

CEA

Curved Blade Ceiling Diffuser

Description

The CEA type diffusers are designed for ceiling applications. They can be used for supply or extract air, together with the accessories required for various demands.

Properties

The CEA type diffusers have fixed and curved blades. For supply air purposes, they are characteristically suitable for horizontal air throws. Where "Coanda effect" is required, they should be installed close to the ceiling. These diffusers are recommended for use with ceiling heights up to 4 m., with a supply air temperature difference of (+/-) 10°C. The diffuser is made of a frame and a central blade block. The blade block is fixed to the frame by the aid of spring pins and can easily be removed / installed. The standard sizes start from 150 x 150 mm, and go up to 500 x 500 mm with increments of 50 mm. One, two, three and four way throwing types are available.

Materials

The frame and the blades are manufactured from ETIAL-60 norm aluminium profiles

Surface Treatment

The surfaces of the diffusers are first cleaned then treated with chromating process; after which, are painted electrostatically, with 20% gloss RAL 9010 (white) as standard. Other colours are also available upon request.

Accessories

Damper With Opposed Blades

Depending on application characteristics, an opposed blade damper can be installed on the back side of the diffuser. This damper is a separate item which can be operated by its special tool from the face of the diffuser. Opposed blade dampers are manufactured from ETIAL-60 norm aluminium extruded profiles. To prevent reflection, they are painted RAL 9005 (matt black) as standard.

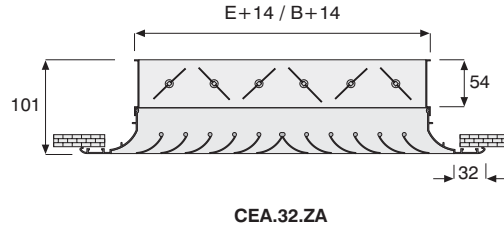
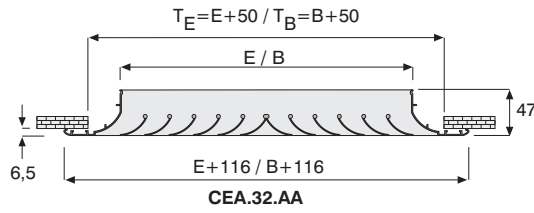
Flap Damper With Rectifier

This type of damper is used in high velocity ducts. The rectifier is made of ETIAL-60 norm aluminium profiles and the flap damper part is formed from steel sheets. To prevent reflection, they are painted RAL 9005 (matt black) as standard.

Plenum Box

The plenum box is used to achieve optimum throw characteristics. It has the inlet either at the top or at one side. Depending on request, a damper can be installed at the inlet, which can be operated internally or externally (has to be specified with the order). The plenum boxes are made from 0.6 mm thick galvanized steel sheets and have 4 hanging brackets on their body. Optionally, a 6 mm thick acoustic foam can be laid inside the plenum box.

Dimensions

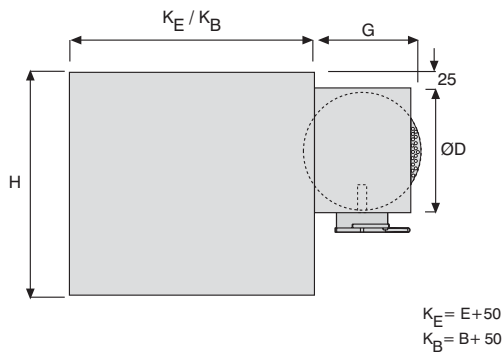


Standard Dimensions (mm)

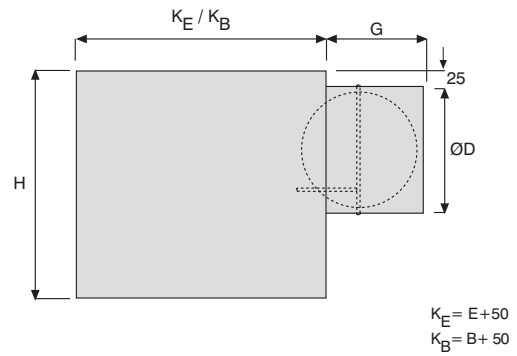
E	B	ØD	H	G
150	150	150	250	150
	200	170	270	150
	250	193	300	150
	300	244	350	175
	350	244	350	175
	400	295	400	200
	450	295	400	200
200	200	193	300	150
	250	244	350	175
	300	244	350	175
	350	295	400	200
	400	295	400	200
	450	346	400	225
250	250	244	350	175
	300	295	400	200
	350	295	400	200
	400	346	450	225
	450	346	450	225

E	B	ØD	H	G
300	300	295	400	200
	350	346	450	225
	400	346	450	225
	450	396	500	250
	500	396	500	250
350	350	295	450	200
	400	346	500	225
	450	396	500	250
400	400	346	500	225
	450	396	550	250
	500	447	550	275
450	450	396	550	250
	500	447	550	275
500	500	447	550	275

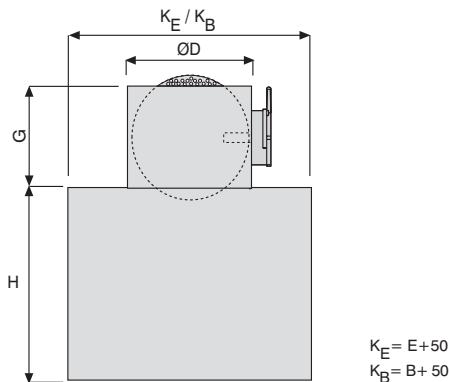
Externally Operated Side Inlet



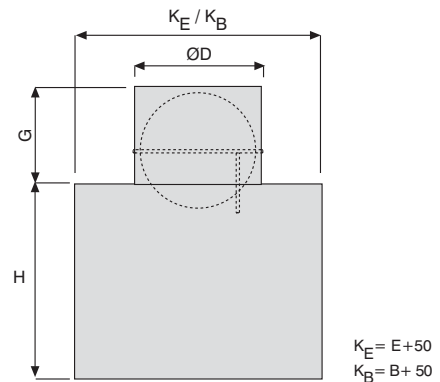
Internally Operated Side Inlet



Externally Operated Top Inlet

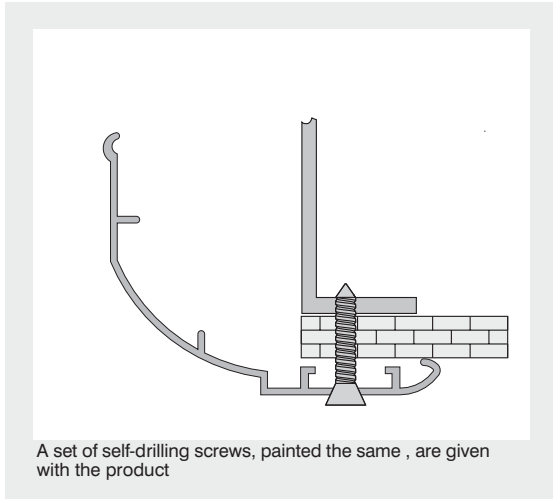


Internally Operated Top Inlet

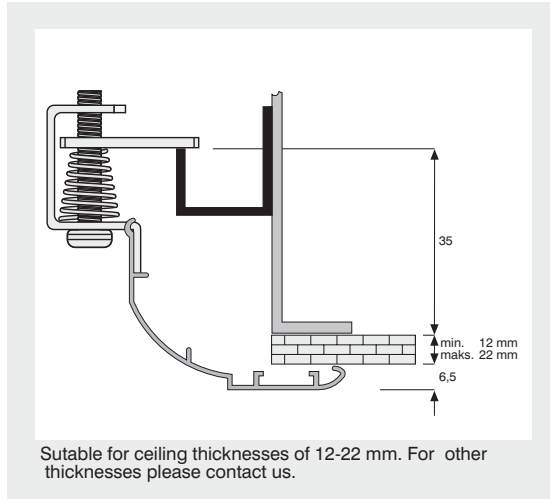


Installation

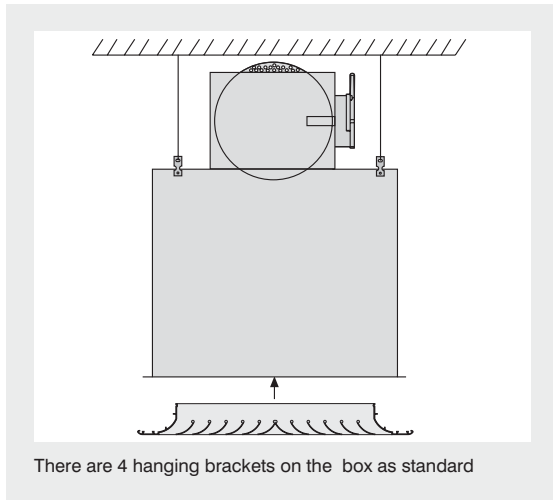
With Screws



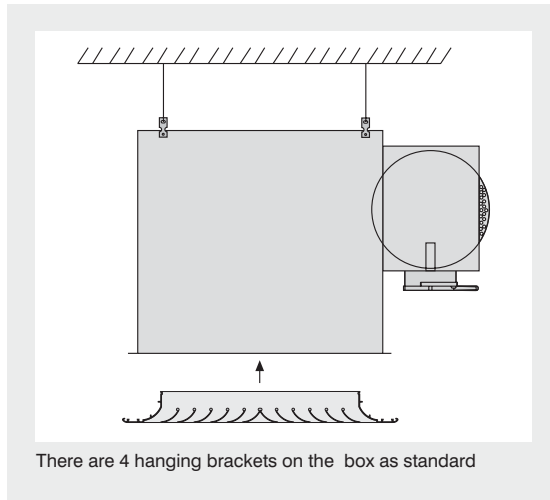
Concealed Fixing



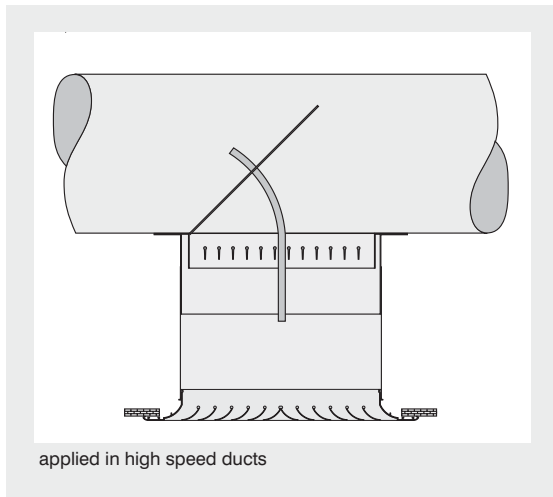
Plenum Box Installation (side inlet)



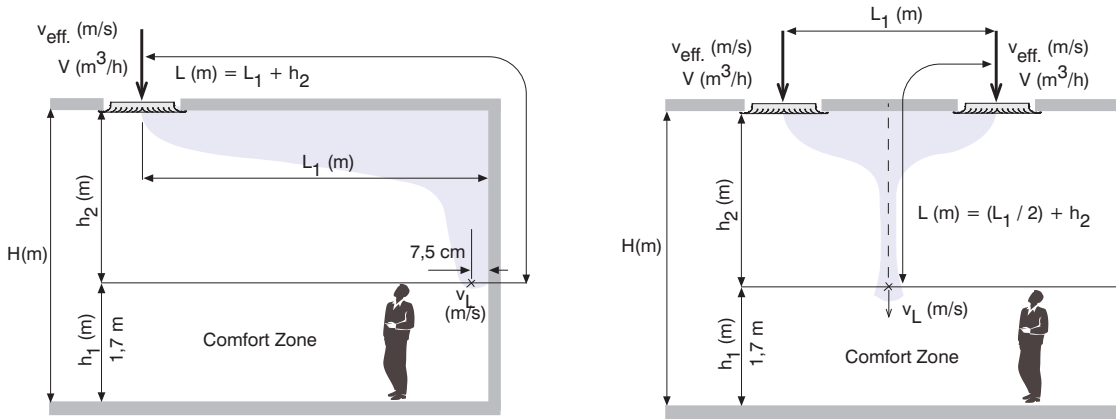
Plenum Box Installation (top inlet)



Application of flap damper with rectifier



Nomenclature



L_1	Distance between diffuser centres or diffuser centre and wall. (m)
h_1	Comfort zone height (m)
h_2	Distance between a diffuser and comfort zone (m)
v_{eff}	Effective outlet velocity (m/s)
v_L	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 (oC)
L	Throw distance (m)
V	Air flow rate (m ³ /h)
H	Room height (m)
S	Sound power level dB(A)

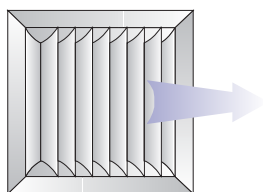
To achieve "Coanda effect", the outlet velocity must be greater than 2m/s. The general comfort conditions require that the sound power level is below 40 dB(A). The height of the comfort zone is taken as 1.70m above the floor. It is important that 0.25 m/s core velocity is not exceeded in this zone.

Note: The tables are given for 4 types of blade blocks (11,21,24,41). For other types of blocks listed on page 12, please contact us.

	Sound Power level	Pressure Drop
Supply air , with damper	+3 dB (A)	x 1,0
Extract air	+3 dB (A)	x 1,1
Extract air , with damper	+13 dB (A)	x 1,15

The data given in the tables are valid for supply air, without dampers. For other conditions, the correction factors in the table (left) have to be applied.

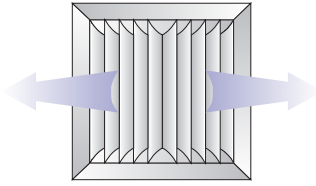
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Size (mm) E x B	Flow Rate V (m ³ /h)	Throw, L (m)		Pressure Loss ΔP (Pa)	Sound Power Level S (dB(A))
		$v_L=0,25$ m/s	$v_L=0,10$ m/s		
150 x 150	80	1,62	4,50	4,8	<20
	110	2,33	6,53	9	25
	140	3,10	8,54	14	30
	170	3,73	10,41	21	35
	200	4,35	11,99	28	40
200 x 200	160	2,47	6,56	5,5	<20
	210	3,37	9,29	9	25
	260	4,29	11,44	14	30
	310	5,10	13,69	21	35
	360	5,84	15,64	28	40
250 x 250	210	2,55	6,56	4,7	<20
	300	3,37	8,81	8	24
	390	4,29	11,14	13	29
	480	5,37	13,88	19	34
	570	6,38	16,42	26	37
300 x 300	290	3,07	8,61	2,9	<20
	380	4,03	10,61	7,5	22
	470	5,28	13,22	11	26
	560	6,13	15,92	16	32
	650	7,00	17,82	22	37
350 x 350	350	3,74	9,22	4	<20
	450	4,60	11,36	7,5	22
	550	5,75	14,70	12	28
	650	6,62	16,56	18	34
	750	7,67	19,40	24	37
400 x 400	440	4,22	10,38	4	<20
	580	5,37	13,52	7	22
	720	6,62	16,66	12	26
	860	7,77	19,40	17	34
	1000	9,21	22,73	24	37
450 x 450	580	4,92	12,23	2,2	<20
	760	6,28	15,69	2,7	<20
	940	7,92	19,73	4	<20
	1120	9,47	23,87	7,5	22
	1300	11,30	28,61	12	27
500 x 500	750	4,23	7,89	4,5	<20
	950	5,49	12,72	8	23
	1150	6,67	15,61	12	28
	1350	8,03	19,31	18	34
	1550	9,30	22,53	25	37

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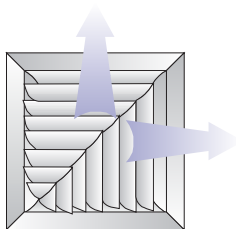


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Curved Blade Ceiling Difuser

Size (mm) E x B	Flow Rate V (m ³ /h)	Throw, L (m)		Pressure Loss ΔP (Pa)	Sound Power Level S (dB(A))
		$v_L = 0,25$ m/s	$v_L = 0,10$ m/s		
150 x 150	80	1,12	3,19	4,8	<20
	110	1,61	4,63	9	25
	140	2,14	6,06	14	30
	170	2,57	7,38	21	35
	200	3,00	8,50	28	40
200 x 200	160	1,8	4,46	5,5	<20
	210	2,46	6,32	9	25
	260	3,13	7,78	14	30
	310	3,72	9,31	21	35
	360	4,26	10,64	28	40
250 x 250	210	1,86	4,46	4,7	<20
	300	2,46	5,99	8	24
	390	3,13	7,58	13	29
	480	3,92	9,44	19	34
	570	4,66	11,17	26	37
300 x 300	290	2,19	6,06	4,2	<20
	380	2,88	7,47	7,5	22
	470	3,77	9,31	11	26
	560	4,38	11,21	16	32
	650	5,00	12,55	22	37
350 x 350	350	2,73	6,49	4	<20
	450	3,36	8,00	7,5	22
	500	4,20	10,35	12	28
	650	4,83	11,66	18	34
	750	5,60	13,66	24	37
400 x 400	440	3,08	7,31	4	<20
	580	3,92	9,52	7	22
	720	4,83	11,73	12	26
	860	5,67	13,66	17	34
	1000	6,72	16,01	24	37
450 x 450	580	3,44	8,93	2,2	<20
	760	4,39	11,45	2,7	<20
	940	5,54	14,40	4	<20
	1120	6,62	17,42	7,5	22
	1300	7,90	20,88	12	27
500 x 500	750	3,33	6,52	4,5	<20
	950	4,32	10,51	8	23
	1150	5,25	12,90	12	28
	1350	6,32	15,96	18	34
	1550	7,32	18,62	25	37

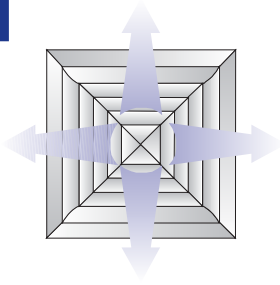
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Size (mm) E x B	Flow Rate V (m ³ /h)	Throw, L (m)		Pressure Loss ΔP (Pa)	Sound Power Level S (dB(A))
		$v_L=0,25$ m/s	$v_L=0,10$ m/s		
150 x 150	80	1,08	3,19	1,1	<20
	110	1,55	4,63	1,9	21
	140	2,06	6,06	3	29
	170	2,47	7,38	4,4	36
	200	2,88	8,50	6,7	41
200 x 200	160	1,77	4,39	2	21
	210	2,42	6,22	3,4	29
	260	3,08	7,66	5,6	37
	310	3,67	9,17	7,3	28
	360	4,19	10,48	10,1	33
250 x 250	210	1,90	4,59	1,9	<20
	300	2,52	6,17	3,8	<20
	390	3,20	7,81	6,4	22
	480	4,01	9,73	9,6	29
	570	4,76	11,51	12,6	34
300 x 300	290	2,19	6,06	2,4	<20
	380	2,88	7,47	4,2	<20
	470	3,77	9,31	6,6	<20
	560	4,38	11,21	9	29
	650	5,00	12,55	12,5	35
350 x 350	350	2,73	6,58	2,1	<20
	450	3,36	8,12	3,3	<20
	550	4,20	10,50	4,4	<20
	650	4,83	11,83	6,2	25
	750	5,60	13,86	8,1	29
400 x 400	440	2,97	7,47	1,9	<20
	580	3,78	9,73	2,8	<20
	720	4,66	11,99	4,2	<20
	860	5,47	13,96	6,1	25
	1000	6,48	16,36	8	29
450 x 450	580	3,44	8,74	2	<20
	760	4,39	11,21	3,2	<20
	940	5,54	14,10	4,7	21
	1120	6,62	17,06	6,7	27
	1300	7,90	20,45	8,7	32
500 x 500	750	3,28	6,42	2	<20
	950	4,26	10,35	3,1	<20
	1150	5,17	12,71	4,9	23
	1350	6,22	15,72	6,5	27
	1550	7,21	18,34	8,6	32

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Size (mm) E x B	Flow Rate V (m ³ /h)	Throw, L (m)		Pressure Loss ΔP (Pa)	Sound Power Level S (dB(A))
		v _L = 0,25 m/s	v _L = 0,10 m/s		
150 x 150	80	1,05	2,55	2,5	<20
	110	1,50	3,70	4,2	<20
	140	2,00	4,85	6,7	<20
	170	2,40	5,90	10	23
	200	2,80	6,80	15	31
200 x 200	160	1,35	3,35	3,6	<20
	210	1,85	4,75	6	<20
	260	2,35	5,85	10	22
	310	2,80	7,00	13	27
	360	3,20	8,00	18	32
250 x 250	210	1,40	3,35	3	<20
	300	1,85	4,50	6	<20
	390	2,35	5,70	10	21
	480	2,95	7,10	15	28
	570	3,50	8,40	20	33
300 x 300	290	1,60	4,30	3,5	<20
	380	2,10	5,30	6	<20
	470	2,75	6,60	9,5	23
	560	3,20	7,95	13	28
	650	3,65	8,90	18	34
350 x 350	350	1,95	4,70	2,8	<20
	450	2,40	5,80	4,5	<20
	550	3,00	7,50	6	<20
	650	3,45	8,45	8,5	24
	750	4,00	9,90	11	28
400 x 400	440	2,20	5,30	2,5	<20
	580	2,80	6,90	3,6	<20
	720	3,45	8,50	5,5	<20
	860	4,05	9,90	8	24
	1000	4,80	11,60	10,5	28
450 x 450	580	2,55	6,20	2,5	<20
	760	3,25	7,95	4	<20
	940	4,10	10,00	6	20
	1120	4,90	12,10	8,5	26
	1300	5,85	14,50	11	31
500 x 500	750	2,50	4,90	2,5	<20
	950	3,25	7,90	3,8	20
	1150	3,95	9,70	6	22
	1350	4,75	12,00	8	26
	1550	5,50	14,00	11	31

Technical Data

Temperature gradients along the throw path are read from the table below, depending on the Δt_0 , Δt_L and throw length values. The temperature of the core at L metres from the diffuser, differs from the room temperature by the value read

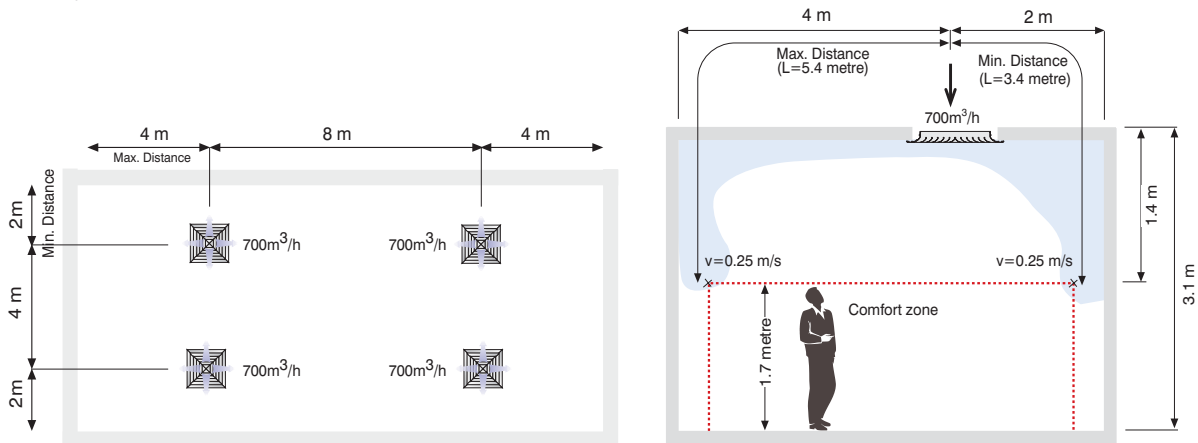
from the tables. The difference is plus in heating and minus in cooling. The less the difference, the better the comfort conditions.

Temperature Gradients along the throw path

Size ØE (mm)	Throw (L) m	Δt_L (°C) Values					
		Δt_0 (°C)					
		4	6	8	10	12	14
150 x 150	2	0,21	0,32	0,42	0,53	0,64	0,74
	2,5	0,14	0,22	0,29	0,36	0,43	0,50
	3	0,10	0,16	0,21	0,26	0,31	0,36
200 x 200	2	0,32	0,48	0,64	0,80	0,96	1,12
	2,5	0,22	0,33	0,44	0,55	0,66	0,77
	3	0,16	0,24	0,32	0,40	0,48	0,56
250 x 250	2	0,50	0,74	0,99	1,24	1,49	1,74
	2,5	0,34	0,50	0,67	0,84	1,01	1,18
	3	0,24	0,37	0,49	0,61	0,73	0,85
	3,5	0,19	0,28	0,38	0,47	0,56	0,66
300 x 300	2	0,68	1,03	1,37	1,71	2,05	2,39
	2,5	0,47	0,70	0,94	1,17	1,40	1,64
	3	0,34	0,52	0,69	0,86	1,03	1,20
	3,5	0,27	0,40	0,54	0,67	0,80	0,94
	4	0,21	0,31	0,42	0,52	0,62	0,73
350 x 350	2	0,95	1,43	1,90	2,35	2,86	3,33
	2,5	0,64	0,97	1,29	1,61	1,93	2,25
	3	0,47	0,71	0,94	1,18	1,42	1,65
	3,5	0,36	0,54	0,72	0,90	1,08	1,26
	4	0,28	0,43	0,57	0,71	0,85	0,99
	5	0,19	0,29	0,38	0,48	0,58	0,67
400 x 400	2	1,23	1,85	2,46	3,08	3,70	4,31
	2,5	0,83	1,25	1,66	2,08	2,50	2,91
	3	0,62	0,92	1,23	1,54	1,85	2,16
	3,5	0,47	0,71	0,94	1,18	1,42	1,65
	4	0,37	0,56	0,74	0,93	1,12	1,30
	5	0,26	0,39	0,52	0,65	0,78	0,91
	6	0,19	0,28	0,38	0,48	0,56	0,66
450 x 450	2	1,58	2,36	3,15	3,94	4,73	5,52
	2,5	1,07	1,60	2,14	2,67	3,20	3,74
	3	0,78	1,18	1,57	1,96	2,35	2,74
	3,5	0,60	0,90	1,20	1,50	1,80	2,10
	4	0,47	0,70	0,94	1,17	1,40	1,64
	5	0,32	0,48	0,64	0,80	0,96	1,12
	6	0,24	0,35	0,47	0,59	0,71	0,83
	7	0,18	0,27	0,36	0,45	0,54	0,63
500 x 500	2	1,95	2,92	3,90	4,87	5,84	6,82
	2,5	1,32	1,99	2,65	3,31	3,97	4,63
	3	0,98	1,47	1,96	2,45	2,94	3,43
	3,5	0,76	1,14	1,52	1,90	2,28	2,66
	4	0,60	0,89	1,19	1,49	1,97	2,09
	5	0,41	0,62	0,82	1,03	1,24	1,44
	6	0,30	0,46	0,61	0,76	0,91	1,06
	7	0,23	0,34	0,46	0,57	0,68	0,80
	8	0,18	0,28	0,37	0,46	0,55	0,64

Example:

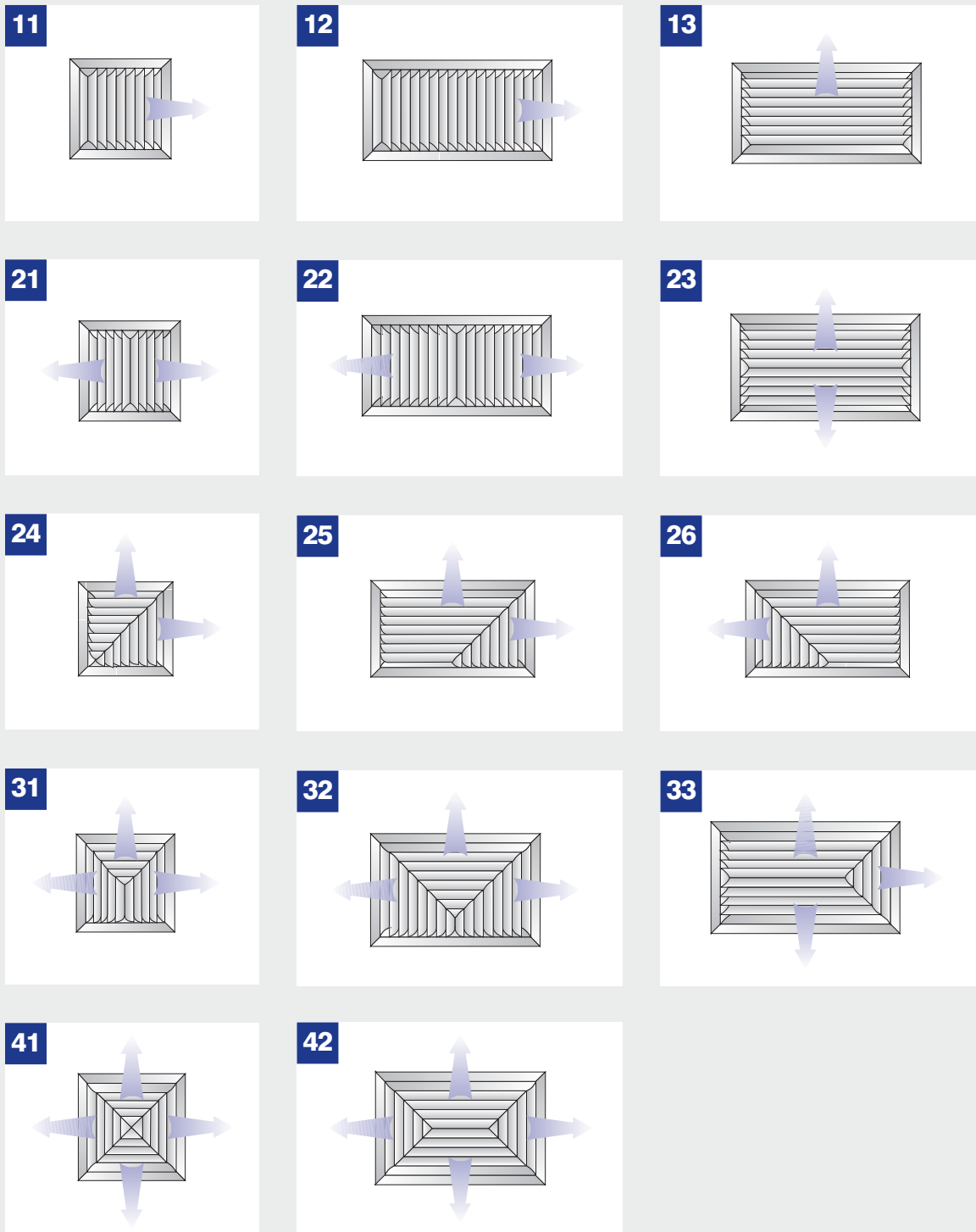
Air at $2800 \text{ m}^3/\text{h}$, is to be supplied into a room with dimensions $16 \times 8 \text{ m}$, and a height of 3.10 m . The supply air is 8°C below room temperature and 4 units of 4-way diffusers will be used. Determine diffuser spacings so that the core velocity in comfort zone is below 0.25 m/s .

**Solution:**

- 1) Diffusers are placed on the ceiling plan symmetrically.
- 2) Air flow rate per diffuser is calculated as $2800 / 4 = 700 \text{ m}^3/\text{h}$.
- 3) Calculation of path length to the comfort zone:
 Minimum distance: $L = 2.0 + 1.40 = 3.40 \text{ m}$
 Maximum distance: $L = 4.0 + 1.40 = 5.40 \text{ m}$.
- 4) From the table on page 9, the most suitable size is found as $400 \times 400 \text{ mm}$; for $700 \text{ m}^3/\text{h}$ and 3.40 m throw.
- 5) From the same table with interpolation, pressure loss is read as 5.5 Pa and sound power level as $<20 \text{ dB(A)}$.
- 6) From the table on page 10; for $400 \times 400 \text{ mm}$ size, $\Delta t_o = 8^\circ\text{C}$, and 3.40 m throw, Δt_L is found as 1°C .

Blade Block Codes

Curved Blade Ceiling Diffuser



Note: The views shown are face views, and throw directions are as seen from below. For blocks 25 and 26 care should be taken when ordering.

Specification Text

Air diffuser for ceiling installation. The diffuser will be manufactured from ETIAL-60 norm aluminium profiles, and chromated. After chromating, will be painted to ordered request with electrostatic powder paint and a minimum thickness of 60 μ . The diffuser will be made of a frame and a central blade block. The blade block will be fixed to the frame by the aid of spring pins and will be easy to be removed / installed. Optionally, a damper will be installed on the back side of the diffuser. This damper will be a separate item which will be formed from ETIAL-60 norm aluminium profiles and be operated from the face of the diffuser.

To prevent reflection, the damper will be painted RAL 9005 (matt black). The plenum box will be manufactured from 0.6 mm galvanized steel sheets by seams. There will be 4 hanging brackets on the box. Optionally, the entry spigot will be equipped with a volume control damper, operated externally or internally, depending on request. Also, optionally, 6-mm thick acoustic foam (according to BS 476 Part 6 & 7 Class 0) will be installed inside the plenum box.

Order Code

Model		CEA.32.AA.1 1-300 x 300 - 41 - 9010		
Frame	32 mm	E x B (mm) Refer To Page 3	Refer to Page 12 11, 12, 13, 21, 22, 23, 24, 25, 26, 31, 32, 33, 41, 42	Indicate RAL Colour Code
Accessories	AA..Without Accessories ZA..Opposed Blade Damper			
Installation	0.....Without Screw Holes 1.....With Screw Holes 3.....Concealed Fixing			
Installation Accessories	0.....Without Installation Bridge 1.....With Installation Bridge			
		Standard Dimensions	Blade Code	Colour Code

Plenum Box Order Code

Model		PLA.10.S B.1 1-360 x 360 x 400 x 295 x 1		
Installation	10...With Screw 30...Concealed Fixing	Please indicate if special dimensions are requested $K_E \times K_B \times H \times \varnothing D$ (mm) x s (no. of inlet spigots)	Plenum Box Dimensions	
Box Inlet	S....Side Inlet T....Top Inlet			
Spigot Damper	A....Without Damper B....Externally Operated C....Internally Operated			
Perforated Rectifier Plate	0....Without Plate 1....With Plate			
Insulation	0....Without Insulation 1....With Acoustic Insulation			