C 26.03
EN.00

CZC

Jet **Nozzle**

KES KLIMA
AIR CONTROL SYSTEMS

Description

The CZC 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

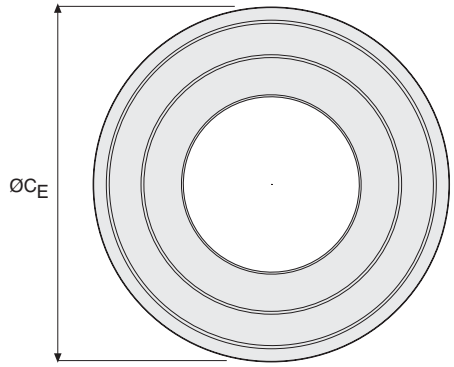
The surfaces of the diffuser is first cleaned and chromated, then painted with electrostatic powder paint to 20% gloss RAL 9010 (white) as standard. Other colours are also available upon request.

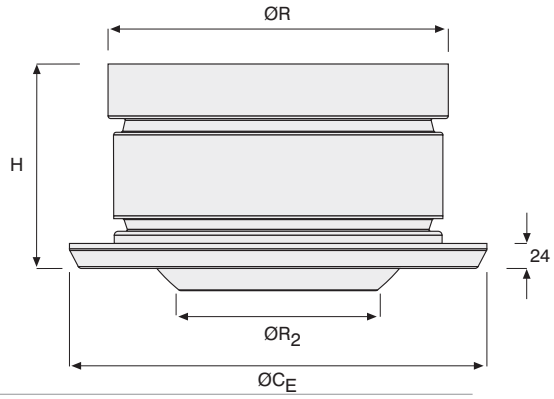
Accessories

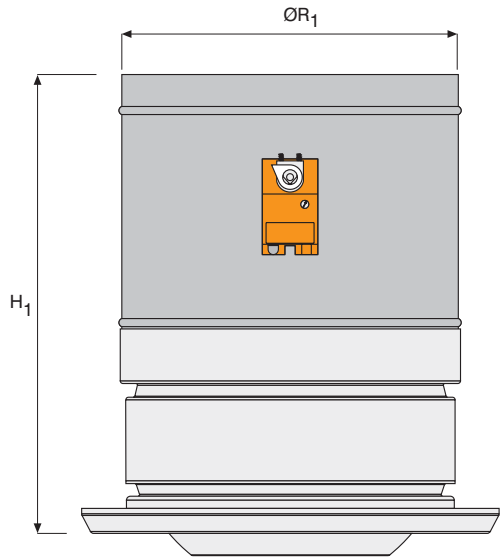
Duct Connection Adapter

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

Dimensions







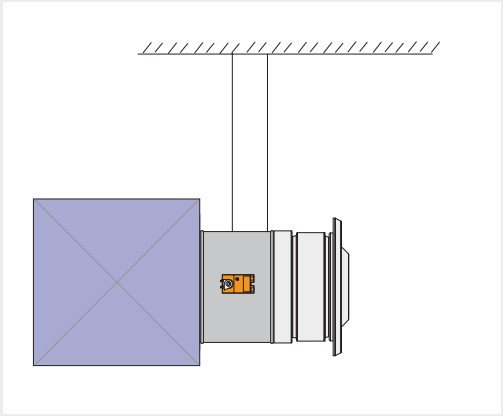
Servomotor application

Standard Dimesions

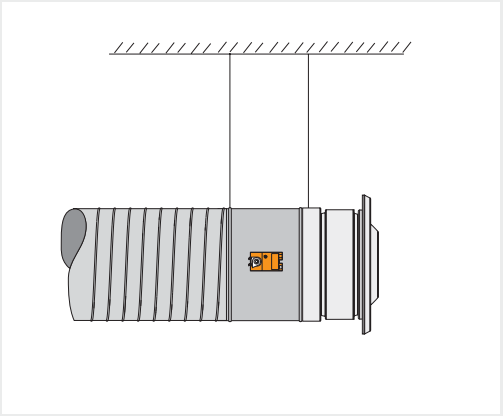
Size (mm)	ØR (mm)	ØC$_E$ (mm)	H (mm)	H$_1$ (mm)	ØR$_1$ (mm)	ØR$_2$ (mm)
100	100	150	80	230	100	50
125	125	170	90	240	125	64
160	153	200	100	250	153	82
200	195	260	120	270	195	108
250	243	305	155	305	243	136
315	310	390	185	385	310	174
400	400	470	210	410	400	230

Installation

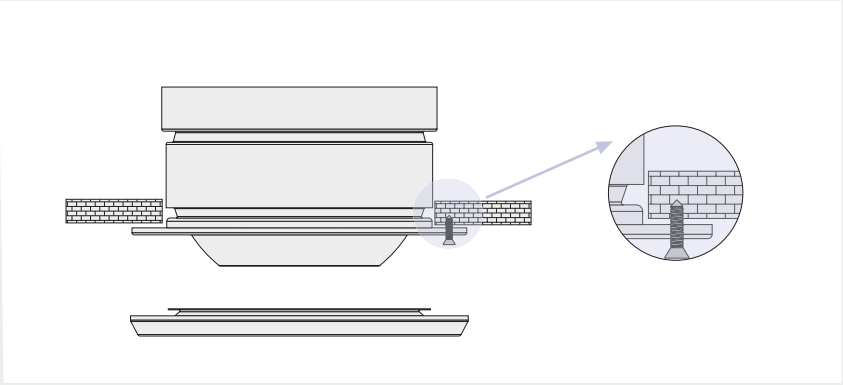
Hanging(with rigid duct)



Hanging (with flexible duct)

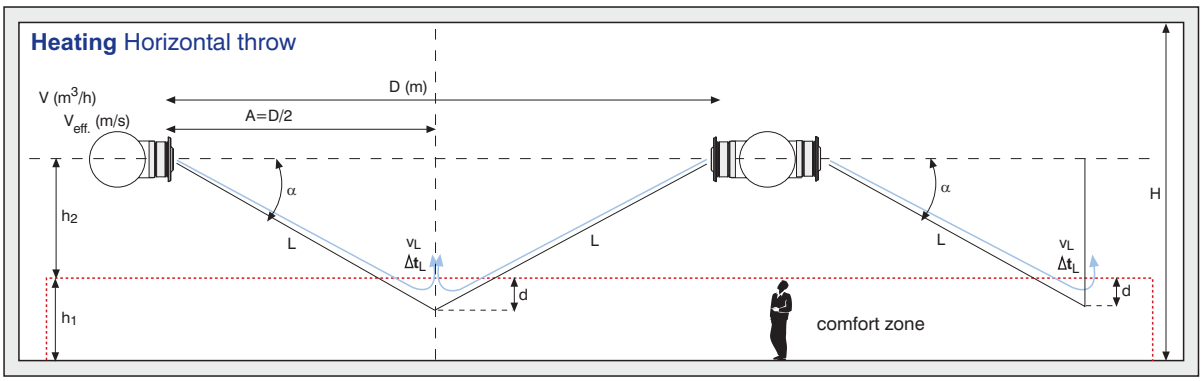


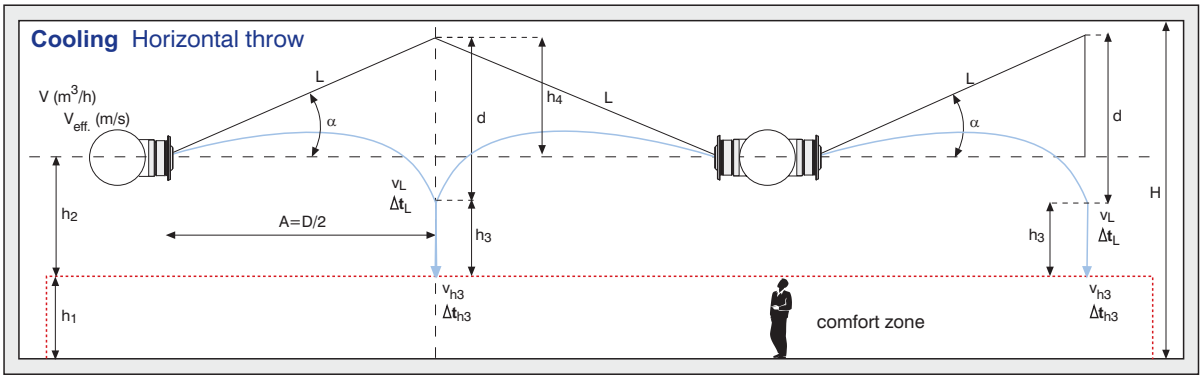
Installation in the ceiling



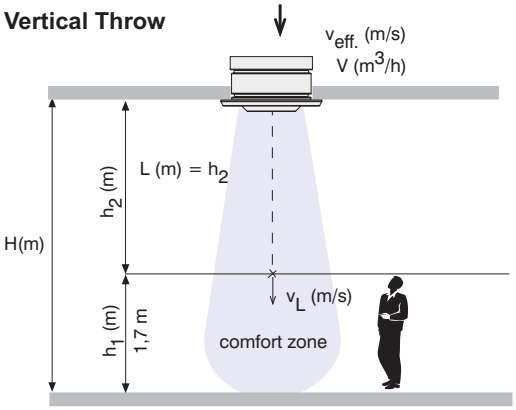
A set of Ø 4.2 x 38 mm self-drilling screws, painted same colour, are with product.

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 (^oC)
Δt_L	Difference between core and comfort zone temperature at distance L (^oC)
Δt_{h3}	Difference between core and comfort zone temperature (^oC)
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) h_4 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 7.
5) h_3 is calculated; $h_3 = h_2 + h_4 - d$
6) vh_3 is read from the graph on page 8.
   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 11.

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 8.
3) Vertical deflection d is read from the graph on page 7.
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 11.

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 air flow rates of nozzles

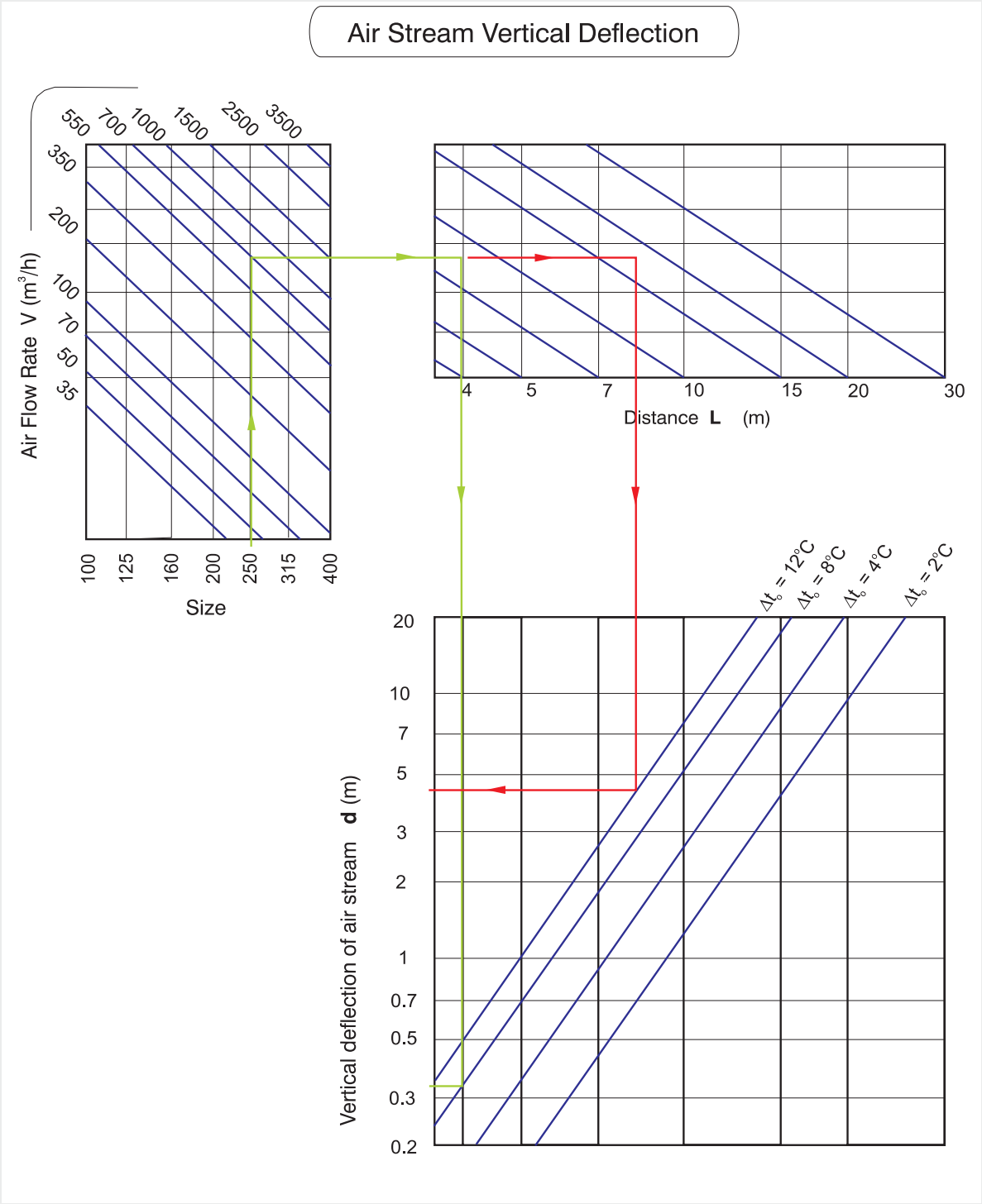
Size	Air Flow Rate (m^3/h)
100	300 - 250
125	50 - 350
160	80 - 540
200	130 - 730
250	200 - 1200
315	400 - 1800
400	700 2700

Table for trigonometric values of α

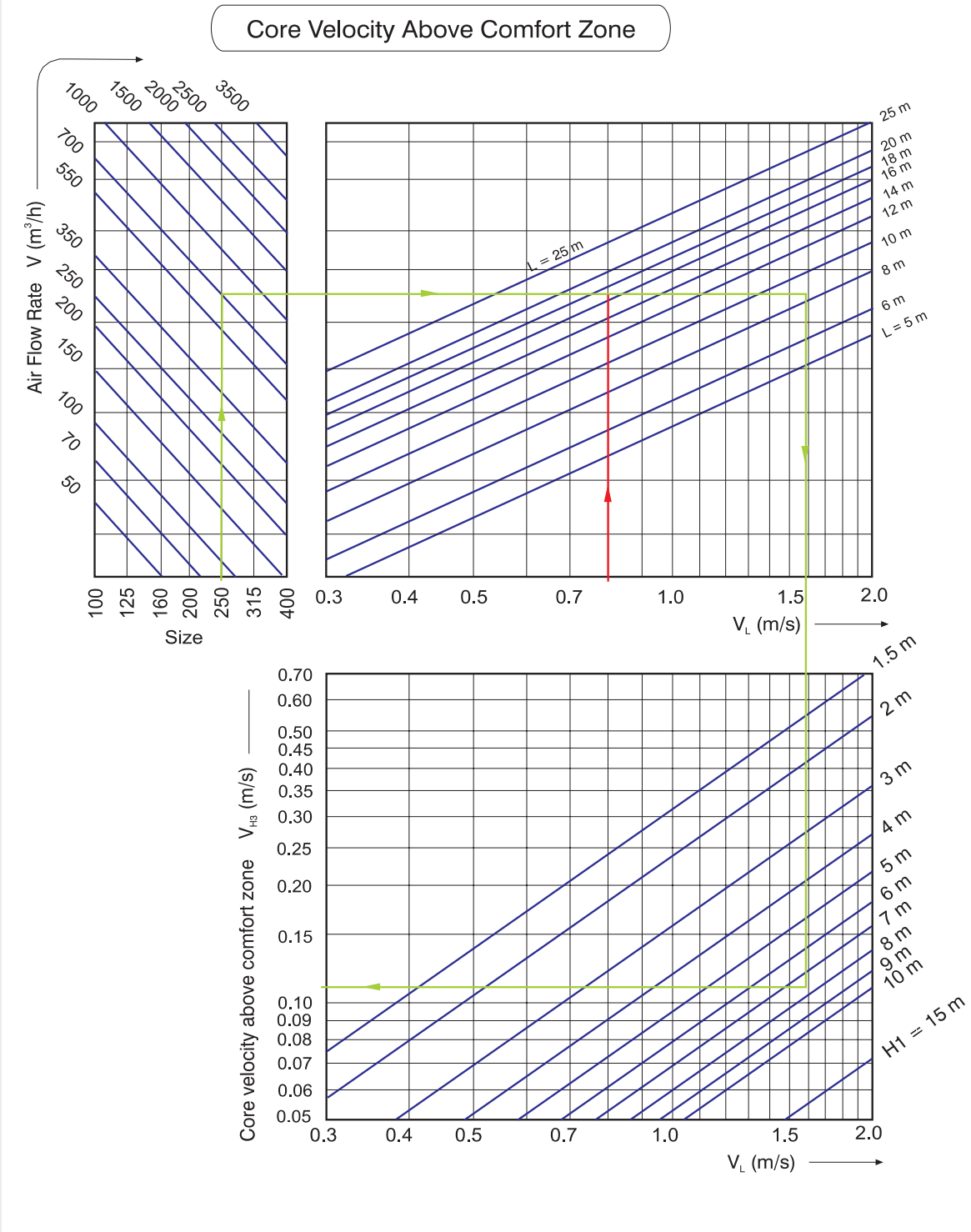
α	sinα	cosα	tanα
0	0,00	1,00	0,00
5	0,09	1,00	0,09
10	0,17	0,98	0,18
15	0,26	0,97	0,27
20	0,34	0,94	0,36
25	0,42	0,91	0,47
30	0,50	0,87	0,58

Note for table on page 11
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



Technical Data



Technical Data

Size (mm)	Air Flow Rate (m^3/h)	Vertical peneration for warm air Δt_0 (°C)			
		+5	+10	+15	+20
100	30	3,90	3,00	2,40	2,25
	70	6,60	5,00	4,15	3,65
	110	9,00	6,80	5,65	5,00
	150	11,90	8,95	7,50	6,70
	190	14,30	10,70	9,15	8,00
125	50	3,80	2,80	2,25	2,05
	100	6,70	5,00	4,15	3,65
	150	9,25	6,90	5,80	5,10
	200	11,40	8,60	7,25	6,35
	250	13,90	10,50	8,70	7,80
160	80	4,20	3,20	2,65	2,40
	160	7,35	5,45	4,60	4,10
	240	10,40	7,75	6,50	5,70
	320	12,85	9,75	8,15	7,25
	400	15,60	11,60	9,80	8,70
200	130	4,85	3,65	3,05	2,75
	260	8,55	6,35	5,35	4,70
	390	11,85	8,90	7,50	6,55
	520	15,00	11,30	9,45	8,30
	650	17,90	13,45	11,30	10,00
250	200	5,40	4,05	3,40	3,00
	450	10,60	7,95	6,70	5,85
	700	15,10	11,35	9,60	8,50
	950	19,30	14,40	12,15	10,70
	1200	23,10	17,30	14,60	13,00
315	400	7,30	5,45	4,55	4,00
	750	12,20	9,15	7,65	6,80
	1100	16,70	12,50	10,50	9,25
	1450	20,90	15,70	13,20	11,65
	1800	24,95	18,60	15,70	13,70
400	700	9,00	6,70	5,65	5,00
	1200	13,80	10,30	8,75	7,65
	1700	18,45	13,80	11,50	10,20
	2200	22,60	17,00	14,35	12,70
	2700	26,70	20,10	16,90	14,85

Technical Data

Pressure loss and sound power for different throw angles			α=°0	α=°10	α=°20	α=°30
Size (mm)	**Air Flow Rate** (m^3/h)	**Pressure loss** (Pa)	**Sound** dB(A)	**Sound** dB(A)	**Sound** dB(A)	**Sound** dB(A)
100	30	5	<20	<20	<20	<20
	85	68	25	26	27	28
	140	190	40	41	42	43
	195	357	50	51	52	53
	250	586	56	57	58	59
125	50	10	<20	<20	<20	<20
	125	64	25	26	28	30
	200	162	38	39	41	43
	275	300	47	48	50	52
	350	495	54	55	57	59
160	80	10	<20	<20	<20	<20
	195	60	26	27	28	29
	310	150	40	41	42	43
	425	280	49	50	51	52
	540	450	56	57	58	59
200	130	10	<20	<20	<20	<20
	280	42	23	24	25	26
	430	100	36	37	38	39
	580	185	45	46	47	48
	730	290	52	53	54	55
250	200	8	<20	<20	<20	<20
	450	41	26	26	27	28
	700	100	39	39	40	41
	950	182	47	47	48	49
	1200	290	55	55	56	57
315	400	13	<20	<20	<20	<20
	750	44	28	28	29	30
	1100	96	40	40	41	42
	1450	165	48	48	49	50
	1800	255	55	55	56	57
400	700	11	<20	<20	<20	<20
	1200	35	28	28	28	29
	1700	71	39	39	39	40
	2200	120	46	46	46	47
	2700	191	53	53	53	54

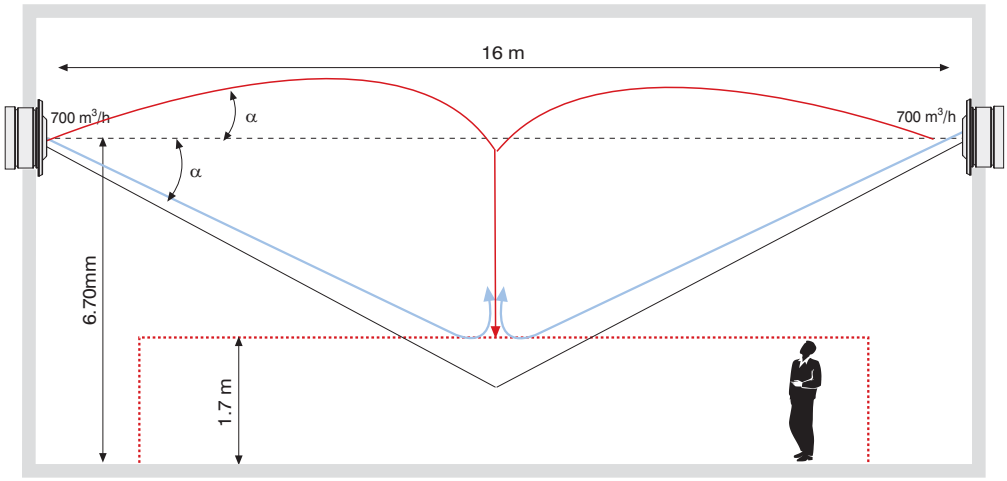
Temperature gradients along the throw path

Δt_{h3} , Δt_L (°C) Values

Size E (mm)	Throw (L) m	Δt_0 (°C)					
		4	6	8	10	12	14
100	3	0,29	0,44	0,58	0,73	0,88	1,02
	4	0,22	0,33	0,44	0,55	0,66	0,77
	5	0,18	0,26	0,35	0,44	0,53	0,61
	6	0,15	0,22	0,29	0,37	0,44	0,51
	7	0,13	0,19	0,25	0,31	0,38	0,44
	10	0,09	0,13	0,18	0,22	0,26	0,31
	15	0,06	0,09	0,12	0,15	0,18	0,21
	20	0,04	0,07	0,09	0,11	0,13	0,15
125	3	0,38	0,56	0,75	0,94	1,13	1,32
	4	0,28	0,42	0,56	0,71	0,85	0,99
	5	0,23	0,34	0,45	0,57	0,68	0,79
	6	0,19	0,28	0,38	0,47	0,57	0,6
	7	0,16	0,24	0,32	0,40	0,48	0,56
	10	0,11	0,17	0,23	0,28	0,34	0,40
	15	0,08	0,11	0,15	0,19	0,23	0,26
	20	0,06	0,08	0,11	0,14	0,17	0,20
160	3	0,50	0,75	1,00	1,25	1,50	1,75
	4	0,38	0,56	0,75	0,94	1,13	1,31
	5	0,30	0,45	0,60	0,75	0,90	1,05
	6	0,25	0,38	0,50	0,63	0,75	0,88
	7	0,21	0,32	0,43	0,54	0,64	0,75
	10	0,15	0,23	0,30	0,38	0,45	0,53
	15	0,10	0,15	0,20	0,25	0,30	0,35
	20	0,08	0,11	0,15	0,19	0,23	0,26
200	3	0,65	0,97	1,30	1,62	1,94	2,27
	4	0,48	0,73	0,97	1,21	1,45	1,70
	5	0,39	0,58	0,77	0,97	1,16	1,35
	6	0,32	0,48	0,64	0,80	0,96	1,13
	7	0,28	0,41	0,55	0,69	0,83	0,96
	10	0,19	0,29	0,38	0,48	0,58	0,67
	15	0,13	0,19	0,26	0,32	0,38	0,45
	20	0,10	0,14	0,19	0,24	0,29	0,33
250	3	0,83	1,24	1,66	2,07	2,48	2,90
	4	0,62	0,93	1,24	1,55	1,86	2,17
	5	0,50	0,75	0,99	1,24	1,49	1,74
	6	0,41	0,62	0,83	1,04	1,24	1,45
	7	0,36	0,53	0,71	0,89	1,07	1,24
	10	0,25	0,37	0,50	0,62	0,75	0,87
	15	0,17	0,25	0,33	0,42	0,50	0,58
	20	0,12	0,19	0,25	0,31	0,37	0,44
	25	0,10	0,15	0,20	0,25	0,30	0,35
315	3	1,07	1,61	2,14	2,68	3,22	3,75
	4	0,80	1,21	1,61	2,01	2,41	2,81
	5	0,64	0,96	1,28	1,61	1,93	2,25
	6	0,54	0,80	1,07	1,34	1,61	1,87
	7	0,46	0,69	0,92	1,15	1,38	1,60
	10	0,32	0,48	0,64	0,80	0,96	1,12
	15	0,21	0,32	0,43	0,53	0,64	0,75
	20	0,16	0,24	0,32	0,40	0,48	0,56
	25	0,13	0,19	0,26	0,32	0,38	0,45
400	3	1,41	2,11	2,82	3,52	4,23	4,93
	4	1,06	1,58	2,11	2,64	3,17	3,69
	5	0,84	1,27	1,69	2,11	2,53	2,95
	6	0,70	1,05	1,41	1,76	2,11	2,46
	7	0,60	0,90	1,20	1,51	1,81	2,11
	10	0,42	0,63	0,84	1,05	1,26	1,47
	15	0,28	0,42	0,56	0,70	0,84	0,98
	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 700 m^3/h, is to be supplied from each nozzle of two rows of nozzles, facing one another 16 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°C lower, and the heating air is 12°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 6, 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 6, $\cos \alpha = 0.94$ (by interpolation); $L = 8 / 0.94 = 8.55$ m.
3) From the table on page 6; $\tan \alpha = 0.36$, $h4 = 8 \times 0.36 = 2.88$ m
4) Vertical deflection d is read as 0.34 m from the graph on page 7. (see the green lines)
5) $h_2 = 6.70 - 1.7 = 5.00$ m; $h_3 = 5.00 + 2.88 - 0.34 = 7.46$ m
6) vh_3 is read as 0.11 m/s from the graph on page 8. This value is good, being less than 0.25 m/s.
7) $L_T = L + h_3 = 8.55 + 7.46 = 16$ m; from the table on page 11, for 8°C, Δth_3, is interpolated as 0.31°C
8) From the table on page 10, pressure loss is read as 100 Pa.

For Heating

1) Let $v_L = 0.80$ m/s

2) From the graph on page 8, L = 18m. (see the red line)

3) Vertical deflection d is read as 4.30 m from the graph on page 7. (see the red lines)

4) From the table on page 6, $\sin \alpha = (5.00 + 4.30) / 18 = 0.51$ and $\alpha = 30^o$.

Together with the 20^o of the cooling mode, the total angle is $50^o < 60^o$,which is acceptable.

5) $L_T = L = 18$ m; from the table on page 11, for 12°C, Δt_L, is interpolated as 0.42°C

6) From the table on page 10, sound power level for 30^o angle is read as 41 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.

Order Code

Model	CZC	.00	.AA	.1	0	-315	-9010
Accessories			**AA**..Manual **MA**..With motor				
Installation				**1**.....With screw holes			
Installation accessories					**0**.....Without Inst. accessories **1**.....Duct connection adapter	Refer to page 3 **Standard Dimensions**	Indicate RAL Colour Code **Colour Code**

C.26.03.EN.00

C CZC Jet **Nozzle**

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