C 26.02
EN.00

CZB

Jet **Nozzle**

KES KLIMA
AIR CONTROL SYSTEMS

Description

The CZB type nozzles are designed for wall and ceiling applications. They can be used for heating and cooling supply air.

Properties

The nozzles are used for throwing conditioned air to long distances. The throw characteristics are suitable for constant or variable air flow rates. The nozzles are a good alternative where normal diffusers or grilles are not preferred. The nozzles can rotate (+/-) 30^{o} about their axis to any direction. However, if a servomotor is used, then the rotating motion takes place in a plane (e.g. only up and down). If installed on a wall, the nozzles are turned up for cooling and down for heating.

Materials

The nozzle is made from 1.2 mm thick ETIAL-5 norm aluminium sheet.

Surface treatment

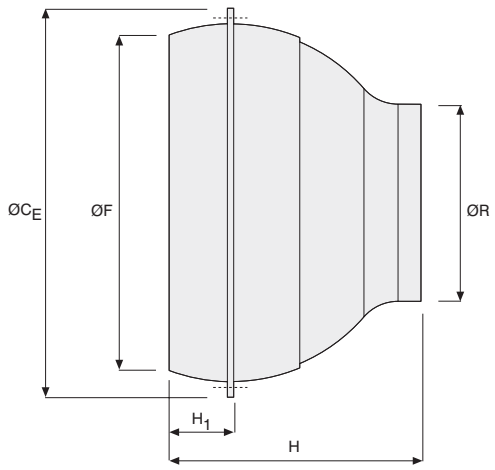
The surfaces of the diffuser is first cleaned and chromated, then painted with electrostatic powder paint to 20% gloss RAL 9010 (white) as standard. Other colours are also available upon request.

Accessories

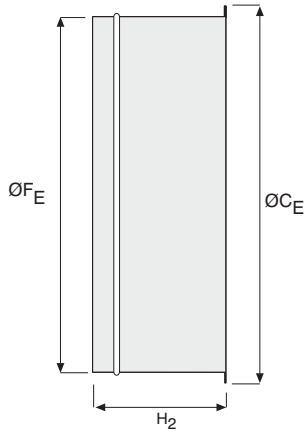
Duct Connection Adapter

This element is used for connection to flexible ducts, and is formed from 1 mm galvanized steel sheet.

Dimensions



Kanal Bağlantı Adaptörü

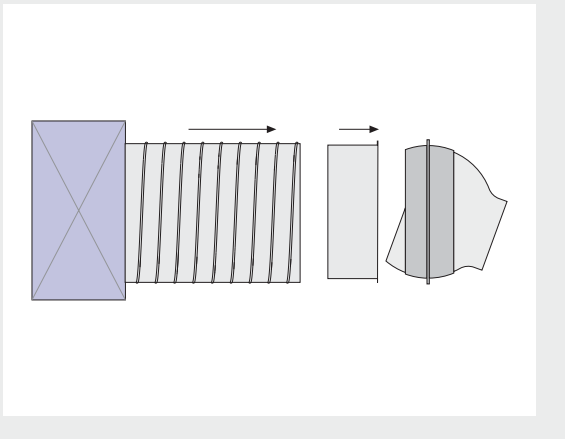


Standard Dimensions (mm)

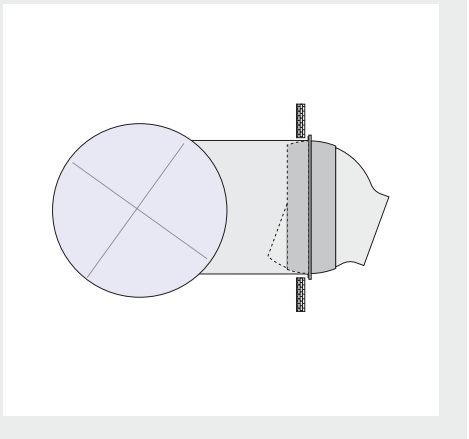
Size	ØR (mm)	ØC$_E$ (mm)	ØF (mm)	H (mm)	H$_1$ (mm)	H$_2$ (mm)	ØF$_E$ (mm)
160	80	210	150	140	50	100	170
200	100	250	193	167	60	100	210
250	125	300	244	195	60	100	260
315	160	370	346	255	85	150	330
400	220	452	396	315	105	150	412

Installation

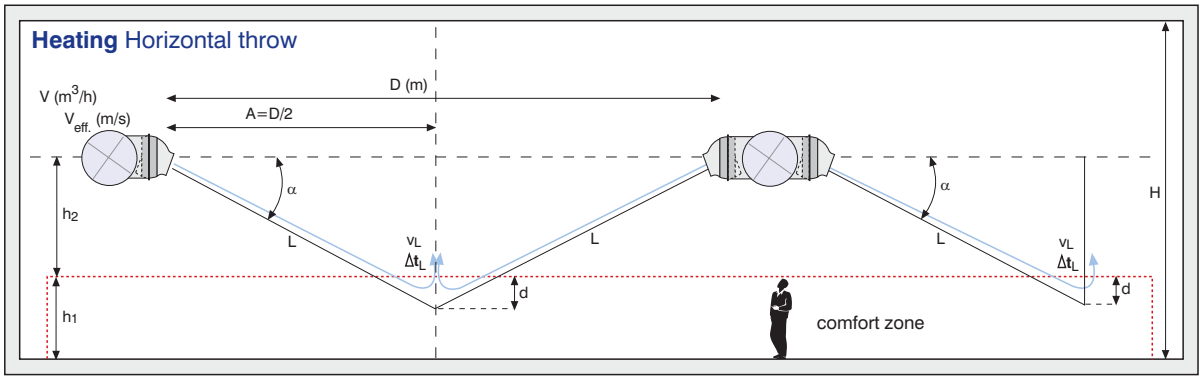
Installation with flexible duct

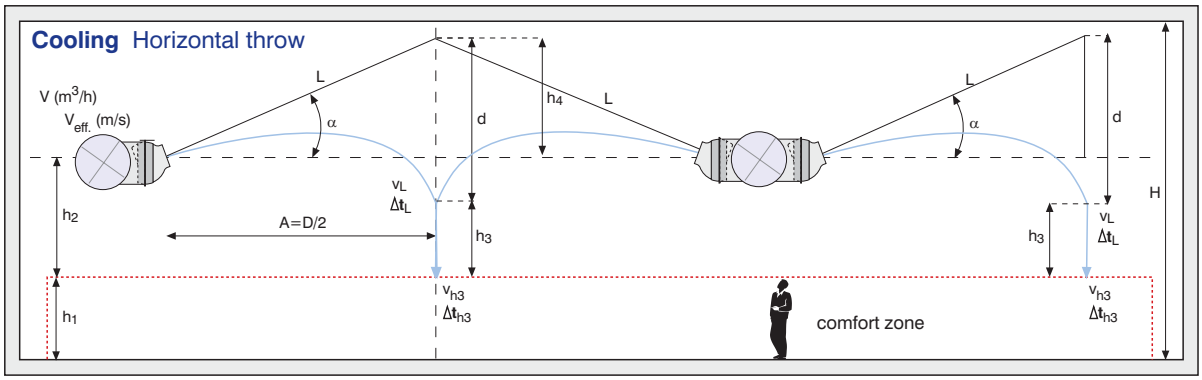


Installation in the wall

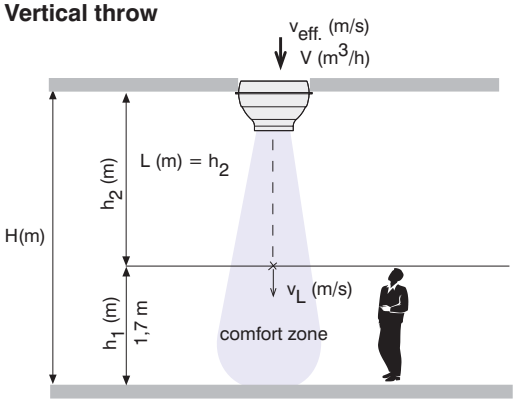


Nomenclature





Vertical throw



D	Distance between nozzles (m)
A	Half-distance between nozzles (m) A= D/2
h1	Comfort zone height (m)
h2	Distance between a nozzle and comfort zone (m)
h3	Distance between the collision point and comfort zone (m)
h4	Distance between the collision point in isothermal conditions and comfort zone (m)
d	Air stream deflection due to non-isothermal conditions (m)
L	Isothermal throw distance (m)
L_T	Total throw distance (m) LT = L+h_3
$v_{eff.}$	Effective outlet velocity (m/s)
v_L	Velocity of core at distance L
v_{h3}	Velocity of core in comfort zone
Δt_0	Difference between supply air and room temperature (^{O}C)
Δt_L	Difference between core and comfort zone temperature at distance L (^{O}C)
Δt_{h3}	Difference between core and comfort zone temperature (^{O}C)
V	Air flow rate (m^3/h)
H	Room height (m)
S	Sound power level dB(A)
α	angle that the nozzle makes with the horizontal (^{O}) (throw angle)

Selection method for cooling

1) A throw angle is assigned, e.g. $\alpha = 30^{o}$
2) L is calculated; $L = A / \cos \alpha$ ($\cos \alpha$ taken from the table on this page)
3) h4 is calculated; $h_4 = A \times \tan \alpha$ ($\tan \alpha$ taken from the table on this page)
4) Vertical deflection d is read from the graph on page 6.
5) h_3 is calculated; $h_3 = h_2 + h_4 - d$
6) vh3 is read from the graph on page 7.
   If vh_3 is much different from the desired value, then a new selection must be made.
7) Δth_3, temperature difference of the stream with the room is read from the table on page 10.

Selection method for heating

1) A v_L value is assigned; e.g. v_L=0.5 m/s
2) L is read from the upper part of the graph on page 7.
3) Vertical deflection d is read from the graph on page 6.
4) Throw angle α is found: From the table on this page, $\sin \alpha = (h_2+d) / L$
   Note: The sum of throw angles for cooling and heating must be less than 60^{o}. If this value is exceeded, then a new selection must be made.

5) Δth_3, temperature difference of the stream with the room is read from the table on page 10.

The height of the comfort zone is taken as 1.70m above the floor. It is important that 0.25 m/s core velocity is not exceeded in this zone.

Ranges of flow rates of nozzles

Size	Air Flow Rate (m^3/h)
160	50 - 500
200	80 - 700
250	130 - 1000
315	210 - 1500
400	400 - 2400

Table for trigonometric values for α

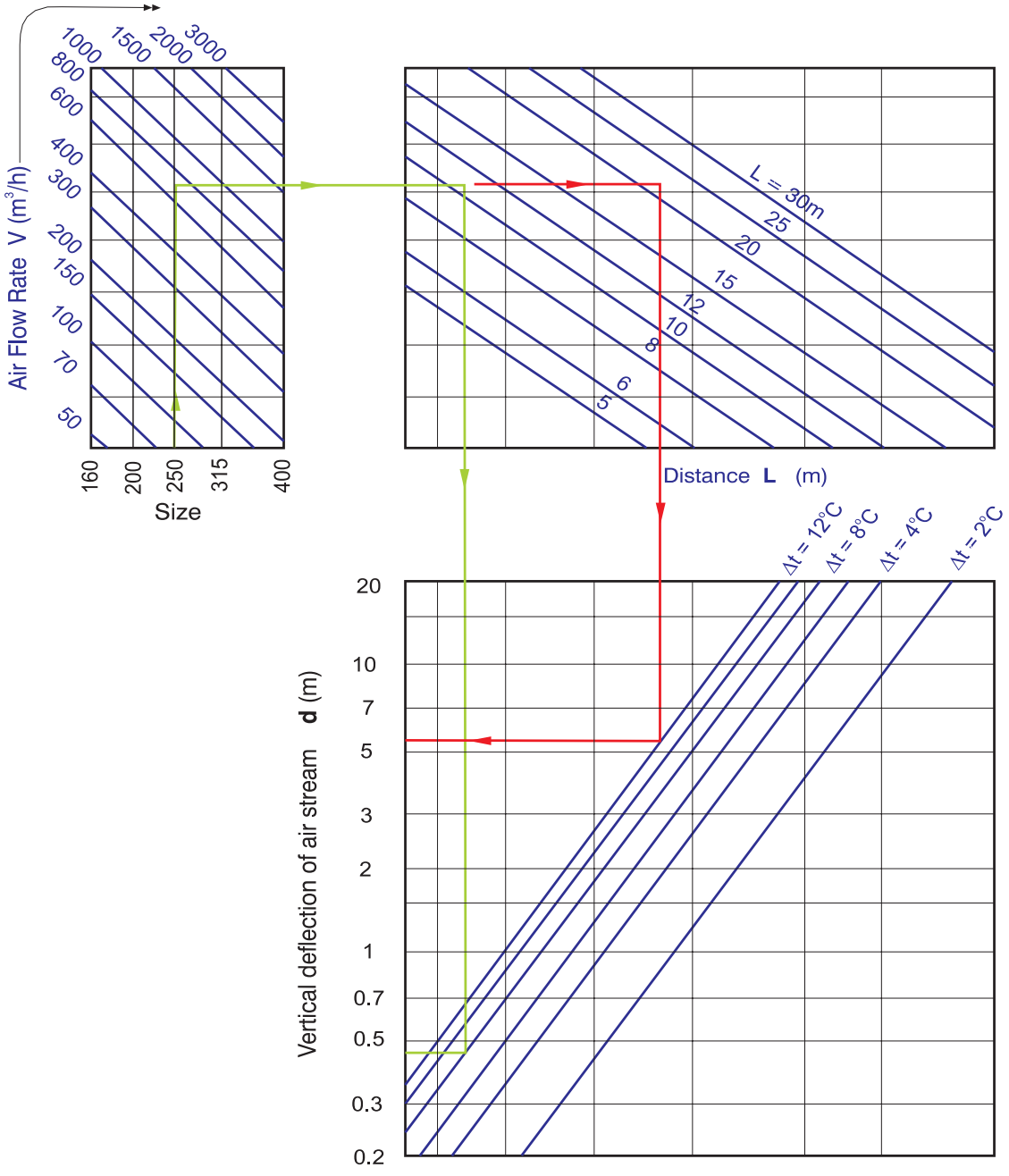
α	sinα	cosα	tanα
0	0,00	1,00	0,00
5	0,09	1,00	0,09
10	0,17	0,98	0,18
15	0,26	0,97	0,27
20	0,34	0,94	0,36
25	0,42	0,91	0,47
30	0,50	0,87	0,58

Note for table on page 10:

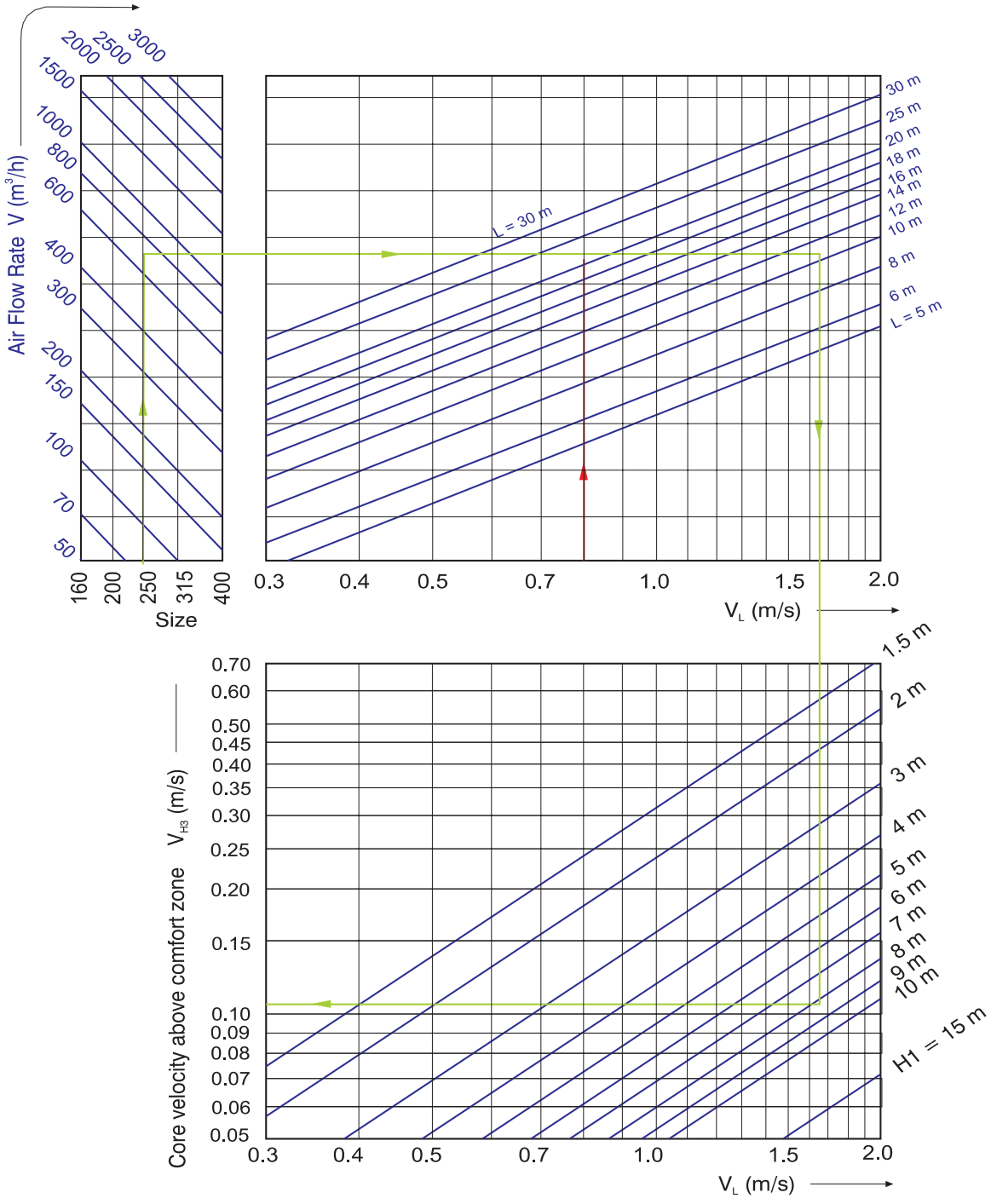
Temperature gradients along the throw path are read from the table, depending on the Δt_o, Δth_3 and throw length values.The temperature of the core at L_T metres from the diffuser, differs from the room temperature by the value read from the tables. The difference is plus in heating and minus in cooling. The less the difference, the better the comfort conditions.

Technical Data

Air Stream Vertical Deflection



Core Velocity Above Comfort Zone



Technical Data

Size (mm)	Flow Rate (m^3/h)	Vertical penetration for warm air (m)			
		Δt_0 (°C)			
		+5	+10	+15	+20
160	50	3,20	2,50		
	160	7,50	5,50	4,60	4,10
	280	11,50	8,60	7,40	6,40
	390	15,00	11,40	9,50	8,50
	500	18,50	14,00	12,00	10,50
200	80	4,00	3,00		
	230	8,00	6,00	5,00	4,40
	390	12,00	9,00	7,50	6,60
	550	16,00	12,00	10,00	9,00
	700	19,50	14,50	12,30	11,00
250	130	4,00	3,00		
	350	9,00	6,80	5,60	5,00
	570	13,50	10,00	8,50	7,50
	780	17,00	12,50	10,80	9,50
	1000	22,00	15,60	13,50	11,80
315	210	4,60	3,50	2,80	2,00
	530	10,00	7,20	6,10	5,50
	850	14,30	10,80	9,00	8,00
	1180	18,50	14,00	11,60	10,40
	1500	22,50	17,00	14,00	12,50
400	400	5,70	4,20	3,70	3,20
	900	10,80	8,20	6,80	6,00
	1400	15,80	11,70	9,90	8,80
	1900	20,00	15,00	12,60	11,00
	2400	24,20	18,00	15,20	13,40

Technical Data

Pressure loss and sound power levels for different throw angles

			α=°0	α=°10	α=°20	α=°30
Size (mm)	**Flow Rate** (m^3/h)	**Pressure loss** (Pa)	**Sound** dB(A)	**Sound** dB(A)	**Sound** dB(A)	**Sound** dB(A)
160	50	10	<20	<20	<20	<20
	160	49	20	21	22	23
	280	158	35	36	37	38
	390	315	44	45	46	47
	500	500	50	51	52	53
200	80	12	<20	<20	<20	<20
	230	41	20	21	22	23
	390	125	34	35	36	37
	550	255	43	44	45	46
	700	420	50	51	52	53
250	130	6	<20	<20	<20	<20
	350	39	22	22	23	24
	570	107	35	35	36	37
	780	200	43	43	44	45
	1000	335	49	49	50	51
315	210	5	<20	<20	<20	<20
	530	31	23	23	24	25
	850	80	35	35	36	37
	1180	163	44	44	45	46
	1500	260	50	50	51	52
400	400	6	<20	<20	<20	<20
	900	27	26	26	26	27
	1400	66	37	37	37	38
	1900	123	45	45	45	46
	2400	200	52	52	52	53

Technical Data

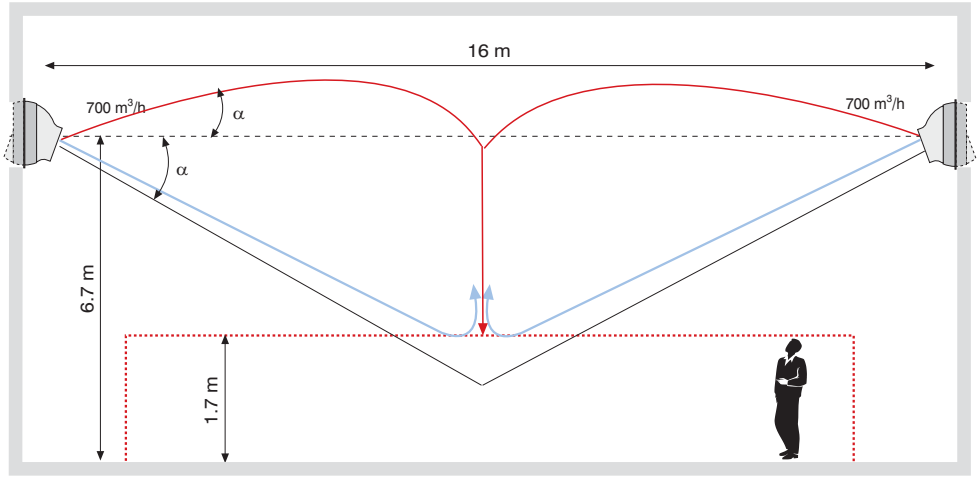
Temperature gradients along the throw path

Size E (mm)	Throw (L) m	Δt_{h3} , Δt_L (°C) Values					
		Δt_0 (°C)					
		4	6	8	10	12	14
160	3	0,48	0,72	0,96	1,20	1,44	1,68
	4	0,36	0,54	0,72	0,90	1,08	1,26
	5	0,29	0,43	0,58	0,72	0,86	1,01
	6	0,24	0,36	0,48	0,60	0,72	0,84
	7	0,21	0,31	0,41	0,51	0,62	0,72
	10	0,14	0,22	0,29	0,36	0,43	0,50
	15	0,10	0,14	0,19	0,24	0,29	0,34
	20	0,07	0,11	0,14	0,18	0,22	0,25
	25	0,06	0,09	0,12	0,14	0,17	0,20
	30	0,05	0,07	0,10	0,12	0,14	0,17
200	3	0,62	0,93	1,24	1,55	1,86	2,17
	4	0,46	0,69	0,92	1,16	1,39	1,62
	5	0,37	0,55	0,74	0,92	1,10	1,29
	6	0,31	0,46	0,61	0,76	0,92	1,07
	7	0,26	0,39	0,52	0,65	0,78	0,91
	10	0,18	0,27	0,36	0,45	0,54	0,64
	15	0,12	0,18	0,24	0,30	0,36	0,42
	20	0,09	0,13	0,18	0,22	0,27	0,31
	25	0,07	0,11	0,14	0,18	0,21	0,25
	30	0,06	0,09	0,12	0,15	0,18	0,21
250	3	0,80	1,20	1,60	2,00	2,40	2,80
	4	0,60	0,90	1,20	1,50	1,80	2,10
	5	0,48	0,72	0,96	1,20	1,44	1,68
	6	0,40	0,60	0,80	1,00	1,20	1,40
	7	0,34	0,51	0,69	0,86	1,03	1,20
	10	0,24	0,36	0,48	0,60	0,72	0,84
	15	0,16	0,24	0,32	0,40	0,48	0,56
	20	0,12	0,18	0,24	0,30	0,36	0,42
	25	0,10	0,14	0,19	0,24	0,29	0,34
	30	0,08	0,12	0,16	0,20	0,24	0,28
315	3	1,00	1,50	2,00	2,50	3,00	3,50
	4	0,75	1,13	1,50	1,88	2,25	2,63
	5	0,60	0,90	1,20	1,50	1,80	2,10
	6	0,50	0,75	1,00	1,25	1,50	1,75
	7	0,43	0,64	0,86	1,07	1,29	1,50
	10	0,30	0,45	0,60	0,75	0,90	1,05
	15	0,20	0,30	0,40	0,50	0,60	0,70
	20	0,15	0,23	0,30	0,38	0,45	0,53
	25	0,12	0,18	0,24	0,30	0,36	0,42
	30	0,10	0,15	0,20	0,25	0,30	0,35
400	3	1,44	2,17	2,89	3,61	4,33	5,05
	4	1,08	1,62	2,16	2,70	3,24	3,77
	5	0,86	1,29	1,72	2,15	2,58	3,01
	6	0,71	1,07	1,43	1,79	2,14	2,50
	7	0,61	0,92	1,22	1,53	1,83	2,14
	10	0,43	0,64	0,85	1,06	1,28	1,49
	15	0,28	0,42	0,56	0,71	0,85	0,99
	20	0,21	0,32	0,42	0,53	0,63	0,74
	25	0,17	0,25	0,34	0,42	0,50	0,59
	30	0,14	0,21	0,28	0,35	0,42	0,49

Example:

Air at 900 m3/h, is to be supplied from each nozzle of two rows of nozzles, facing one another 20 m apart and 6.70 m above floor. The space above the nozzles is high, so upwards throw is free.The cooling air is 8^{O}C lower, and the heating air is 12^{O}C higher than the room temperature.

Determine diffuser spacings so that the core velocity in comfort zone is below 0.25 m/s.



Solution:

From the flow rate range tables on page 5, the 250 mm size looks suitable. Further steps will be taken with this type in consideration.

For cooling

1) Let $\alpha = 20^{O}$
2) From the table on page 5, cos α = 0.94 (by interpolation); L = 10 / 0.94 = 10.60 m.
3) From the table on page 5; tan α = 0.36, h4 = 10 x 0.36 = 3.60 m
4) Vertical deflection d is read as 0.45 m from the graph on page 6. (see the green lines)
5) h_2 = 6.70 - 1.7 = 5.00 m; h_3 = 5.00 + 3.60 - 0.45 = 8.15 m
6) vh_3 is read as 0.11 m/s from the graph on page 7. This value is good, being less than 0.25 m/s.
7) $L_T = L+h_3$ = 10.60 + 8.15 = 18.75 m; from the table on page 10, for 8^{O}C, Δth_3, is interpolated as 0.26^{O}C
8) From the table on page 9, pressure loss is read as 164 Pa.

For heating

1) Let v_L = 0.80 m/s
2) From the graph on page 7, L = 22m. (see the red line)
3) Vertical deflection d is read as 5.50 m from the graph on page 6. (see the red lines)
4) From the table on page 5, sin α = (5.00 + 5.50) / 22 = 0.48 and $\alpha = 28^{O}$.
   Together with the 20^{O} of the cooling mode, the total angle is 48^{O} < 60^{O} ,which is acceptable.
5) $L_T = L$ = 22 m; from the table on page 10, for 12^{O}C, Δt_L, is interpolated as 0.33^{O}C
6) From the table on page 9, sound power level for 30^{O} angle is read as 42 dB(A).

Specification Text

Jet nozzle for wall or ceiling installation. The nozzles will be made from 1.2 mm thick ETIAL-5 norm aluminium sheet. After cleaning and chromation, the nozzles will be painted to ordered request with electrostatic powder paint and a minimum paint thickness of 60μ. Each nozzle will be free to rotate 60° about its axis, 30° for each side of the axis. The motion can be given manually or with an optional servomotor. The nozzles will rotate in a plane if operated by a servomotor. Optionally, an adapter part for connection to flexible ducts will be provided.

Order Code

Model	CZB	.00.	AA.	1	0	-	220	-	9010
							Refer to page 3		Indicate RAL Colour Code
Accessories			**AA** ..Manual **MA**..With motor						
Installation				**1**.....With screw holes					
Installation accessories					**0**.....Without Inst. accessories **1**.....Duct connection adapter		**Standard Dimensions**		**Colour Code**

C.26.02.EN.00

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CZB

Jet **Nozzle**

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