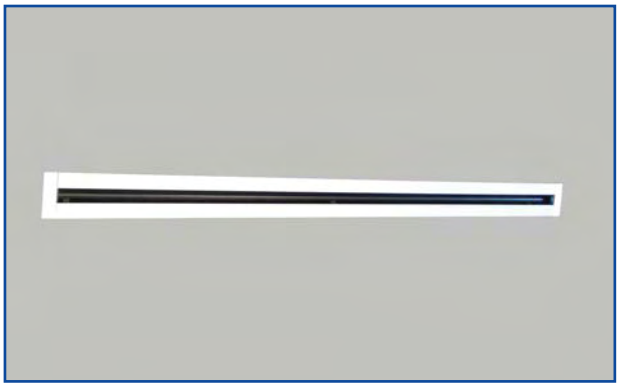
LK-70

Mech-Elec®

CONTENTS

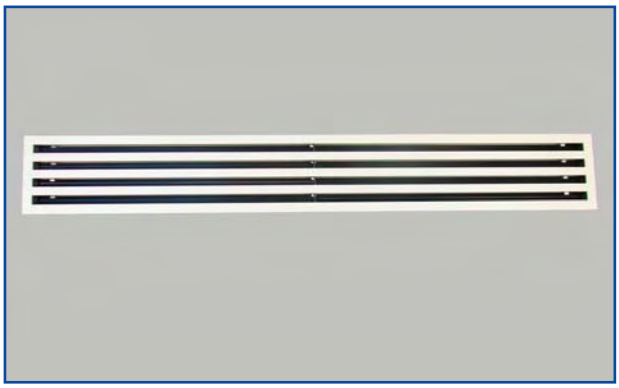
Linear slot diffuser LK-70



LK-70 1 slot

Description

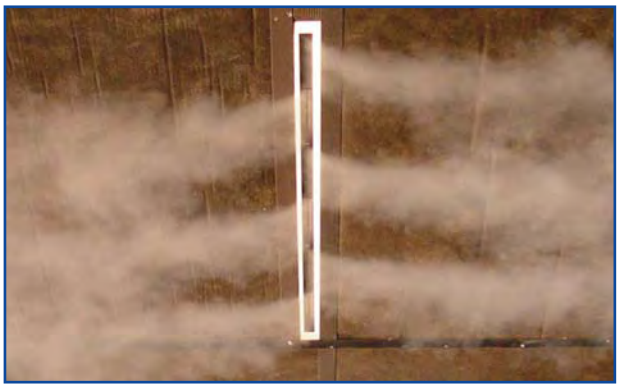
LK-70 linear supply diffuser for variable or constant flow rate, specially designed to maintain the ceiling or Coanda effect, including primary air flow rates reduced to 20% of the nominal flow rate.
This diffuser made with aluminium frames has a 15-mm air passage, providing greater aesthetic appeal.



LK-70 4 slots

Finished products

Standard finished products are constructed of natural anodised aluminium or pre-coated with RAL-9010 gloss white. The directional blades can be adjusted by means of a drive wheel, which allows the air to be aimed in different directions up to 700 mm maximum and 100 mm minimum. The LK-70-P version incorporates a galvanized steel supply plenum, with or without insulation, and integrated regulating damper in the spigot, accessible from the local network in standard implementation. There are two types of plenums, fixed and removable.
Upon request it is possible to integrate the diffuser into panels with special dimensions to suit the installation of modular ceilings (1200x300) with RAL-coated finished products.



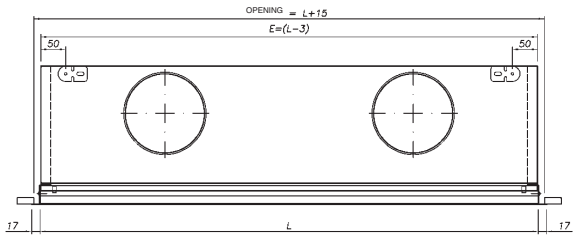
R&D Laboratory test

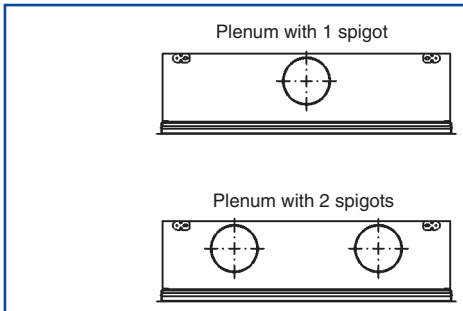
Uses

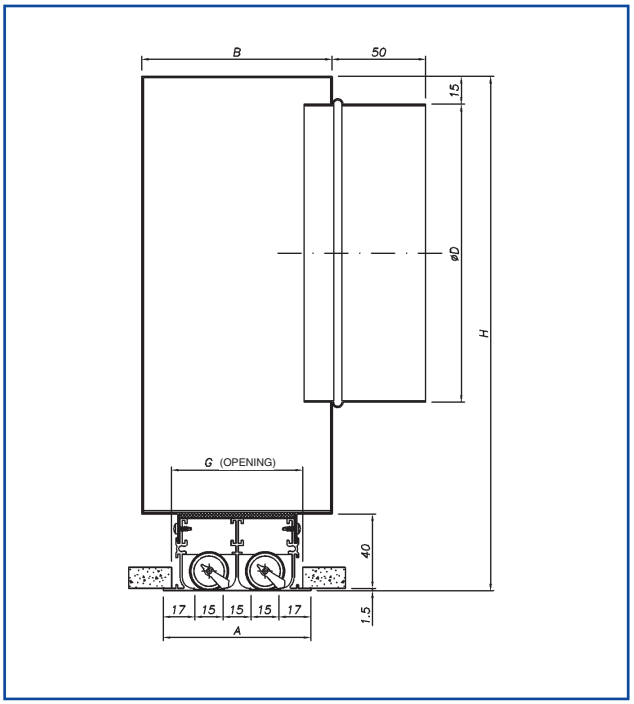
The LK-70 linear supply diffuser is intended for installation in ceilings. It is especially suited for variable flow rates, although the design also provides excellent performance with constant air flow rates. Its blades are directional, so the direction of air flow can be varied from 0 to 180 °. This diffuser can be used for return air. The installation of return and supply diffusers on the same continuous line ensures a high level of aesthetic appeal and performance.

Models and dimensions

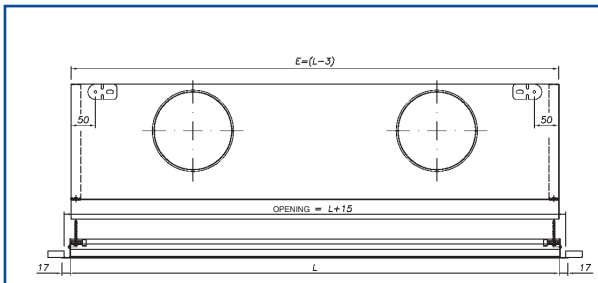
LK-70 with FIXED plenum without damper

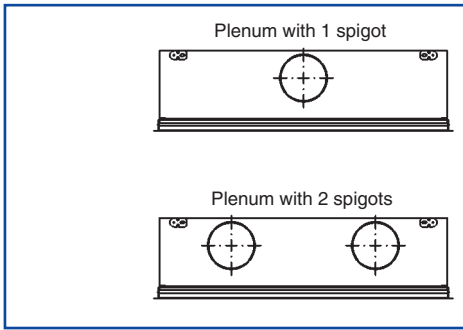


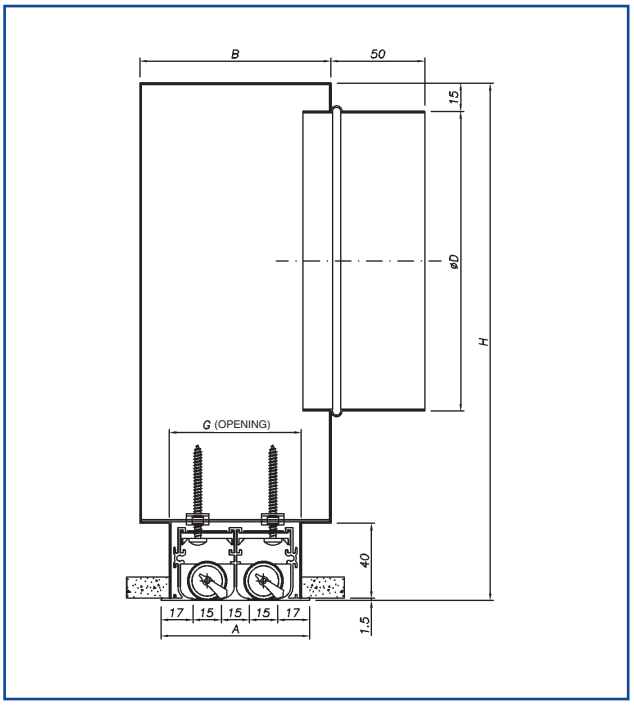




LK-70 with REMOVABLE plenum without damper

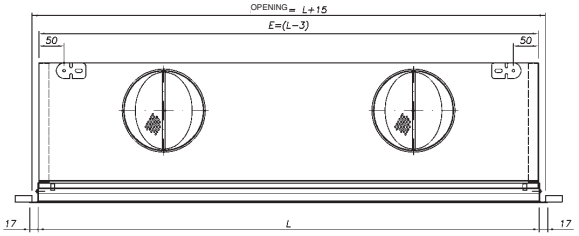


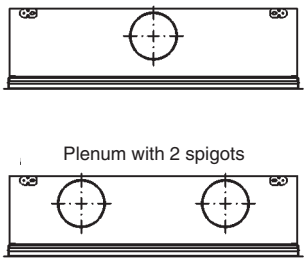


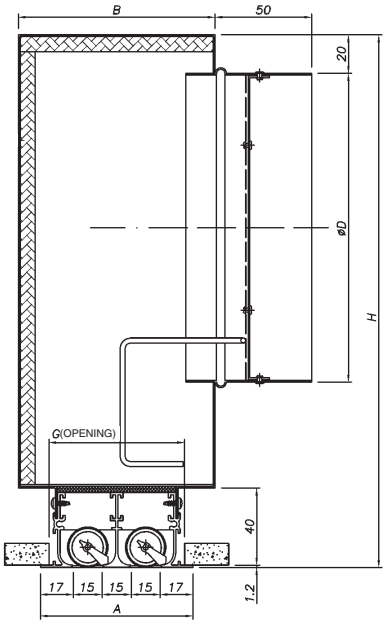


Models and dimensions

LK-70 with FIXED plenum, with adjustable damper from the room

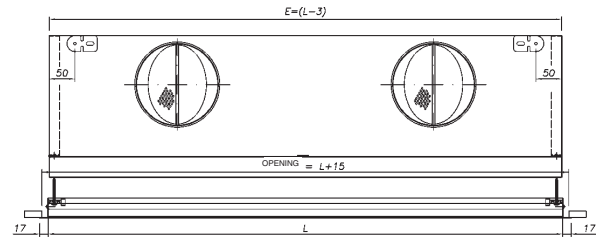


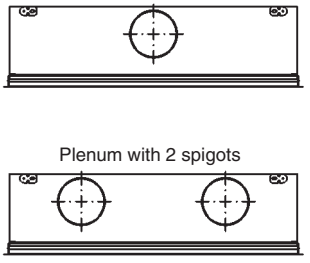


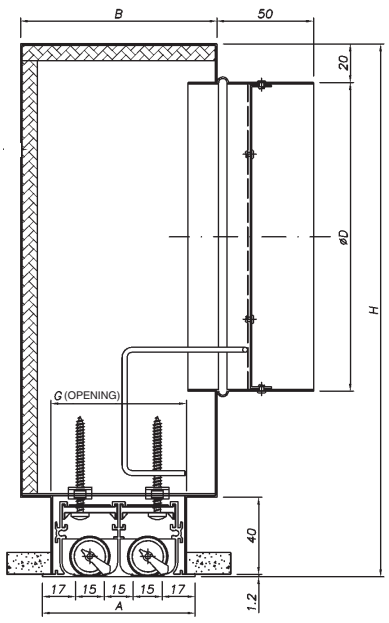


Plenum box insulation by special order

LK-70 with REMOVABLE plenum, with adjustable damper from the room







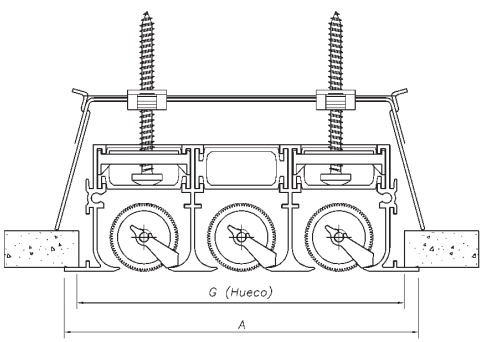
Plenum box insulation by special order

Models and dimensions

DIMENSIONS for FIXED or REMOVABLE plenum, with or without DAMPER

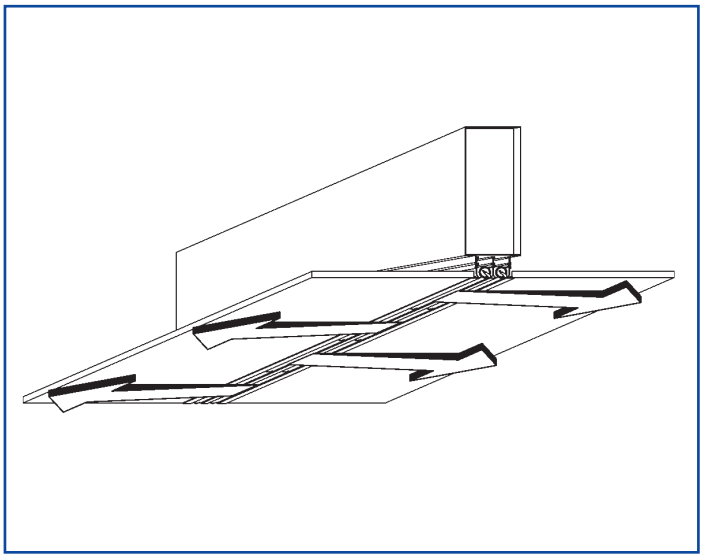
SLOTS	NOMINAL	L ACTIVE LENGTH	E	ØD	Nº OF SPIGOTS	A	B	G (OPENING)	H	Standard nº deflectors sections
1	600	585	582	124	1	49	72	41	225	1
	900	885	882							2
	1015	1000	997							
	1200	1185	1182							
	1500	1485	1482		2					
	1800	1785	1782							3
	2000	1985	1982							
	2015	2000	1997							
2	600	585	582	159	1	79	102	71	275	1
	900	885	882							2
	1015	1000	997							
	1200	1185	1182							
	1500	1485	1482		2					
	1800	1785	1782							3
	2000	1985	1982							
	2015	2000	1997							
3	600	585	582	199	1	109	132	101	325	1
	900	885	882							2
	1015	1000	997							
	1200	1185	1182							
	1500	1485	1482		2					
	1800	1785	1782							3
	2000	1985	1982							
	2015	2000	1997							
4	600	585	582	199	1	139	162	131	325	1
	900	885	882							2
	1015	1000	997							
	1200	1185	1182							
	1500	1485	1482		2					
	1800	1785	1782							3
	2000	1985	1982							
	2015	2000	1997							

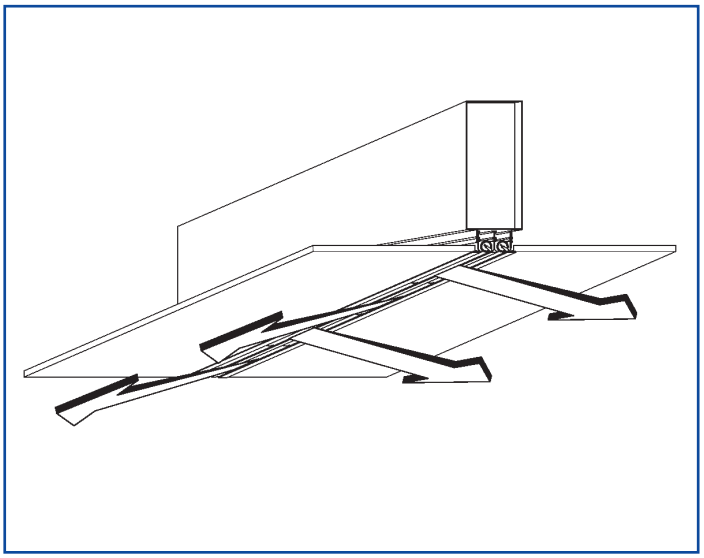
LK-70 with MOUNTING BRIDGES



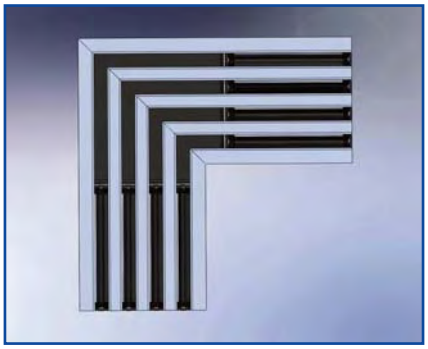
SLOTS	G (OPENING)	A
1	41	49
2	71	79
3	101	109
4	131	139

Models and dimensions

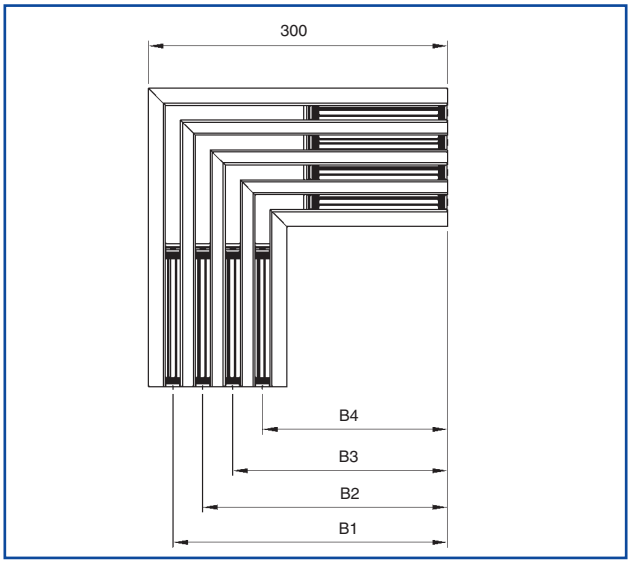




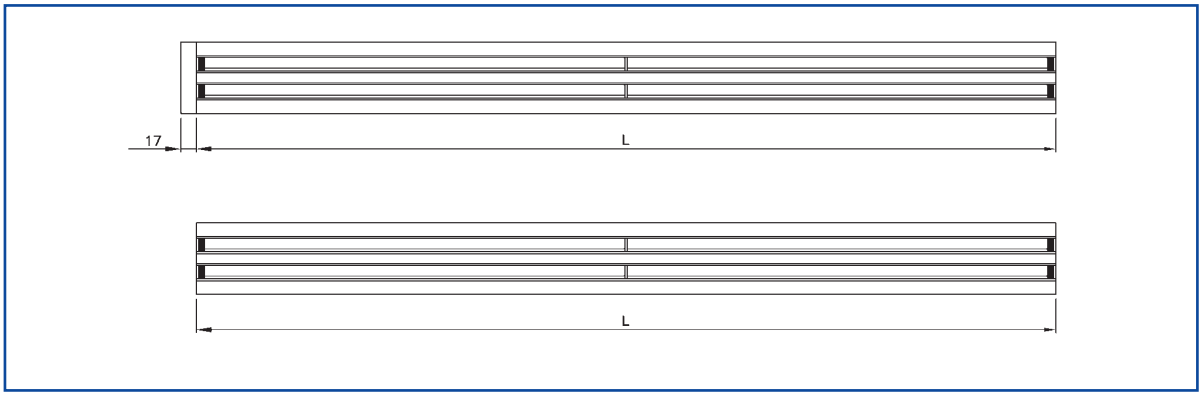
LK-70 MITRED CORNERS



SLOTS	B
1	275,5
2	245,5
3	215,5
4	185,5



LK-70 CONTINUOUS LINES



Technical data. Selection tables

LK - 70 HORIZONTAL DISCHARGE														
Q		Dim	600-1	1000-1	1200-1 600-2	1500-1	1800-1 900-2 600-3	1000-2	1200-2 600-4	1500-2 1000-3	1000-4	1500-3	1500-4	1800-4
(m³/h)	(l/s)	A_k (m²)	0,00553	0,00922	0,01107	0,01383	0,01660	0,01844	0,02213	0,02767	0,03689	0,04150	0,05533	0,06640
40	11,1	V_k (m/s)	2,0	1,2										
		X (m)	2,1	1,6										
		P_t (Pa)	6	2										
		L_W-dB(A)	21	<20										
60	16,7	V_k (m/s)	3,0	1,8	1,5	1,2								
		X (m)	3,1	2,4	2,2	2,0								
		P_t (Pa)	13	5	4	2								
		L_W-dB(A)	30	22	<20	<20								
80	22,2	V_k (m/s)	4,0	2,4	2,0	1,6	1,3	1,2						
		X (m)	4,2	3,2	3,0	2,6	2,4	2,3						
		P_t (Pa)	23	10	7	4	3	2						
		L_W-dB(A)	36	28	25	22	<20	<20						
120	33,3	V_k (m/s)	6,0	3,6	3,0	2,4	2,0	1,8	1,5	1,2				
		X (m)	6,3	4,9	4,4	4,0	3,6	3,4	3,1	2,8				
		P_t (Pa)	51	22	15	10	7	5	4	2				
		L_W-dB(A)	45	37	34	31	28	26	<20	<20				
160	44,4	V_k (m/s)		4,8	4,0	3,2	2,7	2,4	2,0	1,6	1,2	1,1		
		X (m)		6,5	5,9	5,3	4,8	4,6	4,2	3,7	3,2	3,1		
		P_t (Pa)		39	27	17	12	10	7	4	2	1		
		L_W-dB(A)		43	40	37	34	32	25	22	<20	<20		
200	55,6	V_k (m/s)		6,0	5,0	4,0	3,3	3,0	2,5	2,0	1,5	1,3	1,0	
		X (m)		8,1	7,4	6,6	6,0	5,7	5,2	4,7	4,0	3,8	3,3	
		P_t (Pa)		61	42	27	19	15	11	7	4	3	2	
		L_W-dB(A)		48	45	42	39	37	31	27	22	21	<20	
250	69,4	V_k (m/s)				5,0	4,2	3,8	3,1	2,5	1,9	1,7	1,3	1,0
		X (m)				8,3	7,5	7,1	6,5	5,8	5,1	4,8	4,1	3,8
		P_t (Pa)				42	29	24	17	11	6	5	3	2
		L_W-dB(A)				47	44	42	36	32	28	26	21	<20
300	83,3	V_k (m/s)					5,0	4,5	3,8	3,0	2,3	2,0	1,5	1,3
		X (m)					9,0	8,6	7,8	7,0	6,1	5,7	5,0	4,5
		P_t (Pa)					42	34	24	15	9	7	4	3
		L_W-dB(A)					48	46	40	36	32	30	25	22
350	97,2	V_k (m/s)							4,4	3,5	2,6	2,3	1,8	1,5
		X (m)							9,1	8,2	7,1	6,7	5,8	5,3
		P_t (Pa)							32	21	12	9	5	4
		L_W-dB(A)							44	40	35	34	29	26
400	111,1	V_k (m/s)							5,0	4,0	3,0	2,7	2,0	1,7
		X (m)							10,4	9,3	8,1	7,6	6,6	6,0
		P_t (Pa)							42	27	15	12	7	5
		L_W-dB(A)							47	43	39	37	32	29
500	138,9	V_k (m/s)								5,0	3,8	3,3	2,5	2,1
		X (m)								11,7	10,1	9,5	8,3	7,5
		P_t (Pa)								42	24	19	11	7
		L_W-dB(A)								48	44	42	37	34
600	166,7	V_k (m/s)									4,5	4,0	3,0	2,5
		X (m)									12,1	11,4	9,9	9,0
		P_t (Pa)									34	27	15	11
		L_W-dB(A)									48	46	41	39
700	194,4	V_k (m/s)											3,5	2,9
		X (m)											11,6	10,6
		P_t (Pa)											21	14
		L_W-dB(A)											45	42
800	222,2	V_k (m/s)												3,3
		X (m)												12,1
		P_t (Pa)												19
		L_W-dB(A)												45

SYMBOLS

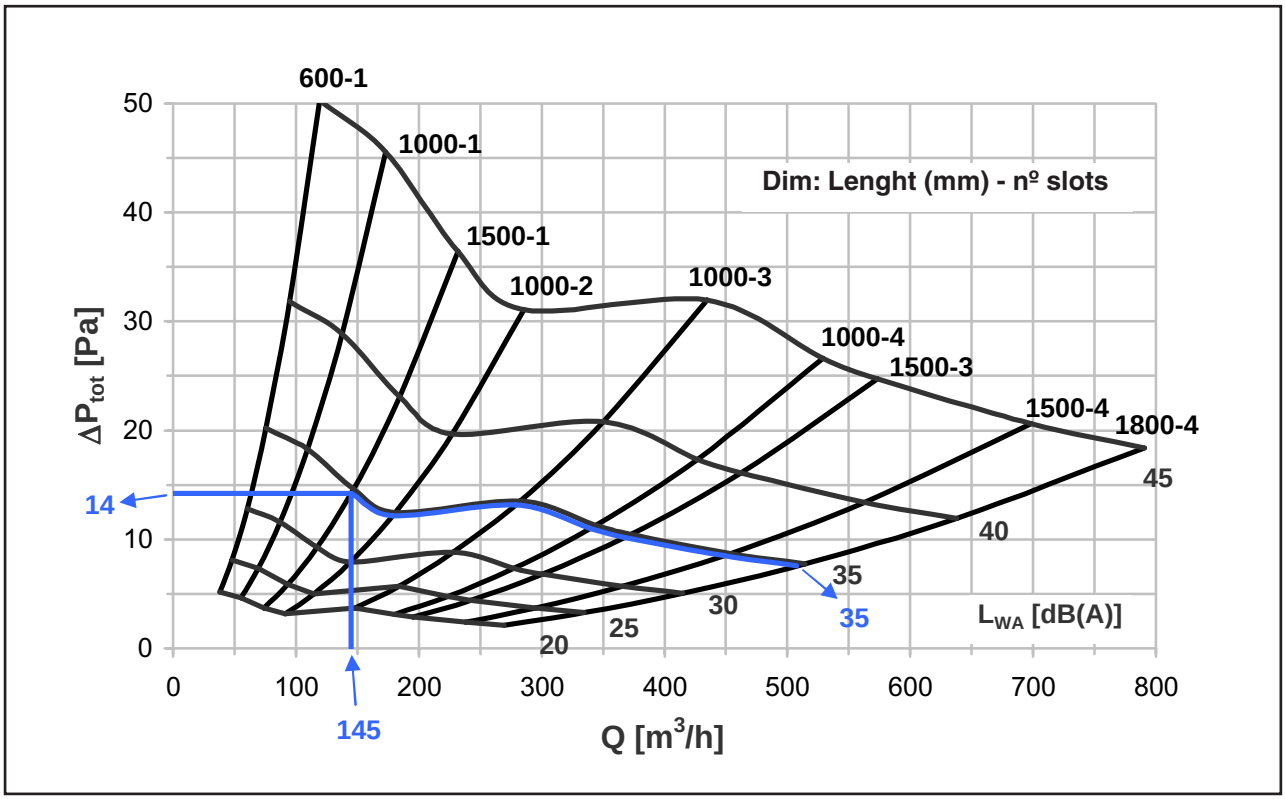
A_k	Effective area in m²
V_k	Effective velocity in m/s
X	Throw for maximum velocity in occupied area of 0.25 m/s, ΔT= 0 K and an installation height of 3 m, considering Coanda effect, in m
P_t	Total pressure drop, in Pa
Lw	Sound power level, in dB(A)

Technical data. Selection tables

LK - 70 VERTICAL DISCHARGE														
Q		Dim	600-1	1000-1	1200-1 600-2	1500-1	1800-1 900-2 600-3	1000-2	1200-2 600-4	1500-2 1000-3	1000-4	1500-3	1500-4	1800-4
(m³/h)	(l/s)	Ak (m²)	0,00581	0,00968	0,01162	0,01452	0,01742	0,01936	0,02323	0,02904	0,03872	0,04356	0,05808	0,06969
50	13,9	V_k (m/s) $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)	2,4 1,2 5 <20											
75	20,8	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)	3,6 1,9 10 27	2,2 1,2 5 <20	1,8 1,0 3 <20									
100	27,8	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)	4,8 2,5 19 33	2,9 1,6 8 25	2,4 1,4 6 22	1,9 1,2 4 <20								
140	38,9	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)	6,7 3,5 36 41	4,0 2,2 16 33	3,3 1,9 11 30	2,7 1,6 7 22	2,2 1,4 5 <20	2,0 1,3 4 <20	1,7 1,2 3 <20					
180	50,0	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)	8,6 4,5 60 47	5,2 2,9 26 39	4,3 2,5 18 36	3,4 2,1 12 28	2,9 1,8 8 25	2,6 1,7 7 24	2,2 1,5 5 21	1,7 1,3 3 <20				
240	66,7	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)		6,9 3,8 47 46	5,7 3,3 32 43	4,6 2,8 21 35	3,8 2,4 14 32	3,4 2,3 12 31	2,9 2,0 8 28	2,3 1,7 5 24	1,7 1,3 3 <20	1,5 1,2 2 <20		
300	83,3	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)			7,2 4,2 51 48	5,7 3,5 32 41	4,8 3,1 22 38	4,3 2,8 18 36	3,6 2,5 13 33	2,9 2,1 8 30	2,2 1,7 5 25	1,9 1,5 4 24	1,4 1,2 2 <20	1,2 1,0 1 <20
400	111,1	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)				7,7 4,7 57 48	6,4 4,1 40 45	5,7 3,8 32 43	4,8 3,3 22 40	3,8 2,8 14 37	2,9 2,2 8 32	2,6 2,1 6 31	1,9 1,5 4 26	1,6 1,3 2 23
500	138,9	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)						7,2 4,7 51 49	6,0 4,2 35 46	4,8 3,5 22 42	3,6 2,8 13 38	3,2 2,6 10 36	2,4 1,9 6 32	2,0 1,7 4 29
600	166,7	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)								5,7 4,2 32 47	4,3 3,4 18 42	3,8 3,1 14 41	2,9 2,3 8 36	2,4 2,0 6 33
700	194,4	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)									5,0 3,9 25 46	4,5 3,6 20 44	3,3 2,7 11 40	2,8 2,3 8 37
800	222,2	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)		SYMBOLS A_k Effective area in m² V_k Effective velocity in m/s Y_{max} Maximum vertical throw of air jet for ΔT = 10 K (in heating) P_t Total pressure drop, in Pa Lw Sound power level, in dB(A)							5,1 4,1 26 48	3,8 3,1 14 43	3,2 2,7 10 40
900	250,0	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)											4,3 3,5 18 46	3,6 3,0 13 43
1000	277,8	V_k (m/s $Y_{máx}$ (m) P_t (Pa) L_W-dB(A)												4,0 3,3 16 46

Technical data. Selection graphs

Graph 1. SOUND LEVEL, HORIZONTAL DISCHARGE

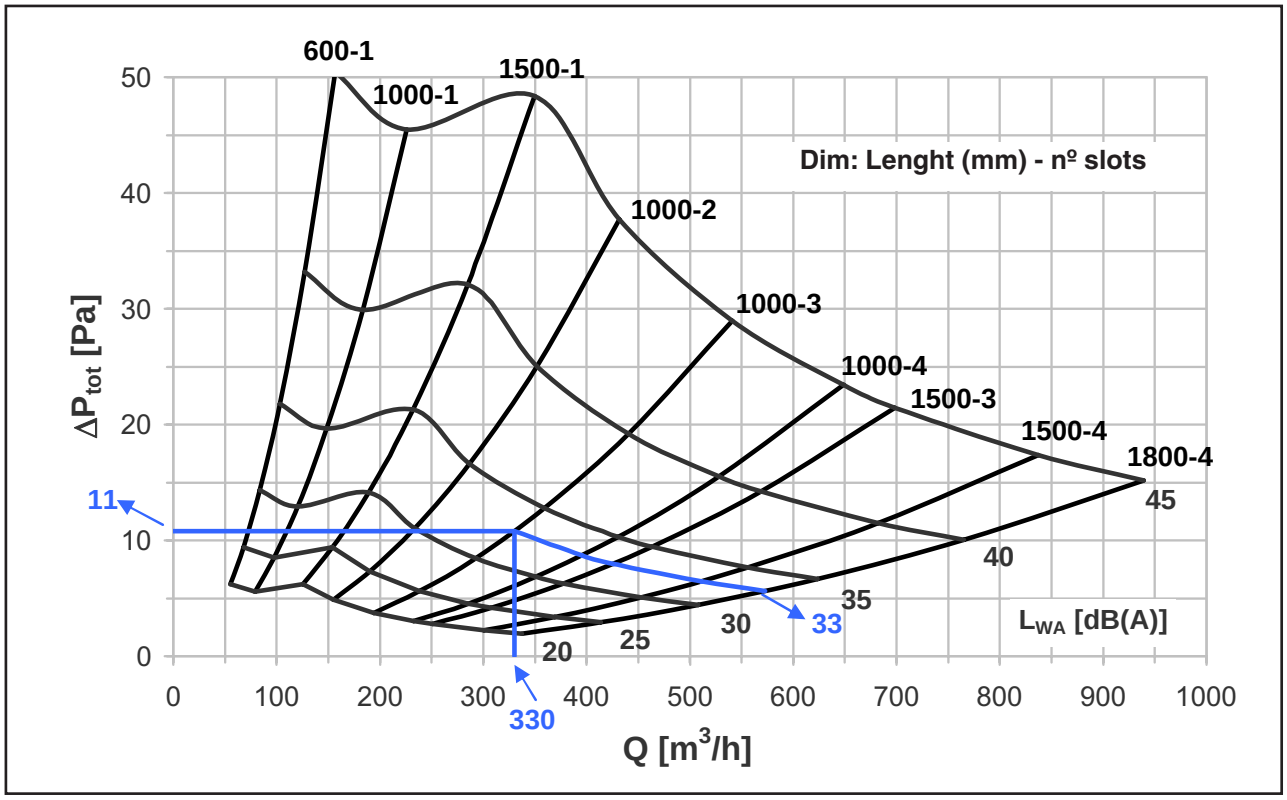


HORIZONTAL AIR SUPPLY	
Effective width of slot	h_k = 0,009222 m
Effective diffuser area	A_k (m^2) = h_k x L (m) x nº slots

L = Nominal length of diffuser (active lenght)

Technical data. Selection graphs

Graph 2. SOUND LEVEL, VERTICAL DISCHARGE

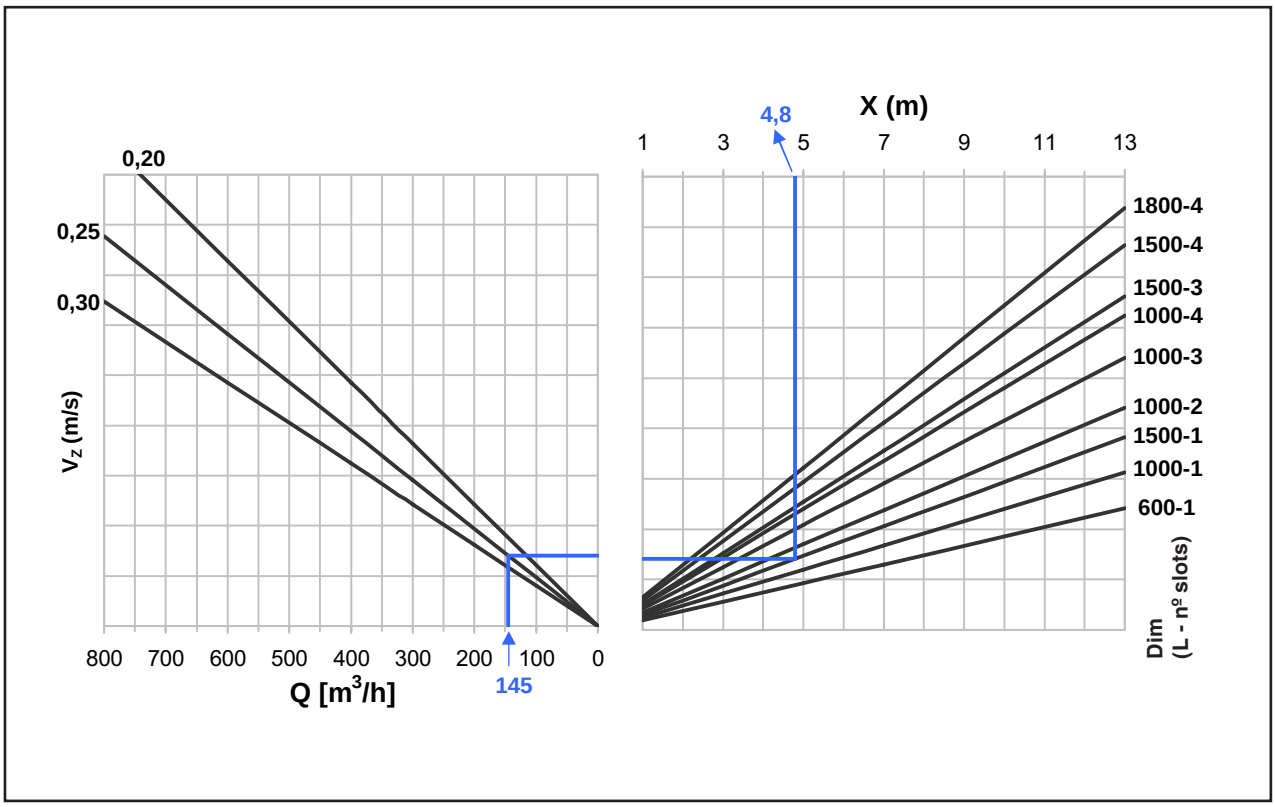


VERTICAL SUPPLY	
Effective width of slot	h_k = 0,009679 m
Effective diffuser area	A_k (m^2) = h_k x L (m) x nº slots

L = Nominal length of diffuser (active length)

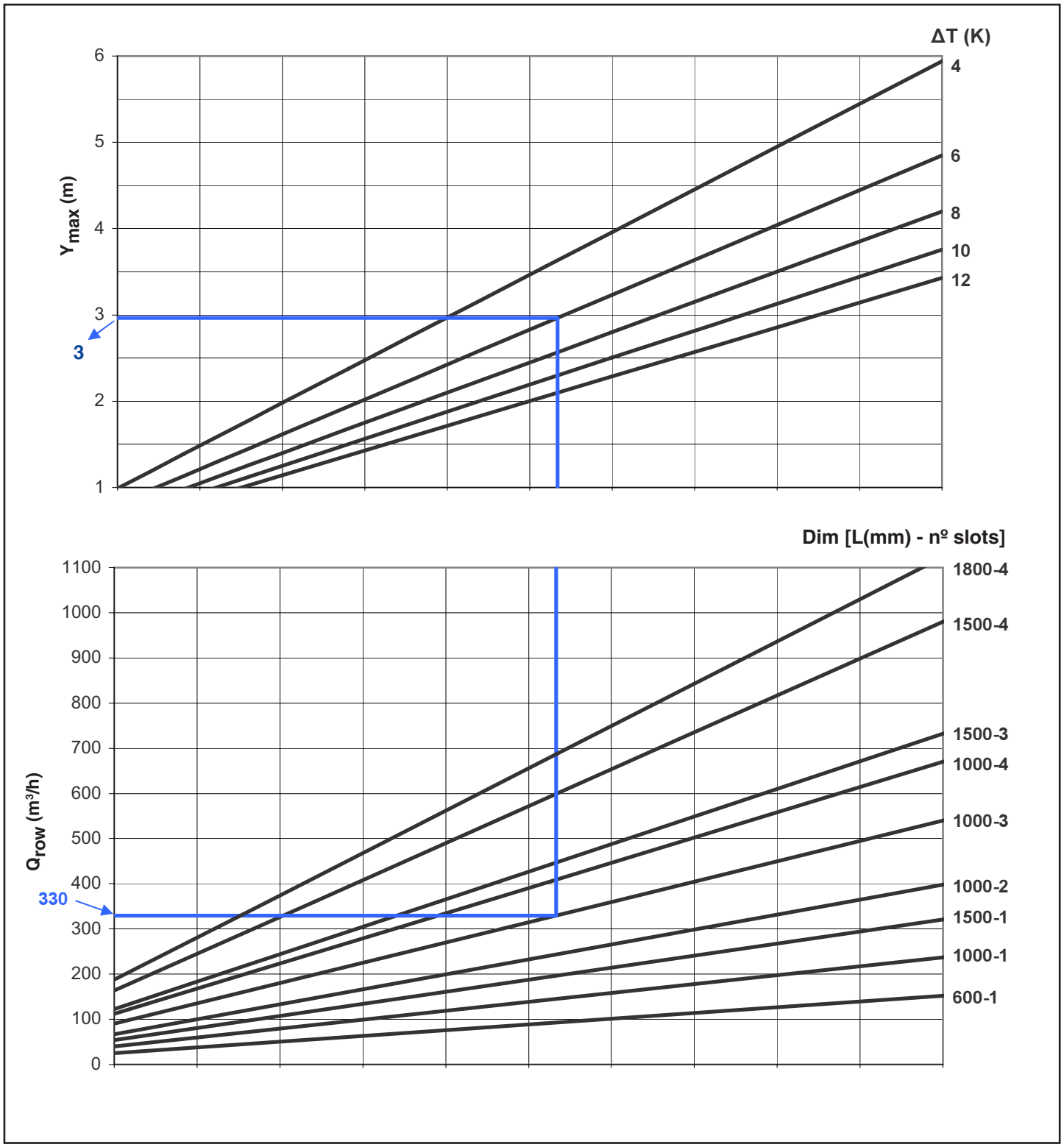
Technical data. Selection graphs

Graph 3. HORIZONTAL THROW



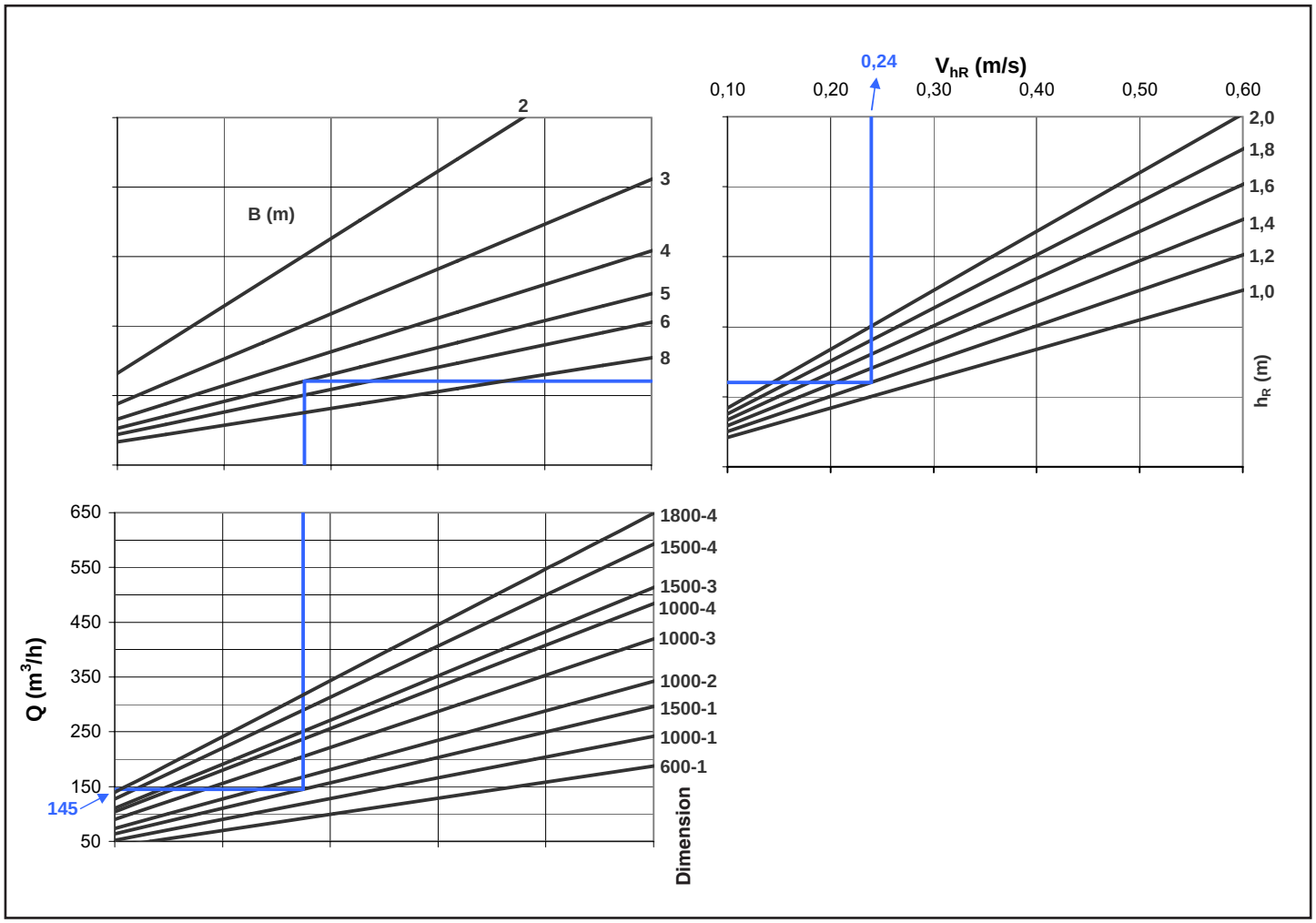
Technical data. Selection graphs

Graph 4. VERTICAL DISCHARGE



Technical data. Selection graphs

Graph 5. AIR STREAM BETWEEN DIFFUSERS



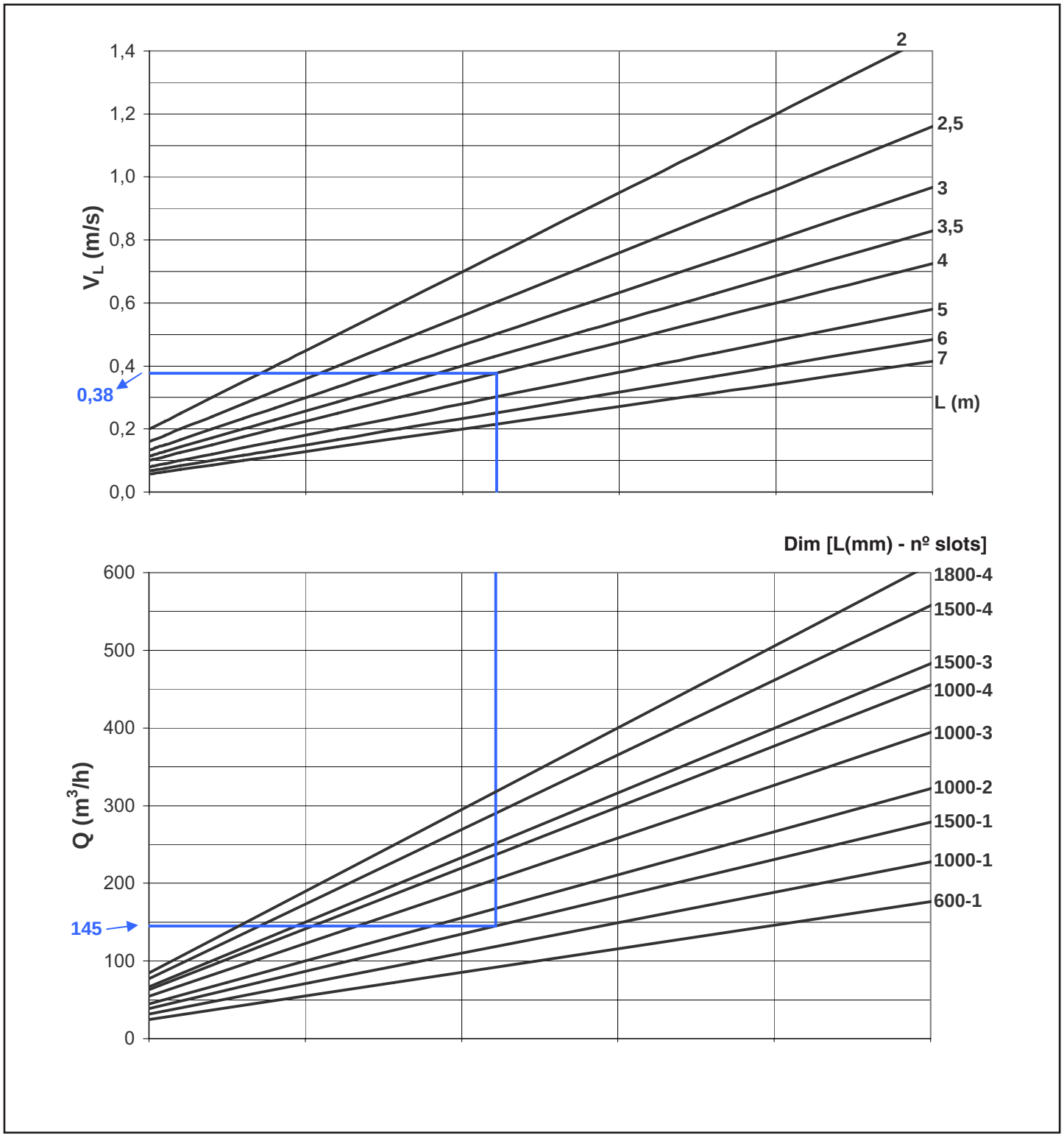
B Distance between diffuser axes (m)

h_R Height from ceiling to occupied area (m)

V_{hR} Velocity at a distance hR from the ceiling below the point where air jets meet (m/s)

Technical data. Selection graphs

Graph 6. AIR STREAM TOWARD THE WALL

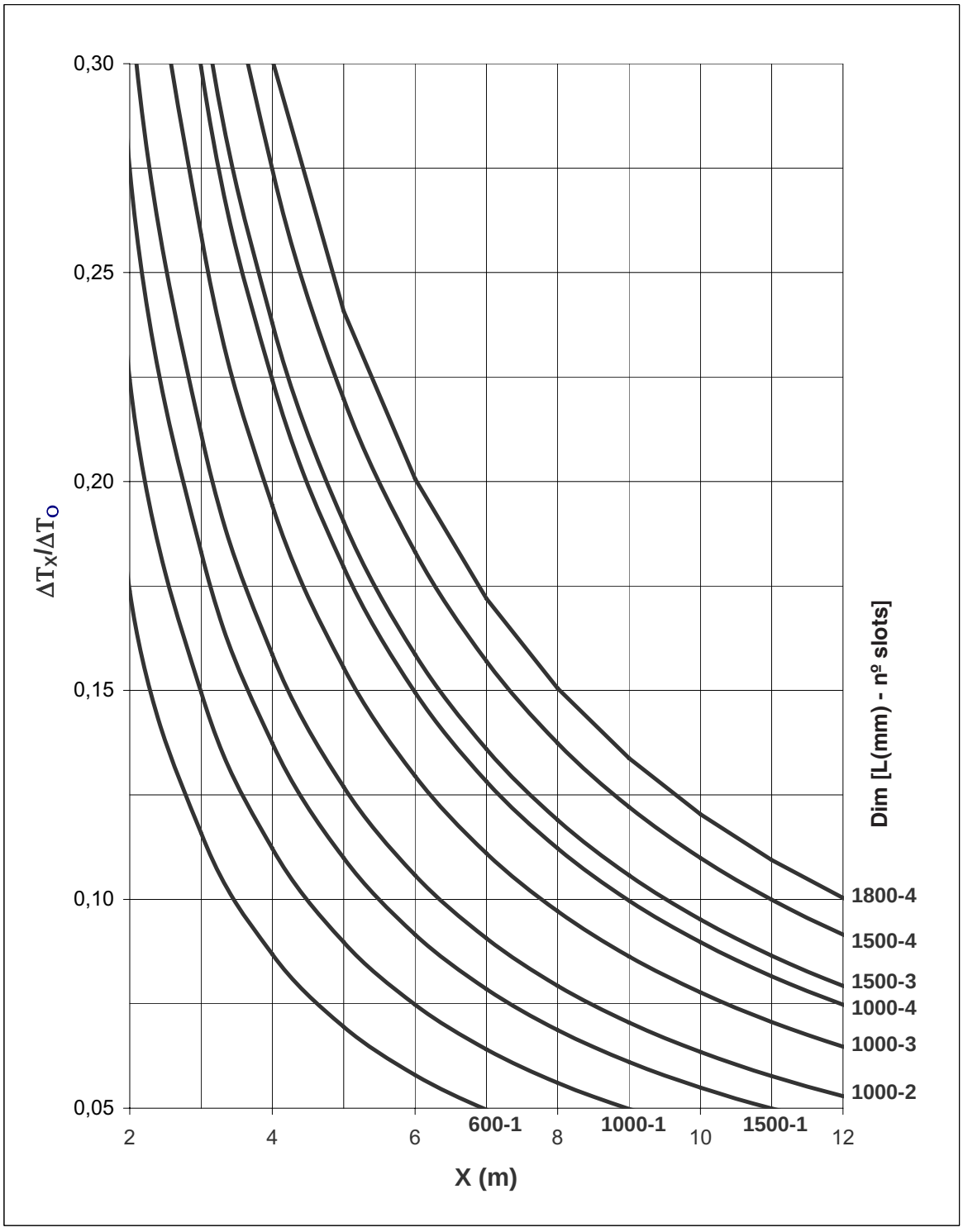


L Horizontal distance from diffuser to wall + h_R

V_L Velocity at the wall, at a distance h_R from the ceiling

Technical data. Selection graphs

Graph 7. TEMPERATURE, HORIZONTAL DISCHARGE

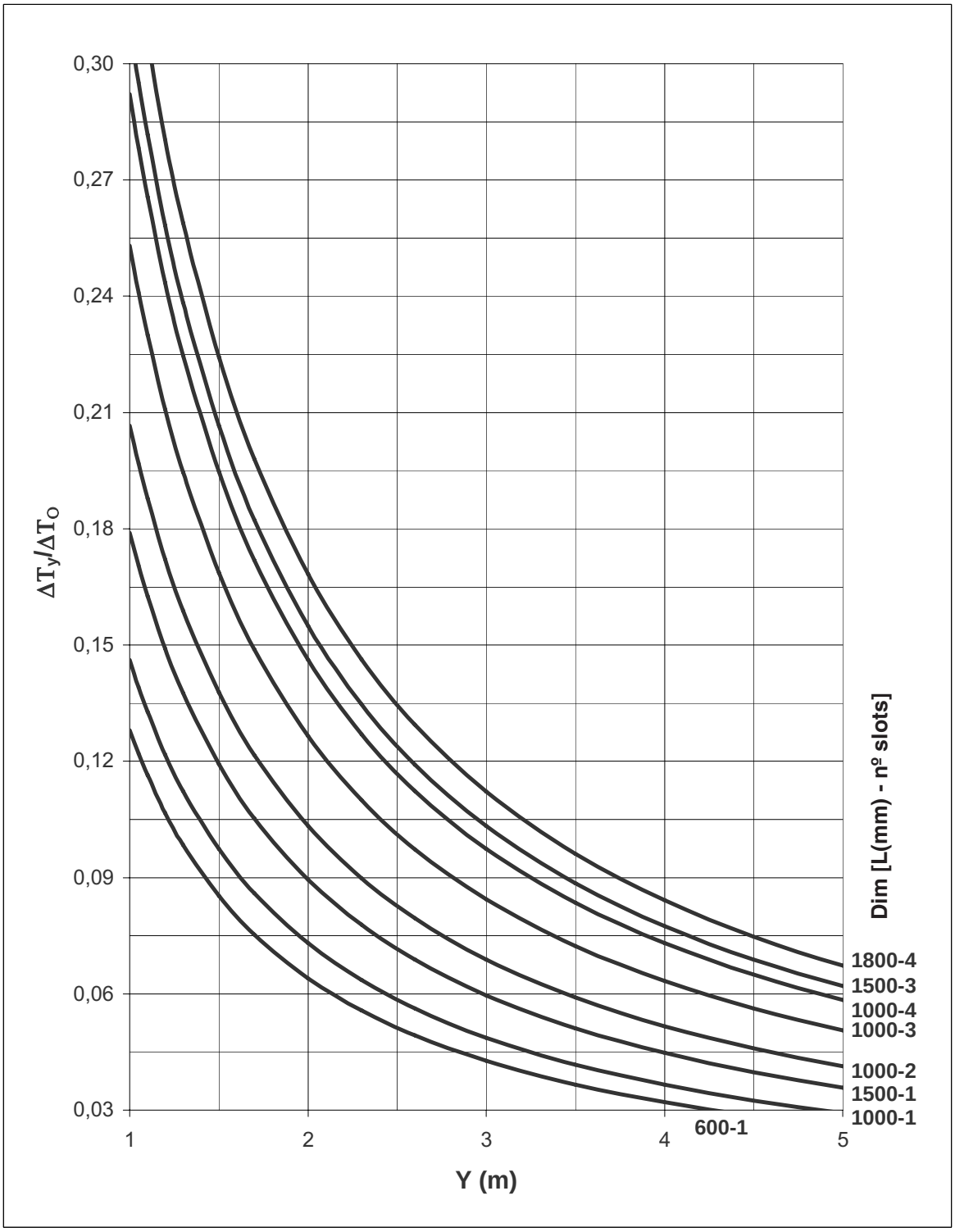


ΔT_o Temperature difference between supply and ambient air

ΔT_x Temperature difference between air jet (for throw X) and ambient air

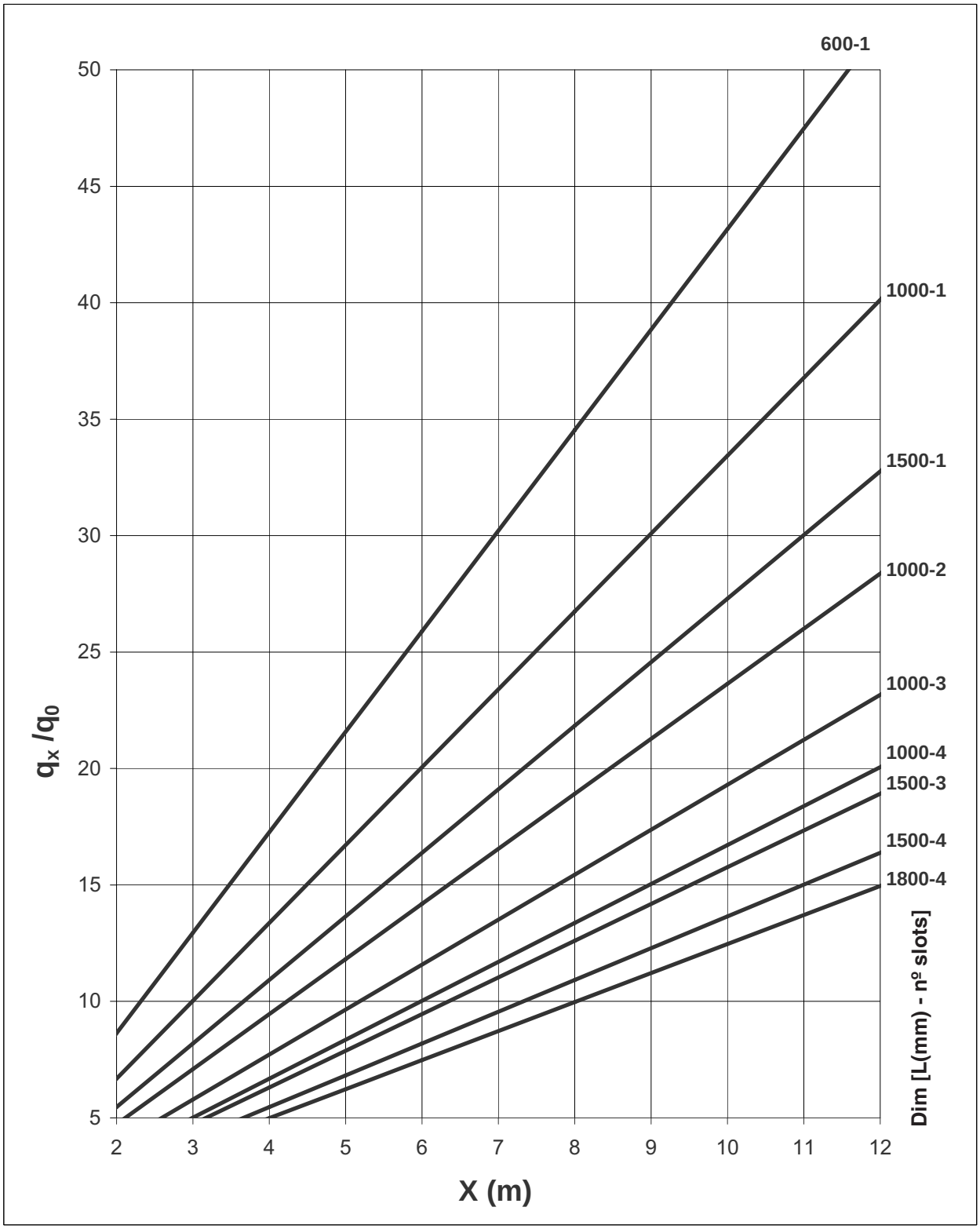
Technical data. Selection graphs

Graph 8. TEMPERATURE, VERTICAL DISCHARGE



Technical data. Selection graphs

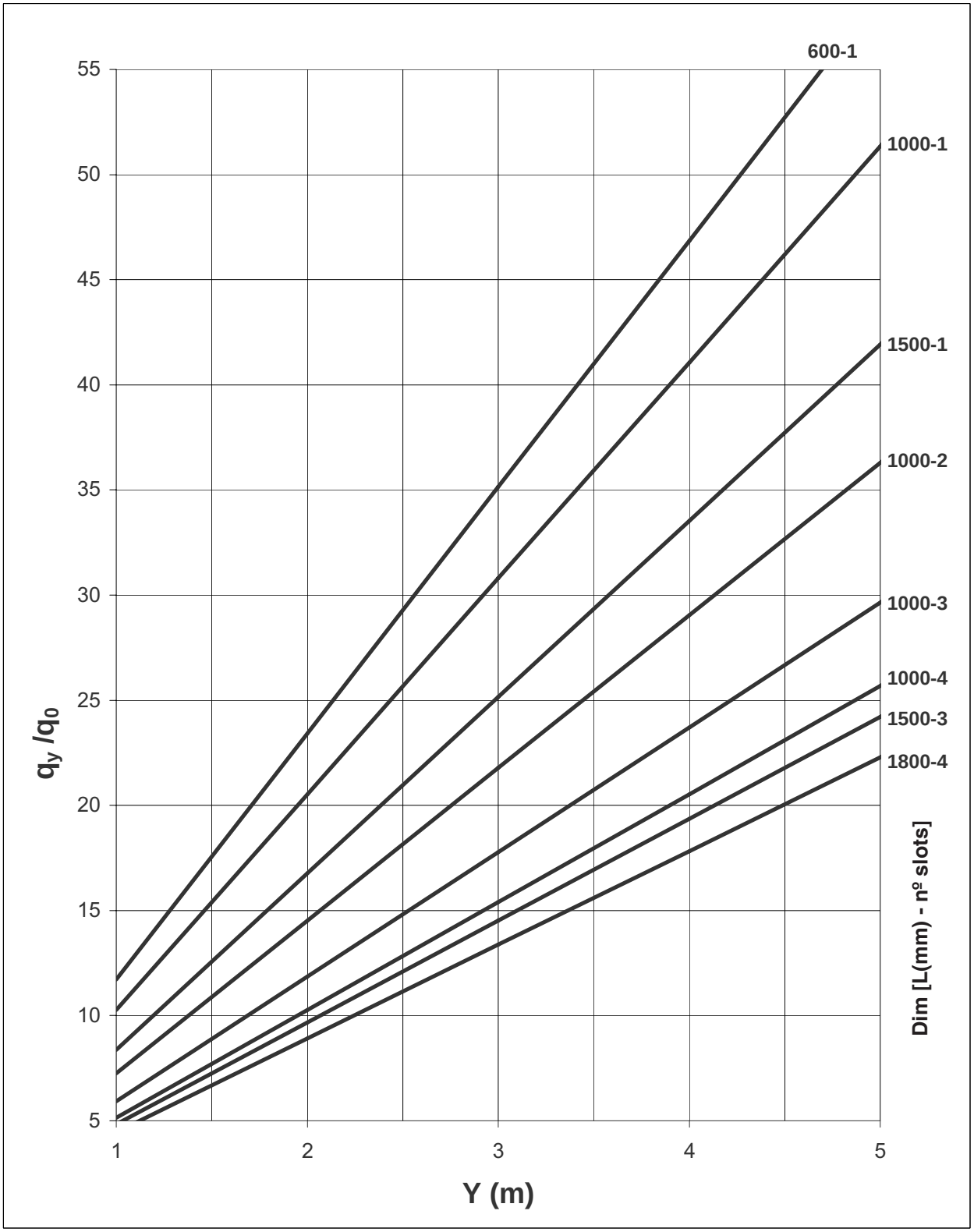
Graph 9. INDUCTION RATE, HORIZONTAL DISCHARGE



q_x/q_o Induction rate. Quotient between the air volume moved by the air jet for a throw X and the supply air volume

Technical data. Selection graphs

Graph 10. INDUCTION RATE, VERTICAL DISCHARGE



Selection examples

Example 1. Horizontal Air Supply

The selection of an LK-70 linear diffuser is planned with the following design input:

- Flow rate: 145 m^3/h
- Sound power < 35 dB(A)
- Ceiling height: 3 m
- Distance from the diffuser to the wall is 2.8 m
- Distance between the diffusers (in the direction of the air supply): 5 m

Starting with Graph 1 with a flow rate of 145 m^3/h, we see that the sound power is 35 dB(A) for an LK 70 1500 – 1-slot linear diffuser, with a drop in pressure of 14 Pa.

In order to obtain the effective velocity (V_k), we must first know the effective area of the diffuser (A_k). In this case, it appears in the table for selecting the horizontal air supply, but it can also be calculated by applying the formula shown in the table on page 9, as follows:

$$A_k = 0.009222 \text{ m} \times 1.5 \text{ m} \times 1 = 0.01383 \text{ m}^2$$

Thus, the effective output velocity (V_k) for the diffuser will be equal to:

$$V_k = \frac{145 \text{ m}^3/\text{h} / (3600 \text{ s/h})}{0.01383 \text{ m}^2} = 2.9 \text{ m/s}$$

In order to obtain the required throw of an LK 70 1500 1-slot diffuser with an air flow rate of 145 m^3/h, we need to look at Graph 3; for a maximum velocity of 0.25 m/s in an occupied area, we arrive at a throw of 4.8 m under isothermal conditions.

The maximum velocity in an occupied area generated by opposing air ducts can be obtained in Figure 5. Starting with an air flow rate of 145 m^3/h, the distance between the axles 8 m = 1.2 m) we arrive at a velocity of V_{hR} = 0.24 m/s.

In order to determine the velocity in the wall area, with the diffuser installed in the wall at a height of 2.8 m, we need to look at Graph 6 with an air flow rate of 145 m^3/h. The length L to be considered for calculating the velocity at a height from the floor of 1.8 m will be:

$$L = 2.8 + (3 - 1.8) = 4 \text{ m}$$

Using these data, we obtain a velocity at this point of V_L = 0.38 m/s.

Selection examples

Example 2. Vertical Air Supply

An LK-70 linear diffuser is selected based on the following design input data:

- Flow rate: 330 m^3/h
- Sound power < 35 dB(A)
- Maximum vertical penetration: 3 m
- ΔT = +6 K

Starting with Graph 4 with a flow rate of 330 m^3/h we observe that, for a size 1000 three-slots LK-70 diffuser and a ΔT = +6 K, we obtain a maximum penetration of Y_{max} = 3 m.

In order to obtain the sound output level and the drop in pressure for the selected diffuser, we need to look at Graph 2 with an air flow rate of 330 m^3/h. We obtain a sound power level of 33 dB(A) and a pressure drop of 11 Pa.

In order to obtain the effective velocity (V_k), we must first know the effective area of the diffuser (A_k). In this case, it appears in the vertical air supply selection table, but it can also be calculated by applying the formula shown in the table on page 9, as follows:

$$A_k = 0.009679 \text{ m} \times 1\text{m} \times 3 = 0.029037 \text{ m}^2$$

Thus, the effective output velocity (V_k) for the diffuser will be equal to:

$$V_k = \frac{330 \text{ m}^3/\text{h} / (3600 \text{ s/h})}{0.029037 \text{ m}^2} = 3.2 \text{ m/s}$$

Product code

The product code shown below is used to define both the diffuser as well as the plenum:

LK-70	Linear diffuser
1-2-3-4	Number of slots
---	length of the diffuser (nominal, opening in mm)

---	nº. of STANDARD lengths of deflector blades
A	nº. of spans to define: (minimum 100 mm maximum 700 mm)

PM	Mounting bridge

PF	Fixed plenum without damper
PD	Removable plenum without damper

PF-C	Fixed plenum with damper
PD-C	Removable plenum with damper

PFA	Insulated fixed plenum without damper
PDA	Insulated removable plenum without damper

PFA-C	Insulated fixed plenum with damper
PDA-C	Insulated removable plenum with damper

RAL 9010	Standard finished product in white
RAL...	Finished product in another RAL coating

Example:

LK-70-1-1200-PFA-C RAL 9010

LK-70 linear diffuser, one-slot, and nominal width 1200 mm, 2 lengths of blades (standard), with insulated fixed plenum and integrated regulating damper in the spigot, coated in RAL-9010 white.