



LINEAR SLOT DIFFUSERS

KL
SERIES

OVERVIEW CHARACTERISTICS APPLICATIONS

OVERVIEW :

The KL series diffusers represent the best development for this type of air diffusion units.

Their particular structure allows to direct the flow of injected air along the ceiling. The effect is one of a progressive mix with the air in the room without the need of creating air currents or air vortexes that may be perceptible even in cooling mode. In contrast it is possible to direct the flow of injected air rapidly towards the floor, with a large forcing action to obtain a rapid heating of the room.

The modular structure allows for an unlimited number of rows, parallel slots, without any visible joint line showing. The KL series diffusers stand out thanks to their innovative design, characterised by its soft lines and curved edges, not purely for aesthetic value. It is a result of accurate fluid dynamic studies, carried out using innovative mathematic models, aimed at optimizing the distribution of the speed of air exiting the diffuser.

The KLV series diffusers are complemented with their own line of plenum boxes made in such a way that when installing, no particular tools or accessories are required for the job.

WORKING CHARACTERISTICS:

The KL series diffusers are made of a diffuser body constructed in aluminium, housing the various air expulsion slots and a series of deflecting blades, also in aluminium, for horizontal or vertical orientation flow of the air. The direction may be easily adjusted without the need to remove the diffuser itself.

The body of the diffuser may be integrated with a regulation damper having small square holes. This solution has been studied so as to obtain a precise calibration of the quantity of air injected into the room and at the same time, to reduce to a minimum the pressure loss with the damper fully opened.

APPLICATIONS:

The KL diffuser series are used in ventilations systems in facilities where the ceiling height is between 3 and 6 meters, such as open space offices, commercial galleries and hospital wards.

The achievable air flows vary in relation to the length of the diffuser and the number of slots. The capacities are included between 50m³/h and 120m³/h per meter per slot with temperature grades varying between +15 °C end I -10 °C.

FITTING OF THE DIFFUSER:

The KL diffusers are fitted with specific plenums by means of suspension springs or with mounting bridges.

This allows for a rapid fitting even after all masonry work has been completed.

FINISH:

The KL diffusers are constructed with an anodized or RAL 9010 painted aluminium body with deflecting blades also painted black or white RAL9010.

Other special finishes may be provided upon request.

MATERIALS:

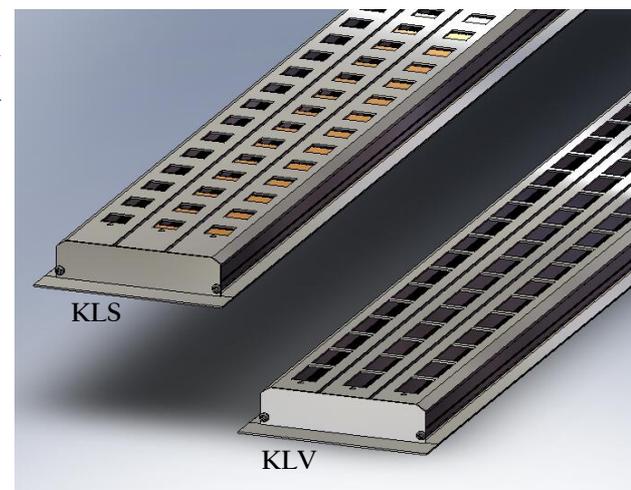
Diffuser completely in naturally anodized extruded aluminium, plenum from galvanized steel sheet and external insulation in self-extinguishing Class I material.

VERSIONS :

KLV Series: identifiable from the large area that allows to minimise the pressure loss and noise even at elevated air flow capacities.

Adjustment can be made to the air flow via a damper in the plenum connector.

KLS Series: identifiable by the possibility of installing sliding regulation dampers inside the body of the diffuser to allow adjustment to the air flow individually for each linear slot.





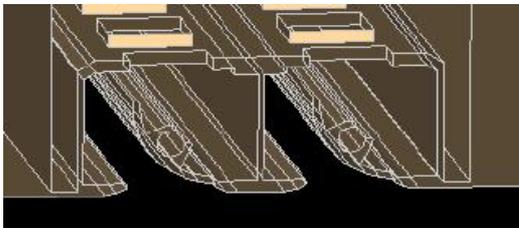
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AIR FLOW REGULATION

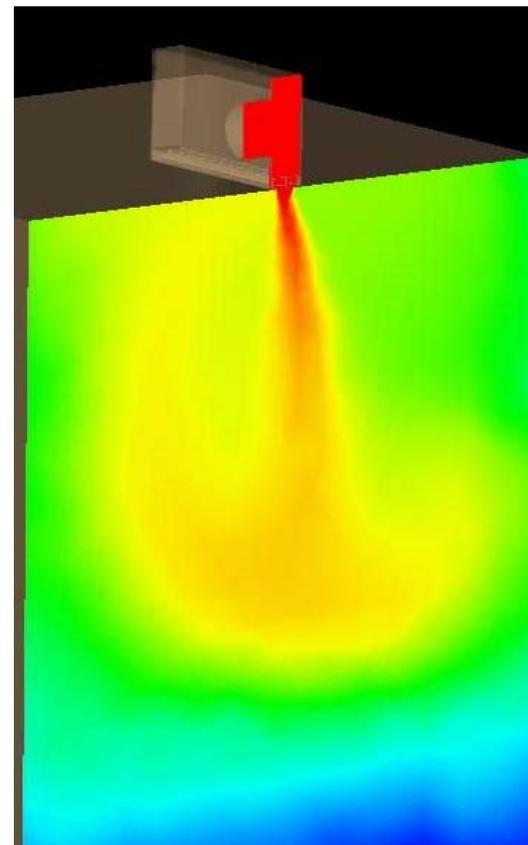
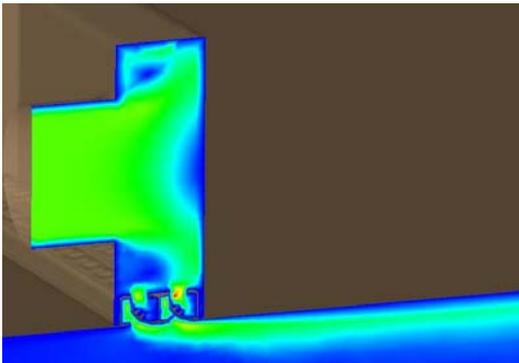
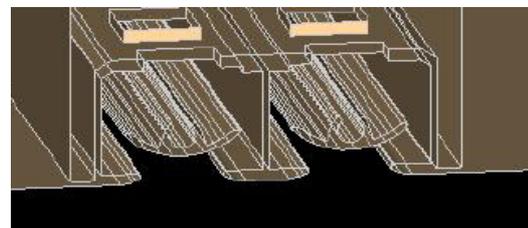
Configuration for a horizontal Flow

The slot follows the line of the ceiling
Guaranties the total absence of air currents
both in heating and cooling.



Configuration for a vertical flow

The flow penetrates the room directly
Prevents th for lengths greater or euqal to 1500mm
used for heating.



CHOICE OF DIRECTION OF THE FLOW:

The horizontal flow represents the more common use for this kind of diffuser, both in heating and cooling. The flow stays close to the ceiling and spreads horizontally inside the room. This generates a vertical recall effect of the air already present guarantying the perfect mix without the presence of air currents within the occupied zone.

The vertical flow, used when heating, allows to send hot air directly in the occupied zone, contrasting the common tendency of hot air to stratify due the lower density in the higher parts of the room.

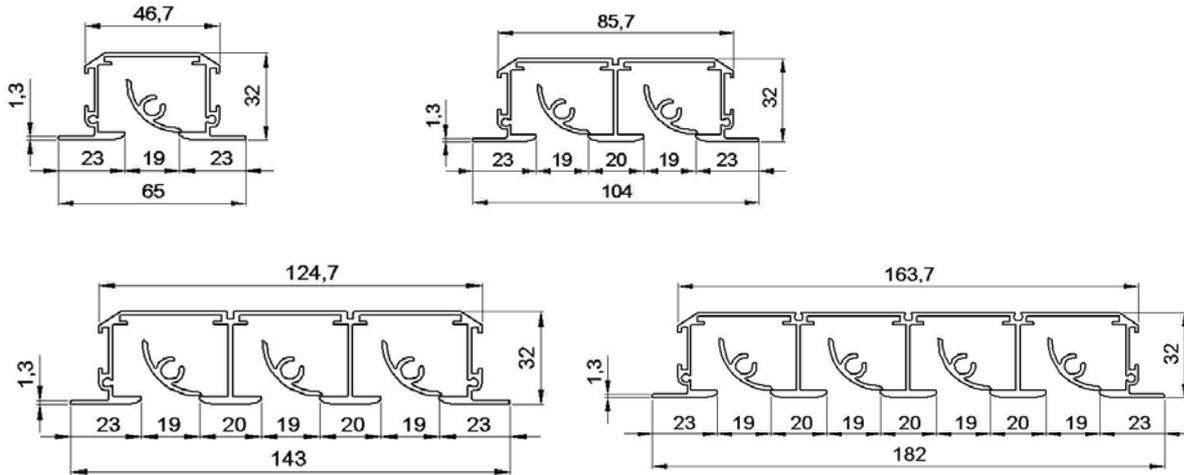
The change of direction of the flow is obtained turning the deflector blade from inclined to horizontal and vice versa. The blade is adjusted from outside the diffusers with a lever, at both the extremities of each slot.



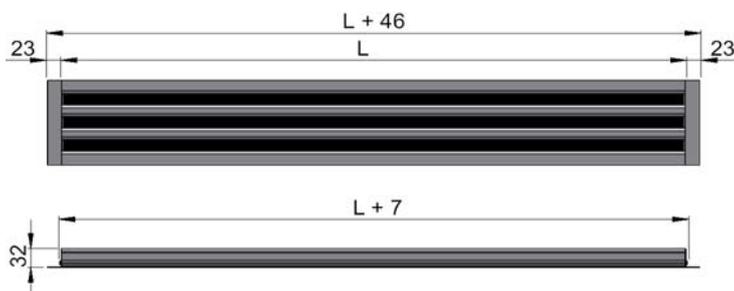
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DIMENSIONS



efficient section AK for a diffuser L=1 m (m ²)				
	1 slot	2 slots	3 slots	4 slots
horizontal throw	0,00845	0,01650	0,02287	0,03070
vertical throw	0,01478	0,02890	0,04328	0,05700



Holes in counter ceiling

Given L as the nominal length of the diffuser, the holes in the counter ceiling will need to be:

	length	width	
1 slot diffuser	L+15	x	57 millimetres
2 slot diffuser	L+15	x	95 millimetres
3 slot diffuser	L+15	x	134 millimetres
4 slot diffuser	L+15	x	177 millimetres

Example:

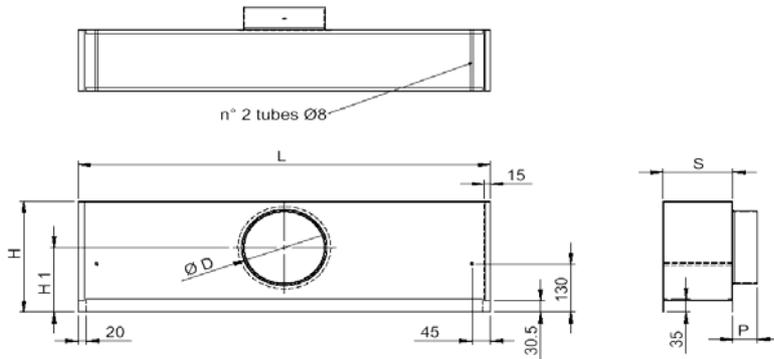
1 slot diffuser L=2000
hole 2015x57 mm

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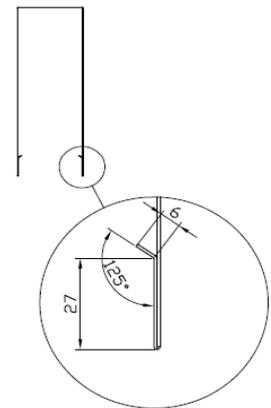
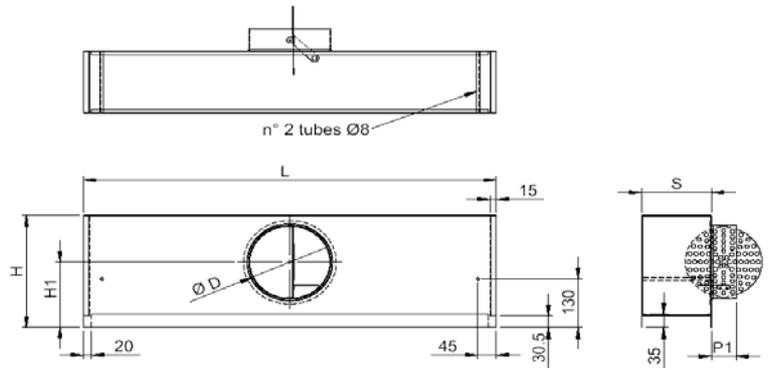


DIMENSIONS

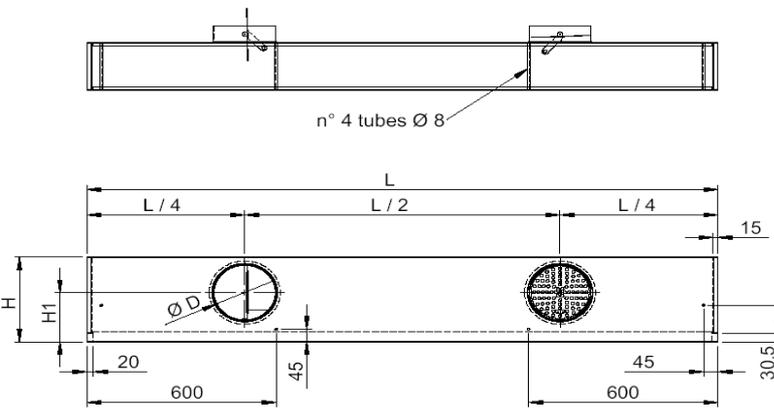
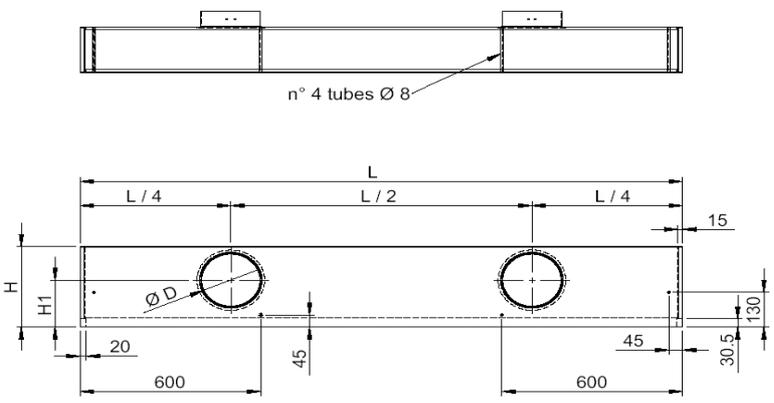


L= diffuser length
the 2 connector version is used
for lengths greater or equal to 1500mm

	H	HI	ØD	S	P	PI
1 slot	200	110	125	52	51	60
2 slot	250	145	160	91	51	60
3 slot	300	175	200	130	51	60
4 slot	300	175	200	169	51	60



location of fixing bridge





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METHOD OF ANALYSIS OF PERFORMANCE

Test Method

The analysis of the aerodynamic performances of the KLV series diffusers have been carried out by means of a "virtual test laboratory". All the tests and the relative measurements have been conducted by means of an advanced CFD (Computational Fluid Dynamics) software.

This applies the method of the finished elements to the fluid dynamic for the analysis of speeds, air flow distribution and pressures losses.

The dimensions of the virtual room in the test configuration for each single diffuser are:

Width of the test room: br=5.6 m
Length of the test room: lr=7.5 m
Height of the test room: hr=3.0 m

The Values of **flow length** of each diffuser have been defined in isothermal conditions in accordance with ISO 5219 regulation with deflectors angled in "cooling" position, for horizontal flow. The length of the flow is indicated by values obtained from the speed along the trajectory of the air vein.

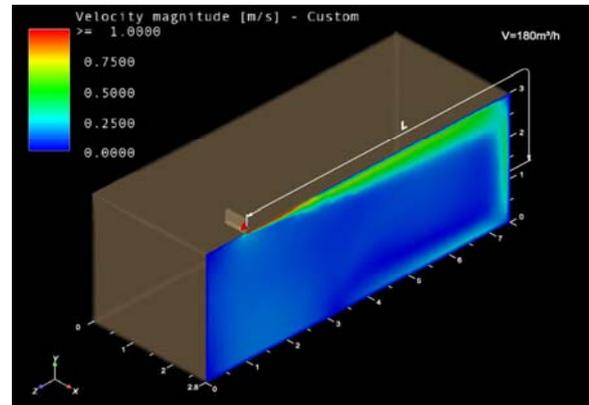
An analysis has also been carried out of the intersection of the flow of two diffusers with equal flow rate placed opposite at a distance of 4.5 meters. In this case the obtained results show the air speed of the intermediate zone between the two diffusers at different heights.

The values of the **depth of penetration** have been defined with the deflectors angled in "heating" position with a temperature difference between injected and room temperature of 10 °C. The best possible adherence to real conditions has been followed considering the dissipation of heat throw surfaces of the virtual test room.

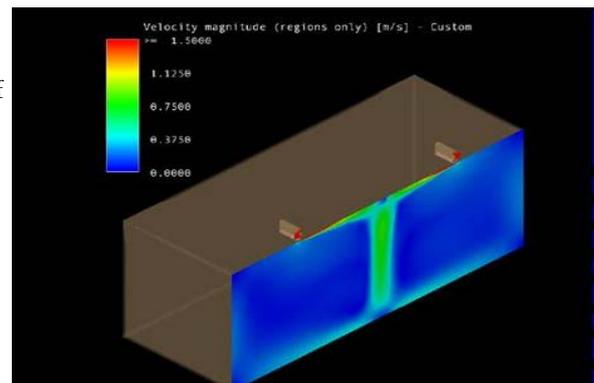
The values of **pressure loss** have been defined in isothermal conditions with deflectors angled both at "heating" and "cooling" positions.

The Ak values (efficient section for the expulsion of the air flow) have been defined in accordance with ISO 5219 regulation.

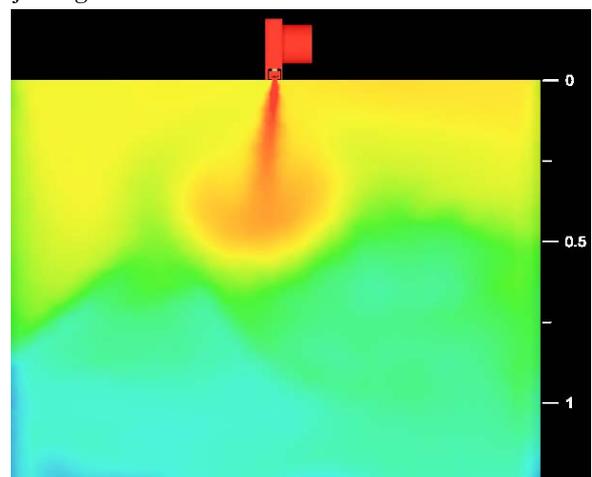
fluiddynamic analysis carried out by



cooling conditions
deflectors angled for horizontal flow



cooling conditions
joining of flows



heating conditions
deflectors angled for vertical flow



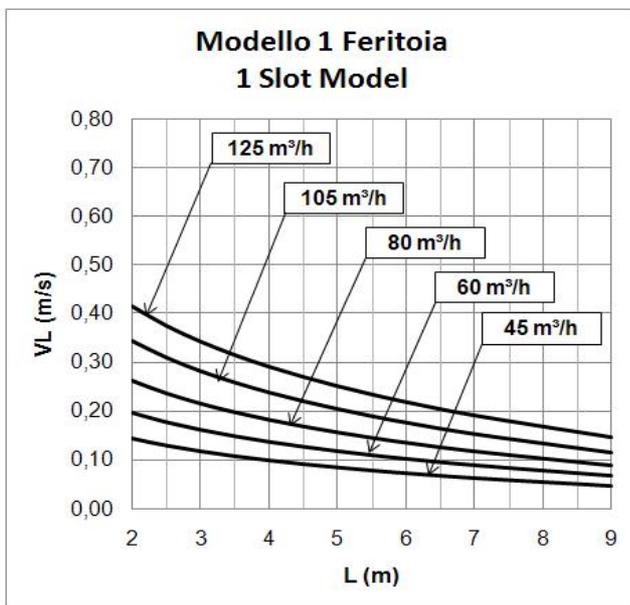
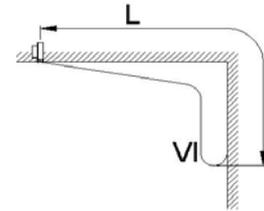
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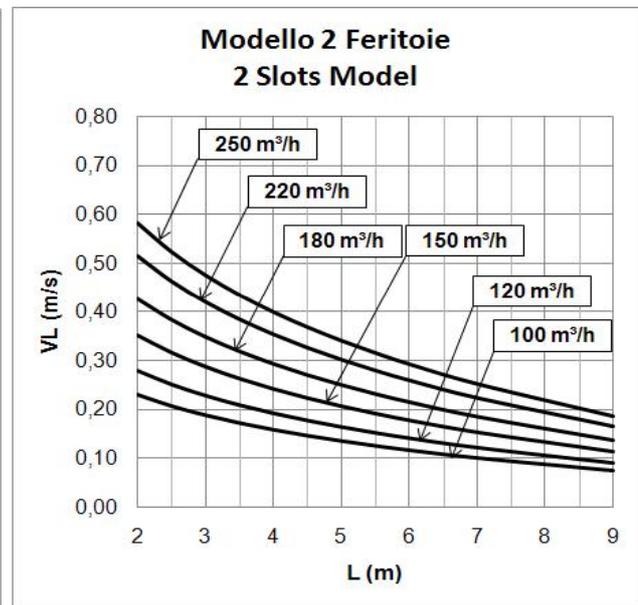
AEREAULIC CHARACTERISTICS THROW ANALYSIS FOR A SINGLE DIFFUSER

Flow analysis of the single diffuser:

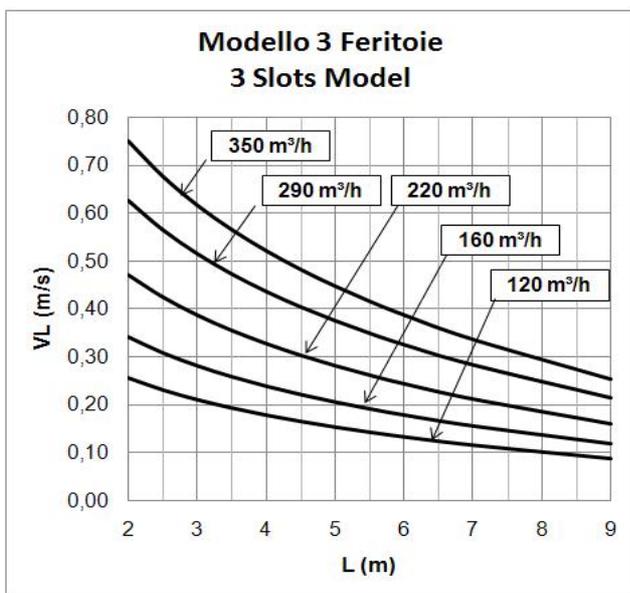
The values indicated in the graph and the table refer to the speed and the vane of the air at the various distances from the diffuser in isothermic conditions, in accordance with ISO 5219 standard, with deflectors angled for a horizontal flow.



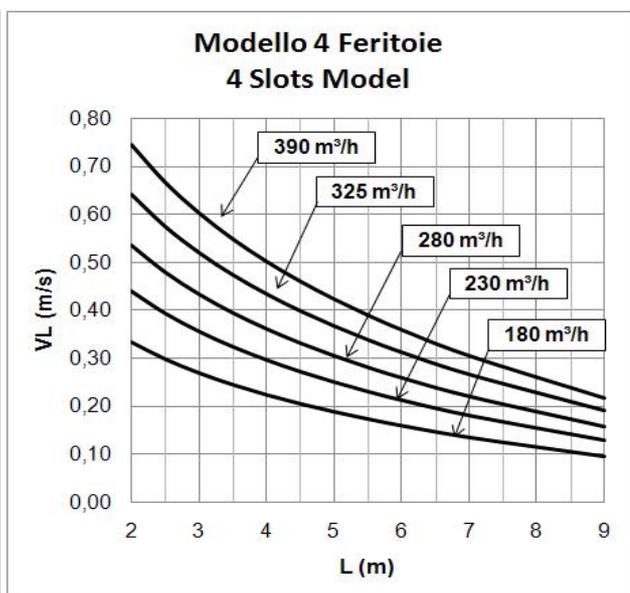
Q=125 m³h V average occupied zone V_c 0,084 m/s



Q=250 m³h V average occupied zone V_c 0,131m/s



Q=350 m³h V average occupied zone V_c 0,124m/s



Q=390 m³h V average occupied zone V_c 0,130m/s



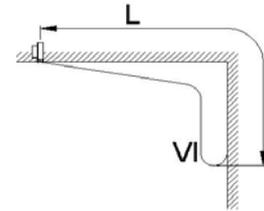
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AEREAULIC CHARACTERISTICS THROW ANALYSIS FOR A SINGLE DIFFUSER

Flow analysis of the single diffuser:

The values indicated in the graph and the table refer to the speed and the vain of the air at the various distances from the diffuser in isothermic conditions, in accordance with ISO 5219 standard, with deflectors angled for a horizontal flow.



		1 SLOT MODEL				
		Q (m ³ /h)				
		45	60	80	105	125
L (m)	2	0,15	0,20	0,27	0,35	0,42
	2,5	0,13	0,18	0,23	0,31	0,37
	3	0,12	0,16	0,21	0,28	0,34
	3,5	0,11	0,15	0,20	0,26	0,32
	4	0,10	0,14	0,18	0,24	0,30
	4,5	0,09	0,13	0,17	0,23	0,28
	5	0,09	0,12	0,16	0,21	0,26
	5,5	0,08	0,12	0,15	0,20	0,24
	6	0,08	0,11	0,14	0,19	0,23
7	0,07	0,09	0,12	0,15	0,19	
9	0,05	0,07	0,09	0,11	0,14	

Q=125 m³h V average occupied zone Vc 0,084 m/s

		2 SLOT MODEL					
		Q (m ³ /h)					
		100	120	150	180	220	250
L (m)	2	0,23	0,28	0,35	0,43	0,52	0,58
	2,5	0,21	0,25	0,31	0,38	0,46	0,53
	3	0,19	0,23	0,28	0,35	0,42	0,47
	3,5	0,17	0,21	0,26	0,32	0,38	0,44
	4	0,16	0,19	0,24	0,29	0,35	0,40
	4,5	0,15	0,18	0,22	0,27	0,33	0,37
	5	0,13	0,16	0,21	0,25	0,30	0,34
	5,5	0,12	0,15	0,19	0,23	0,28	0,32
	6	0,11	0,14	0,17	0,21	0,25	0,29
7	0,10	0,12	0,15	0,18	0,22	0,25	
9	0,08	0,09	0,12	0,15	0,17	0,20	

Q=250 m³h V average occupied zone Vc 0,131m/s

		3 SLOT MODEL				
		Q (m ³ /h)				
		120	160	220	290	350
L (m)	2	0,25	0,33	0,46	0,60	0,73
	2,5	0,23	0,30	0,42	0,56	0,66
	3	0,21	0,28	0,39	0,52	0,62
	3,5	0,20	0,26	0,36	0,48	0,57
	4	0,19	0,24	0,34	0,45	0,54
	4,5	0,17	0,23	0,32	0,42	0,50
	5	0,16	0,21	0,29	0,39	0,47
	5,5	0,15	0,20	0,27	0,37	0,44
	6	0,14	0,18	0,25	0,34	0,41
7	0,11	0,14	0,20	0,27	0,31	
9	0,08	0,10	0,14	0,19	0,23	

Q=350 m³h V average occupied zone Vc 0,124m/s

		4 SLOT MODEL				
		Q (m ³ /h)				
		180	230	280	325	390
L (m)	2	0,33	0,43	0,53	0,63	0,73
	2,5	0,30	0,39	0,47	0,57	0,66
	3	0,27	0,36	0,44	0,52	0,61
	3,5	0,25	0,33	0,40	0,49	0,56
	4	0,23	0,30	0,37	0,45	0,52
	4,5	0,21	0,28	0,34	0,41	0,47
	5	0,19	0,25	0,31	0,38	0,43
	5,5	0,17	0,23	0,28	0,34	0,39
	6	0,15	0,21	0,25	0,31	0,35
7	0,13	0,17	0,21	0,25	0,29	
9	0,10	0,13	0,16	0,19	0,22	

Q=390 m³h V average occupied zone Vc 0,130m/s



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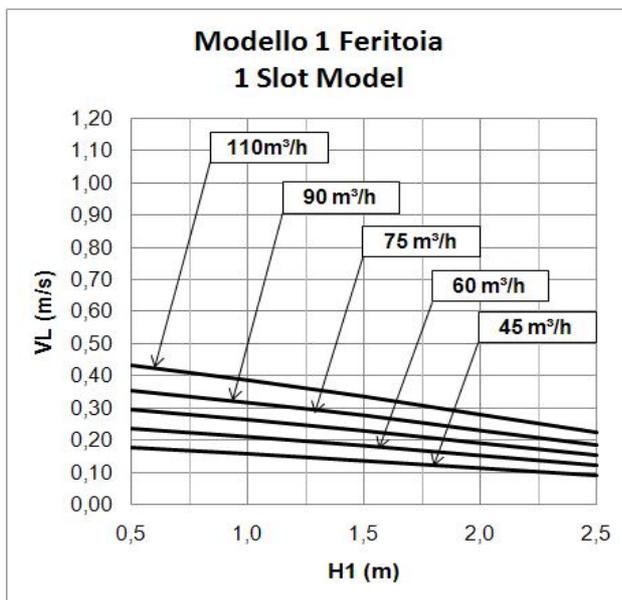
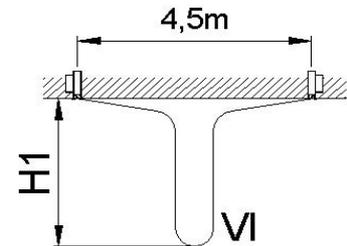
AEREAULIC CHARACTERISTICS THROW ANALYSIS FOR OPPOSED DIFFUSERS

Air flow intersection analysis

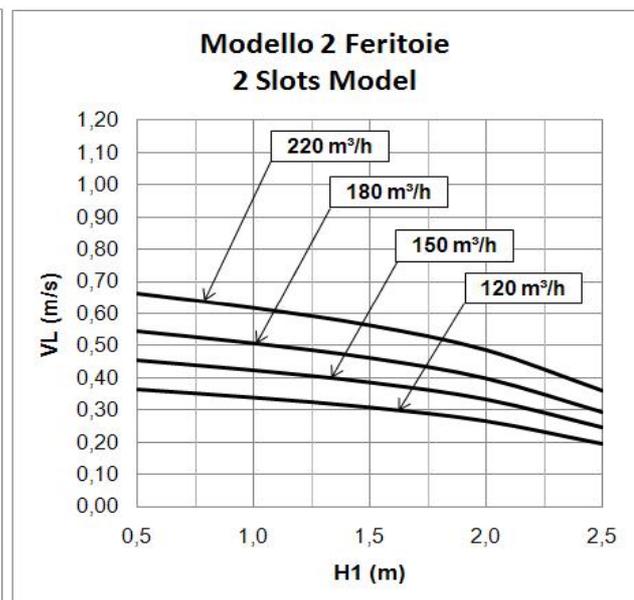
The analysis has been carried out with a 1 meter long diffuser and has been done by placing two diffusers at 4.5 meters opposite each other.

The flow analysis has allowed to show, at the chosen flow values, the speed in the zone at the equal distance from both diffusers, in relation to the distance from the ceiling.

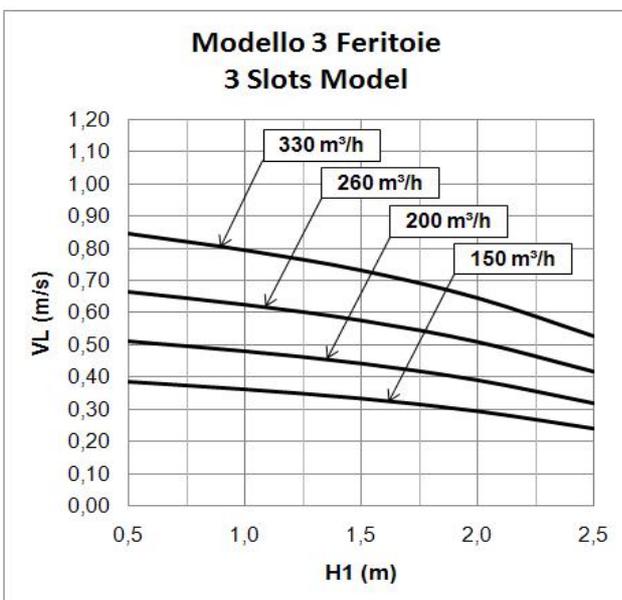
The values shown in the graph and table refer to isothermic conditions in accordance with ISO 5219 standard, with deflectors angled for a horizontal flow.



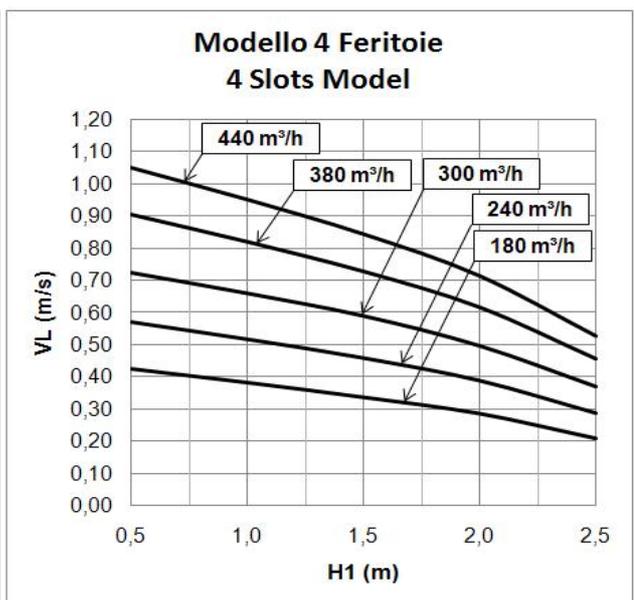
Q=110 m³h V average occupied zone Vc 0,090 m/s



Q=220 m³h V average occupied zone Vc 0,128m/s



Q=330 m³h V average occupied zone Vc 0,180m/s



Q=440 m³h V average occupied zone Vc 0,200m/s



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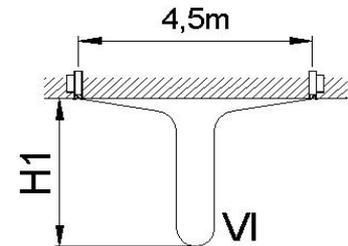
AEREAULIC CHARACTERISTICS THROW ANALYSIS FOR OPPOSED DIFFUSERS

Air flow intersection analysis

The analysis has been carried out with a 1 meter long diffuser and has been done by placing two diffusers at 4.5 meters opposite each other.

The flow analysis has allowed to show, at the chosen flow values, the speed in the zone at the equal distance from both diffusers, in relation to the distance from the ceiling.

The values shown in the graph and table refer to isothermic conditions in accordance with ISO 5219 standard, with deflectors angled for a horizontal flow.



1 SLOT MODEL		Q (m ³ /h)				
		45	60	75	90	110
L (m)	0,5	0,18	0,24	0,29	0,35	0,43
	1,0	0,16	0,21	0,26	0,32	0,39
	1,5	0,14	0,18	0,23	0,28	0,34
	2,0	0,11	0,15	0,19	0,23	0,28
	2,5	0,09	0,12	0,15	0,19	0,22

Q=110 m³h V average occupied zone Vc 0,090 m/s

2 SLOT MODEL		Q (m ³ /h)			
		120	150	180	220
L (m)	0,5	0,36	0,45	0,54	0,66
	1,0	0,34	0,42	0,51	0,62
	1,5	0,31	0,39	0,46	0,56
	2,0	0,27	0,33	0,40	0,49
	2,5	0,20	0,25	0,30	0,36

Q=220 m³h V average occupied zone Vc 0,128m/s

3 SLOT MODEL		Q (m ³ /h)			
		150	200	260	330
L (m)	0,5	0,38	0,51	0,67	0,85
	1,0	0,36	0,48	0,63	0,80
	1,5	0,33	0,44	0,58	0,73
	2,0	0,29	0,39	0,51	0,65
	2,5	0,24	0,32	0,42	0,53

Q=330 m³h V average occupied zone Vc 0,180m/s

4 SLOT MODEL		Q (m ³ /h)				
		180	240	300	380	440
L (m)	0,5	0,42	0,57	0,73	0,91	1,05
	1,0	0,38	0,52	0,66	0,82	0,95
	1,5	0,34	0,46	0,59	0,73	0,84
	2,0	0,29	0,39	0,50	0,62	0,71
	2,5	0,21	0,29	0,37	0,46	0,53

Q=440 m³h V average occupied zone Vc 0,200m/s



LINEAR SLOT DIFFUSERS

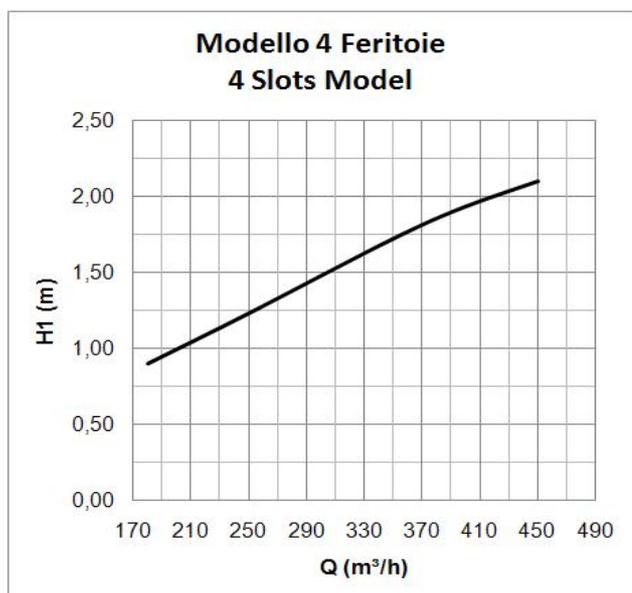
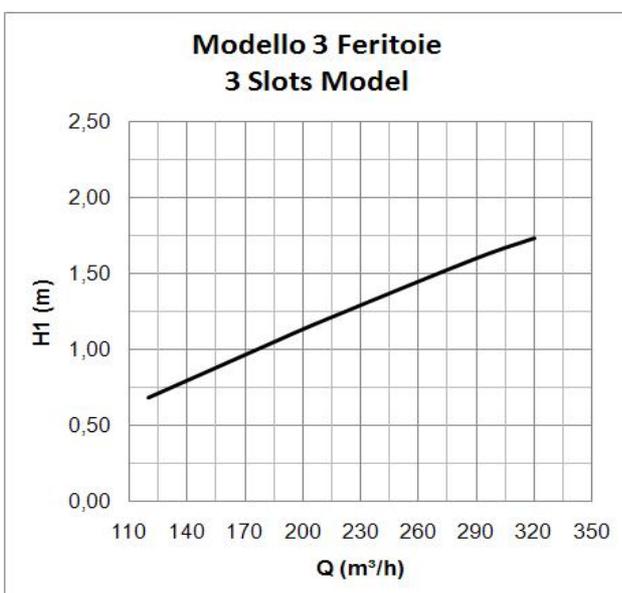
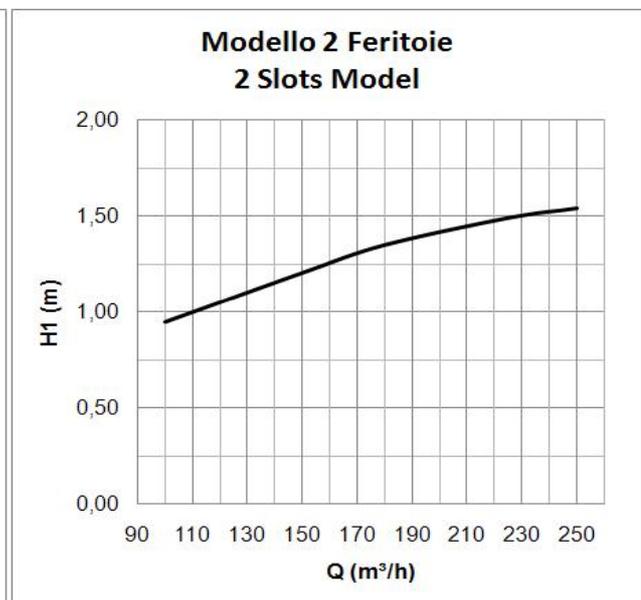
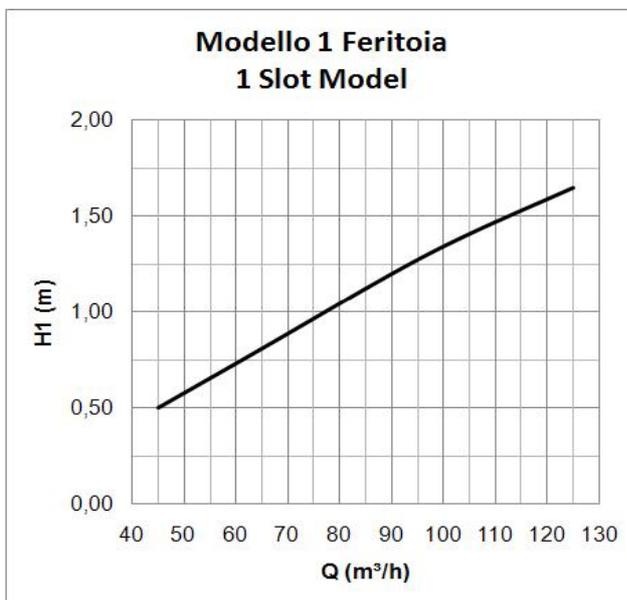
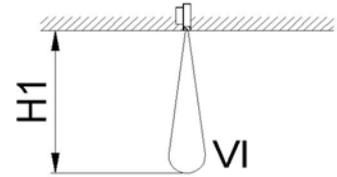
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AEREAULIC CHARACTERISTICS THROW PENETRATION ANALYSIS

Analysis of the depth of penetration

The analysis has been carried out with a 1 meter long diffuser.
The temperatures used are 30°C for the injected air and 20°C for the room temperature.

The analysis of the depth of penetration has shown, in relation to the pressure loss, the distance from the diffuser at which the effect of the return flow is eliminated towards the higher parts of the room.





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PRESSURE LOSSES

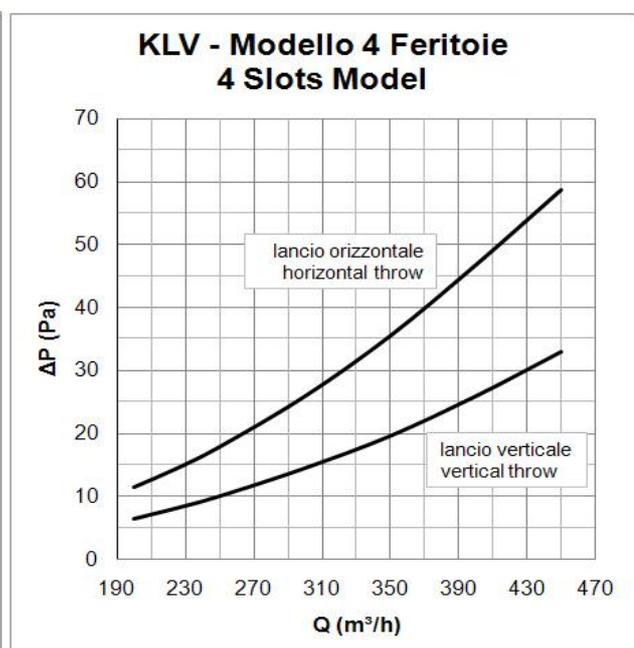
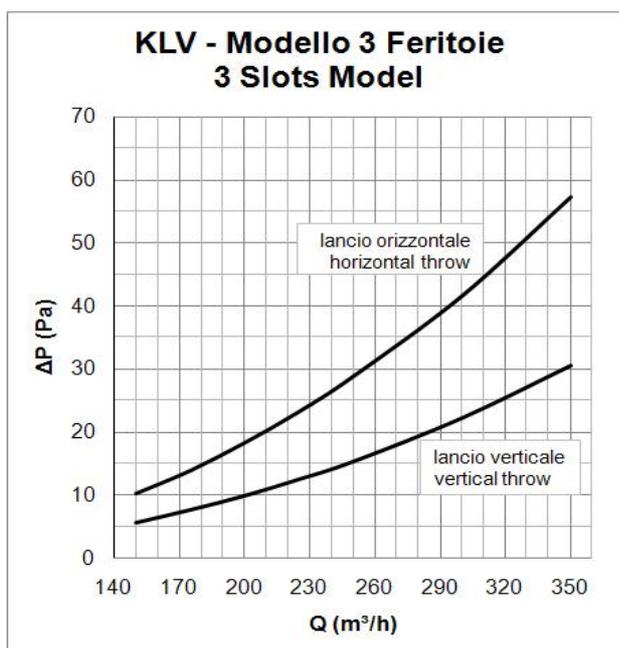
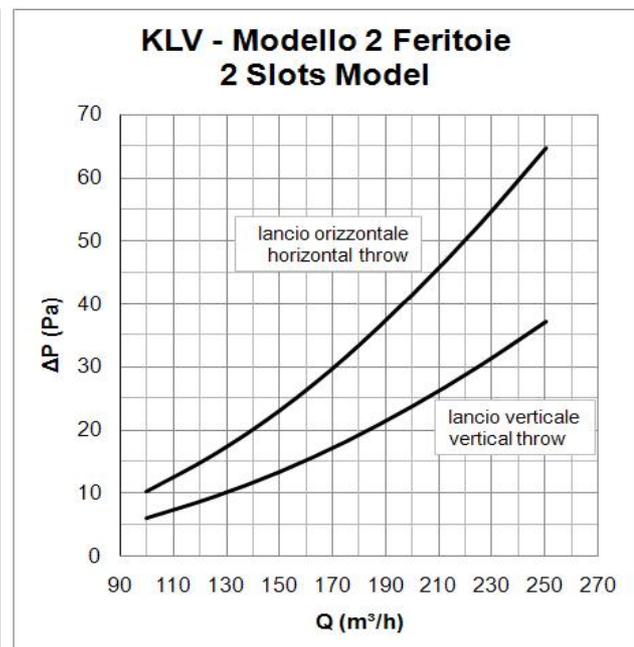
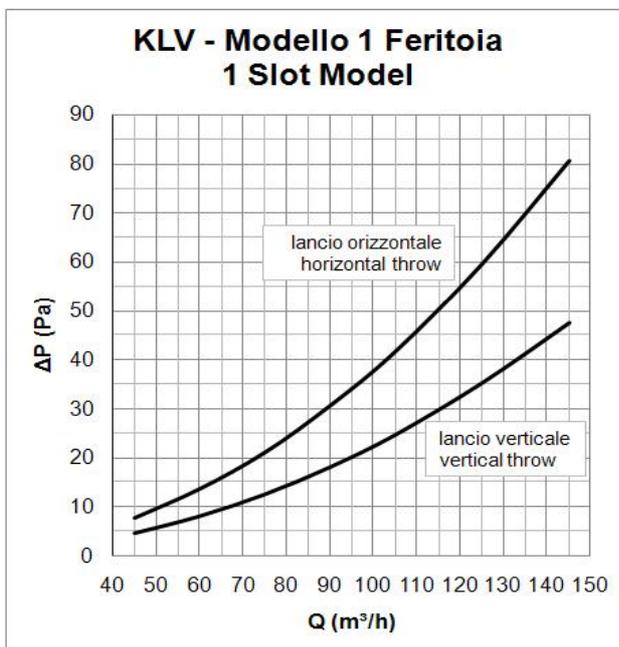
Pressure loss analysis

The analysis has been carried out with a 1 meter long diffuser.

The pressure loss analysis has shown, in relation to the air capacity, the pressure loss as a result of the air exiting the diffuser.

The different geometry given from the air flow depending on whether the deflectors are angled in a 'cooling' or 'heating' position entails, in relation the air capacity, different values of pressure loss.

In the case of both geometries, the analysis has been carried out in isothermic conditions.





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PRESSURE LOSSES

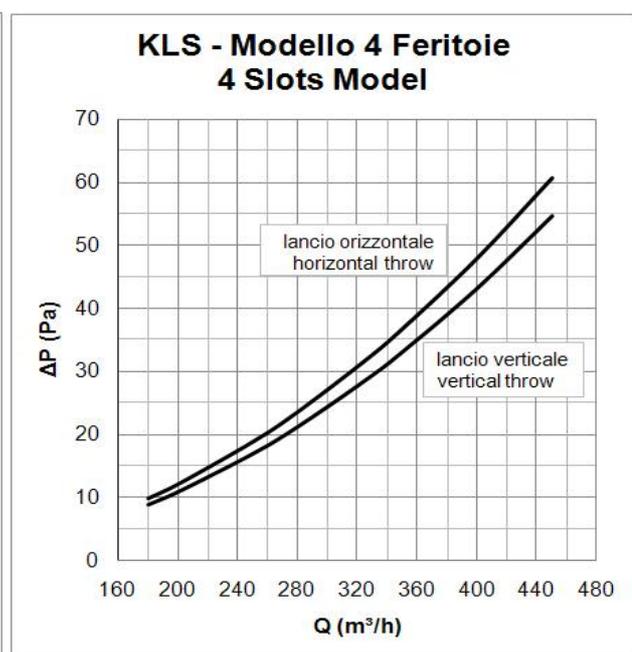
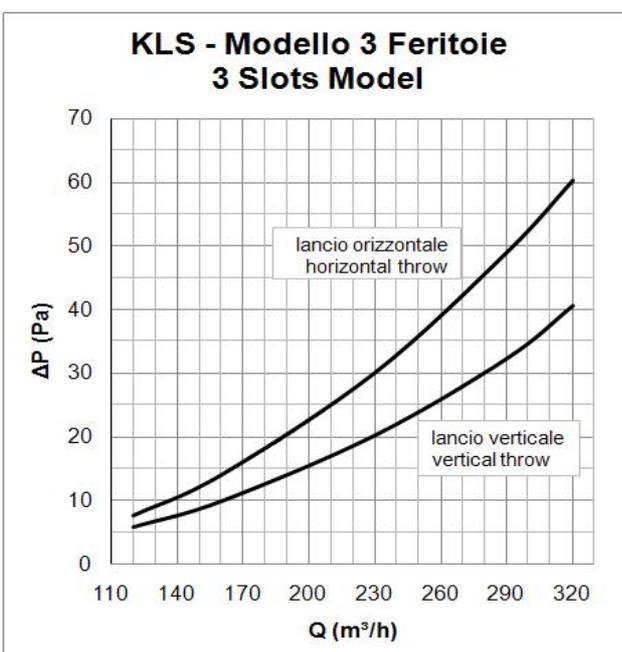
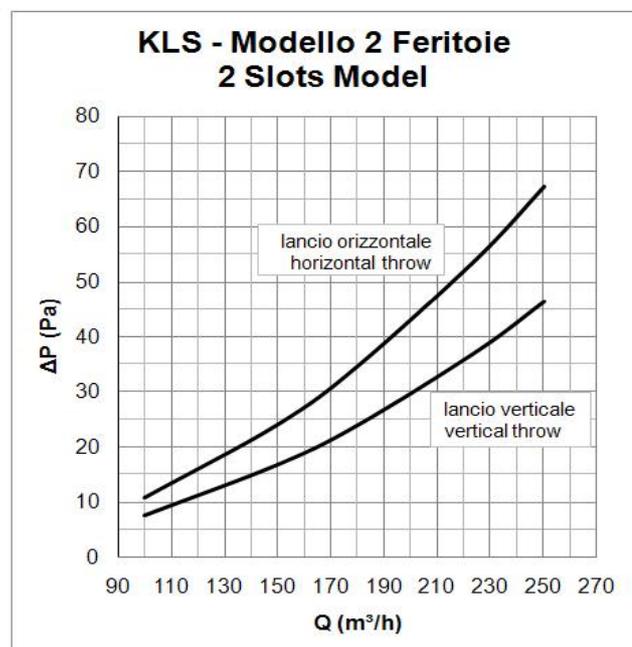
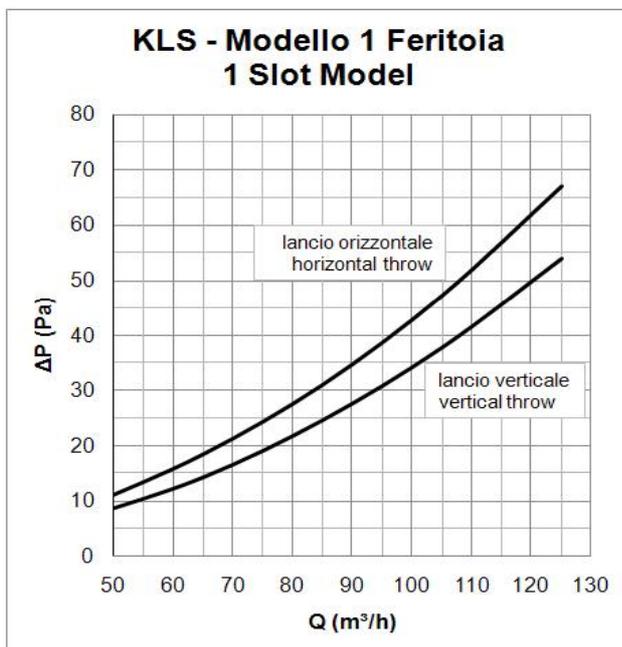
Pressure loss analysis

The analysis has been carried out with a 1 meter long diffuser.

The pressure loss analysis has shown, in relation to the air capacity, the pressure loss as a result of the air exiting the diffuser.

The different geometry given from the air flow depending on whether the deflectors are angled in a vertical or horizontal position entails, in relation to the air capacity, different values of pressure losses.

In the case of both geometries, the analysis has been carried out in isothermic conditions.

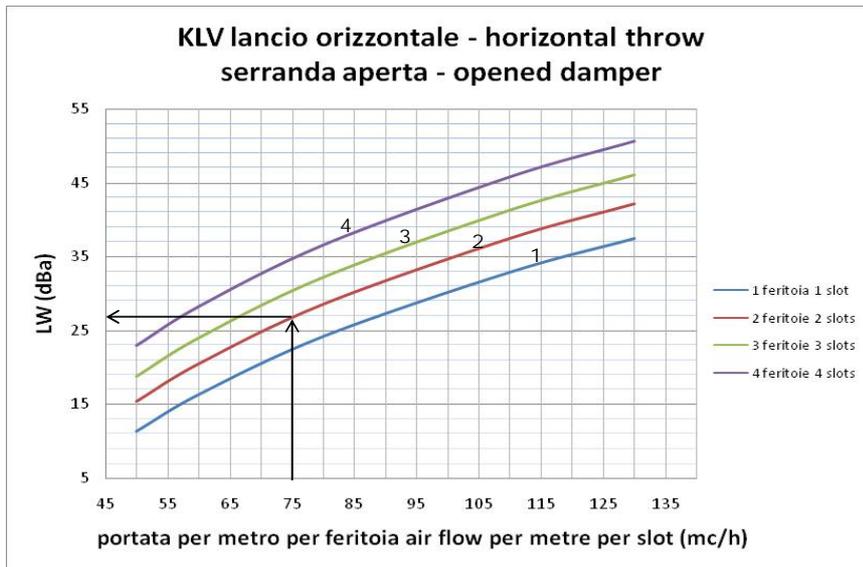




LINEAR SLOT DIFFUSERS

KLV
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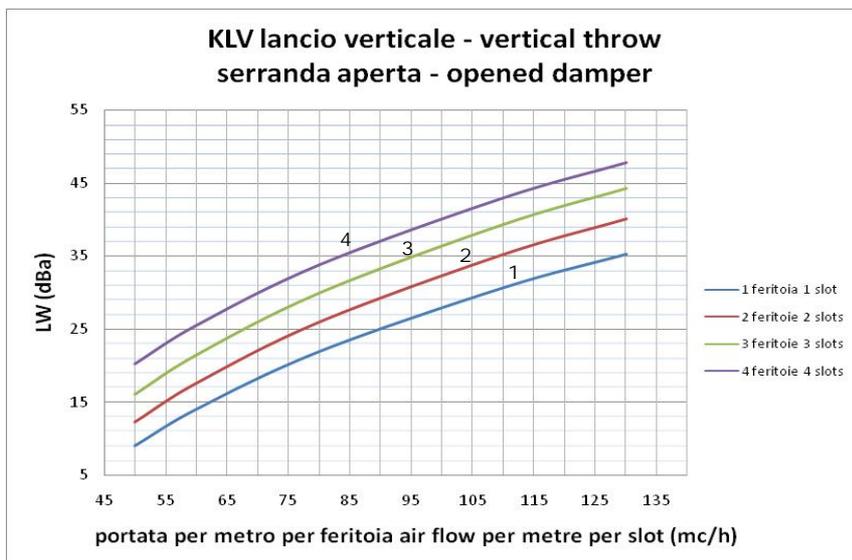
ACOUSTIC CHARACTERISTICS



Noise power with horizontal flow
The noise power level is expressed in dBa with damper fully opened.
the noise power is obtained from in relation to the air capacity expressed in mc/h per metre per slot.

Correction coefficients:
25% closed damper: +2dBa
50% closed damper: +5dBa
75% closed damper: +8dBa
Length 1,5m: +2dBa
Length 2m: +3dBa

Example:
diffuser L=1,5m 2 slots
air flow 225mc/h
 $225 / 2 / 1,5 = 75$
air flow per metre per slot 75mc/h
noise power 27dBa

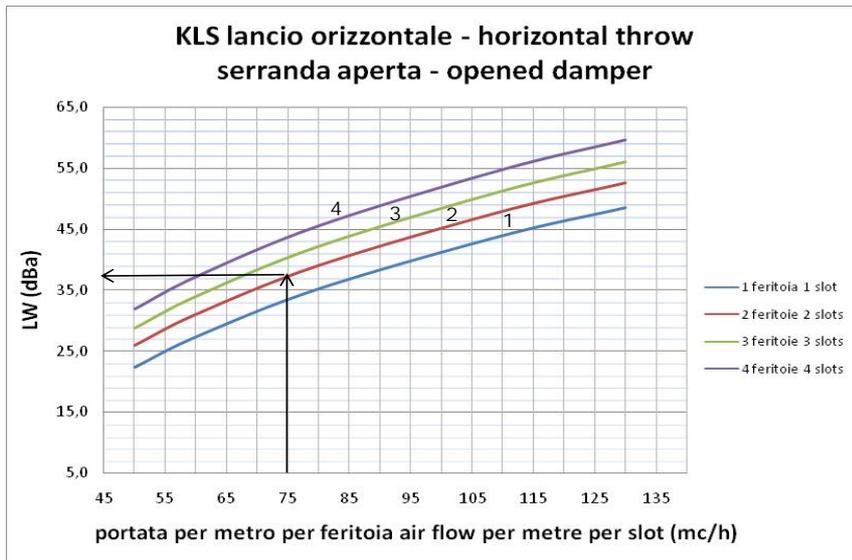




LINEAR SLOT DIFFUSERS

ACOUSTIC CHARACTERISTICS

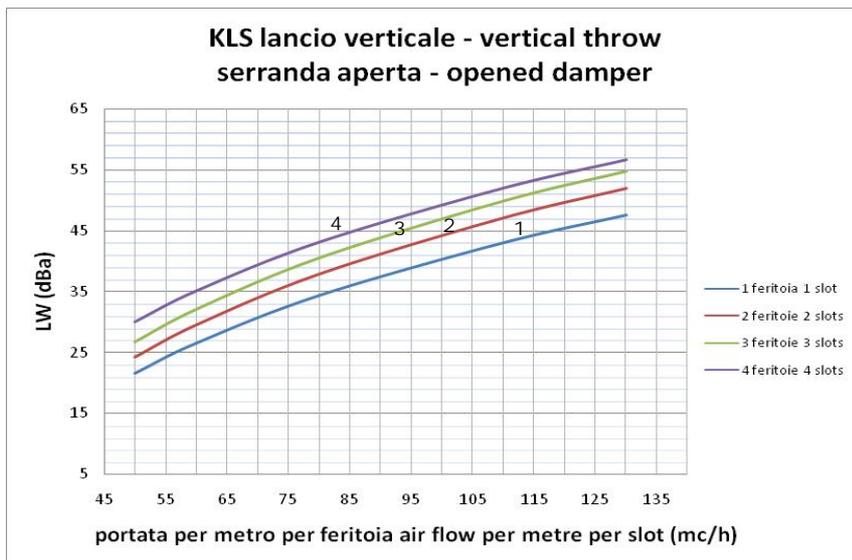
KLS SERIES



Noise power with horizontal flow
The noise power level is expressed in dBa with damper fully opened.
the noise power is obtained from the relation to the air capacity expressed in mc/h per metre per slot.

Correction coefficients
 25% closed damper: +2dBa
 50% closed damper: +5dBa
 75% closed damper: +8dBa
 Length 1,5m: +2dBa
 Length 2m: +3dBa

Example:
 diffusor L=1,5m 2 slots
 air flow 225mc/h
 $225 / 2 / 1,5 = 75$
 air flow per metre per slot 75mc/h
 noise power level $37+2 = 39$ dBa

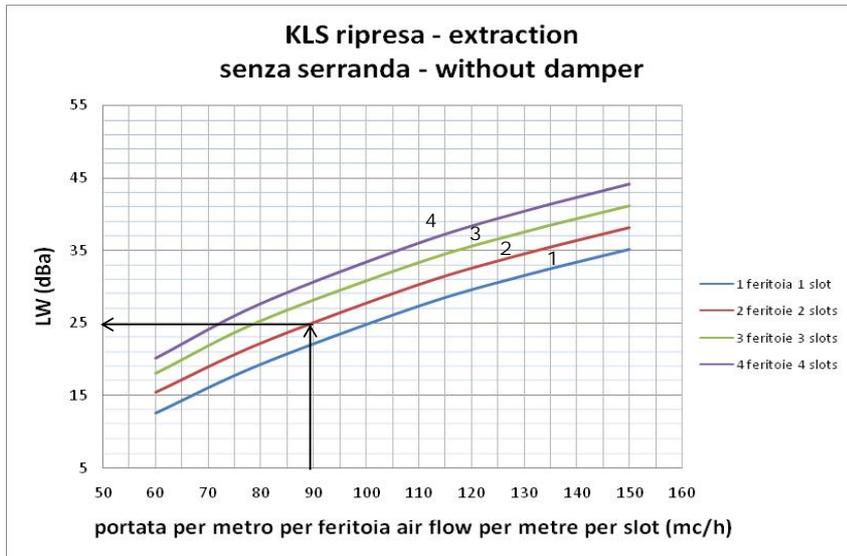




LINEAR SLOT DIFFUSERS

ACOUSTIC CHARACTERISTICS

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Noise level in return mode

The diagram refers to the diffuser version without deflection blade and without damper. This version is in fact particularly indicated for use in air extraction.

The noise power level expressed in dBa is calculated in relation to the air flow in mc/h per metre per slot.

Correction coefficients:

Length 1,5m: +2dBa

Length 2m: +3dBa

Esempio:

diffuser L=1,5m 2 slots

air flow 225mc/h

$225 / 2 / 1,5 = 75$

air flow per metre per slot 75mc/h

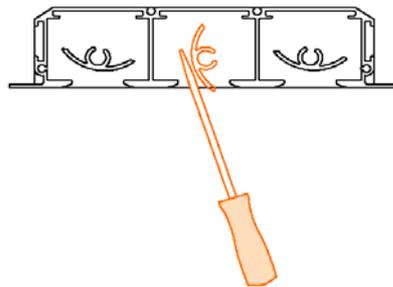
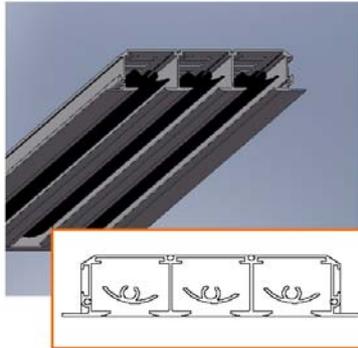
noise power level $37+2 = 39$ dBa



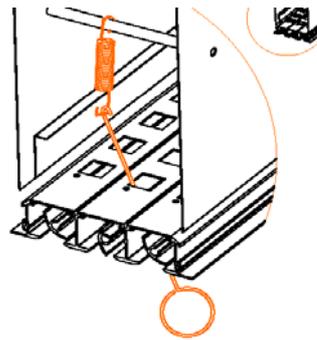
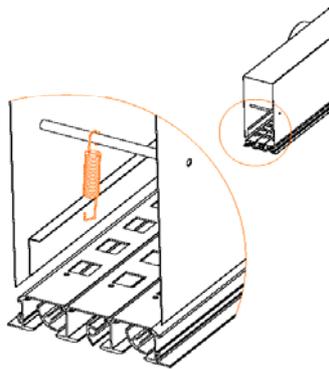
LINEAR SLOT DIFFUSERS

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ASSEMBLY INSTRUCTIONS VERSION WITH FIXING SPRING



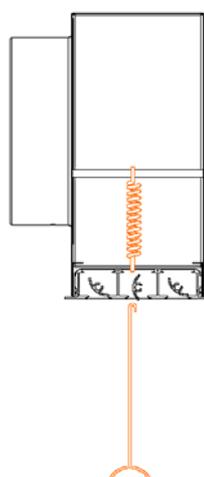
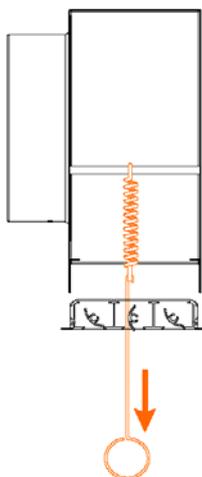
Vertically position the lug slot centrally or near the centre acting as shown in the picture, with a screwdriver at the ends of the deflector (without applying pressure to the centre of it).



Locate the spring attached inside the plenum (shown above in section).

Thread the hook shown in the picture through the slot with the deflector previously positioned vertically taking care to insert it on the side of the fixing hole shown.

Number of springs:
- 2 springs for diffuser, regardless of length



Using the hook stretch the spring and hook it to the fixing hole.

Repeat on the other side.

Release the diffuser that as a result of the tension in the springs will stay aligned with the plenum.

NOTE

For lengths up to 2000mm there are two springs already included in the product code of the diffuser.

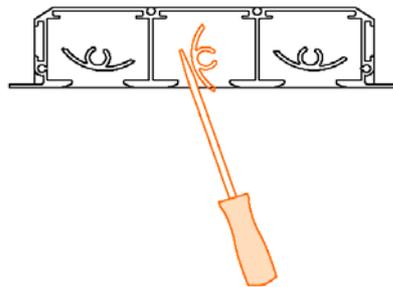
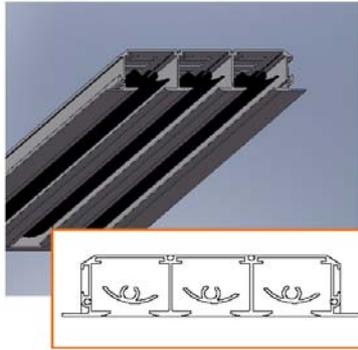
For lengths over 2000mm composed of several diffusers, two mounting springs for each unit should be foreseen.



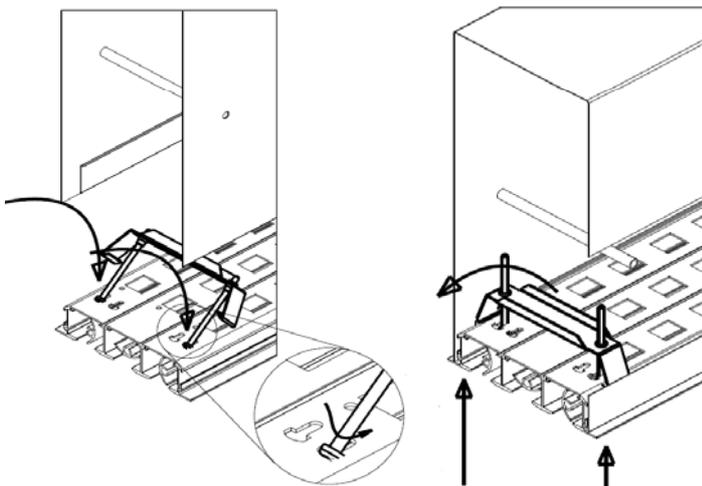
LINEAR SLOT DIFFUSERS

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FITTING INSTRUCTIONS FOR VERSIONS WITH FIXING BRIDGE

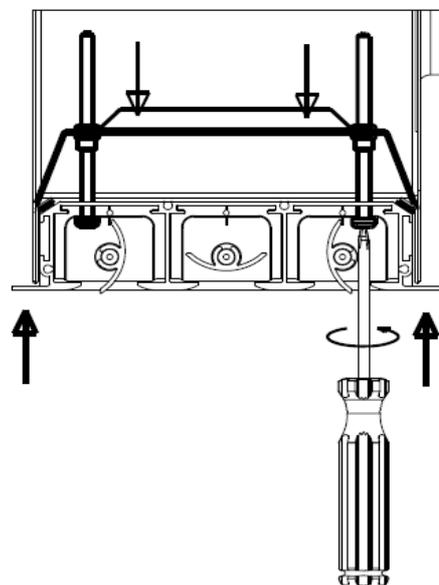


Vertically position the lug of the central slot or near the centre acting as shown in the figure, with a screwdriver at the ends of the deflector (without applying pressure to the centre of it).



Attach fixing bridges to the diffuser by inserting the screw heads in its slots. Insert the diffuser into the plenum and, turning the screws, place the bridge on the folds of sheet metal cut into the sides of the plenum.

Number of bridges:
- Up to 1500mm length; 2 bridges
- 1500mm length over: 3 bridges.



turn the screws until the diffuser completely touches the ceiling.

NOTE
For lengths up to 1500mm two bridges are already included in the code of the diffuser.
For lengths over 1500mm up to 2000mm three bridges are already included in the code of the speaker.
For lengths over 2000mm composed by various elements, it is necessary to foresee:
2 fixing bridges for each element of length up to 1500mm;
3 fixing bridges for each element of lengths greater than 1500mm.



LINEAR SLOT DIFFUSERS

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CODES

ORDERING CODES - KLV SERIES					
KLV	X	X	0	X	000
Linear diffusers	body finish A=anodized R=white RAL9010	fixing 0= with springs P= with bridge	number of slots	deflecting blade B=black RAL 9005 A=anodized R=white RAL 9010 Z=without blade (*)	length mm

ORDERING CODES - KLS SERIES						
KLS	X	X	0	X	X	000
Linear diffusers	body finish A=anodized R=white RAL9010	fixing 0= with springs P= with bridge	number of slots	damper D=with damper N=without damper	deflecting blade B=black RAL 9005 A=anodized R=white RAL 9010 Z=without blade (*)	length mm

(*) the version without blade is best used for the extraction of air.

ORDERING CODES - PLENUM				
P90	X	00	M000	X
plenum linear diffuser KL	insulation I=isolated N=non insulated	slot number	length mm	damper D=with damper N=without damper

(**) for the KLS series it is recommended to use the damper in the plenum connector

Standard lengths:

800 mm

1000 mm

1500 mm

2000 mm

All intermediate sizes are available on request

Plenums longer or equal to 1500mm are supplied with two connections