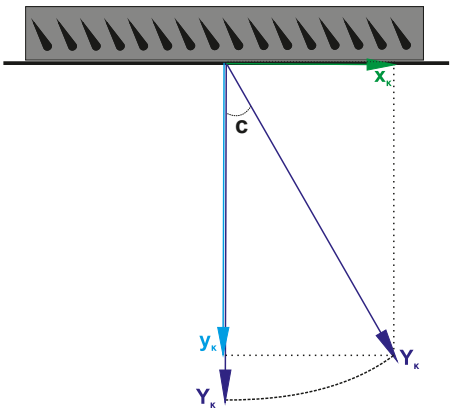
DIAGRAM 9.3



T: ATHENS +30 211 70.55.500 / THES/NIKI +30 2311 82.40.00

ERTICAL RANGE CALCULATION - K4

Vertical Stream Deflection



Curve ①: c = 0°
Curve ②: $y_κ$ for c = 15°
$x_κ$ for c = 75°
Curve ③: $y_κ$ for c = 30°
$x_κ$ for c = 60°
Curve ④: $y_κ$ for c = 45°
$x_κ$ for c = 45°
Curve ⑤: $y_κ$ for c = 60°
$x_κ$ for c = 30°
Curve ⑥: $y_κ$ for c = 75°
$x_κ$ for c = 15°

Correction Factors
for pressure drop and noise level
due to air stream deflection

	45°	60°	75°
U_o	x 1,1	x 1,2	x 1,3
Δp	x 1,4	x 1,8	x 2,1
Θ	+ 4	+ 5	+ 6

Vertical Air Stream

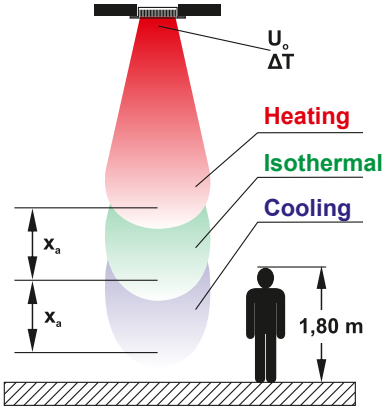


DIAGRAM 10.1

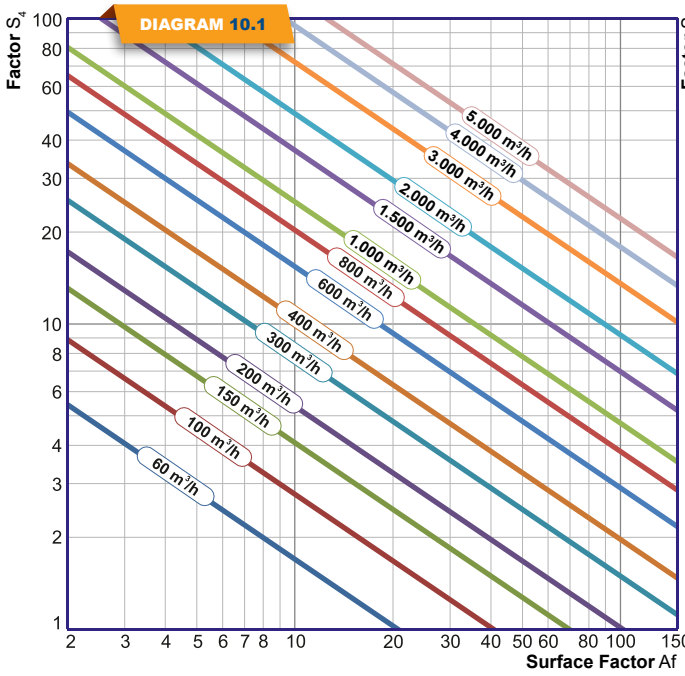


DIAGRAM 10.2

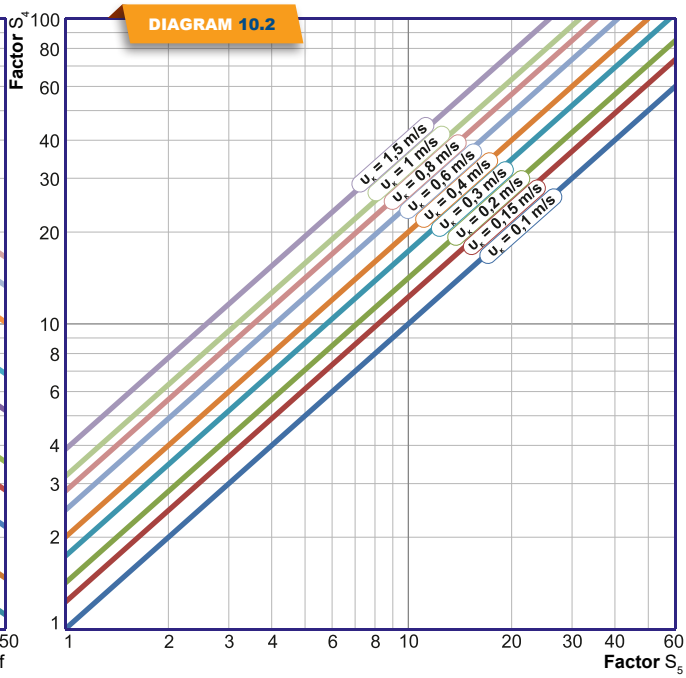


DIAGRAM 10.4

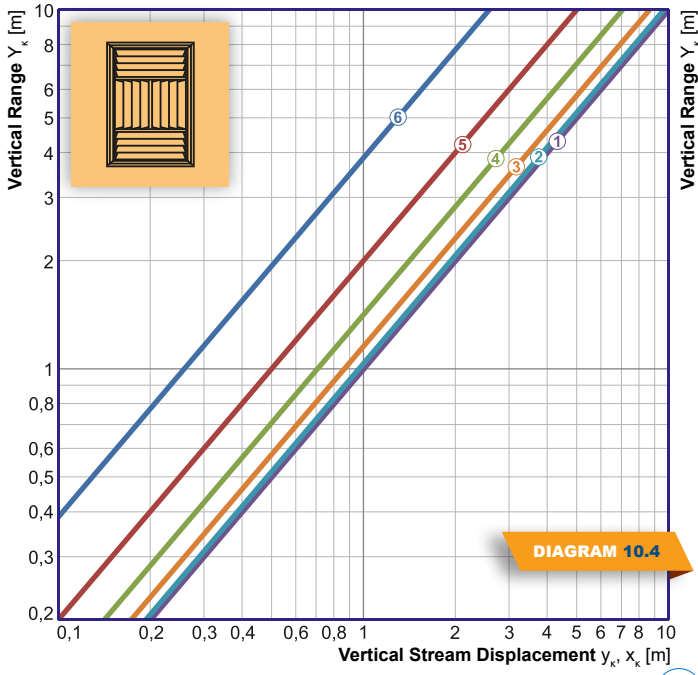
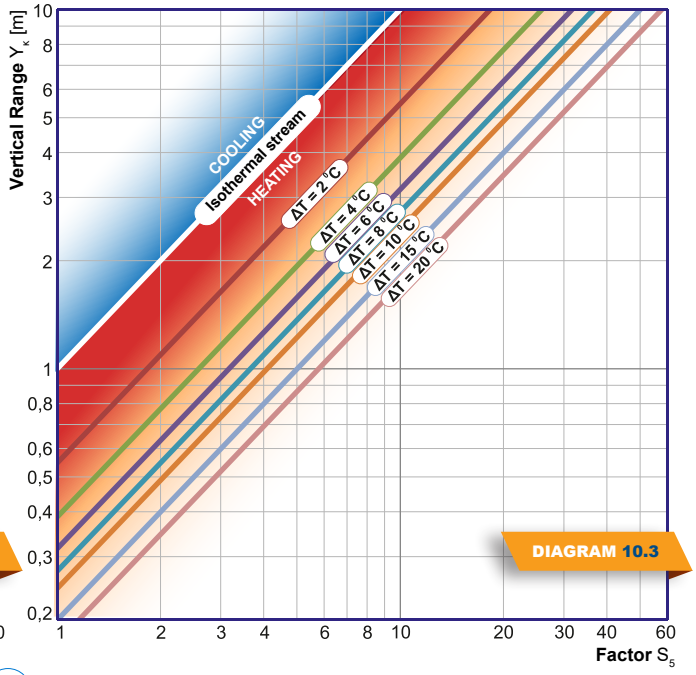


DIAGRAM 10.3



T: ATHENS +30 211 70.55.500 / THES/NIKI +30 2311 82.40.00

All grilles can be powder painted in **any RAL color**, under request. For the full range of RAL colors please contact us.

RAL 1007 Daffodil yellow	RAL 2002 Vermillion	RAL 3017 Rose	RAL 5007 Brillant blue	RAL 6003 Olive green	RAL 6024 Traffic green	8028 ra brown
RAL 1011 Brown beige	RAL 2003 Pastel orange	RAL 3018 Strawberry red	RAL 5008 Grey blue	RAL 6004 Blue green	RAL 6025 Fern green	RAL 9001 Cream
RAL 1012 Lemon yellow	RAL 2004 Pure orange	RAL 3020 Traffic red	RAL 5009 Azure blue	RAL 6005 Moss green	RAL 6026 Opal green	RAL 9002 Grey white

RAL COLOR EXAMPLES

ORDERING K1 ÷ K4 GRILLES

For the proper order of **K1 ÷ K4** grilles please use the following codification :

K1 | **400** x **400** + **TP** + **E, D, F** | **RAL**

- **RAL** = Blades & frame from aluminium painted in RAL colour
  Κενό = Blades & frame from anodized aluminium
- **E** = with **equalizing grid**
  D = with **volume damper**
  F = with **filter**
  Κενό = without additional components
- **TP** = with **thermostatic mechanism** (**K1** and **K2** with **automatic blade movement**)
  Κενό = without additional components
- Grille **height** [mm]
- Grille **width** [mm]
- **K1** = Air discharge in **1 direction**
  K2 = Air discharge in **2 directions**
  K3 = Air discharge in **3 directions**
  K4 = Air discharge in **4 directions**
  K1.A = Air discharge in **1 direction**, **accessible**
  K2.A = Air discharge in **2 directions**, **accessible**
  K3.A = Air discharge in **3 directions**, **accessible**
  K4.A = Air discharge in **4 directions**, **accessible**

Examples

K2 400 x 400 | 9010 =
K2 ceiling grille for air discharge in 2 directions, 400 mm in width and in height, with anodized aluminium construction powder painted in RAL 9010.

K3 500 x 400 + D =
K3 ceiling grille for air discharge in 3 directions, 500 mm in width and 400 mm in height, with anodized aluminium construction and volume damper.

SPECIFICATIONS

Ceiling diffuser with adjustable curved blades, for 1 / 2 / 3 / 4 directions, K1 / K2 / K3 / K4

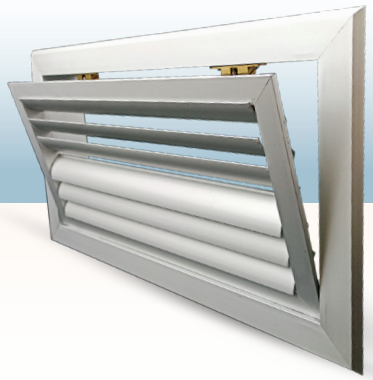
Ceiling outlet, indicative type **K1** / **K2** / **K3** / **K4** by **AIRTECHNIC**, manufactured of anodized aluminum / aluminum painted in RAL… color / copper / galvanized steel / stainless steel with independent, manually adjustable curved blades configured for air supply into 1 direction (**K1**) / 2 directions (**K2**) / 3 directions (**K3**) / 4 directions (**K4**). The manufacturer will have performed measurements of the technical characteristics of the grille, in an independent laboratory according to the standard ELOT EN 12238:2002. It will have a volume damper [**D**] / filter G3 [**F**] / equalizing grid [**E**]. It will be suitable for ceiling or air duct placement and visible installation with screws / concealed installation with Π-shaped subframe. The factory will be certified according to **ISO 9001:2015** (Quality Management Systems) and according to **ISO 14001:2015** (Environmental Management Systems).
It will be manufactured by **AIRTECHNIC** type **K1 / K1 +D, +E, +F**
It will be manufactured by **AIRTECHNIC** type **K2 / K2 +D, +E, +F**
It will be manufactured by **AIRTECHNIC** type **K3 / K3 +D, +E, +F**
It will be manufactured by **AIRTECHNIC** type **K4 / K4 +D, +E, +F**

Ceiling diffuser with adjustable curved blades, for 1 / 2 / 3 / 4 directions - accessible, K1.A / K2.A / K3.A / K4.A

Ceiling outlet, indicative type **K1.A** / **K2.A** / **K3.A** / **K4.A** by **AIRTECHNIC**, manufactured of anodized aluminum / aluminum painted in RAL… color / copper / galvanized steel / stainless steel with independent, manually adjustable curved blades configured for air supply into 1 direction (**K1**) / 2 directions (**K2**) / 3 directions (**K3**) / 4 directions (**K4**) and accessible face. The manufacturer will have performed measurements of the technical characteristics of the grille, in an independent laboratory according to the standard ELOT EN 12238:2002. It will have a volume damper [**D**] / filter G3 [**F**] / equalizing grid [**E**]. It will be suitable for ceiling or air duct placement and visible installation with screws / concealed installation with internal screws, on the side of the outer frame. The factory will be certified according to **ISO 9001:2015** (Quality Management Systems) and according to **ISO 14001:2015** (Environmental Management Systems).
It will be manufactured by **AIRTECHNIC** type **K1.A / K1.A +D, +E, +F**
It will be manufactured by **AIRTECHNIC** type **K2.A / K2.A +D, +E, +F**
It will be manufactured by **AIRTECHNIC** type **K3.A / K3.A +D, +E, +F**
It will be manufactured by **AIRTECHNIC** type **K4.A / K4.A +D, +E, +F**

Ceiling diffuser with automatically adjustable curved blades, for 1 / 2 directions, K1+TP / K2+TP

Ceiling outlet, indicative type **K1+TP** / **K2+TP** by **AIRTECHNIC**, manufactured of anodized aluminum, with grouped, automatically adjustable curved blades configured for air supply into 1 direction (**K1+TP**) / 2 directions (**K2+TP**). The angle adjustment will be achieved via a thermodynamic piston. The manufacturer will have performed measurements of the technical characteristics of the grille, in an independent laboratory according to the standard ELOT EN 12238:2002. It will have a volume damper [**D**] / filter G3 [**F**] / equalizing grid [**E**]. It will be suitable for ceiling or air duct placement and visible installation with screws / concealed installation with Π-shaped subframe. The factory will be certified according to **ISO 9001:2015** (Quality Management Systems) and according to **ISO 14001:2015** (Environmental Management Systems).
It will be manufactured by **AIRTECHNIC** type **K1+TP**
It will be manufactured by **AIRTECHNIC** type **K2+TP**



AIRTECHNIC

www.airtechnic.gr

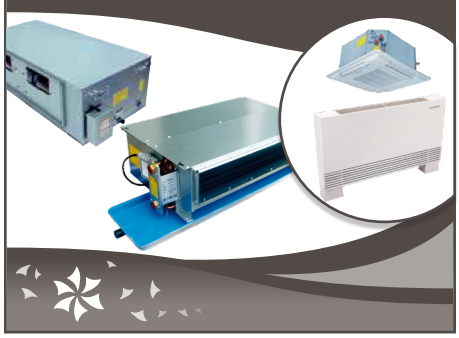
Air-Conditioning & Ventilation Components & Systems

ISO 9001:2015 ISO 14001:2015

AIR HANDLING UNITS

HEAT EXCHANGERS

FAN COIL UNITS



FANS & FAN SECTIONS

FIRE DAMPERS

AIR OUTLETS

STEAM HUMIDIFIERS - DEHUMIDIFIERS

CENTRAL VACUUM SYSTEMS

STAINLESS STEEL CHIMNEYS

AIR FILTERS

AIR CURTAINS

EVAPORATIVE COOLING

Main Office ATHENS
Paparrigopoulou 10 & Lagada,
12132, Peristeri, Athens
211 - 705.55.00
sales@airtechnic.gr

Factory - THIVA
4th km Thiva - Chalkida Hwy,
32200, Thiva
22620 - 89.006
factory@airtechnic.gr

Factory - THESSALONIKI
End of Meandrou Str.,
57013, Oraiokastro, Thessaloniki
2311 - 82.40.00
thessaloniki@airtechnic.gr