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GENERAL

Air terminal devices of group E are linear light type air grilles (diffusers) with rectangular cross sections. Series E grilles have fixed horizontal series of blades. Series BT grilles are special heavy-duty linear grilles mounted on floors. Series E grilles may be equipped with interior adjustable series of vertical blades, allowing for air jet direction manipulation.

E series grilles are manufactured in the following types, each type addressing different cooling-heating applications :

E12 : Dense series of blades, usually mounted on walls, ceilings or inclined surfaces

E17 : Sparse series of blades, usually mounted on walls, ceilings or inclined surfaces

E15 : Inclined series of blades with a 15° inclination angle (either E12 or E17)

Air grilles of series E are mainly used for air supply from vertical planes, e.g. walls, sides of air ducts, etc, or ceilings. They can also be mounted on inclined surfaces. They may be equipped with volume flow regulating dampers of D series, and/or air filter of series FA. They are manufactured at any size, however their usual dimensions are shown in the table of p. E2.

Anodized aluminum profile of 12 µm width is used for their construction providing long life. Electrostatic painting at numerous colors is also an option.

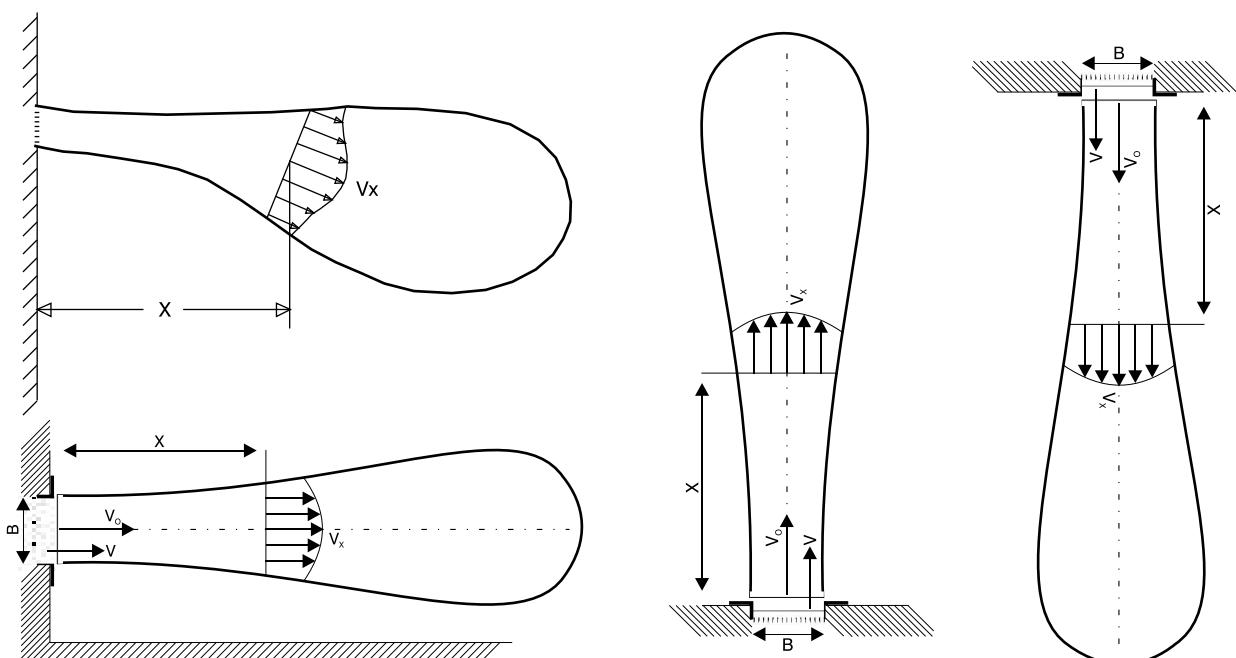


Figure E1: Possible air jet morphologies using linear grilles of E or BT series

Due to continuous development of its products, AEROGRAMMI reserves the right of modifications without prior notice.

LINEAR GRILLES - SERIES E & BT - Dimensions

The dimensions of the grilles of series E are shown below. The dimensions of the grilles of series BT are shown in the Figure E3. For selection and ordering purposes their nominal opening dimensions AXB are used.

SIDE VIEW

Figure E2

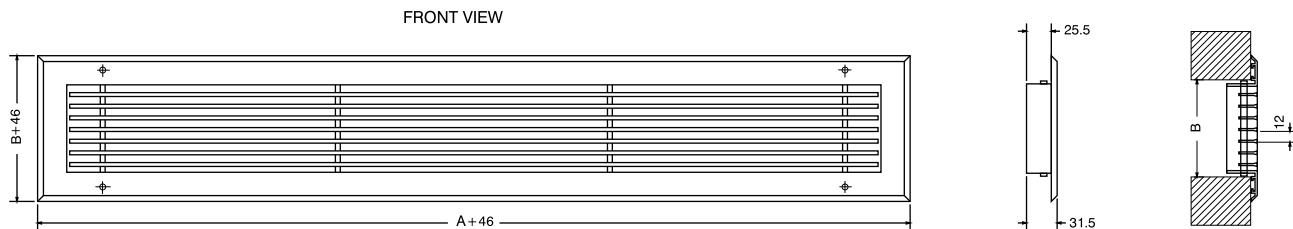
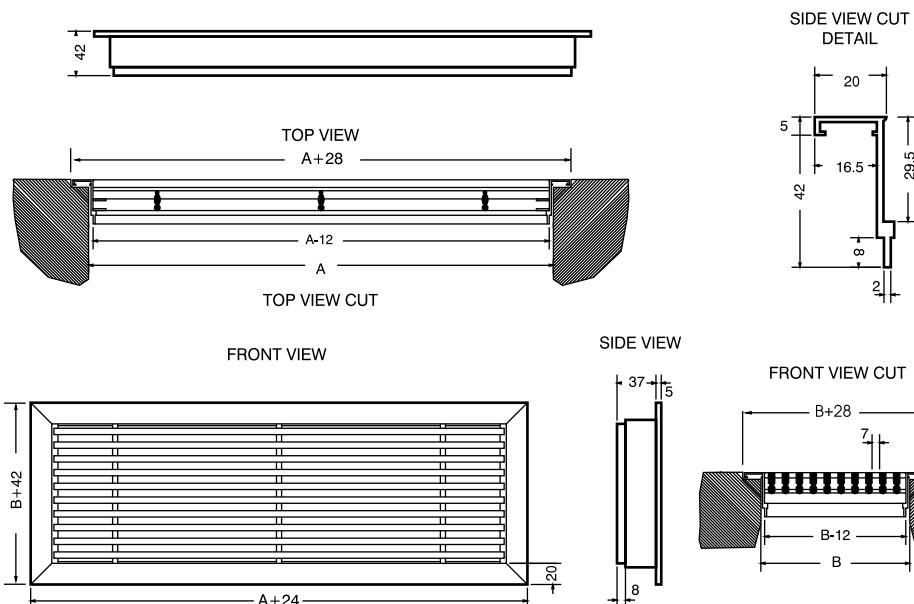


Figure E3



Diagrams of page E5
Diagrams of page E6
Diagrams of page E7
Diagrams of page E8
Diagrams of page E9

Table of the most common nominal dimensions of series E and BT grilles.

The table shows also the appropriate diagrams to be used for the estimation of the grilles' characteristics.

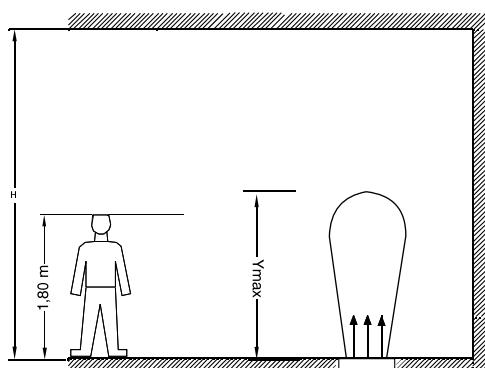
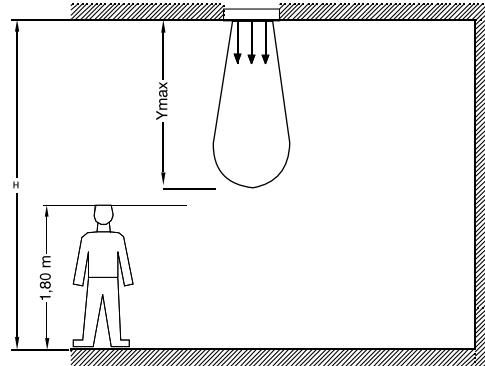
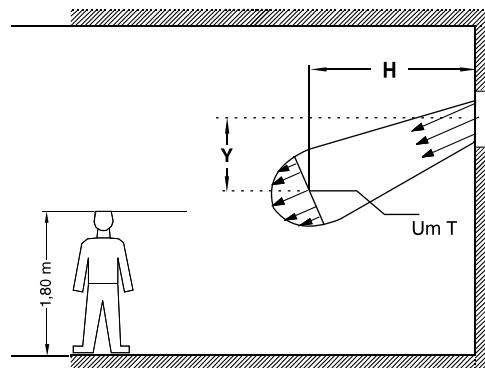
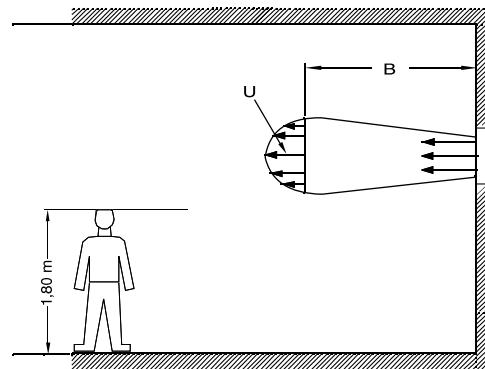
B [cm]

A [cm]

	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
10	11	14	16	18	20	21	23	24	25	26	28	29	30	31	32	33	34	35	36
15	14	17	20	22	24	26	28	29	31	32	34	35	37	38	39	40	41	43	44
20	16	20	23	25	28	30	32	34	36	37	39	41	42	44	45	47	48	49	50
25	18	22	25	28	31	33	36	38	40	42	44	45	47	49	50	52	54	55	56
30	20	24	28	31	34	37	39	41	44	46	48	50	52	54	55	57	59	60	62
35	21	26	30	33	37	40	42	45	47	50	52	54	56	58	60	62	63	65	67
40	23	28	32	36	39	42	45	48	50	53	55	58	60	62	64	66	68	70	71
45	24	29	34	38	41	45	48	51	54	56	59	61	63	66	68	70	72	74	76
50	25	31	36	40	44	47	50	54	56	59	62	64	67	69	71	74	76	78	80
55	26	32	37	42	46	50	53	56	59	62	65	67	70	72	75	77	79	82	84
60	28	34	39	44	48	52	55	59	62	65	68	70	73	76	78	81	83	85	87
65	29	35	41	45	50	54	58	61	64	67	70	73	76	79	81	84	86	89	91
70	30	37	42	47	52	56	60	63	67	70	73	76	79	82	84	87	90	92	94
75	31	38	44	49	54	58	62	66	69	72	76	79	82	85	87	90	93	95	98
80	32	39	45	50	55	60	64	68	71	75	78	81	84	87	90	93	96	98	101
85	33	40	47	52	57	62	66	70	74	77	81	84	87	90	93	96	99	101	104
90	34	41	48	54	59	63	68	72	76	79	83	86	90	93	96	99	102	104	107
95	35	43	49	55	60	65	70	74	78	82	85	89	92	95	98	101	104	107	110
100	36	44	50	56	62	67	71	76	80	84	87	91	94	98	101	104	107	110	113

Shape of the air jet

Possible air jet configurations using E series grilles are shown in the adjacent figures. Different grille types are used for different applications. For example, for jet projection having an inclination angle with the wall the 15° E grilles are used. For cooling applications heavy-duty floor BT grilles are used. For heating purposes the E series grilles may also be mounted on ceilings.



Selection of E and BT series grilles

While selecting grilles of E and BT series it is important that the air jet conditions, i.e temperatures and velocities in the occupied zone are within specifications (e.g. CEN-CR-1752). For the selection of E and BT series grilles with dense blades the diagrams of pages E5 to E9 are used. The grilles' selection is based on their equivalent diameter. The equivalent diameter can be found for each grille type from the corresponding table. The equivalent diameter table may be used for identifying the diagrams to be used for the estimation of the grille's characteristics

The selection diagrams provide data for the following parameters:

- Throw of horizontal air jets (isothermal jet and 0,5 m/s final velocity)
- Pressure drop
- Mean air velocity at the grille
- Noise
- Drop/rise of an non-isothermal horizontal air jet
- Maximum throw of vertical non-isothermal air jets

For return air applications using E or BT series grilles the diagrams of pages E5 to E9 may be used for the estimation of the required pressure drop. The resulting noise should be reduced by 3 dBA.

All characteristics estimated using diagrams on pages E5 to E9 concern E12 grilles. To find the values for E17, inclined blades, or BT use the conversions of table in page E10.

The recommended noise levels to be used for grille selection are shown in the next table:

Nomenclature

Vo[m³/h]: Air volume flow

Uo [m/s]: Air velocity at the grille

D_{eq} [m]: Grille equivalent diameter

B [m] : Horizontal air throw (distance from the grille where the air jet has a velocity of 0,5 m/s)

X [m] : Horizontal distance from the grille

Y [m] : Vertical air throw or drop/rise

ΔP [Pa]: Pressure drop

Θ [dBA]: Noise level

ΔT [°C] : Temperature difference (air jet temperature - return air temperature)

Sound rooms, libraries, studios	under 30dBA
Offices, homes, hospital rooms, churches, hotel rooms, theaters	25 to 35dBA
Public buildings, restaurants, public places, banks	30 to 40dBA
Factories, gyms, shops, etc	35 to 50dBA

* The values are indicative and may not represent every case

Selection examples

For a space to be properly ventilated $3000 \text{ m}^3/\text{h}$ of air are required. The acceptable noise level is 30 dBA. What is the appropriate size and number of identical type E12 grilles mounted on the walls to cover the previous need? The grille horizontal dimension should be twice the vertical one. What are their operational characteristics?

From the equivalent diameter table of page E2 and for the dimensions specified, the corresponding diagrams are found to be the ones on page E6. From the noise level diagram E6.2 one may find that by using six identical E12 grilles with $500 \text{ m}^3/\text{h}$ air flow each, the equivalent diameter of the grilles should be around $D_{eq} = 0,31 \text{ m}$. Thus, from the equivalent diameter table one may select grilles of dimensions 450x200mm.

The operation data for these grilles are :

Pressure drop around $\Delta P = 10 \text{ Pa}$ (Diagram E6.2),

Air velocity at the grille around $U_0 = 2,2 \text{ m/s}$ (Diagram E6.1),

Air throw of around $B = 9,6 \text{ m}$ (Diagram E6.1).

What would be the operational characteristics of E17 grilles of the same dimensions ?

Using E17 grilles instead of the E12 means that according to the table on page E10, the pressure drop ΔP would have been $0,775 * 10 = 7,8 \text{ Pa}$, the air velocity at the grille $U_0 = 1,8 \text{ m/s}$, air throw B of $8,4 \text{ m}$ and noise level around 25 dBA.

What is the appropriate height for the above E12 grilles to be mounted on the sidewalls, when they operate with cool air of $500\text{m}^3/\text{h}$ each and with $\Delta T = 10^\circ\text{C}$, so that the air jet would not enter the occupied zone for a distance less than 6 m from the walls? The room height exceeds 5 m.

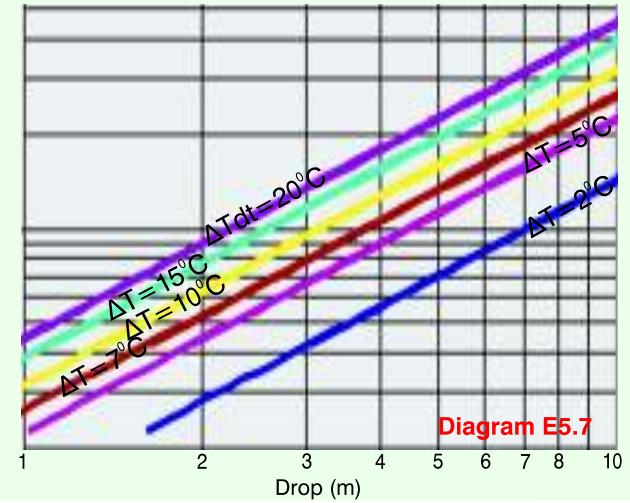
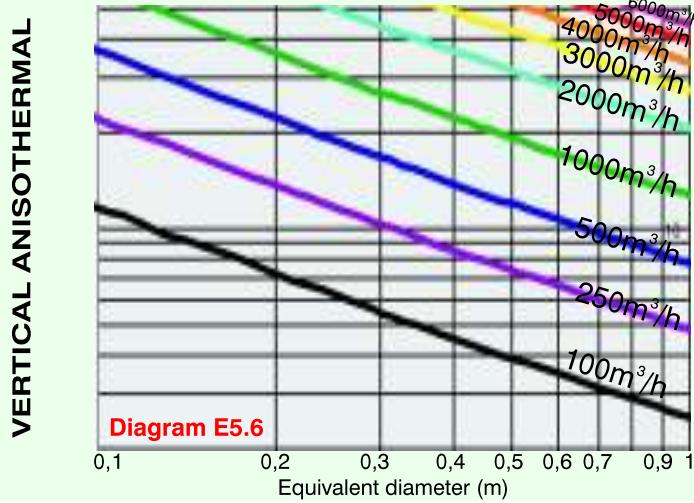
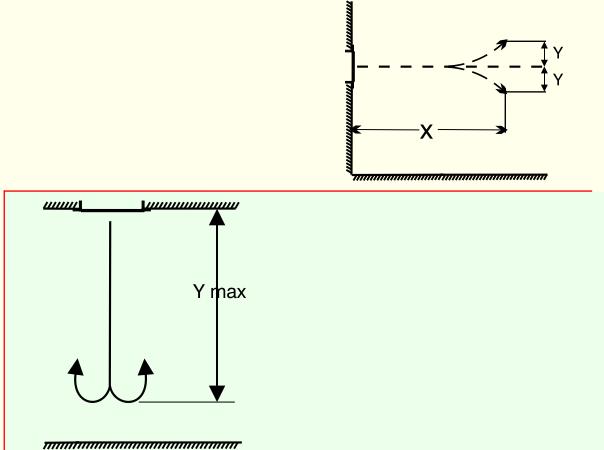
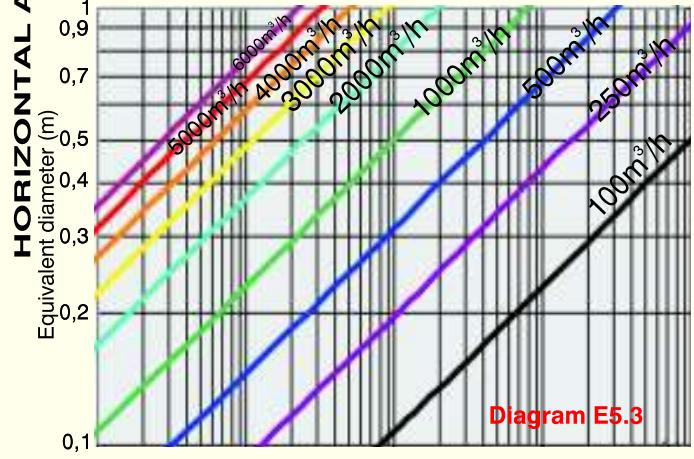
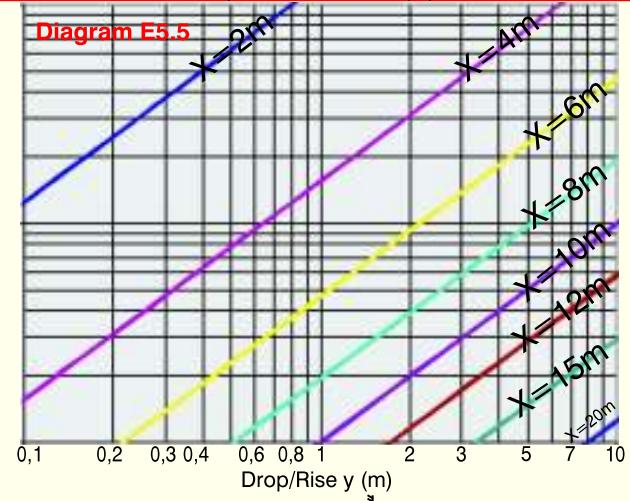
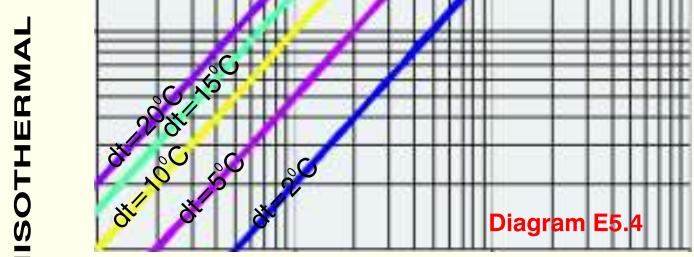
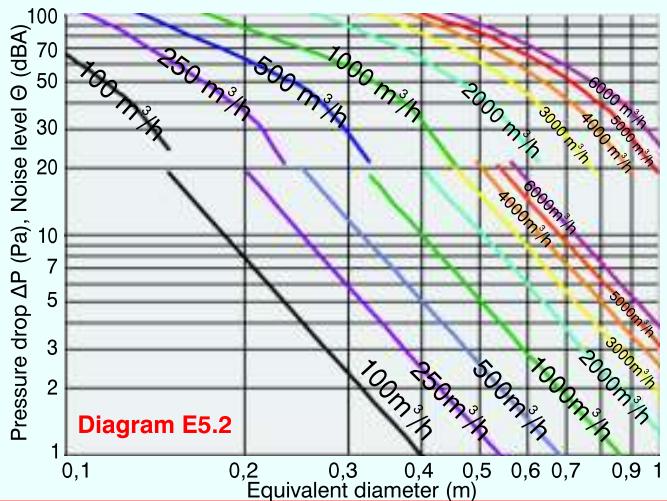
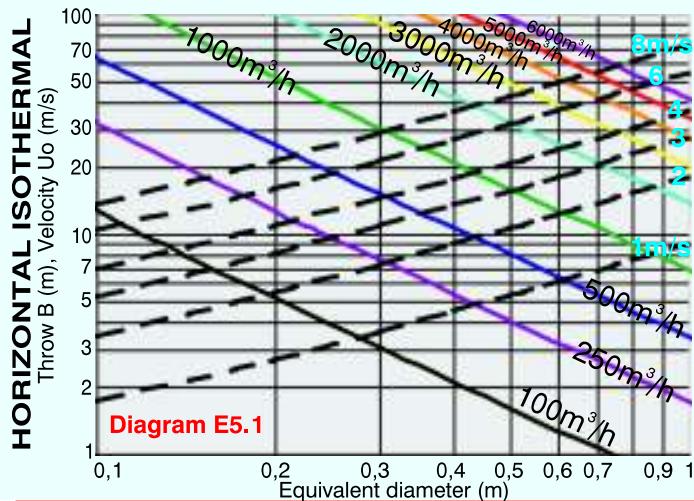
From Diagram E6.3 and for $D_{eq} = 0,31 \text{ m}$ and $500\text{m}^3/\text{h}$, moving first vertically to Diagram E6.4 and curve corresponding to $\Delta T = 10^\circ\text{C}$, and then horizontally to Diagram E6.5 and curve corresponding to distance 6 m from the sidewall, one reads a drop of about 1,4 m. This means that since the occupied zone is 1,8 m from the floor, the grilles should be mounted at a height greater than $H = 1,8 + 1,4 = 3,2 \text{ m}$. At this height there is no possibility of Coanda effect, since the room height is large enough.

For heating the same space E17 linear grilles of size 550x150 have been selected to be mounted on the ceiling. Which is the appropriate air flow rate for supplying hot air of a $\Delta T = 10^\circ\text{C}$, keeping the maximum throw below 5 m?

From the equivalent diameter table of page E2 the equivalent diameter is found to be $D_{eq} = 0,3 \text{ m}$ while the corresponding diagrams are the ones on page E7. From Diagrams E7.6 and E7.7 it can be found that for $D_{eq} = 0,3 \text{ m}$ and $500 \text{ m}^3/\text{h}$ the maximum throw is around 5,1 m. Thus, from the table on page E10, the maximum throw is around $Y_{max} = 5,1 * 0,875 = 4,5 \text{ m}$. From Diagram E7.2 the resulting noise is around 32 dBA. Thus, for the E17 grilles the noise level raises to 27 dBA.

The following selection diagrams may be used for grille selection as good approximation.
 For more accurate grille selection please refer to Breezmaster software program
[at www.aerogrammi.gr](http://www.aerogrammi.gr)

LINEAR GRILLES - SERIES E & BT - Performances



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