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CZA

Nozzle **Group**

KES KLIMA
AIR CONTROL SYSTEMS

Description

The CZA 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 (+/-) 22.5^{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. The nozzle groups are produced as groups of 1, 2 or 3 rows.

Materials

The nozzle frame is made from ETIAL-60 norm aluminium profiles and nozzles are from white coloured plastic.

Surface Treatment

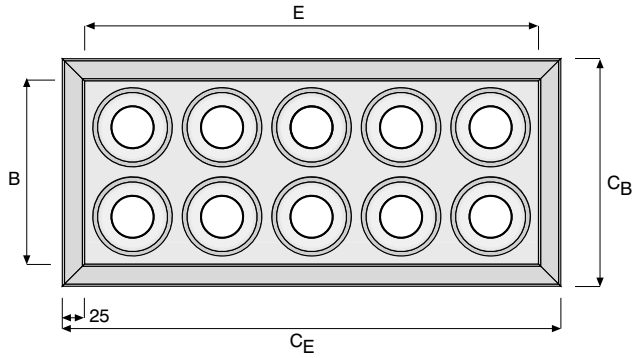
The surfaces of the diffuser is first cleaned and chromated, then painted with electrostatic powder paint to 20% gloss RAL 9010 (white) as standard. Other colours are also available upon request.

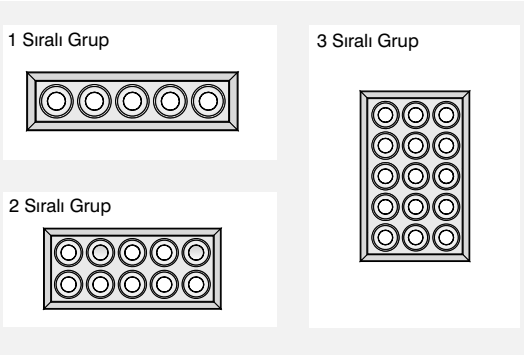
Accessories

Air Damper

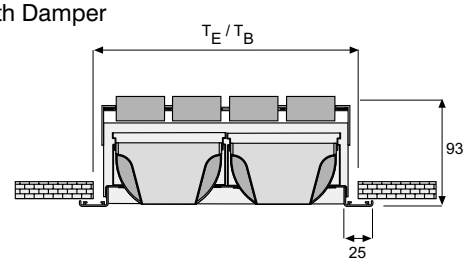
A slider type damper can be installed at the back side of the nozzle group, to adjust the flow rate.The damper is made from ETIAL-60 norm aluminium profiles, and is painted to RAL 9005 matt black to prevent light reflections.

Dimensions

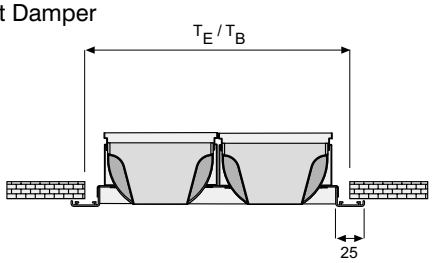




With Damper



Without Damper



Standard Dimensions (mm)

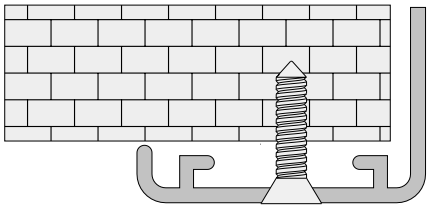
1 Row		B=100 mm
E (mm)	T_E x T_B (mm)	C_E x C_B (mm)
300	320 x 120	350 x 150
400	420 x 120	450 x 150
500	520 x 120	550 x 150
600	620 x 120	650 x 150
800	820 x 120	850 x 150
1000	1020 x 120	1050 x 150

2 Row		B=200 mm
E (mm)	T_E x T_B (mm)	C_E x C_B (mm)
300	320 x 220	350 x 250
400	420 x 220	450 x 250
500	520 x 220	550 x 250
600	620 x 220	650 x 250
800	820 x 220	850 x 250
1000	1020 x 220	1050 x 250

3 Row		B=300 mm
E (mm)	T_E x T_B (mm)	C_E x C_B (mm)
300	320 x 320	350 x 350
400	420 x 320	450 x 350
500	520 x 320	550 x 350
600	620 x 320	650 x 350
800	820 x 320	850 x 350
1000	1020 x 320	1050 x 350

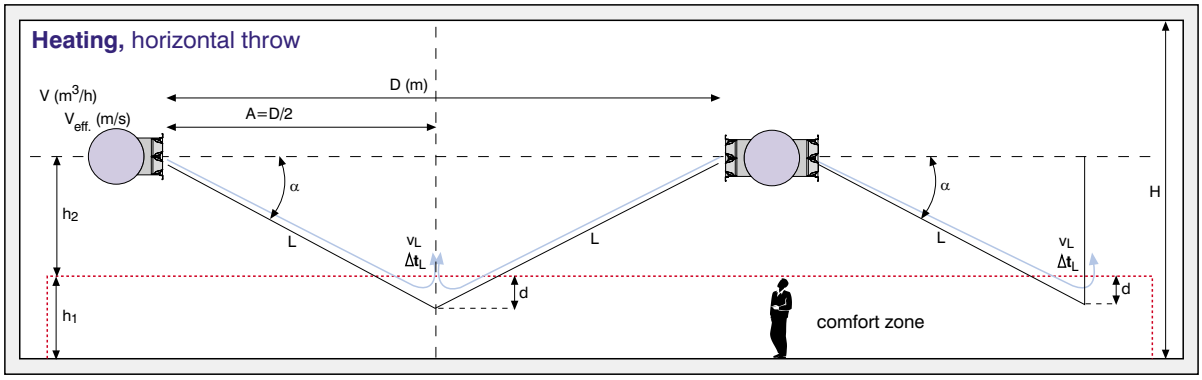
Installation

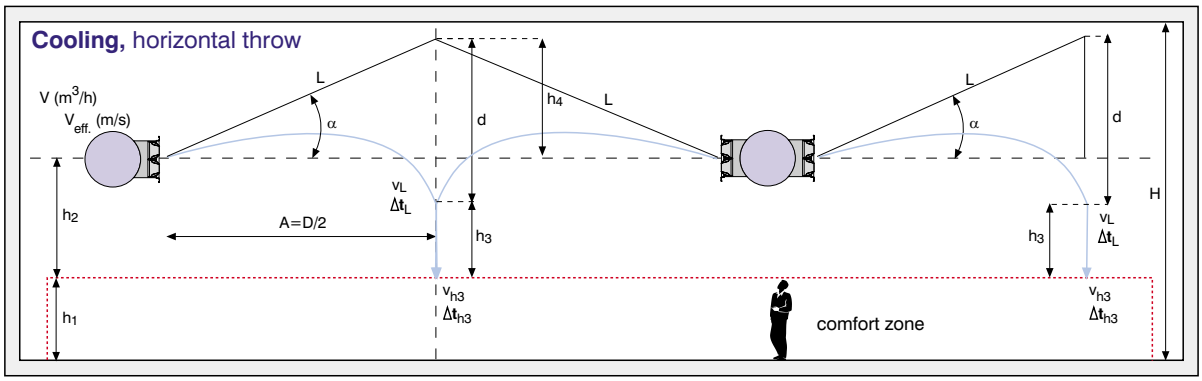
With Screws



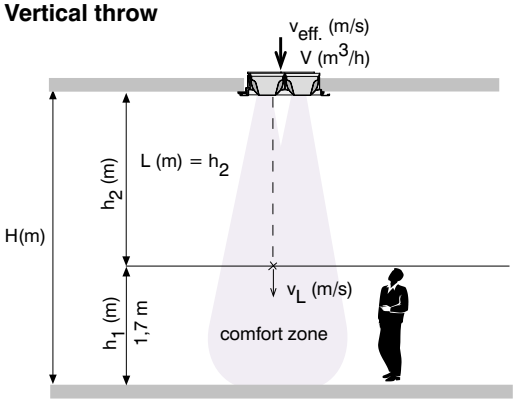
A set of Ø4.2 x 38 mm screws, painted the same colour, are given with the product

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 (^{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. $\alpha = 20^{o}$
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 6.
5) h_3 is calculated; $h_3 = h_2 + h_4 - d$
6) v_{h3} is read from the graph on page 7.
   If v_{h3} 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 tables on pages 10-11-12.

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 45^{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 tables on pages 10-11-12.

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

Note for tables on pages 10-11-12:
Temperature gradients along the throw path are read from the table below, depending on the Δt_o, Δt_{h3} 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 tebles. The difference is plus in heating and minus in cooling. The less the difference, the better the comfort conditions.

Ranges of flow rates of nozzle groups

1 Row	
Type	**Air Flow Rate(m^3/h)**
300	40 - 280
400	65 - 380
500	80 - 480
600	100 - 560
800	130 - 750
1000	160 - 900

2 Rows	
Type	**Air Flow Rate(m^3/h)**
300	100 - 560
400	130 - 750
500	160 - 900
600	200 - 1150
800	270 - 1500
1000	320 - 1950

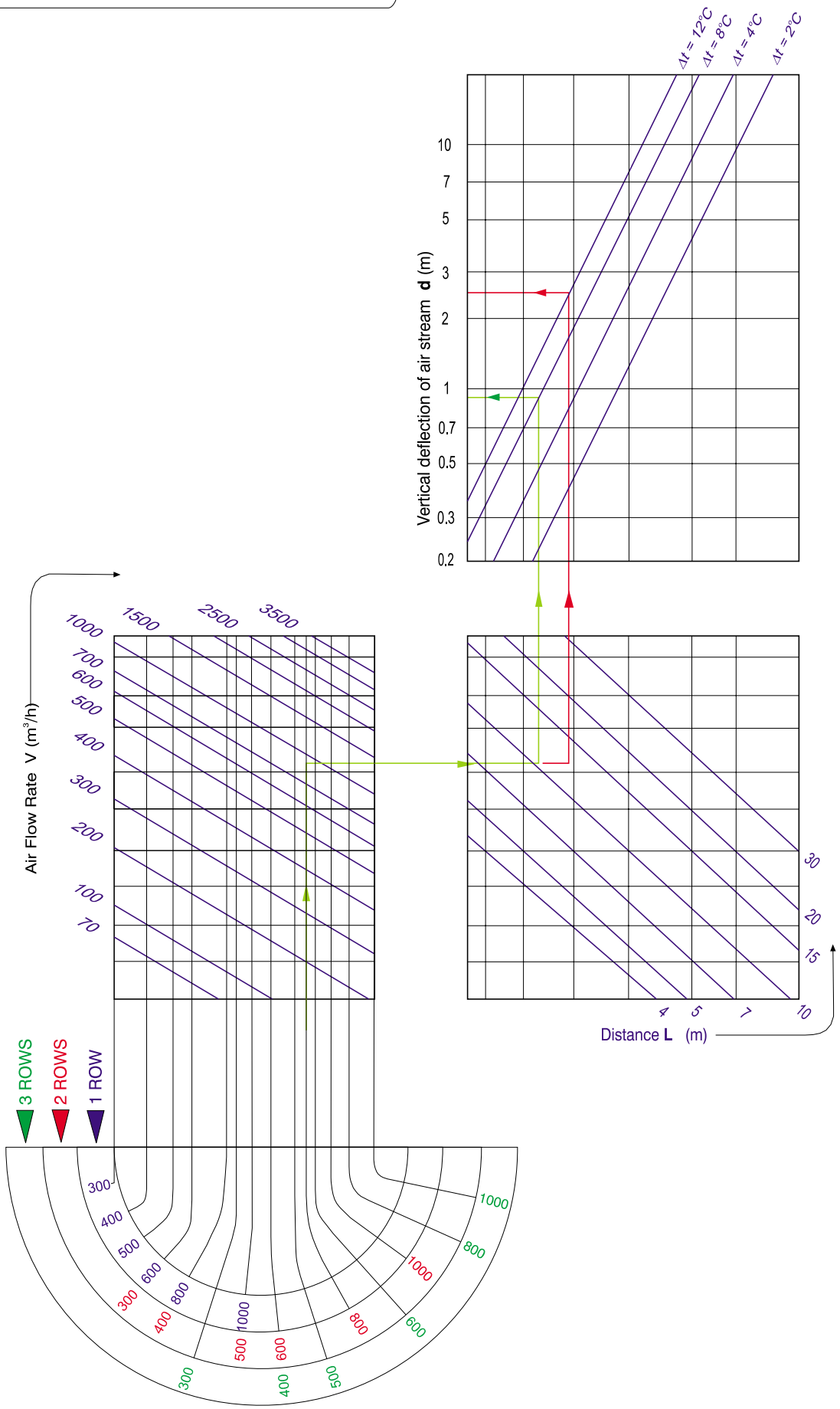
3 Rows	
Type	**Air Flow Rate(m^3/h)**
300	150 - 830
400	200 - 1150
500	260 - 1400
600	300 - 1700
800	400 - 2300
1000	500 - 3000

Table for trigonometric values for α

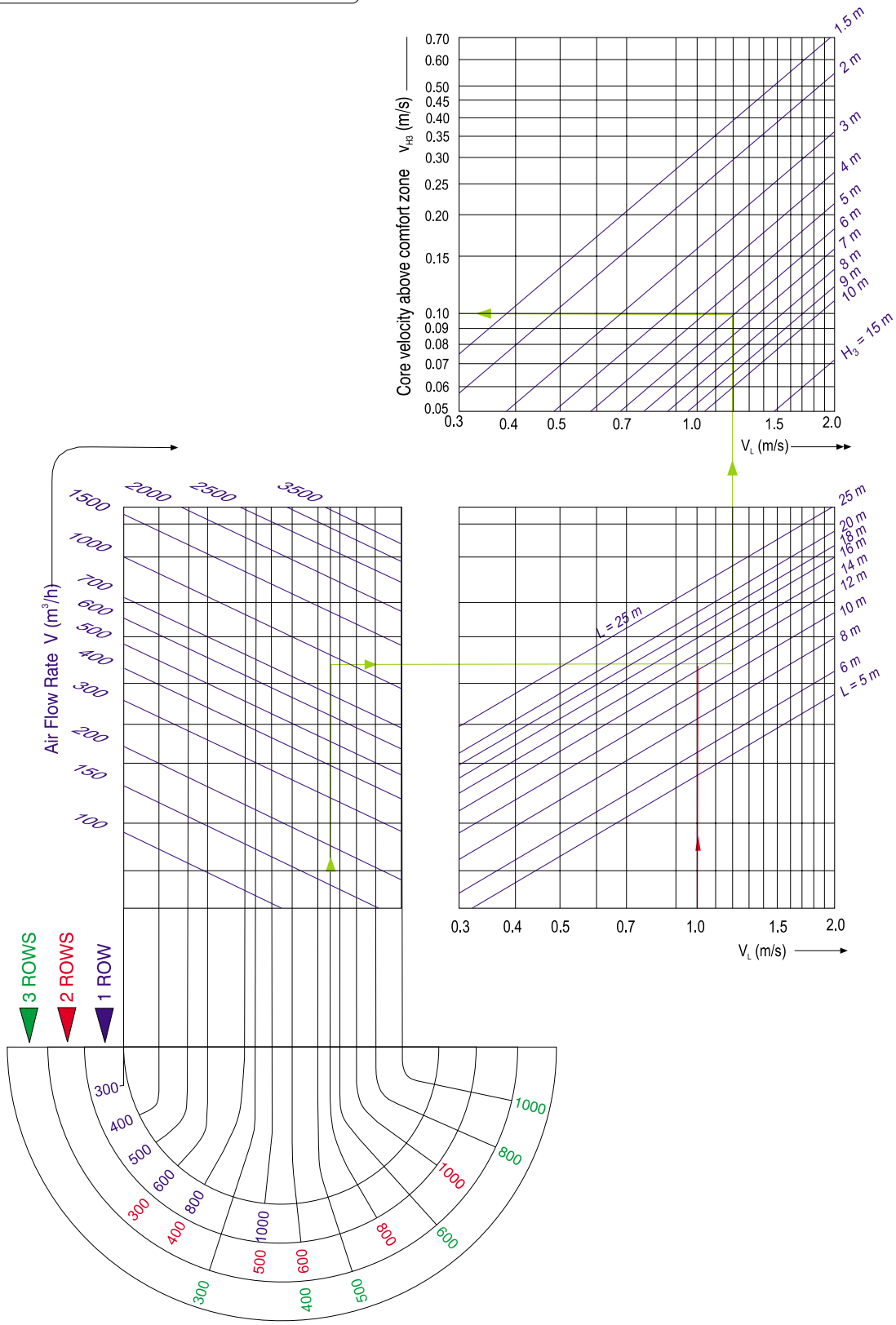
α	**sinα**	**cosα**	**tanα**
0	0,00	1,00	0,00
5	0,09	1,00	0,09
10	0,17	0,98	0,18
15	0,26	0,97	0,27
20	0,34	0,94	0,36
25	0,42	0,91	0,47
30	0,50	0,87	0,58

Technical Data

Air Stream Vertical Deflection

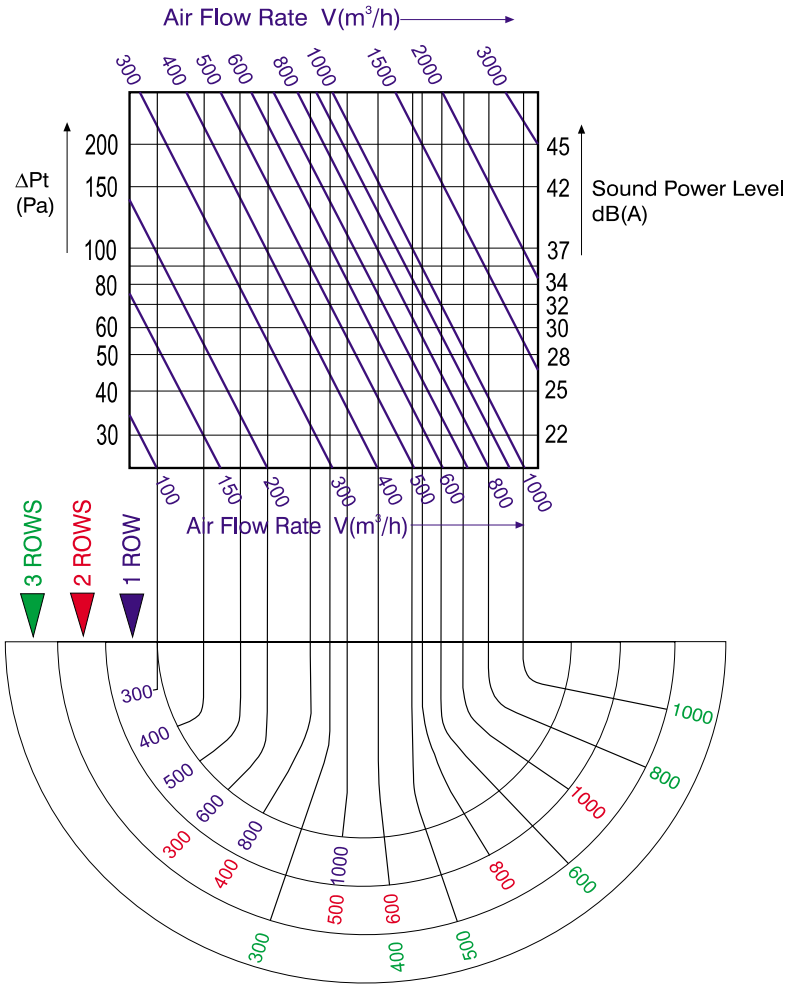


Core Velocity Above Comfort Zone v_{h3}

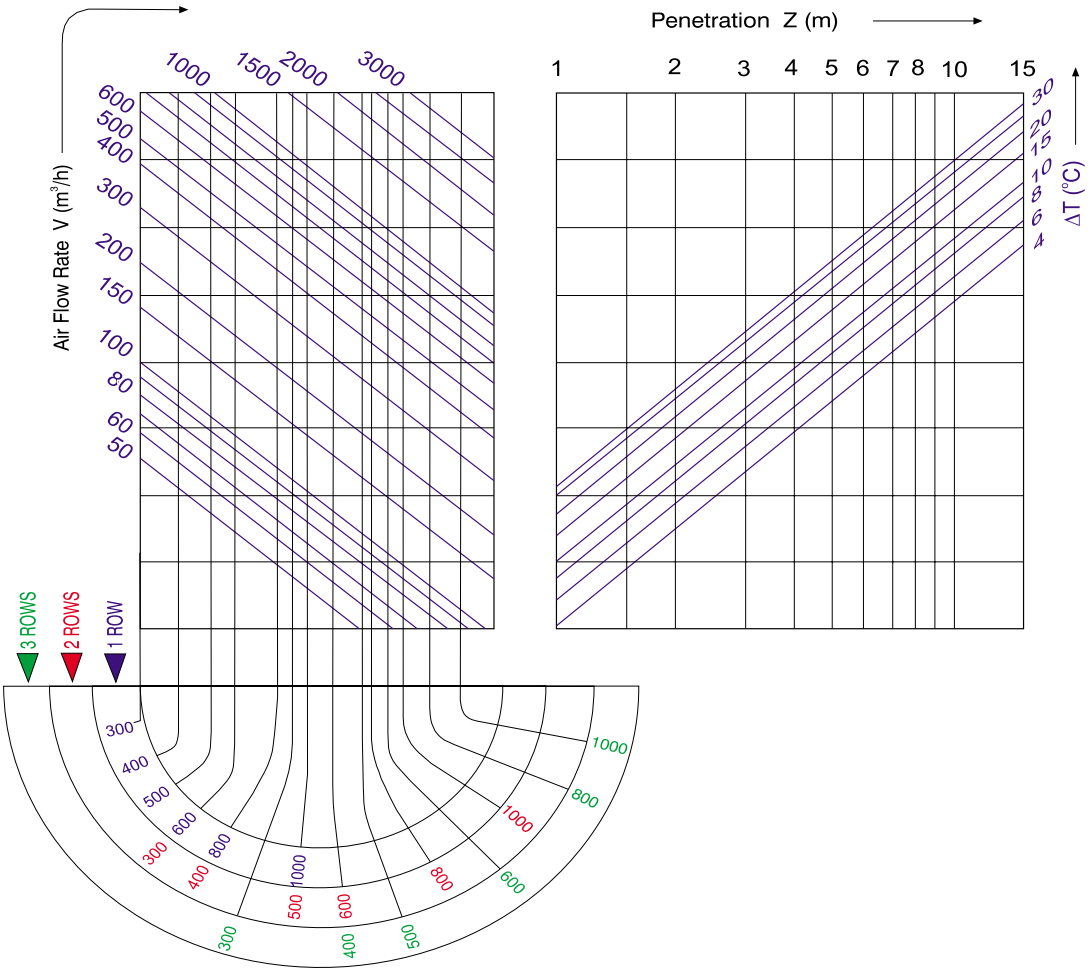


Techical Data

Pressure Losses and Sound Power Levels



Vertical Penetration for Warm Air



Technical Data

Temperature gradients along the throw path

1 Row

Δt_L and Δt_{h3} (°C) Values

E (mm)	Throw (L) m	Δt_0 (°C)					
		4	6	8	10	12	14
300	2	0,58	0,87	1,16	1,45	1,74	2,03
	3	0,39	0,58	0,77	0,97	1,16	1,36
	4	0,29	0,44	0,58	0,73	0,87	1,02
	5	0,23	0,35	0,47	0,58	0,70	0,81
	6	0,19	0,29	0,39	0,49	0,58	0,68
	8	0,15	0,22	0,29	0,36	0,44	0,51
	10	0,12	0,18	0,23	0,29	0,35	0,41
	15	0,08	0,12	0,16	0,20	0,23	0,27
	20	0,06	0,09	0,12	0,15	0,18	0,20
	25	0,05	0,07	0,09	0,12	0,14	0,16
400	2	0,65	0,98	1,30	1,63	1,96	2,28
	3	0,44	0,65	0,87	1,09	1,31	1,52
	4	0,33	0,49	0,65	0,82	0,98	1,15
	5	0,26	0,39	0,52	0,66	0,79	0,92
	6	0,22	0,33	0,44	0,55	0,66	0,76
	8	0,16	0,25	0,33	0,41	0,49	0,57
	10	0,13	0,20	0,26	0,33	0,39	0,46
	15	0,09	0,13	0,18	0,22	0,26	0,31
	20	0,07	0,10	0,13	0,17	0,20	0,23
	25	0,05	0,08	0,11	0,13	0,16	0,18
500	2	0,73	1,10	1,46	1,83	2,20	2,56
	3	0,49	0,73	0,98	1,22	1,47	1,71
	4	0,37	0,55	0,73	0,92	1,10	1,28
	5	0,29	0,44	0,59	0,73	0,88	1,03
	6	0,24	0,37	0,49	0,61	0,73	0,86
	8	0,18	0,28	0,37	0,46	0,55	0,64
	10	0,15	0,22	0,29	0,37	0,44	0,52
	15	0,10	0,15	0,20	0,25	0,29	0,34
	20	0,07	0,11	0,15	0,18	0,22	0,26
	25	0,06	0,09	0,12	0,15	0,18	0,21
600	2	0,81	1,21	1,62	2,02	2,42	2,83
	3	0,54	0,81	1,08	1,35	1,62	1,89
	4	0,41	0,61	0,81	1,01	1,22	1,42
	5	0,32	0,49	0,65	0,81	0,97	1,14
	6	0,27	0,41	0,54	0,68	0,81	0,95
	8	0,20	0,30	0,41	0,51	0,61	0,71
	10	0,16	0,24	0,32	0,41	0,49	0,57
	15	0,11	0,16	0,22	0,27	0,33	0,38
	20	0,08	0,12	0,16	0,20	0,24	0,29
	25	0,07	0,10	0,13	0,16	0,20	0,23
800	2	0,93	1,39	1,86	2,32	2,79	3,25
	3	0,62	0,93	1,24	1,55	1,86	2,17
	4	0,47	0,70	0,93	1,16	1,40	1,63
	5	0,37	0,56	0,74	0,93	1,12	1,30
	6	0,31	0,47	0,62	0,78	0,93	1,09
	8	0,23	0,35	0,47	0,58	0,70	0,82
	10	0,19	0,28	0,37	0,47	0,56	0,65
	15	0,12	0,19	0,25	0,31	0,37	0,44
	20	0,09	0,14	0,19	0,23	0,28	0,33
	25	0,07	0,11	0,15	0,19	0,22	0,26
1000	2	1,05	1,58	2,10	2,63	3,15	3,68
	3	0,70	1,05	1,40	1,75	2,10	2,45
	4	0,53	0,79	1,05	1,31	1,58	1,84
	5	0,42	0,63	0,84	1,05	1,26	1,47
	6	0,35	0,53	0,70	0,88	1,05	1,23
	8	0,26	0,39	0,52	0,66	0,79	0,92
	10	0,21	0,32	0,42	0,53	0,63	0,74
	15	0,14	0,21	0,28	0,35	0,42	0,49
	20	0,11	0,16	0,21	0,26	0,32	0,37
	25	0,08	0,13	0,17	0,21	0,25	0,29

Temperature gradients along the throw path

2 Rows

Δt_L and Δt_{h3} (°C) Values

E (mm)		Δt_0 (°C)					
		4	6	8	10	12	14
300	2	0,70	1,06	1,41	1,76	2,11	2,46
	3	0,47	0,71	0,94	1,18	1,41	1,65
	4	0,35	0,53	0,71	0,89	1,06	1,24
	5	0,28	0,43	0,57	0,71	0,85	0,99
	6	0,24	0,36	0,47	0,59	0,71	0,83
	8	0,18	0,27	0,36	0,45	0,53	0,62
	10	0,14	0,21	0,29	0,36	0,43	0,50
	15	0,10	0,14	0,19	0,24	0,29	0,33
	20	0,07	0,11	0,14	0,18	0,21	0,25
	25	0,06	0,09	0,12	0,14	0,17	0,20
400	2	0,82	1,23	1,64	2,05	2,46	2,87
	3	0,55	0,82	1,10	0,37	1,64	1,92
	4	0,41	0,62	0,82	1,03	1,23	1,44
	5	0,33	0,49	0,66	0,82	0,99	1,15
	6	0,27	0,41	0,55	0,69	0,82	0,96
	8	0,21	0,31	0,41	0,52	0,62	0,72
	10	0,16	0,25	0,33	0,41	0,49	0,58
	15	0,11	0,17	0,22	0,28	0,33	0,39
	20	0,08	0,12	0,17	0,21	0,25	0,29
	25	0,07	0,10	0,13	0,17	0,20	0,23
500	2	0,91	1,36	1,82	2,27	2,72	3,18
	3	0,61	0,91	1,21	1,52	1,82	2,12
	4	0,46	0,68	0,91	1,14	1,37	1,60
	5	0,37	0,55	0,73	0,91	1,10	1,28
	6	0,30	0,46	0,61	0,76	0,91	1,07
	8	0,23	0,34	0,46	0,57	0,69	0,80
	10	0,18	0,28	0,37	0,46	0,55	0,64
	15	0,12	0,18	0,25	0,31	0,37	0,43
	20	0,09	0,14	0,18	0,23	0,28	0,32
	25	0,07	0,11	0,15	0,19	0,22	0,26
600	2	1,00	1,50	2,00	2,51	3,01	3,51
	3	0,67	1,00	1,34	1,67	2,00	2,34
	4	0,50	0,75	1,00	1,25	1,50	1,75
	5	0,40	0,60	0,80	1,00	1,20	1,40
	6	0,33	0,50	0,67	0,84	1,00	1,17
	8	0,25	0,38	0,50	0,63	0,75	0,88
	10	0,20	0,30	0,40	0,50	0,60	0,70
	15	0,13	0,20	0,27	0,33	0,40	0,47
	20	0,10	0,15	0,20	0,25	0,30	0,35
	25	0,08	0,12	0,16	0,20	0,24	0,28
800	2	1,16	1,75	2,33	2,91	3,49	4,07
	3	0,78	1,16	1,55	1,94	2,33	2,72
	4	0,58	0,87	1,16	1,46	1,75	2,04
	5	0,47	0,70	0,93	1,16	1,40	1,63
	6	0,39	0,58	0,78	0,97	1,16	1,36
	8	0,29	0,44	0,58	0,73	0,87	1,02
	10	0,23	0,35	0,47	0,58	0,70	0,81
	15	0,16	0,23	0,31	0,39	0,47	0,54
	20	0,12	0,17	0,23	0,29	0,35	0,41
	25	0,09	0,14	0,19	0,23	0,28	0,33
1000	2	1,30	1,95	2,60	3,26	3,91	4,56
	3	0,87	1,30	1,74	2,17	2,60	3,04
	4	0,65	0,98	1,30	1,63	1,95	2,28
	5	0,52	0,78	1,04	1,30	1,56	1,82
	6	0,43	0,65	0,87	1,09	1,30	1,52
	8	0,33	0,49	0,65	0,81	0,98	1,14
	10	0,26	0,39	0,52	0,65	0,78	0,91
	15	0,17	0,26	0,35	0,43	0,52	0,61
	20	0,13	0,20	0,26	0,33	0,39	0,46
	25	0,10	0,16	0,21	0,26	0,31	0,36

Technical Data

Temperature gradients along the throw path

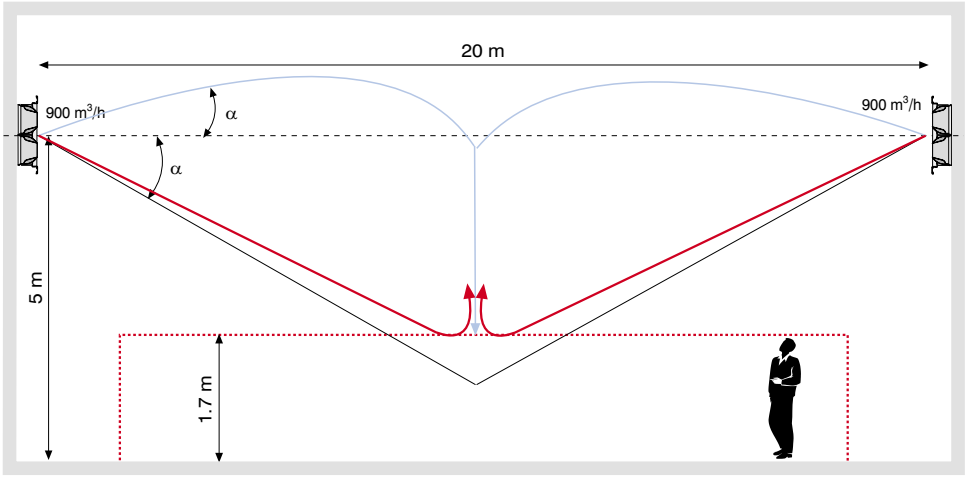
3 Rows

Δt_L and Δt_{h3} (°C) Values

E (mm)	Throw (L) m	Δt_0 (°C)					
		4	6	8	10	12	14
300	2	0,50	0,75	1,00	1,25	1,49	1,74
	3	0,40	0,60	0,80	1,00	1,20	1,39
	4	0,33	0,50	0,66	0,83	1,00	1,16
	5	0,28	0,43	0,57	0,71	0,85	1,00
	6	0,25	0,37	0,50	0,62	0,75	0,87
	8	0,22	0,33	0,44	0,55	0,66	0,77
	10	0,20	0,30	0,40	0,50	0,60	0,70
	15	0,13	0,20	0,27	0,33	0,40	0,46
	20	0,10	0,15	0,20	0,25	0,30	0,35
	25	0,08	0,12	0,16	0,20	0,24	0,28
400	2	0,57	0,86	1,15	1,43	1,72	2,01
	3	0,46	0,69	0,92	1,15	1,38	1,60
	4	0,38	0,57	0,76	0,96	1,15	1,34
	5	0,33	0,49	0,66	0,82	0,98	1,15
	6	0,29	0,43	0,57	0,72	0,86	1,00
	8	0,25	0,38	0,51	0,64	0,76	0,89
	10	0,23	0,34	0,46	0,57	0,69	0,80
	15	0,15	0,23	0,31	0,38	0,46	0,53
	20	0,11	0,17	0,23	0,29	0,34	0,40
	25	0,09	0,14	0,18	0,23	0,27	0,32
500	2	0,64	0,96	1,28	1,61	1,93	2,25
	3	0,51	0,77	1,03	1,28	1,54	1,80
	4	0,43	0,64	0,86	1,07	1,28	1,50
	5	0,37	0,55	0,73	0,92	1,10	1,28
	6	0,32	0,48	0,64	0,80	0,96	1,12
	8	0,29	0,43	0,57	0,71	0,86	1,00
	10	0,26	0,39	0,51	0,64	0,77	0,90
	15	0,17	0,26	0,34	0,43	0,51	0,60
	20	0,13	0,19	0,26	0,32	0,39	0,45
	25	0,10	0,15	0,21	0,26	0,31	0,36
600	2	0,70	1,05	1,40	1,76	2,11	2,46
	3	0,56	0,84	1,12	1,40	1,68	1,97
	4	0,47	0,70	0,94	1,17	1,40	1,64
	5	0,40	0,60	0,80	1,00	1,20	1,40
	6	0,35	0,53	0,70	0,88	1,05	1,23
	8	0,31	0,47	0,62	0,78	0,94	1,09
	10	0,28	0,42	0,56	0,70	0,84	0,98
	15	0,19	0,28	0,37	0,47	0,56	0,66
	20	0,14	0,21	0,28	0,35	0,42	0,49
	25	0,11	0,17	0,22	0,28	0,34	0,39
800	2	0,80	1,20	1,60	2,00	2,40	2,80
	3	0,64	0,96	1,28	1,60	1,92	2,24
	4	0,54	0,80	1,07	1,34	1,61	1,87
	5	0,46	0,69	0,92	1,15	1,38	1,61
	6	0,40	0,60	0,80	1,01	1,21	1,41
	8	0,36	0,54	0,72	0,90	1,07	1,25
	10	0,32	0,48	0,64	0,81	0,97	1,13
	15	0,22	0,32	0,43	0,54	0,65	0,75
	20	0,16	0,24	0,32	0,41	0,49	0,57
	25	0,13	0,20	0,26	0,33	0,39	0,46
1000	2	0,89	1,34	1,78	2,23	2,68	3,12
	3	0,72	1,07	1,43	1,79	2,15	2,50
	4	0,60	0,90	1,19	1,49	1,79	2,09
	5	0,51	0,77	1,03	1,28	1,54	1,79
	6	0,45	0,67	0,90	1,12	1,35	1,57
	8	0,40	0,60	0,80	1,00	1,20	1,40
	10	0,36	0,54	0,72	0,90	1,08	1,26
	15	0,24	0,36	0,48	0,60	0,72	0,84
	20	0,18	0,27	0,36	0,45	0,54	0,64
	25	0,15	0,22	0,29	0,36	0,44	0,51

Example:

Air at 18000 m3/h, is to be supplied into a room from two rows of nozzles 20 m apart and 5 m above floor. The space above the nozzles is high, so upwards throw is free. There will be 10 groups of 2-row nozzles in each row. 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:

The flow rate in each group of nozzles is: 18000 / 2 / 10 = 900 m3/h. From the flow rate range tables on page 5, the group 800mm x 2 rows looks suitable. Further steps will be taken with this type in consideration.

For cooling

1) Let $\alpha = 19^{o}$
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 0.90 m from the graph on page 6. (see the green lines)
5) h_2 = 5 - 1.7 = 3.30 m; h3 = 3.30 + 3.60 - 0.90 = 6 m
6) v_{h3} is read as 0.1 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 + 6.00 = 16.60 m; from the table on page 11, for 8^{o}C, Δth_3, is interpolated as 0.28^{o}C
8) From the graph on page 8, pressure loss is read as 72 Pa and sound power level as 32.5 dB(A).

For heating

1) Let v_L = 1 m/s
2) From the graph on page 7, L = 13m. (see the red line)
3) Vertical deflection d is read as 2.50 m from the graph on page 6. (see the red lines)
4) From the table on page 5, sin α = (3.30 + 2.50) / 13 = 0.44 and $\alpha = 26^{o}$.
   Together with the 19^{o} of the cooling mode, the total angle is 45^{o} which is acceptable.
5) $L_T = L$ = 13 m; from the table on page 11, for 12^{o}C, Δt_L, is interpolated as 0.56^{o}C

Specification Text

Nozzle group for wall or ceiling installation. The groups will be composed of 1, 2 or 3 rows of 3,4,5,6,8 and 10 nozzles. Each nozzle will be free to rotate 45° about its axis, 22.5° 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.

The frame will be made from ETIAL-60 norm aluminium profiles, and after chromation, it will be painted to ordered request with electrostatic powder paint and a minimum thickness of 60μ.The nozzles will be made from white coloured plastic.

Order Code

Model	CZA.25.AA.10 - 400 x 200 -9010			
Accessories	**AA**..Manual **MA**.With motor		E x B (mm) Refer to page 3	Indicate RAL Colour Code
Installation	**00**...Without screw holes **10**...With screw holes		**Standard Dimensions**	**Colour Code**

C.26.01.EN.00

C CZA Nozzle Group

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