

K6

ACTIVE CLOSED CHILLED BEAM



K6

ACTIVE CLOSED CHILLED BEAM

K6 active closed climate beam for various ceiling types. The casing is made of galvanized sheet steel, powder coated, with a perforated front plate with circular perforations. Plenum manufactured from galvanized sheet steel with connection diameter of 125 mm. The heat exchanger has aluminium fins and a copper collector with a \varnothing 15 mm connection. The K6 climate beam is Eurovent certified.



TECHNICAL DETAILS

APPLICATION	Product	K6
	Airflow direction	Horizontal
	Airflow type	Supply
	Installation height	<3,5 m
CONSTRUCTION	Min. length climate beam	600 mm
	Max. length climate beam	3000 mm
	Available steps in length	100 mm (other steps on request)
	Height	210 mm
MATERIAL	Casing	Galvanised steel plate, powder coated
	Plenum box	Galvanised steel plate
	Door	Perforated galvanised steel plate
		Rotating in 2 directions, removable
	Deflection vanes (optional)	Plastic
		+/- 40° adjustable with steps of 10°
	Pressure measuring point	Silicone
Heat exchanger	Cu / Al	
Standard finishing	RAL9010	
MOUNTING	Air side	\varnothing 125 mm (2 air inlets recommended for primary airflow rates larger than 140 m ³ /h)
	Water side	\varnothing 15 mm
	Rail with mounting straps	4 per beam
PERFORMANCE	Certification	Eurovent Chilled Beams
	Minimum primary pressure	50 Pa

TABLE OF CONTENT

Used symbols.....	5
Working principle.....	6
Longitudinal section	7
Cross section	7
Dimensions	7
Other types.....	8
Connection possibilities.....	9
Accessibility of heat exchanger	10
Option	11
Selection table/graph	
• A. Capacity heat exchanger	12
• B. Sound power without room attenuation	14
• C. Pressure loss	18
• D. Air velocity.....	19
How to order	24

SYMBOLS USED

SYMBOL	UNIT	DESCRIPTION
A	m	center distance between 2 beams
C	mm	nominal length heat exchanger
H	m	room height
H1	m	room height - height of comfort zone
L	mm	nominal length beam
L1	m	jet distance to the side wall location at a height of 1.8 m
L2	m	jet distance to the side wall location at a height of 0.1 m
L3	m	jet distance to the mid-plane location between 2 beams at a height of 1.8 m
Lw	dB(A)	sound power without room attenuation
Pw	W	heat exchanger capacity
Qp	m ³ /h	primary airflow rate
Qw	L/h	waterflow rate heat exchanger
Tr	°C	room temperature
Twin	°C	water temperature inlet heat exchanger
V1	m/s	air speed at a distance of 0.5 m from the wall and at a height of 1.8 m
V2	m/s	air speed at a distance of 0.5 m from the wall and at a height of 0.1 m
V3	m/s	air speed at the mid-plane between 2 beams at a height of 1.8 m
X	m	distance between wall and beam
Y	m	mid-distance between 2 beams
ΔPs	Pa	static pressure loss
ΔPw	kPa	water pressure loss
ΔT	°C	water temperature difference heat exchanger: outlet - inlet

WORKING PRINCIPLE

A chilled beam is an on convection based HVAC system. The K6 chilled beam is a high-performance, active and closed chilled beam able to both cool and heat room air. This air is subsequently mixed with fresh, primary air in order to finally be blown back into the room.

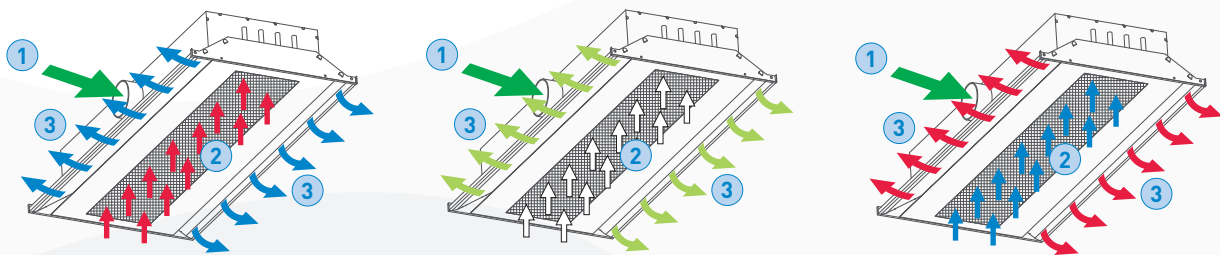
The primary supply air is led to a plenum from where it is blown into the room by a series of nozzles. The resulting small jets create a reduced pressure above a built-in heat exchanger, being the driving force for room air to travel through this exchanger. This cooled or heated, secondary air mixes with the primary air supply to, subsequently, enter the room along the ceiling by long slots. A minimum plenum pressure of 50 Pa is needed for optimum operation of the chilled beam.

The chilled beam is primarily intended for air cooling. Heating may be accomplished by (i) a change-over heat exchanger with one water circuit for both cooling and heating (so-called two-pipe system), or (ii) a double water circuit for cooling and heating respectively (so-called 4-pipe system). Using the latter combined heat exchanger, the total cooling capacity of the beam will of course be limited.

Another option involves deflector vanes mounted in the outlet slots to lead the mixed air towards a desired direction. This is useful if there are obstructions located in the vicinity of the chilled beam, adversely affecting the airflow pattern. Obviously, a VAV (Variable Air Volume) unit can always be mounted in series so that a variable primary airflow is possible.

In cooling mode, condensation should always be avoided. Condensation may occur in two ways, i.e. by condensation of humid primary air and condensation of room air inside the heat exchanger. In order to avoid condensation of the primary air, its temperature should always be 1 to 2°C higher than the dew point of the room air. It is therefore advisable to dehumidify and cool the primary air in an air treatment unit. In this way, the degree of humidity in the room is controlled and condensation is prevented. Common primary air temperatures are in the range 16-20°C and 18-21°C for summer and winter conditions respectively. Condensation inside the heat exchanger is avoided by using water temperatures that are not too low. Water temperatures in the heat exchanger are therefore generally in the range 14-18°C when cooling. In heating mode, the water temperature is set in the range 35-50°C. As such, chilled beams can be combined with heat pumps. The heat exchanger has a maximum operating pressure of 7 bar.

Controlling the comfort zone temperature can be performed in several ways. One popular way is the on/off control of the heat exchanger's water flow. The cooling capacity can also be modified though by controlling the primary airflow rate with a VAV unit.



COOLING

- 1 = Primary air
- 2 = Secondary (room) air
- 3 = Primary air mixed with cooled room air

VENTILATION

- 1 = Primary air
- 2 = Secondary (room) air
- 3 = Primary air mixed with room air

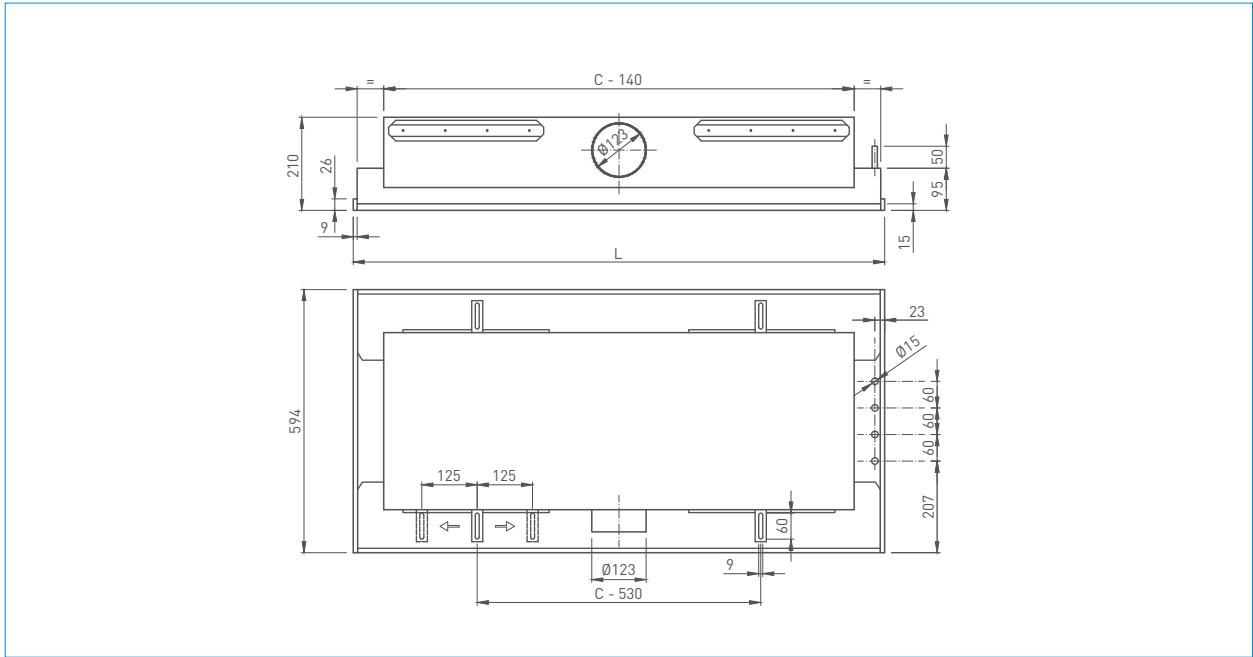
HEATING

- 1 = Primary air
- 2 = Secondary (room) air
- 3 = Primary air mixed with heated room air

LONGITUDINAL SECTION

T TYPE

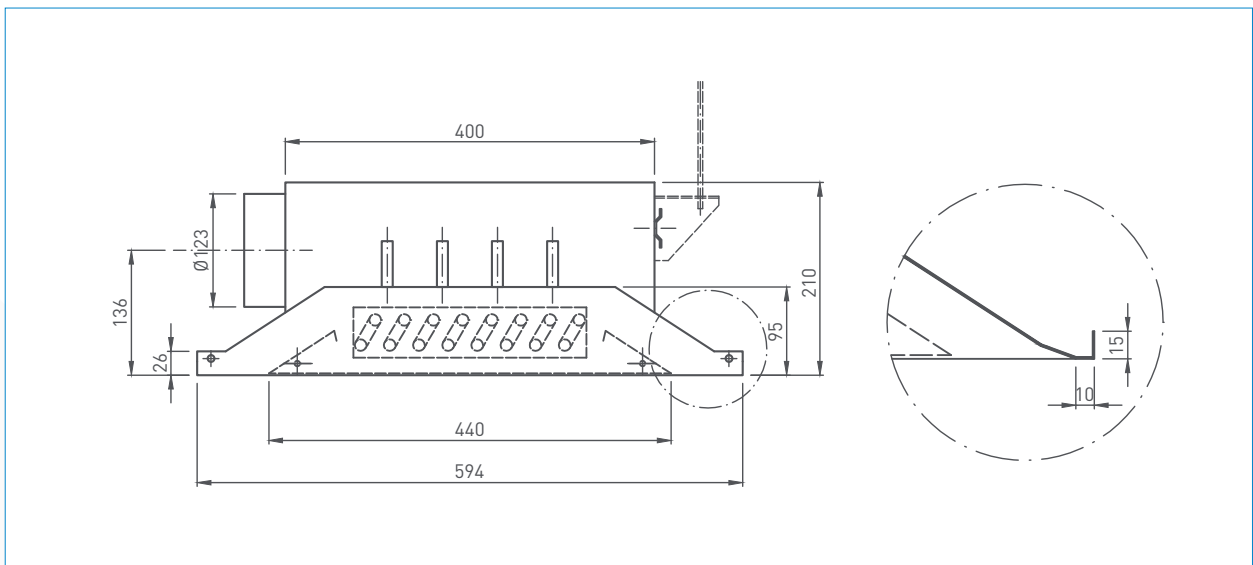
K T 6 R A H - 1 2 0 0 1 2 0 0



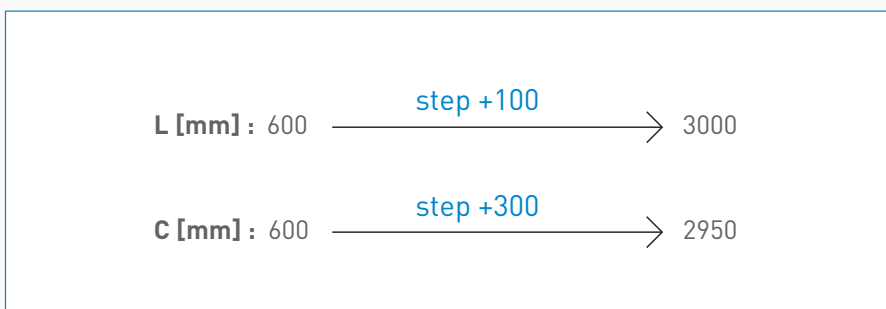
CROSS SECTION

T TYPE

K T 6 R A H - 1 2 0 0 1 2 0 0



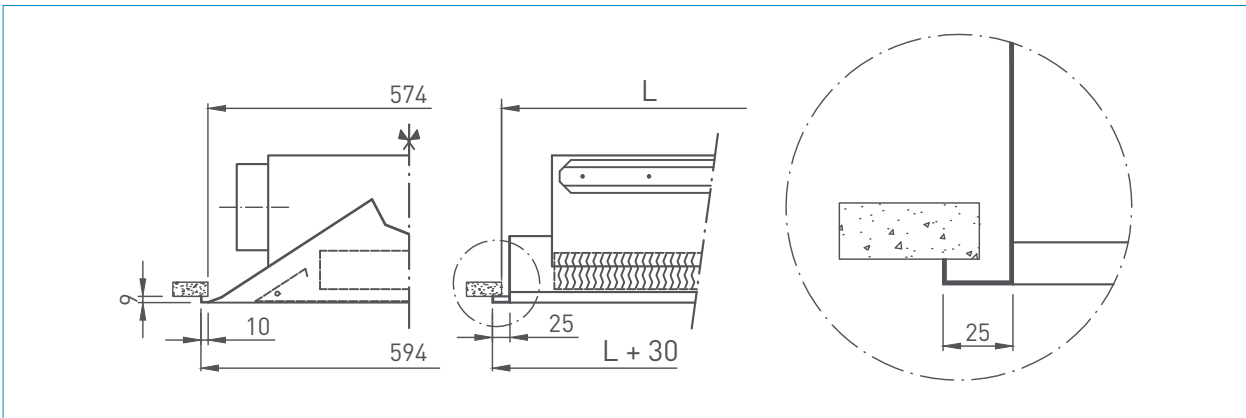
DIMENSIONS



OTHER TYPES

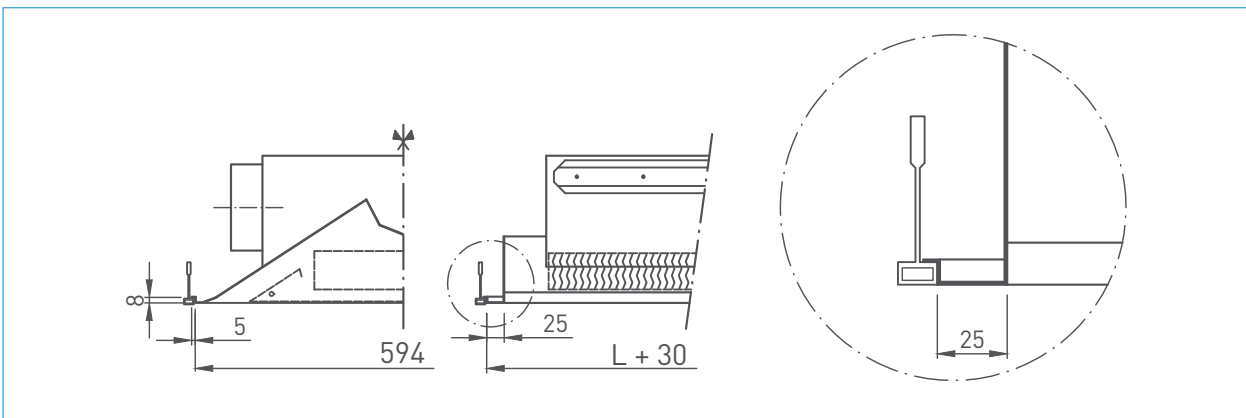
S TYPE

K S 6 R A H - 1 2 0 0 1 2 0 0



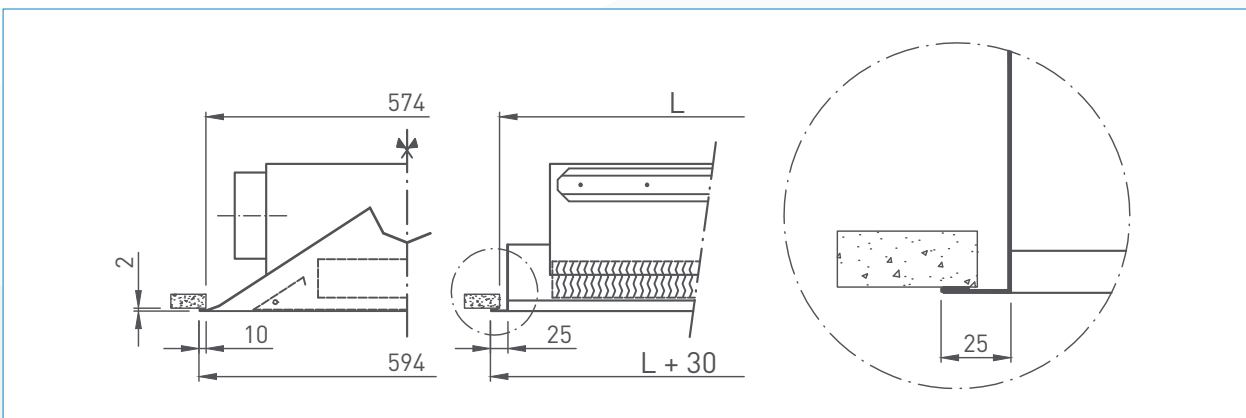
Z TYPE

K Z 6 R A H - 1 2 0 0 1 2 0 0



V TYPE

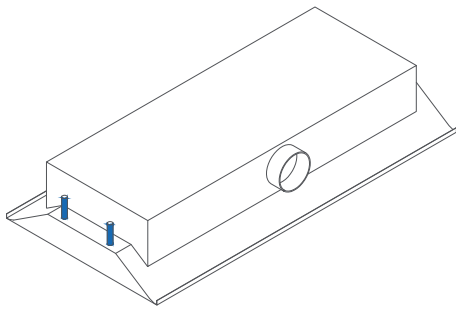
K V 6 R A H - 1 2 0 0 1 2 0 0



CONNECTION POSSIBILITIES

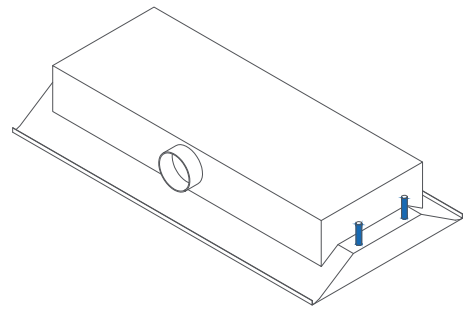
2-PIPE SYSTEM

1 connection left



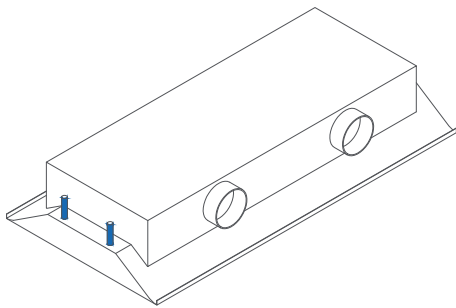
K T 6 L A C - 1 2 0 0 1 2 0 0

1 connection right



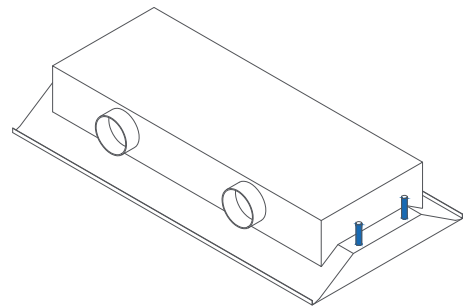
K T 6 R A C - 1 2 0 0 1 2 0 0

2 connections left



K T 6 G A C - 1 2 0 0 1 2 0 0

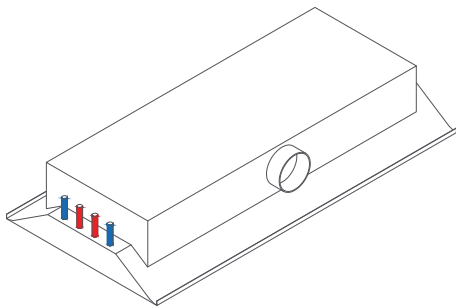
2 connections right



K T 6 D A C - 1 2 0 0 1 2 0 0

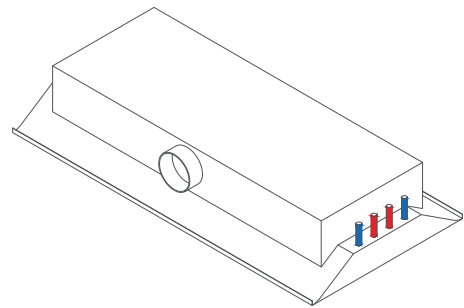
4-PIPE SYSTEM

1 connection left



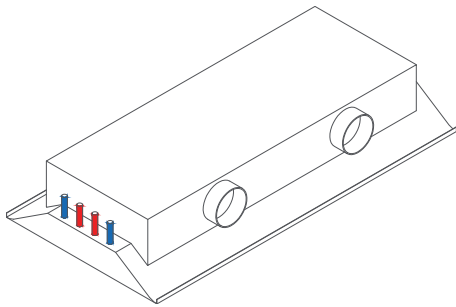
K T 6 L A H - 1 2 0 0 1 2 0 0

1 connection right



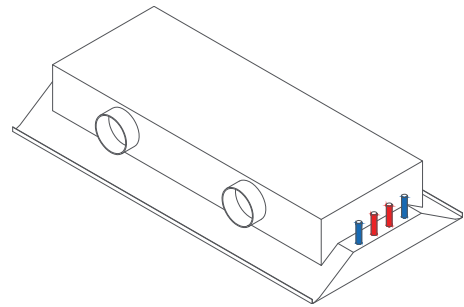
K T 6 R A H - 1 2 0 0 1 2 0 0

2 connections left



K T 6 G A H - 1 2 0 0 1 2 0 0

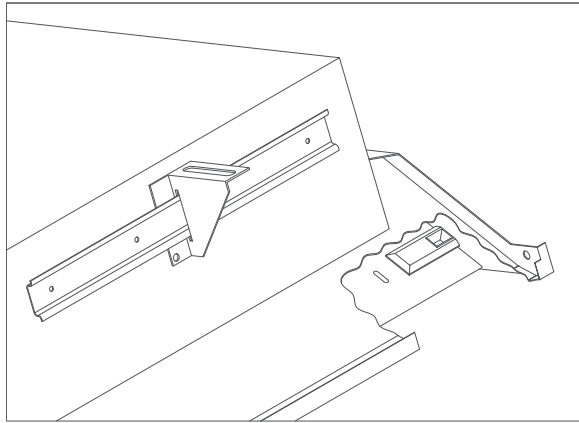
2 connections right



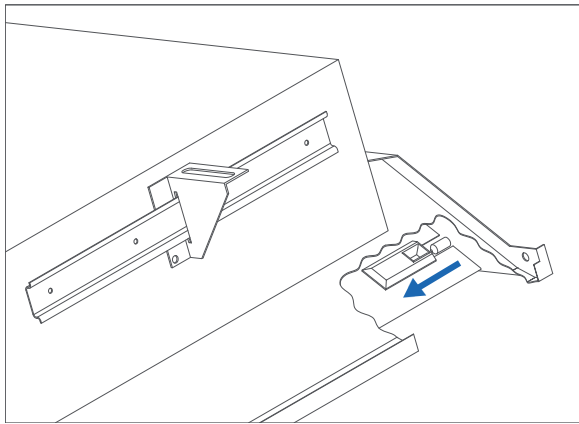
K T 6 D A H - 1 2 0 0 1 2 0 0

ACCESSIBILITY OF HEAT EXCHANGER

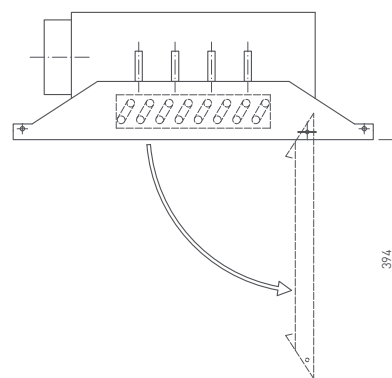
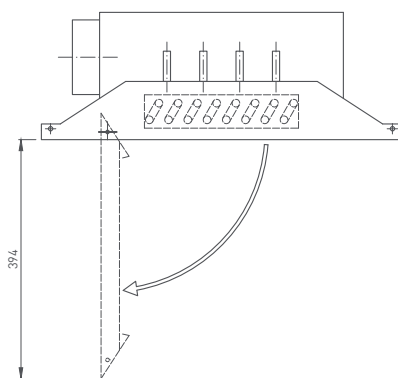
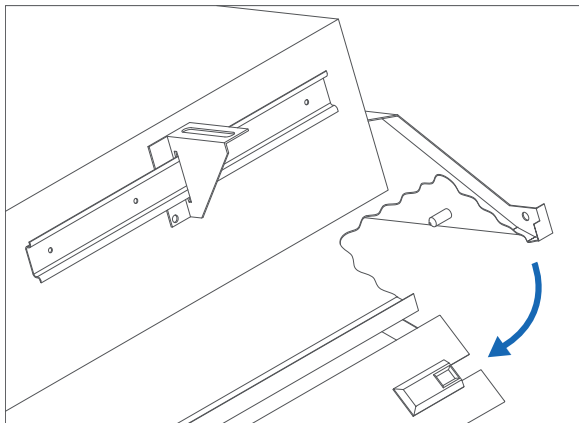
1



2

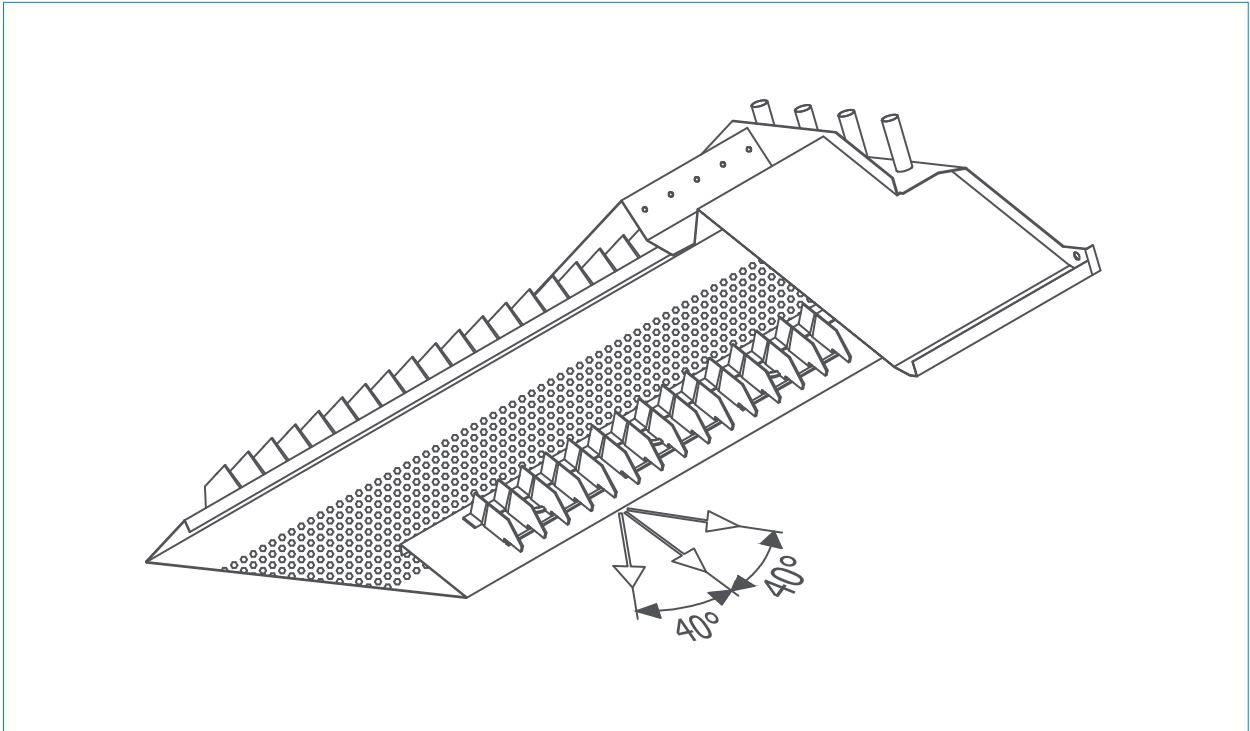


3



OPTION
DEFLECTION VANES

K	T	6	L	A	H	V	1	2	0	0	1	2	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---



SELECTION TABLE/GRAPH

A. CAPACITY HEAT EXCHANGER

(for other selections, please contact GRADA)

2-PIPE SYSTEM

COOLING	DESIGN VARIABLE								
	ΔP_s [Pa]			Q_p [m ³ /h]			P_w [W]		
	50	100	150	50	100	150	500	1000	1500
Qp [m³/h]	146	145	144	50	100	150	50	115	150
Qw [L/h]	368	437	400	207	390	500	235	480	422
Pw [W]	1284	1523	1392	720	1358	1617	500	1000	1500
ΔP_s [Pa]	50	100	150	132	112	107	82	87	128
Lw [dB(A)]	29	25	26	23	25	25	20	29	26
ΔP_w [kPa]	15,7	22,1	14,9	2,9	17,6	29,0	2,5	15,8	18,6
ΔT [°C]	3,0	3,0	3,0	3,0	3,0	2,8	1,8	1,8	3,1
C [mm]	2950	2950	2400	1800	2950	2950	1200	1800	2700
Nozzle type [-]	D	C	C	A	B	C	C	D	C

Selection based on: Tr [°C]: 26, Twin [°C]: 16

HEATING	DESIGN VARIABLE								
	ΔP_s [Pa]			Q_p [m ³ /h]			P_w [W]		
	50	100	150	50	100	150	500	500	1500
Qp [m³/h]	177	145	177	50	100	150	30	56	117
Qw [L/h]	430	500	500	485	500	500	101	317	317
Pw [W]	1819	2070	2339	1120	1387	2118	500	1000	1500
ΔP_s [Pa]	50	100	150	132	134	107	116	100	100
Lw [dB(A)]	29	25	28	23	24	25	21	22	24
ΔP_w [kPa]	29,0	29,0	29,0	16,1	17,1	29,0	0,5	6,9	9,4
ΔT [°C]	3,2	3,6	4,1	2,0	2,4	3,7	4,3	2,7	4,1
C [mm]	2950	2950	2950	1800	1800	2950	1200	1800	2400
Nozzle type [-]	D	C	C	A	C	C	A	B	C

Selection based on: Tr [°C]: 22, Twin [°C]: 35

4-PIPE SYSTEM

COOLING	DESIGN VARIABLE								
	ΔP_s [Pa]			Q_p [m ³ /h]			P_w [W]		
	50	100	150	50	100	150	500	1000	1500
Q_p [m³/h]	146	145	178	50	100	150	50	100	150
Q_w [L/h]	195	221	213	194	246	415	313	480	467
P_w [W]	906	1025	989	676	856	1448	500	1000	1500
ΔP_s [Pa]	50	100	150	132	134	107	82	134	107
L_w [dB(A)]	29	25	28	23	24	25	20	24	25
ΔP_w [kPa]	4,0	5,2	4,8	2,2	3,5	18,3	3,7	13,3	23,1
ΔT [°C]	4,0	4,0	4,0	3,0	3,0	3,0	1,4	1,8	2,8
C [mm]	2950	2950	2950	1800	1800	2950	1200	1800	2950
Nozzle type [-]	D	C	C	A	C	C	C	C	C

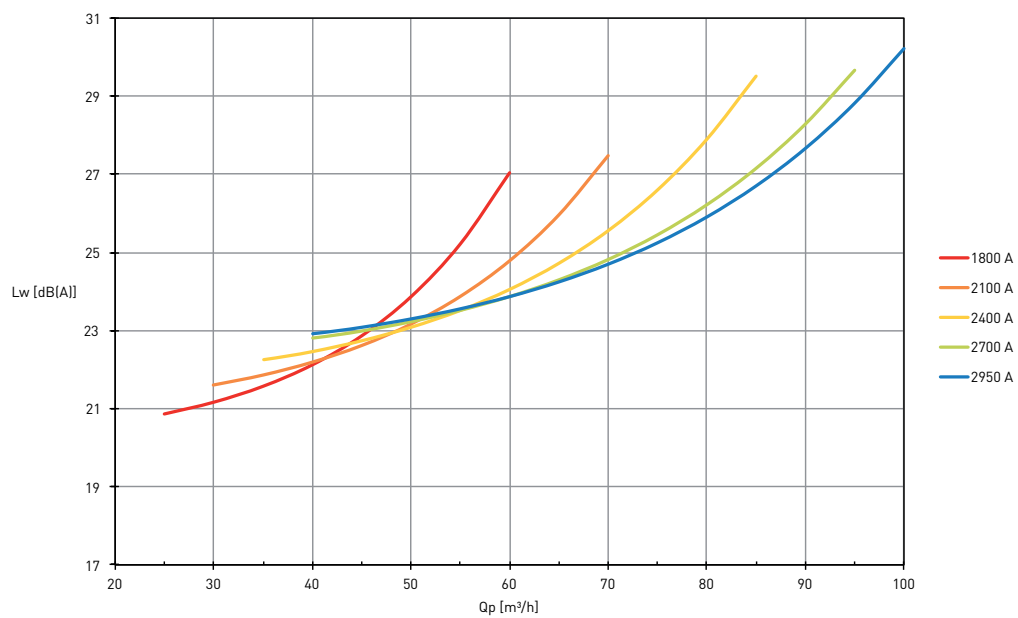
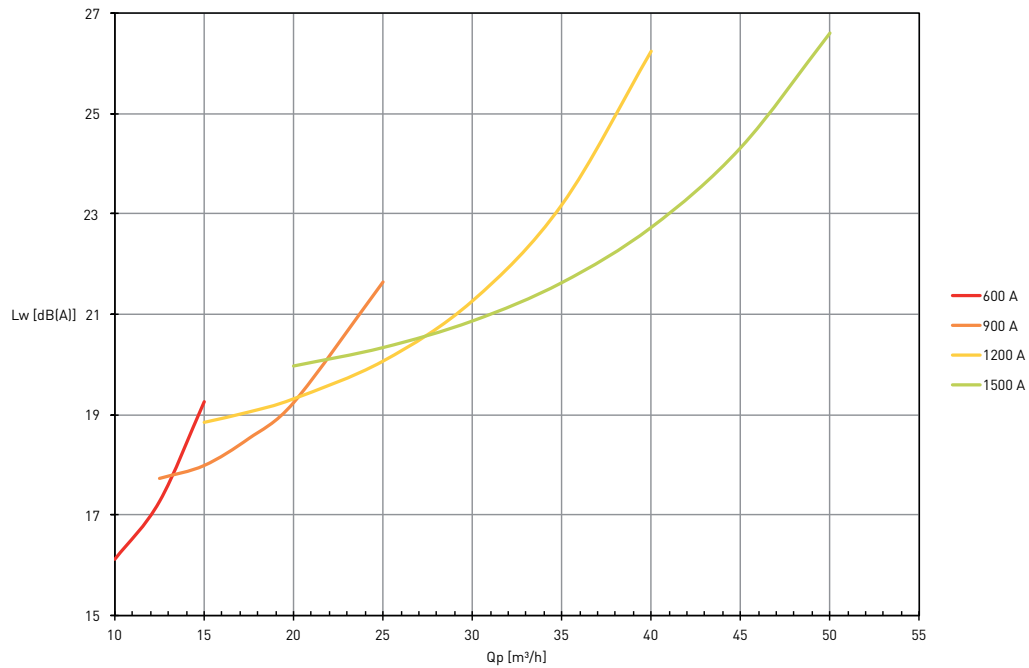
Selection based on: Tr [°C]: 26, Twin [°C]: 16

HEATING	DESIGN VARIABLE								
	ΔP_s [Pa]			Q_p [m ³ /h]			P_w [W]		
	50	100	150	50	100	150	250	500	750
Q_p [m³/h]	146	145	177	50	100	150	35	120	140
Q_w [L/h]	305	335	347	167	316	338	143	126	297
P_w [W]	704	772	800	385	729	780	250	500	750
ΔP_s [Pa]	50	100	150	132	112	107	158	105	93
L_w [dB(A)]	29	25	28	23	25	25	22	24	25
ΔP_w [kPa]	9,7	11,7	12,6	1,5	10,5	12,0	0,7	1,3	9,2
ΔT [°C]	2,0	2,0	2,0	2,0	2,0	2,0	1,5	3,4	2,2
C [mm]	2950	2950	2950	1800	2950	2950	1200	2400	2950
Nozzle type [-]	D	C	C	A	B	C	A	C	C

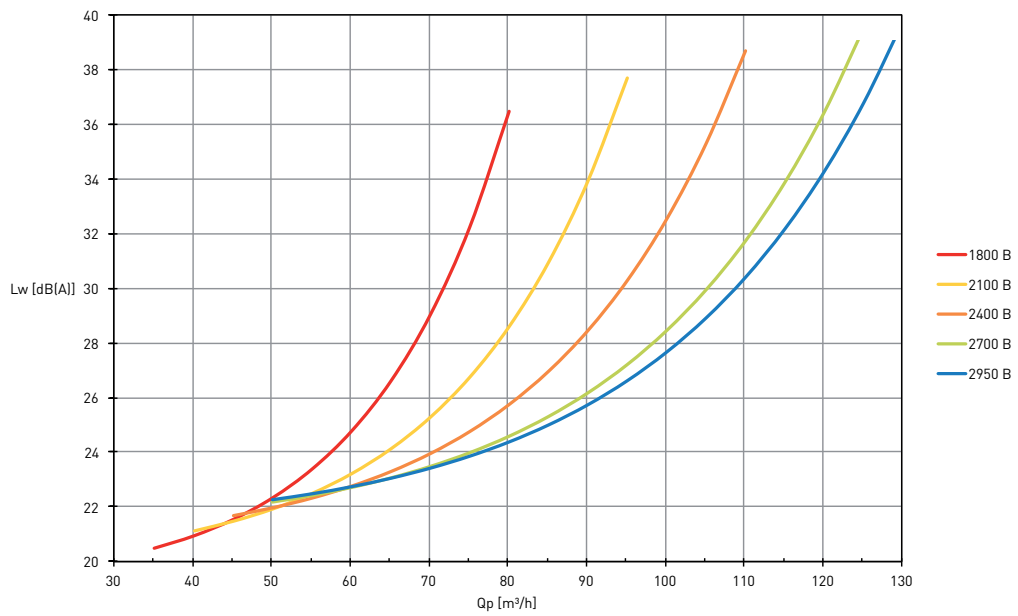
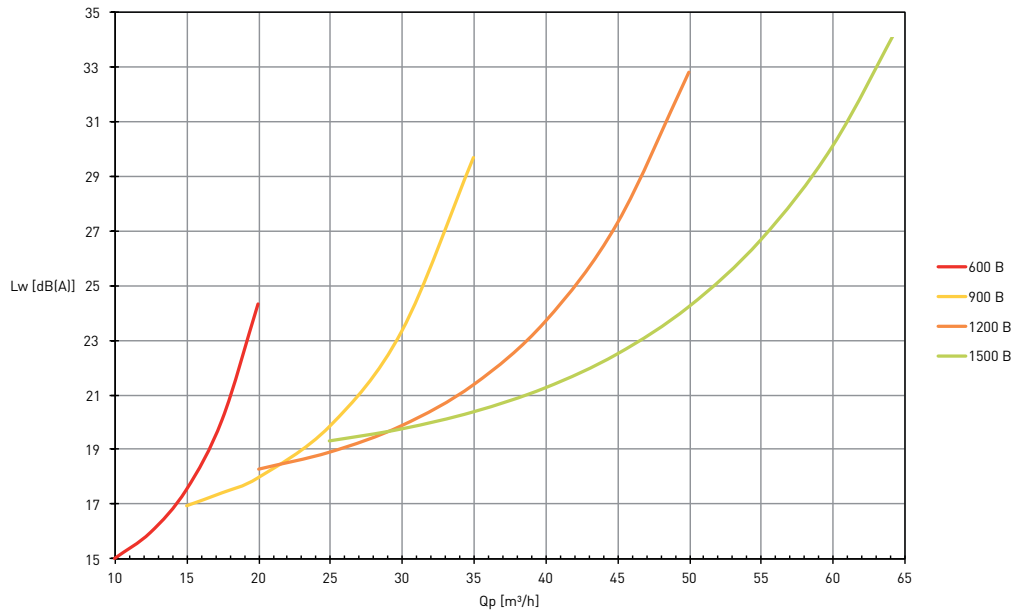
Selection based on: Tr [°C]: 22, Twin [°C]: 35

B. SOUND POWER WITHOUT ROOM ATTENUATION

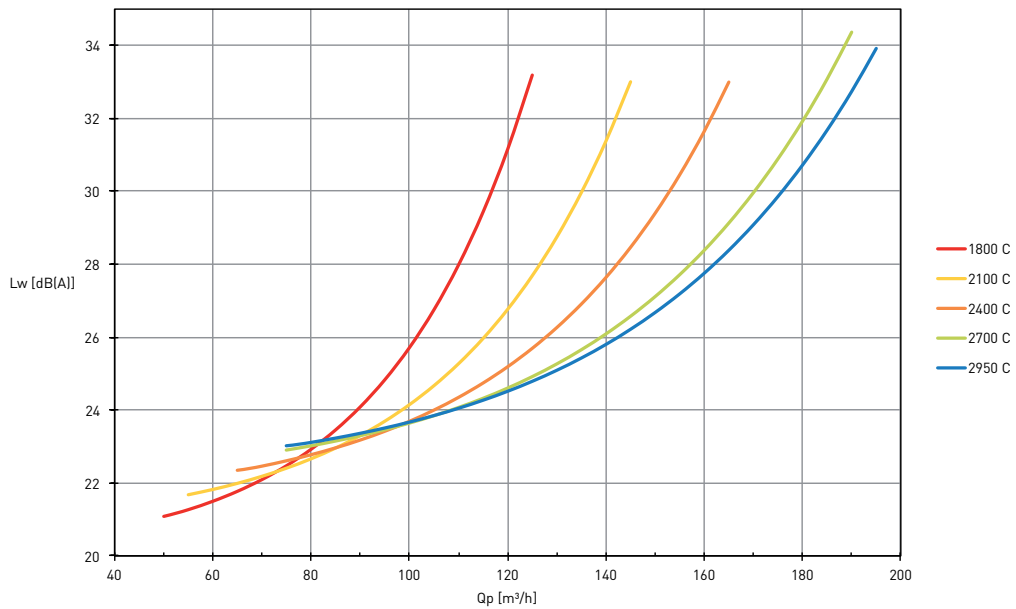
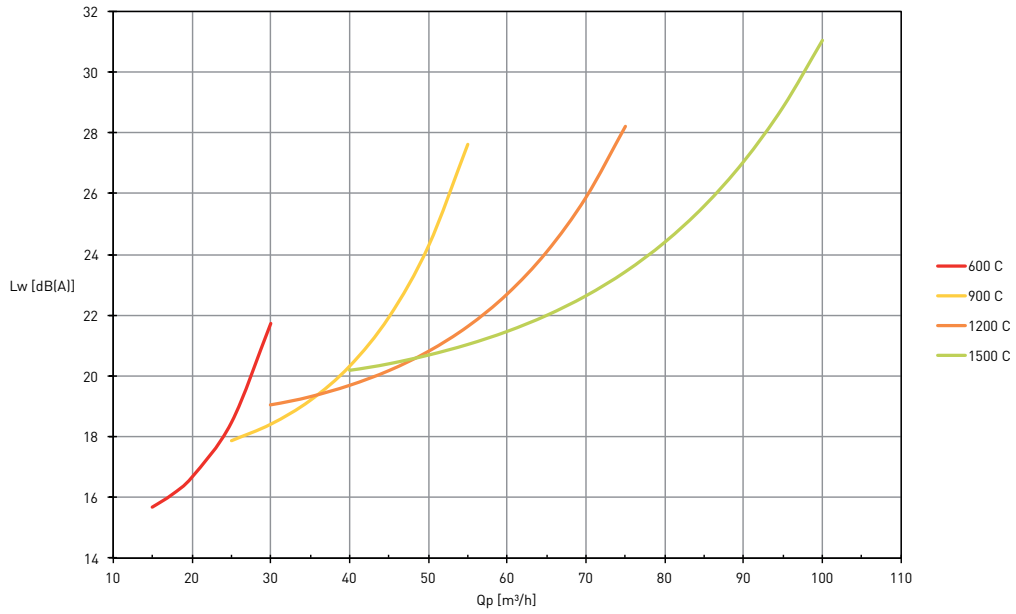
A NOZZLE



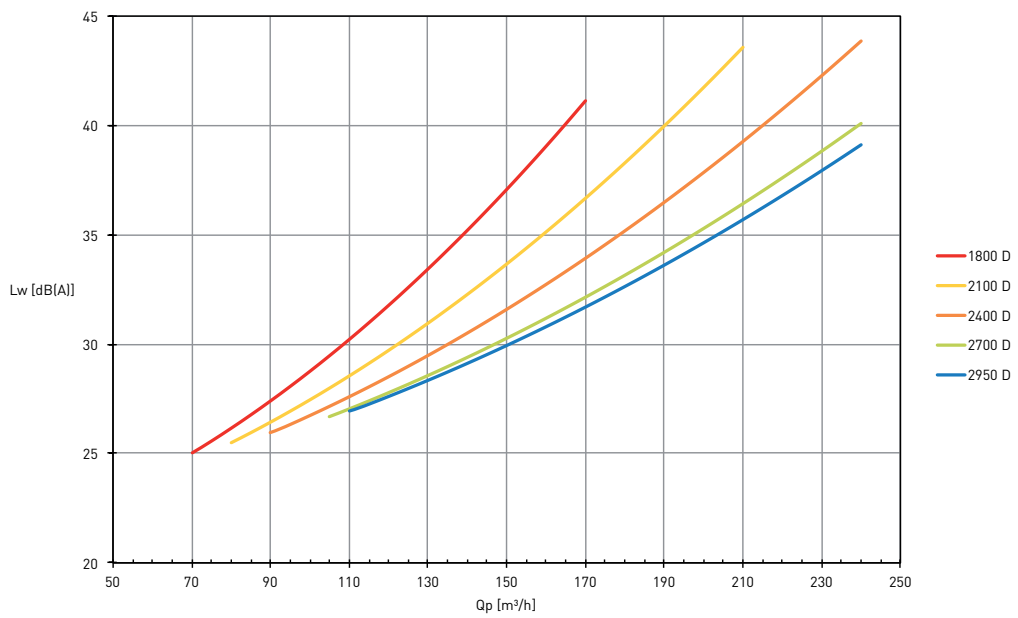
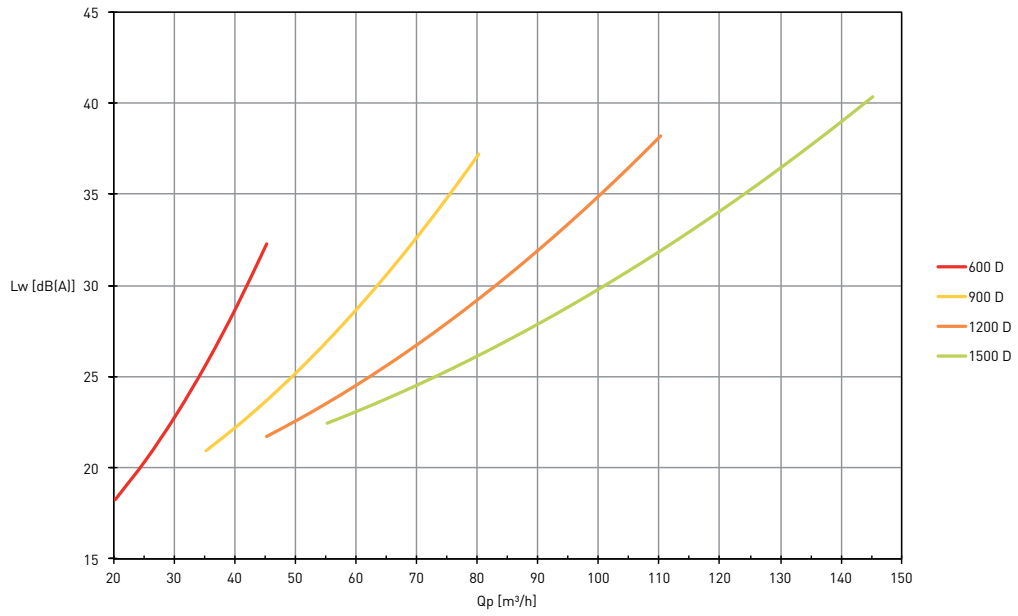
B NOZZLE



C NOZZLE



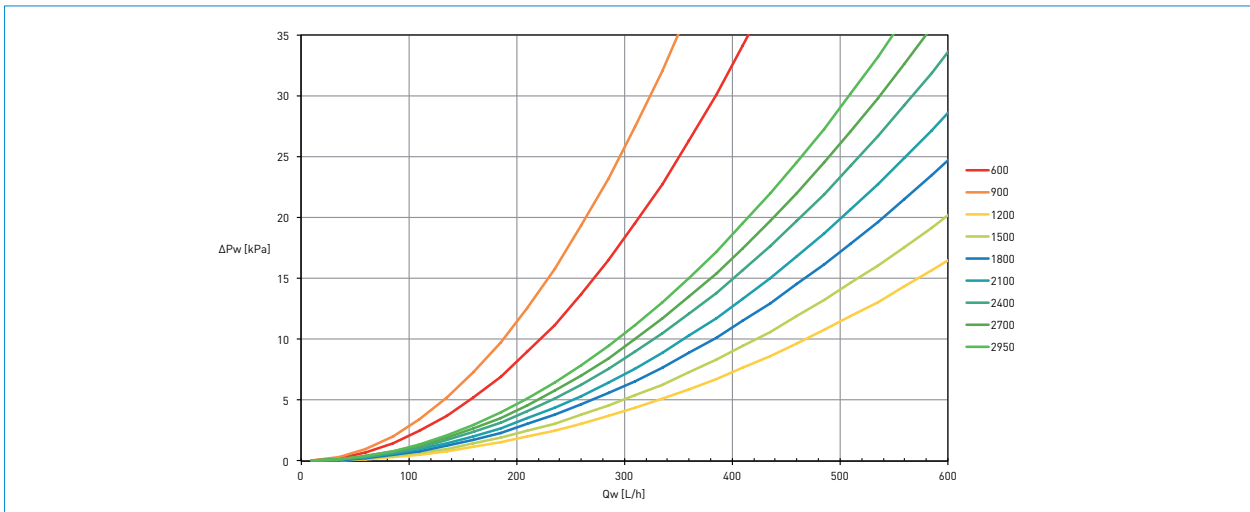
D NOZZLE



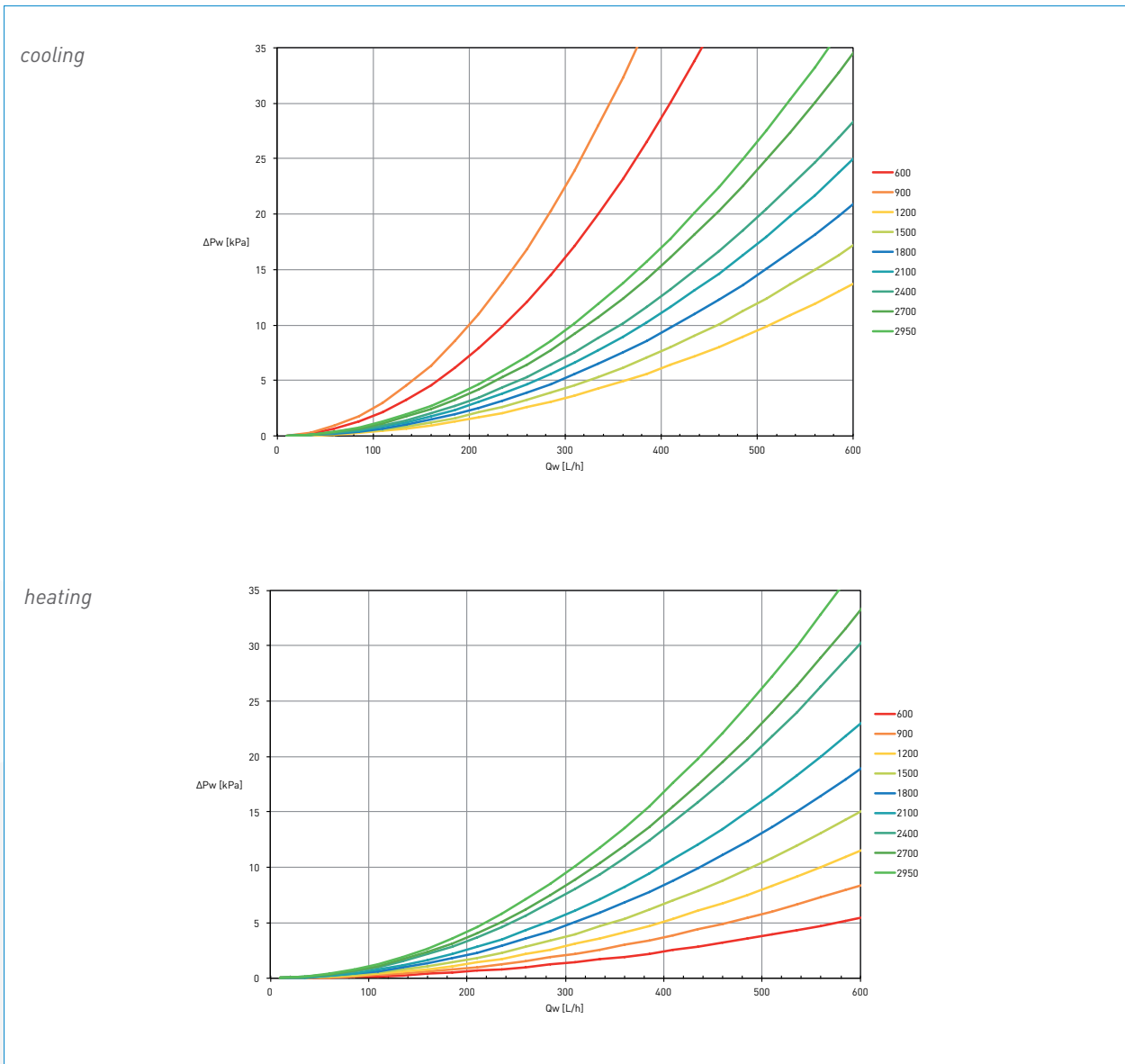
C. PRESSURE LOSS

WATER SIDE

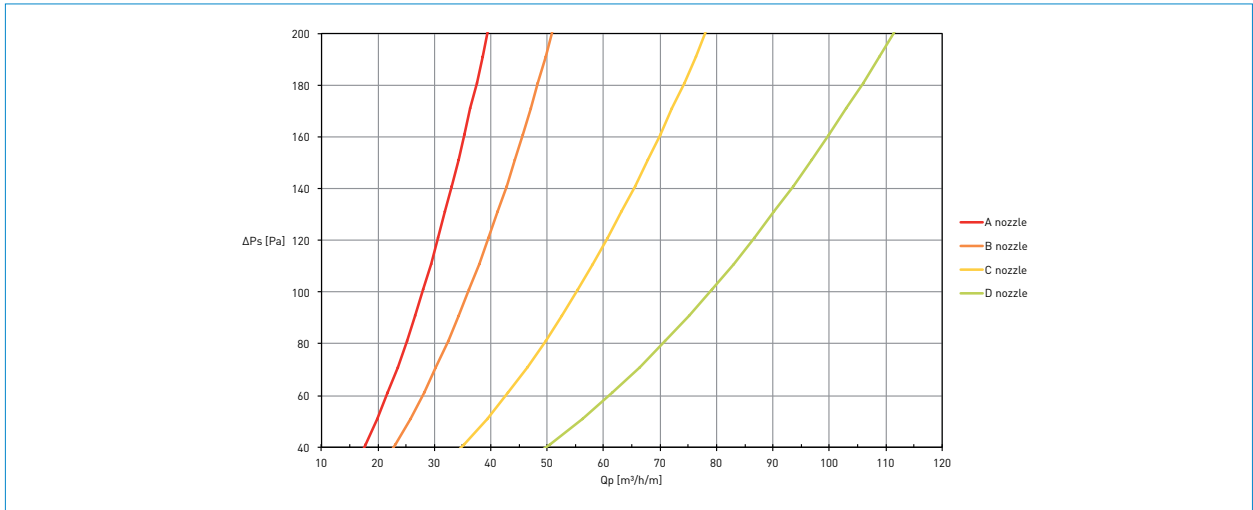
2-pipe system



4-pipe system

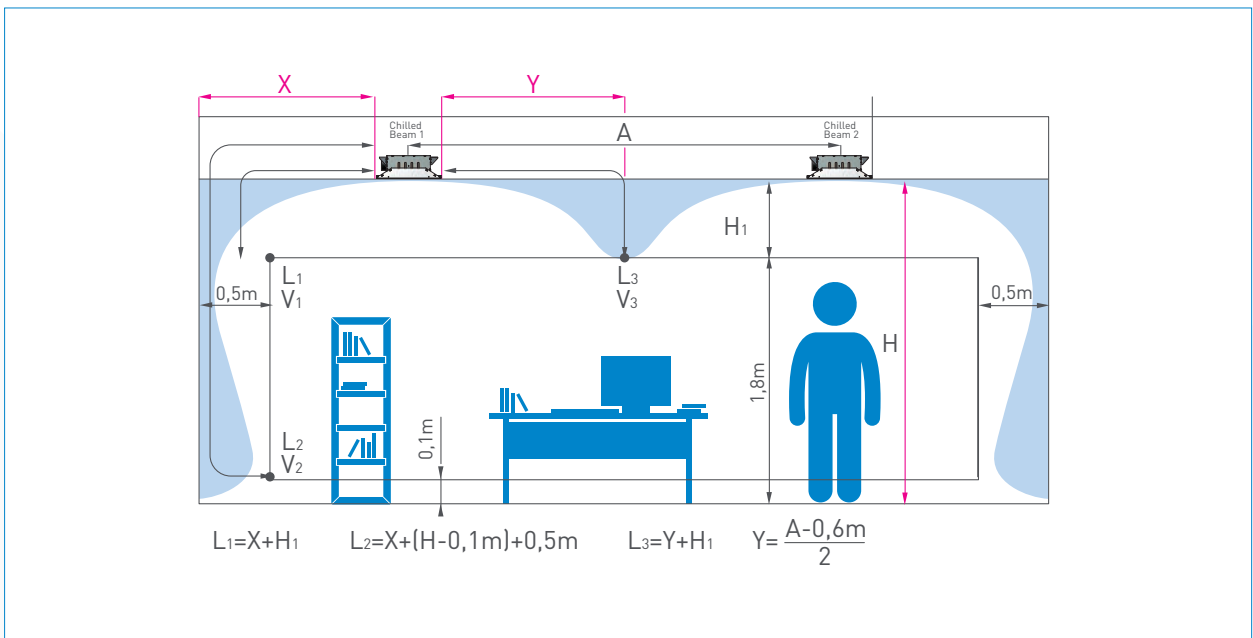


AIR SIDE

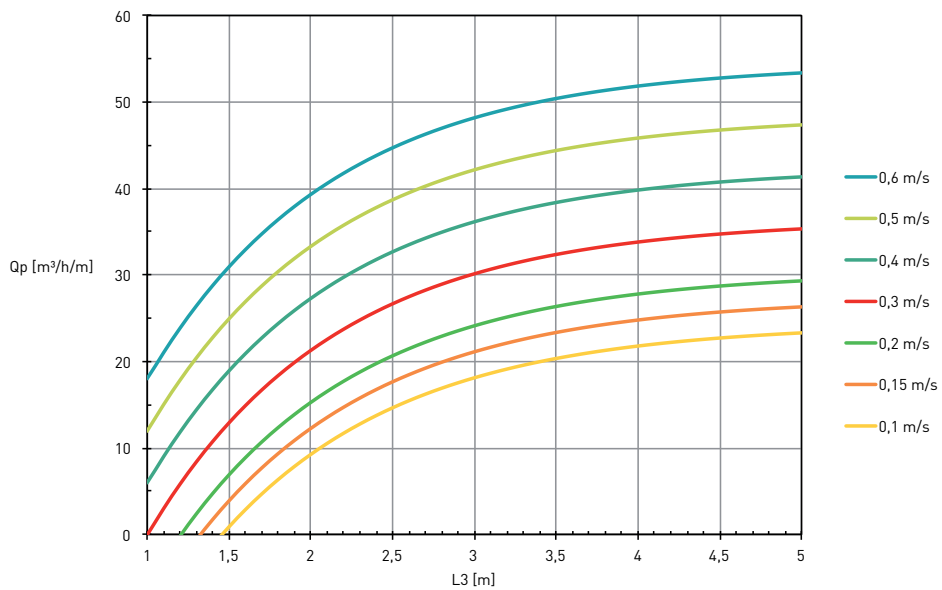
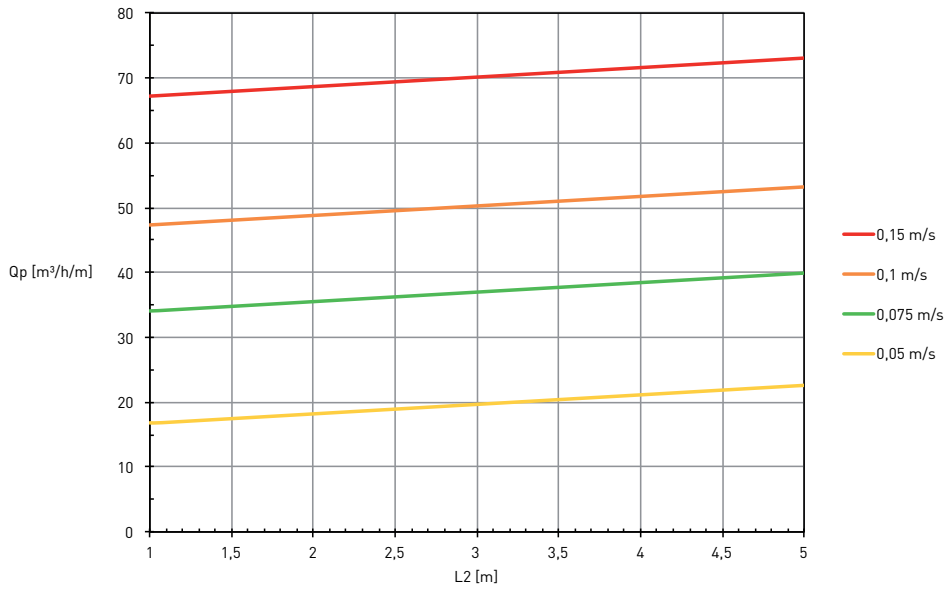
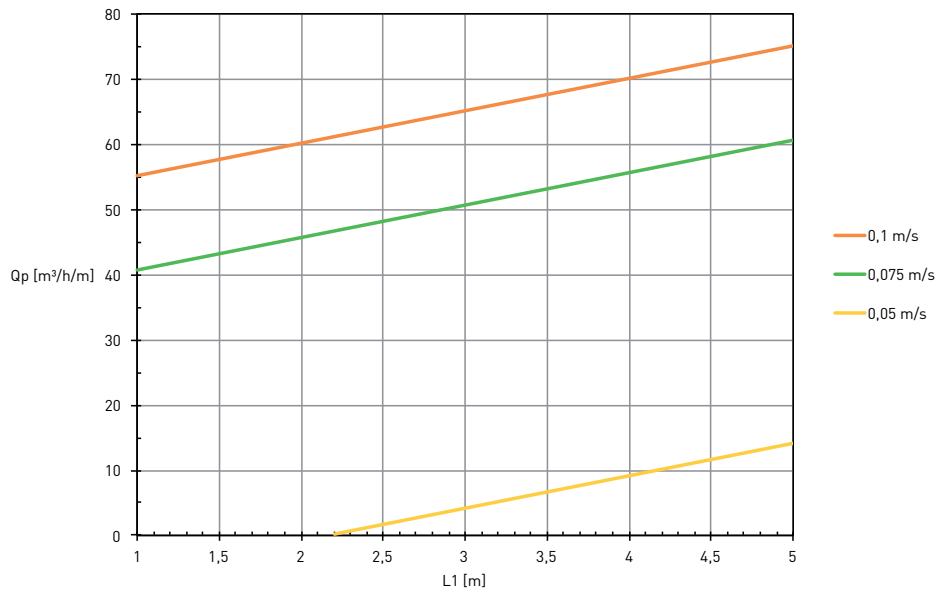


D. AIR VELOCITY

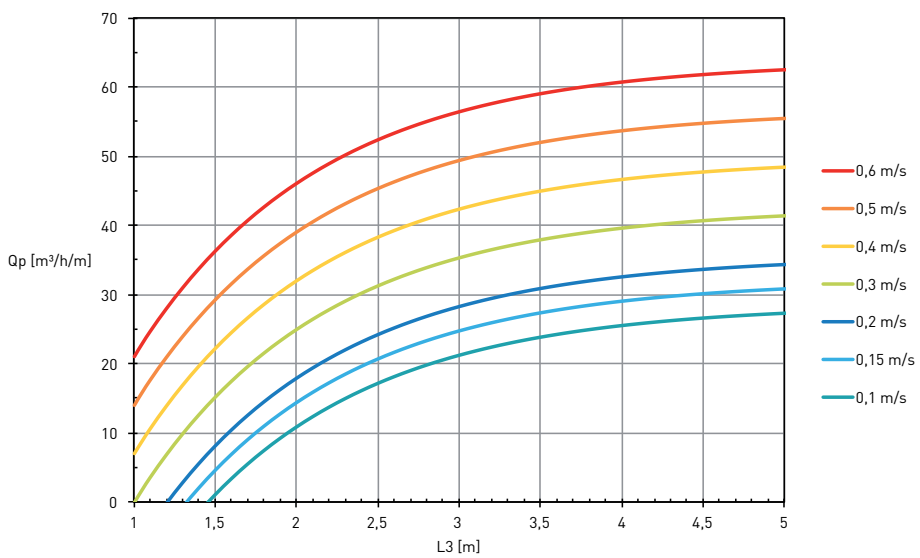
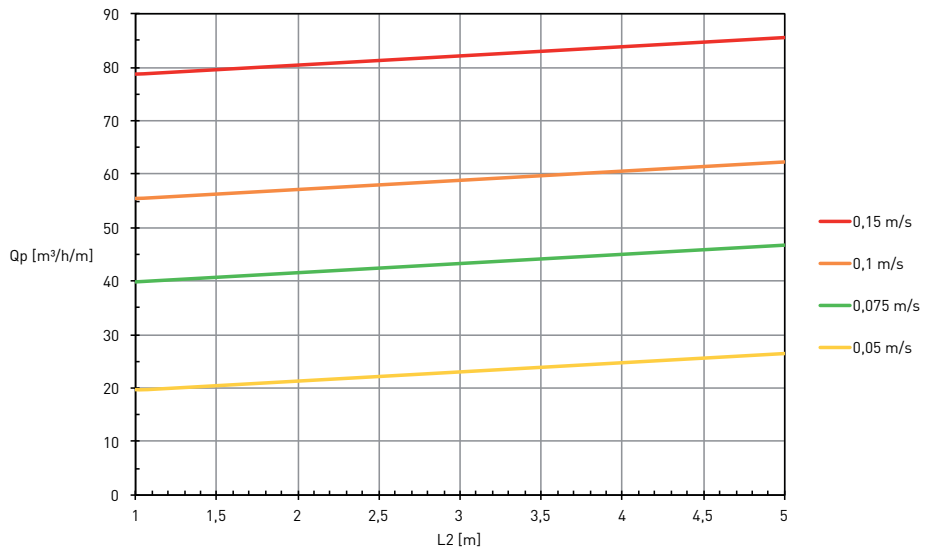
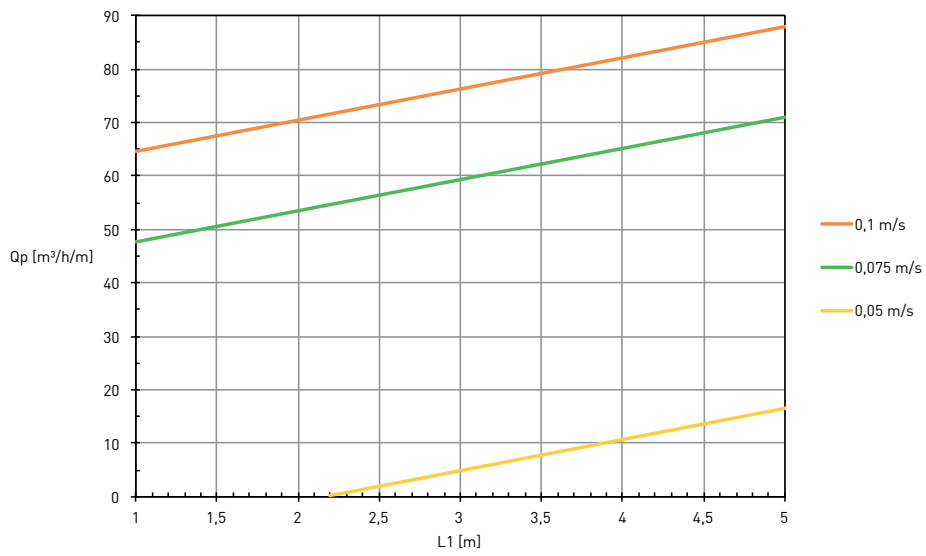
EXPLANATORY DRAWING



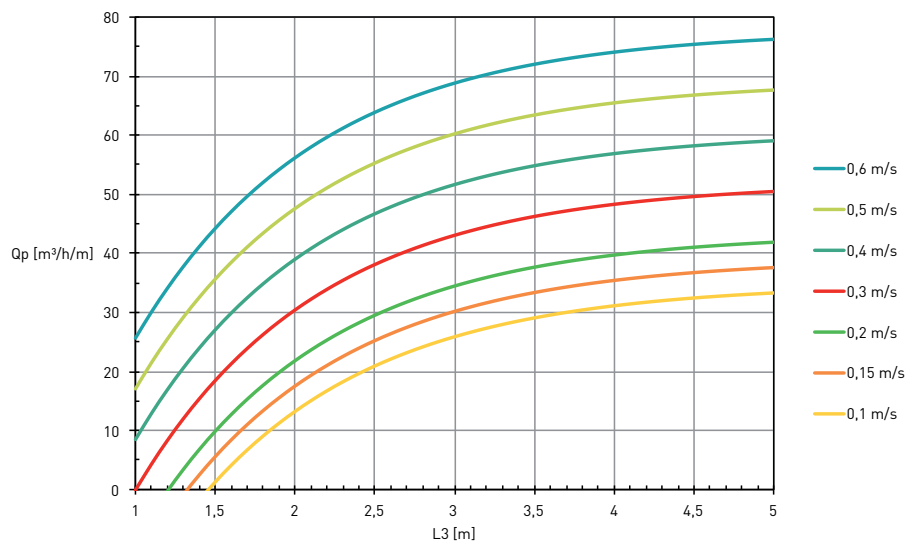
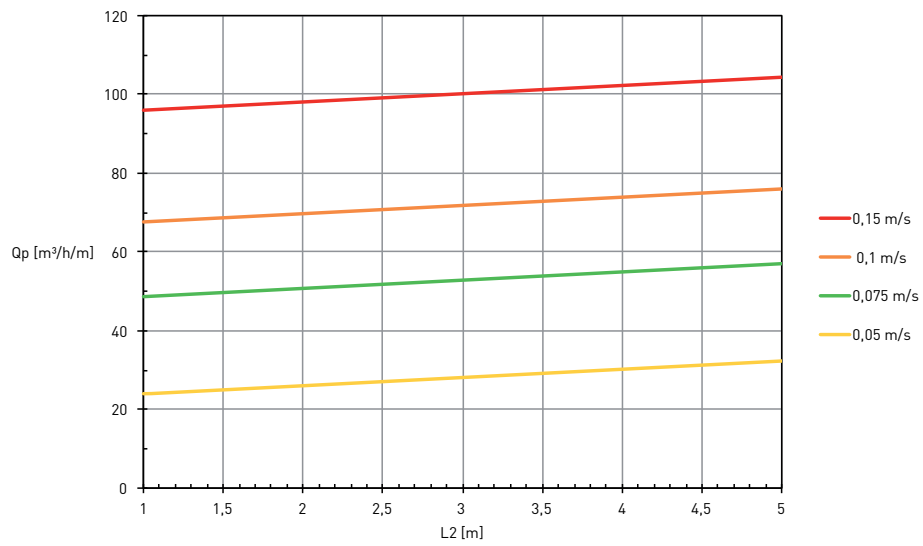
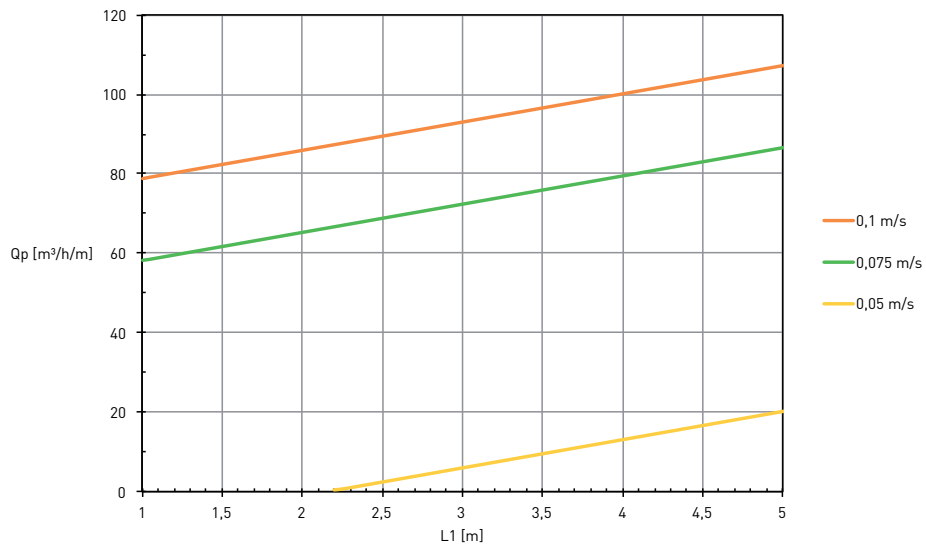
A NOZZLE



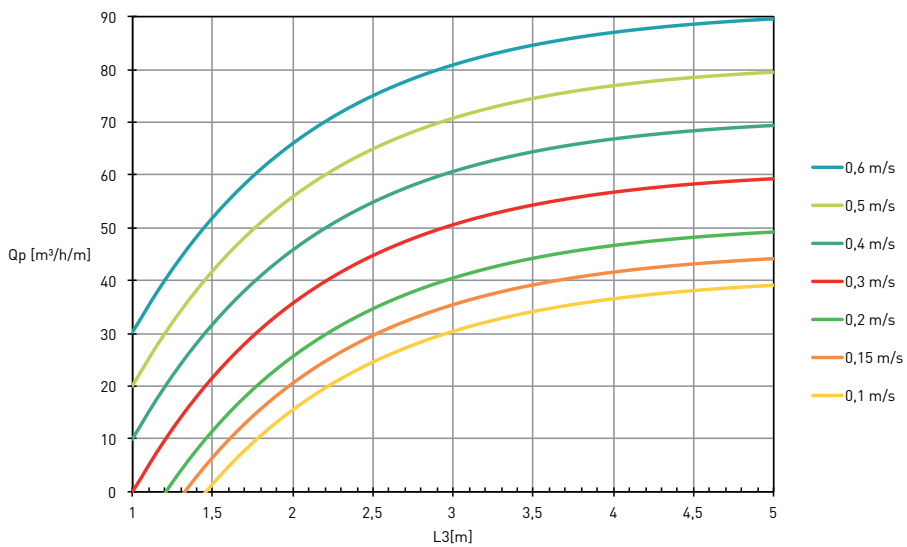
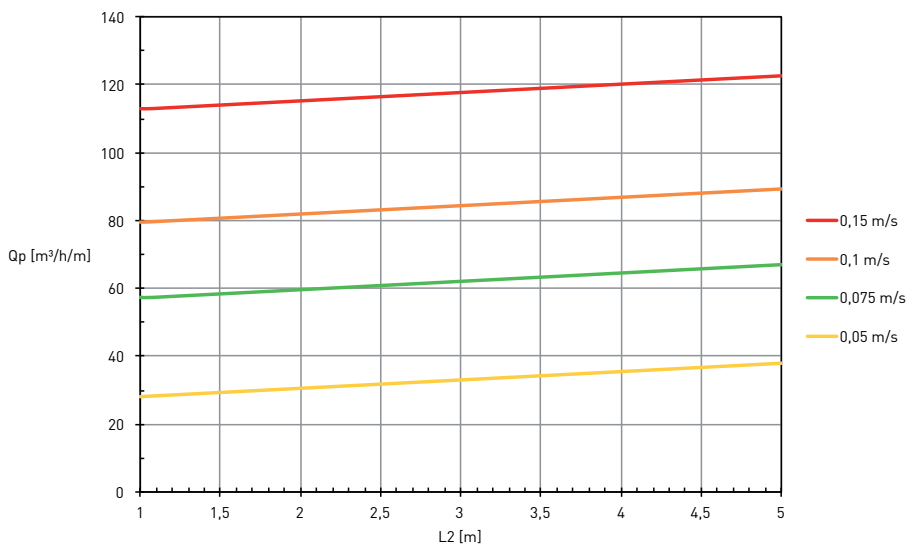
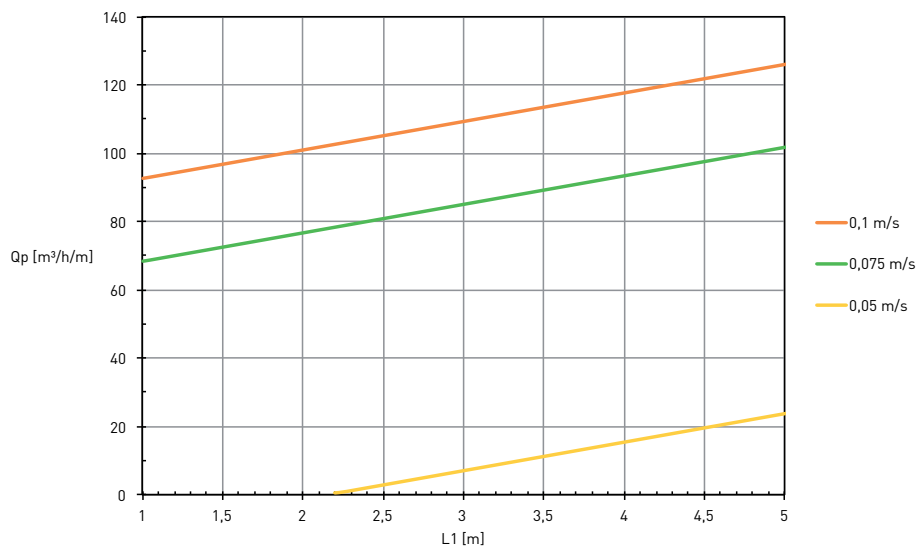
B NOZZLE



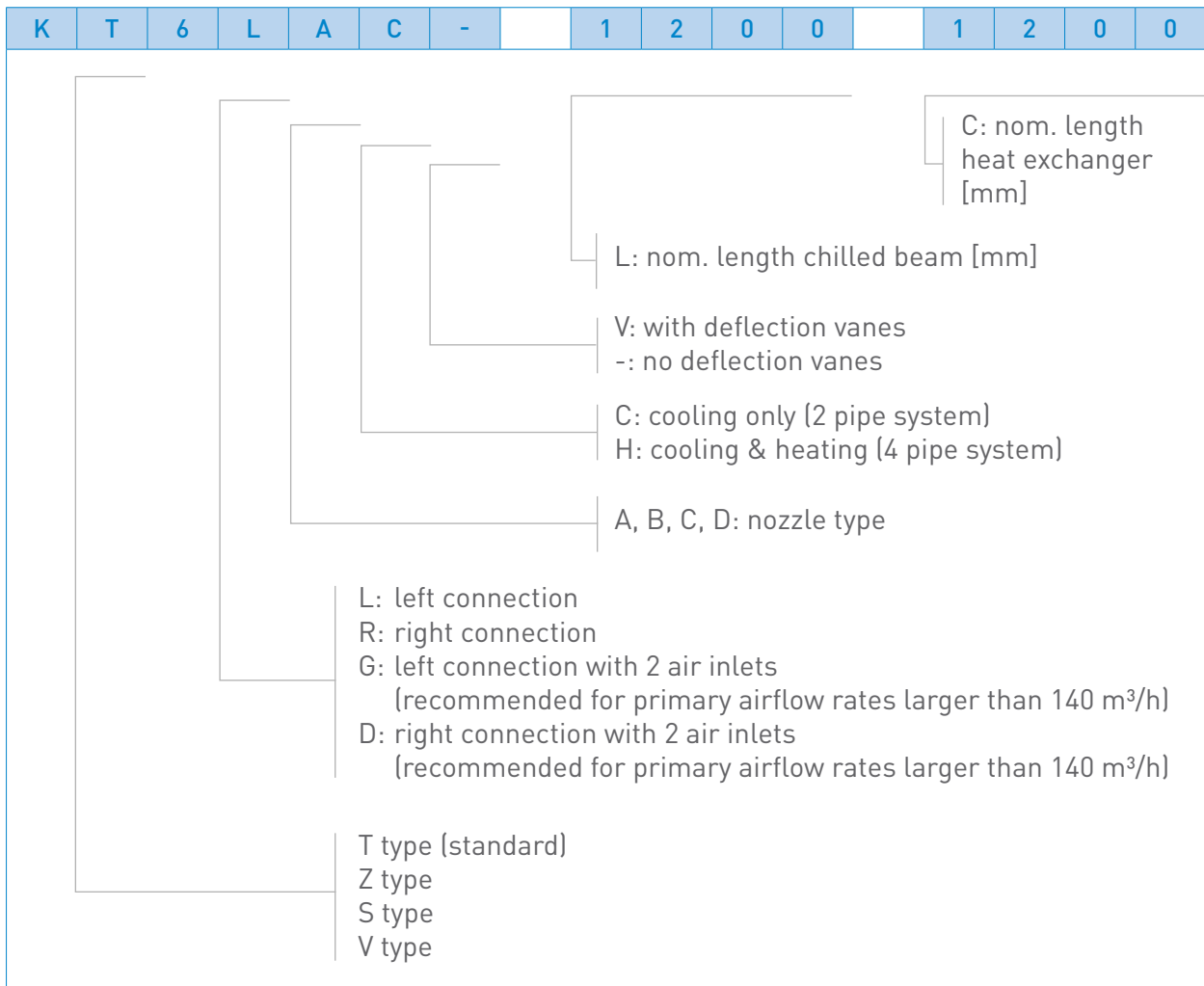
C NOZZLE



D NOZZLE



HOW TO ORDER



GRADA INTERNATIONAL NV
Toekomstlaan 18
B-9160 Lokeren

T: +32 (0)9 340 40 40
F: +32 (0)9 340 40 50

www.grada.com
info@grada.be



GRADA FRANCE
Parc Des Chanteraines
6 rue du cdt d'Estienne D'orves
92390 Villeneuve La Garenne

T: +33 (0)1 46 88 92 92
F: +33 (0)1 46 88 92 99

www.grada.com
gradafrance@gradafrance.com