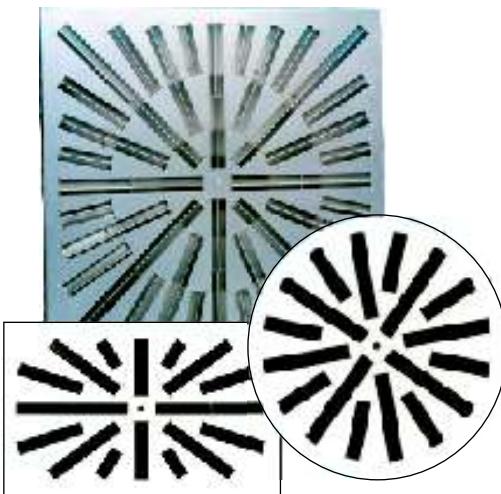


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GENERAL

Ceiling air diffusers of type GR use is highly appropriate for ventilating spaces with high standards for comfort, where several different combinations are requested for air supply and return. The special characteristic of series GR diffusers is their ability to manipulate the air throw direction by simply adjusting the position of the blades, either manually or by means of a servomotor.

This series of diffusers may be used effectively in applications of varying air volume, since they are able to retain the shape and morphology of the air jet for large air supply variations. Moreover, the pressure requirements and noise level resulting by the diffuser operation remain practically unchanged for any blade positioning configuration, thus providing stable operation to the ventilation system.

GR series diffusers are manufactured in a variety of types, in order to be easily adopted and integrated with the aesthetics and architectural design directions of any space.

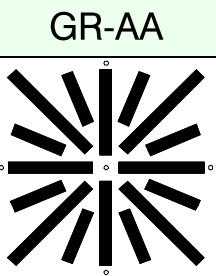
For easier control they may be equipped with a flow measuring device, allowing for the fast adjustment of the flow regulating damper to the desired air flow rate. All flow regulating equipment may easily be removed for maintenance.

GR series diffusers advantages are summarized below :

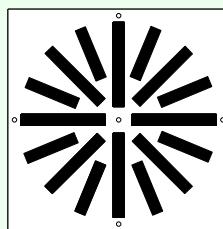
- Blade control possibility after installation, both manually and automatically (servomotor).
- Required pressure and resulting noise level are independent of blade positioning.
- Large mixture coefficients resulting in an appropriate mixture of ventilation and room air.
- Stable air jet morphology even for large air flow variations.

Possibility of coupling with flow measuring and control device.

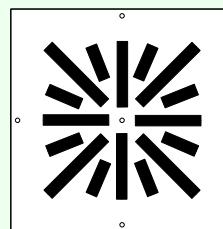
GR SERIES DIFFUSERS



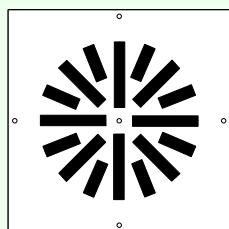
GR-AR



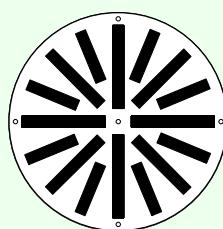
GR-AA/A



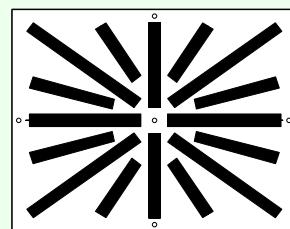
GR-AR/A



GR-RR

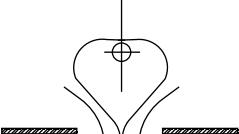
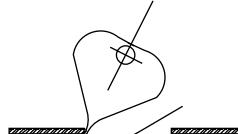
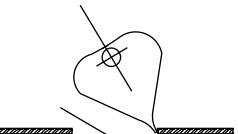


GR-B



Blade positioning

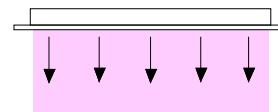
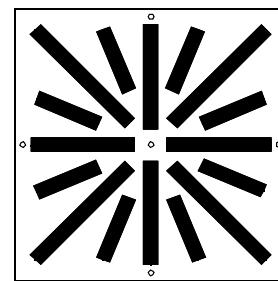
Series GR diffusers have the possibility to control the air jet morphology, after their installation, for covering heating warm air supply- or cooling cold air supply- needs. The main air throw possibilities are presented in the following figure :

Blade positioning			
Symbol			
Position	1	2	3

Throw type A.

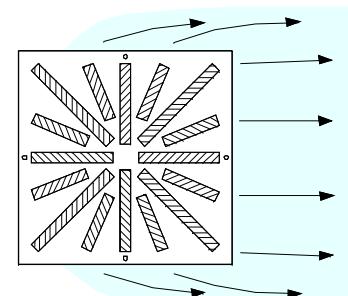
All blades are set to position 1 see figure-. The air throw direction is vertical to the ceiling. This throw type results to the largest air throw for as certain flow rate. This throw type is used mainly for heating applications where there is a need for large air throws serving the lower space regions-.

Several other throw types may result by setting some of the blades in position 1 and others in position 2, or intermediate positions. In this way shorter air throws with larger jet span may be achieved.



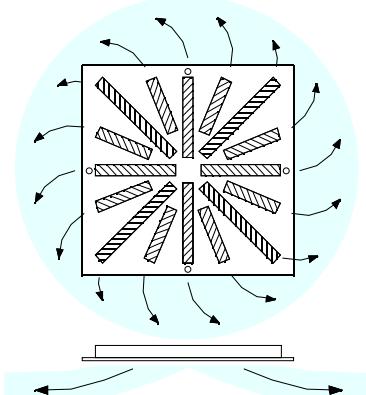
Throw type B.

Half of the blades are set to position 2 and the rest to position 3 see figure-. In this way air is thrown towards a certain direction parallel to the ceiling.

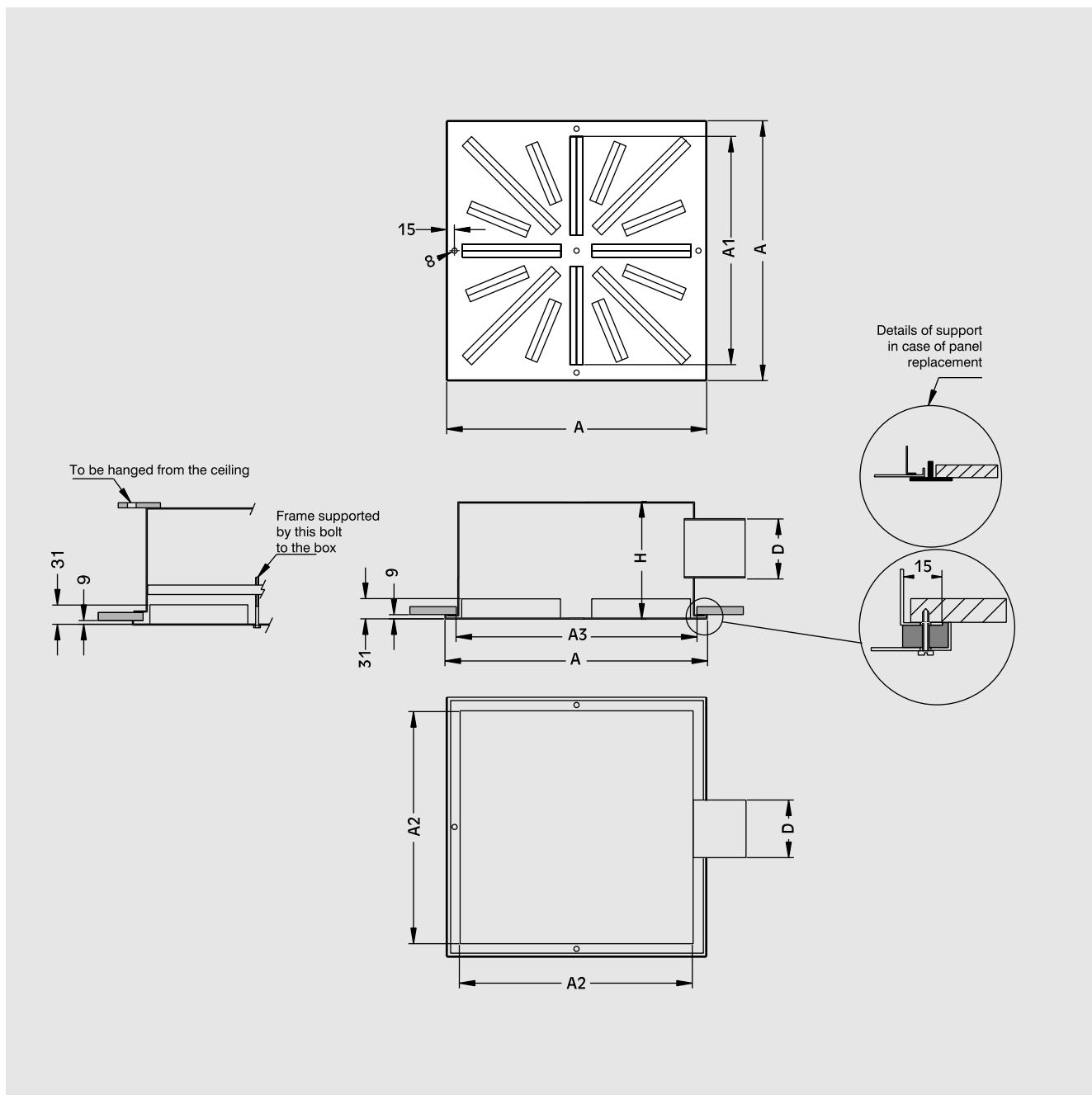


Throw type C.

All blades are set to position 2 see figure-. The air is thrown in a rotating sense parallel to the ceiling. This throw type is mainly used for cooling applications, avoiding the direct cold downwards air streams, in case there are no colliding air jets see selection example-.



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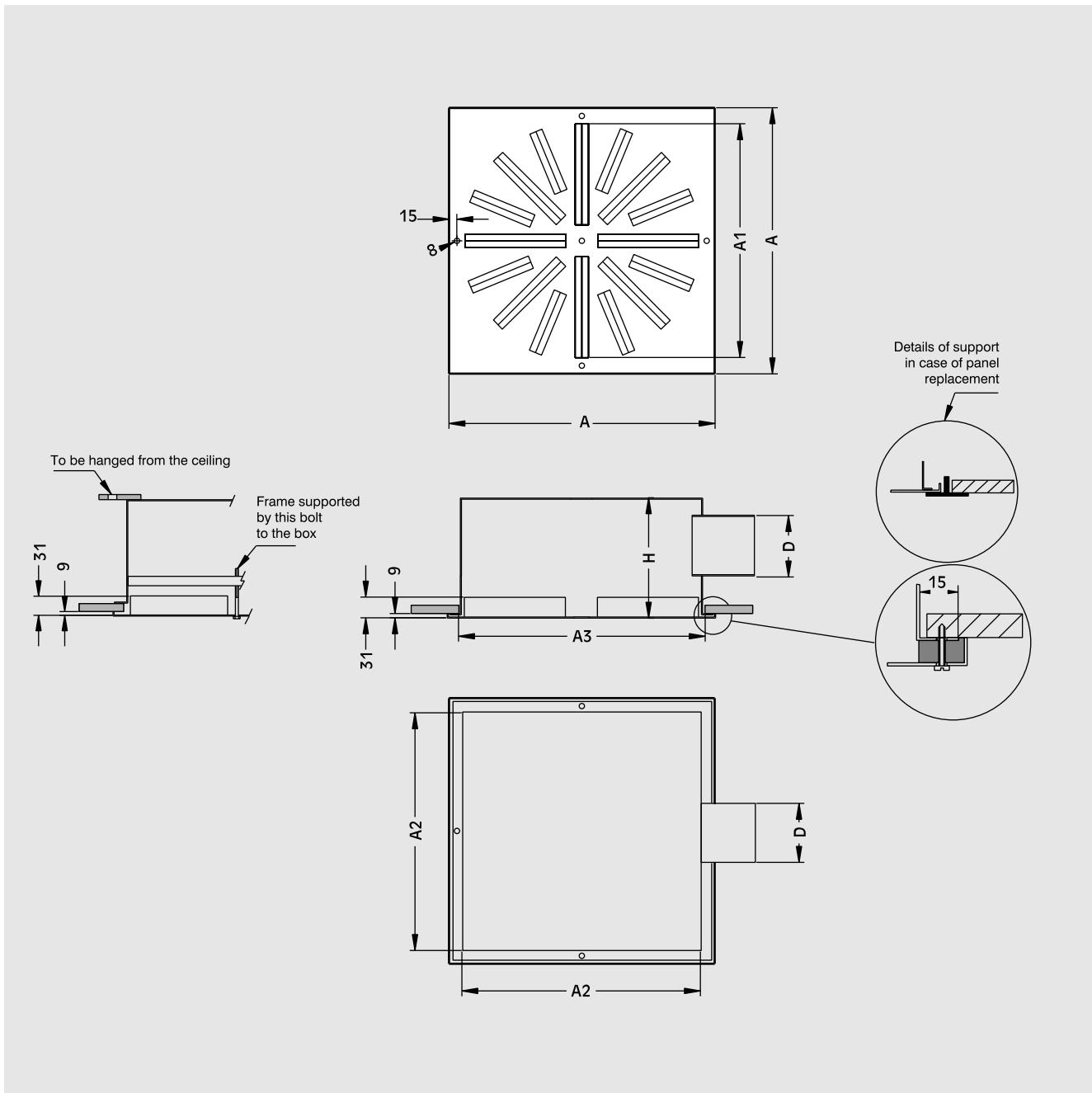


GR-AA DIMENSION TABLE

TYPE	A	A1	A2	A3	H	D
GR-AA300	340	278	295	300	260	Φ 160
GR-AA400	440	378	395	400	260	Φ 160
GR-AA500	540	478	495	500	300	Φ 200
GR-AA600	640	578	595	570	350	Φ 250
GR-AA700	740	679	695	700	400	Φ 300
GR-AA800	840	778	795	800	450	Φ 350

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DIMENSIONS GR-AR

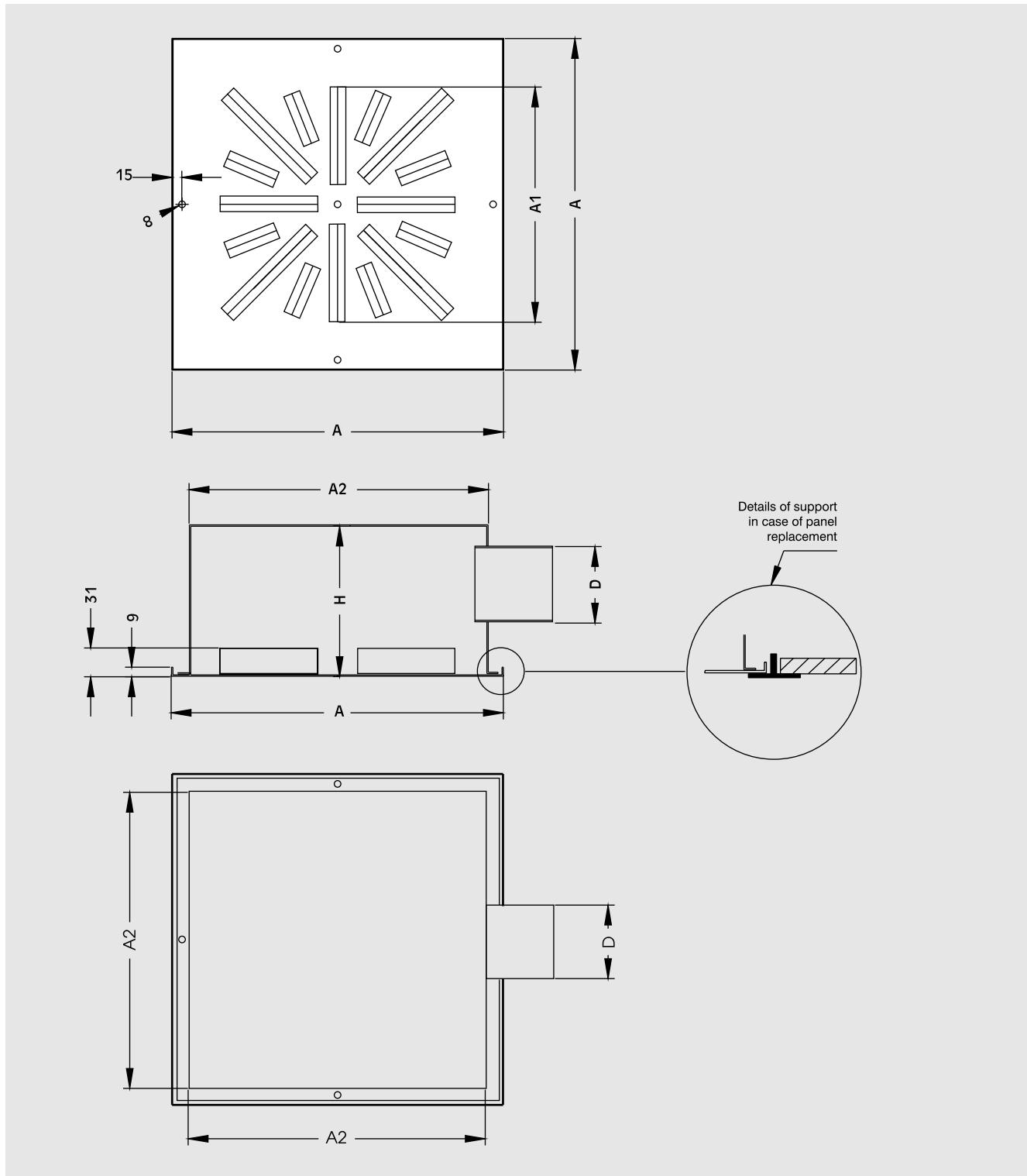


GR-AR DIMENSION TABLE

TYPE	A	A1	A2	A3	H	D
GR-AR300	340	278	295	300	260	Φ 160
GR-AR400	440	378	395	400	260	Φ 160
GR-AR500	540	478	495	500	300	Φ 200
GR-AR600	596	534	555	570	350	Φ 250
GR-AR700	740	678	695	700	400	Φ 300
GR-AR800	840	778	795	800	450	Φ 350

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DIMENSIONS GR-AA/A

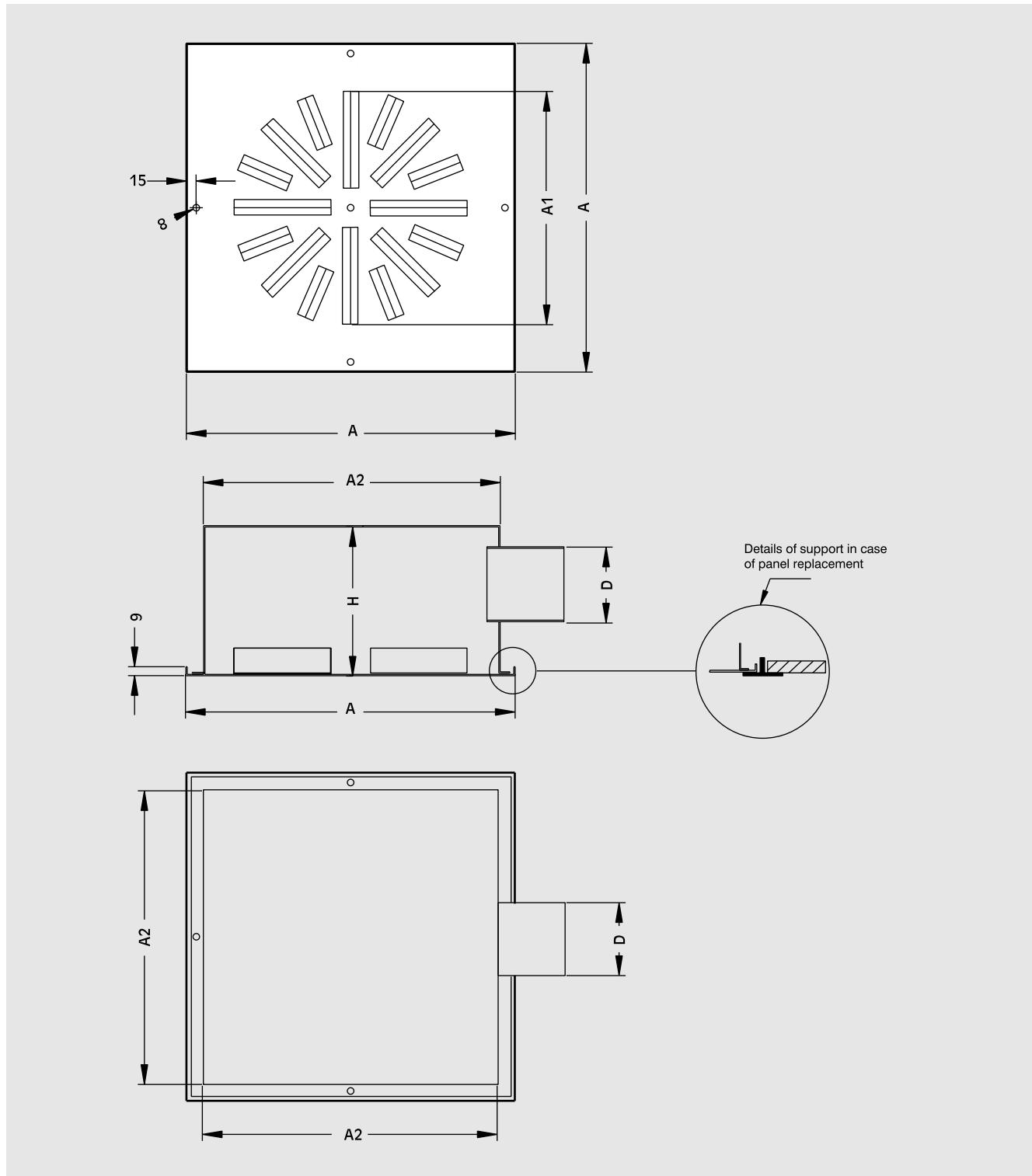


GR-AA/A DIMENSION TABLE

TYPE	A	A1	A2	A3	H	D
GR-AA-A-300	596	278	300	-	260	Φ160
GR-AA-A-400	596	378	400	-	269	Φ160
GR-AA-A-500	596	478	500	-	300	Φ200

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DIMENSIONS GR-AR/A

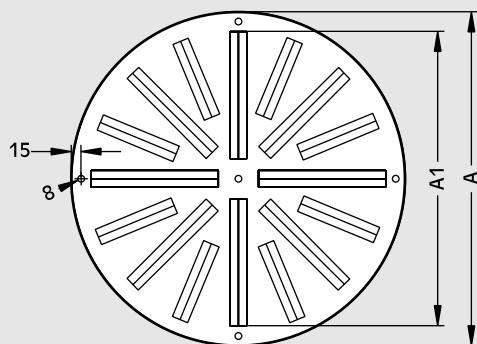


DIMENSION TABLE GR-AR/A

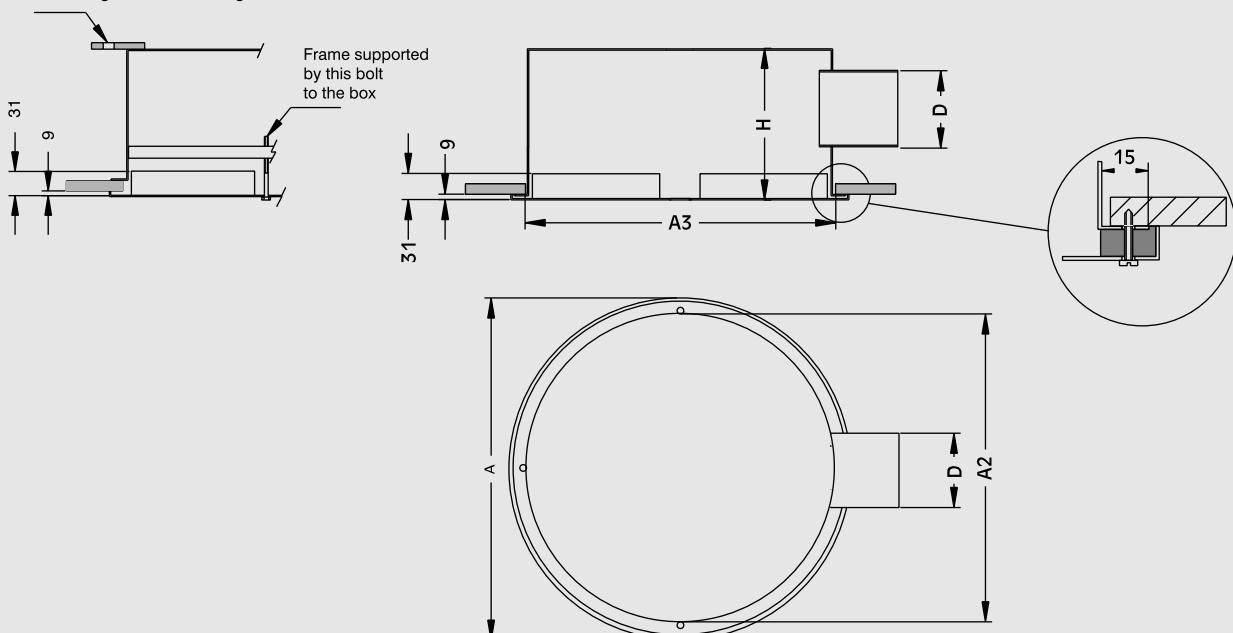
TYPE	A	A1	A2	A3	H	D
GR-AR-A-300	596	278	300	-	260	Φ 160
GR-AR-A-400	596	378	400	-	269	Φ 160
GR-AR-A-500	596	478	500	-	300	Φ 200

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DIMENSIONS GR-RR



To be hanged from the ceiling

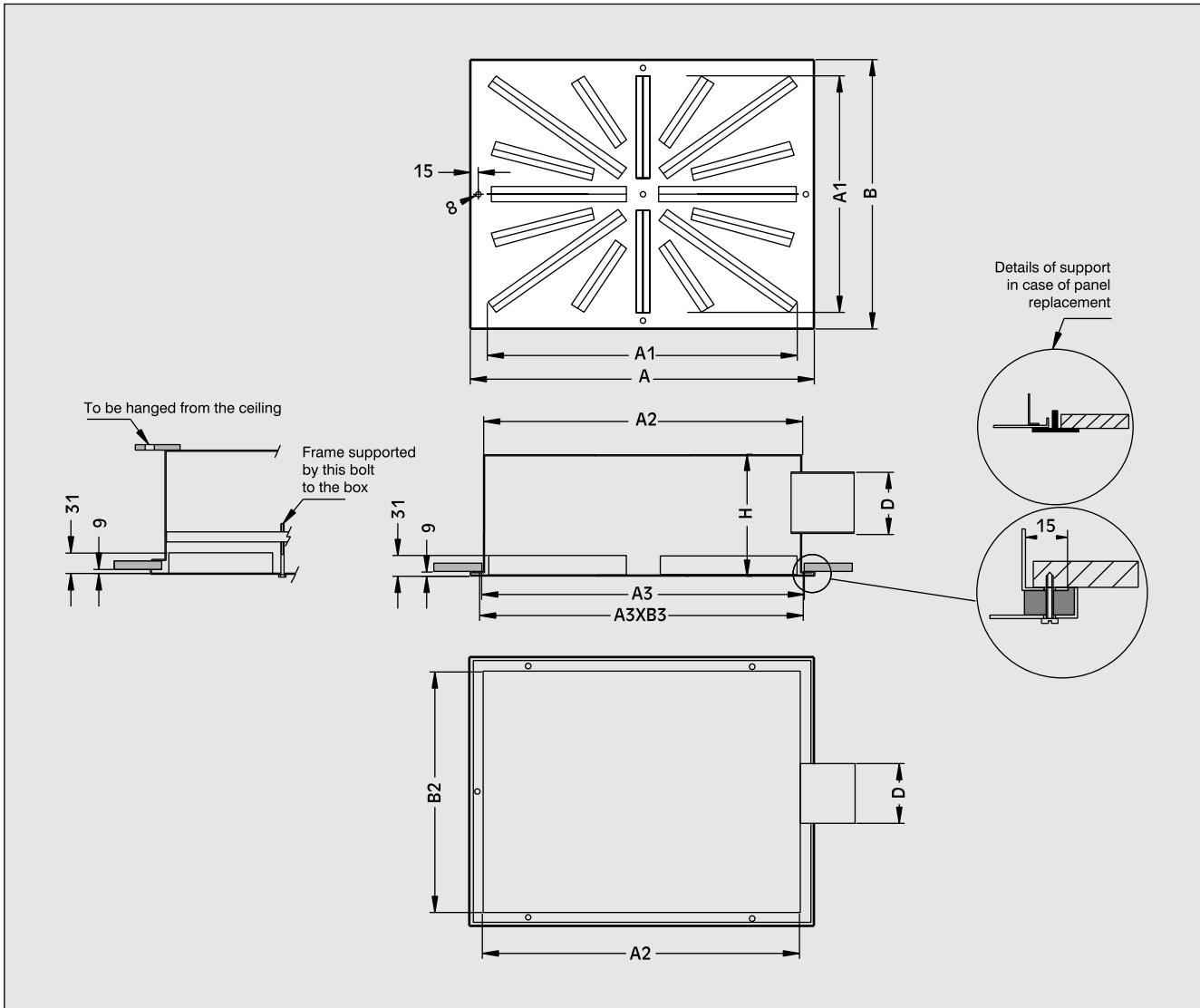


DIMENSION TABLE GR-RR

TYPE	A	A1	A2	A3	H	D
GR-RR-300	340	278	295	300	260	Φ 160
GR-RR-400	440	378	395	400	260	Φ 160
GR-RR-500	540	478	495	500	300	Φ 200
GR-RR-600	596	534	555	570	350	Φ 250

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DIMENSIONS GR-B



GR-B DIMENSION TABLE

TYPE	A	B	A1	B1	A2	B2	A3	B3	H	D
GR400X250	440	290	378	228	395	245	400	250	260	Φ 160
GR400X300	440	340	378	278	395	295	400	300	260	Φ 160
GR400X350	440	390	378	328	395	345	400	350	260	Φ 160
GR500X250	540	290	478	228	495	245	500	250	300	Φ 200
GR0500X300	540	340	478	278	495	295	500	300	300	Φ 200
GR500X350	540	390	478	328	495	345	500	350	300	Φ 200
GR600X250	596	290	534	228	555	245	560	250	350	Φ 250
GR600X300	596	340	534	278	555	295	560	300	350	Φ 251
GR600X350	596	390	534	328	555	345	560	350	350	Φ 252
GR700X250	740	290	678	228	695	245	700	250	400	Φ 300
GR700X300	740	340	678	278	695	295	700	300	400	Φ 300
Gr700X350	740	390	678	328	695	345	700	350	400	Φ 300
GR800X250	840	290	778	228	795	245	800	250	450	Φ 350
GR800X300	840	340	778	278	795	295	800	300	450	Φ 350
GR800X350	840	390	778	328	795	345	800	350	450	Φ 350

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For the GR diffuser selection the diagrams of the following pages are used, depending on the diffuser type.

Selection example.

For a space to be properly ventilated $5000 \text{ m}^3/\text{h}$ of air are required. The space has a height of 4 m. The acceptable noise level is 45 dBA and the selected diffusers are of GR-AA type.

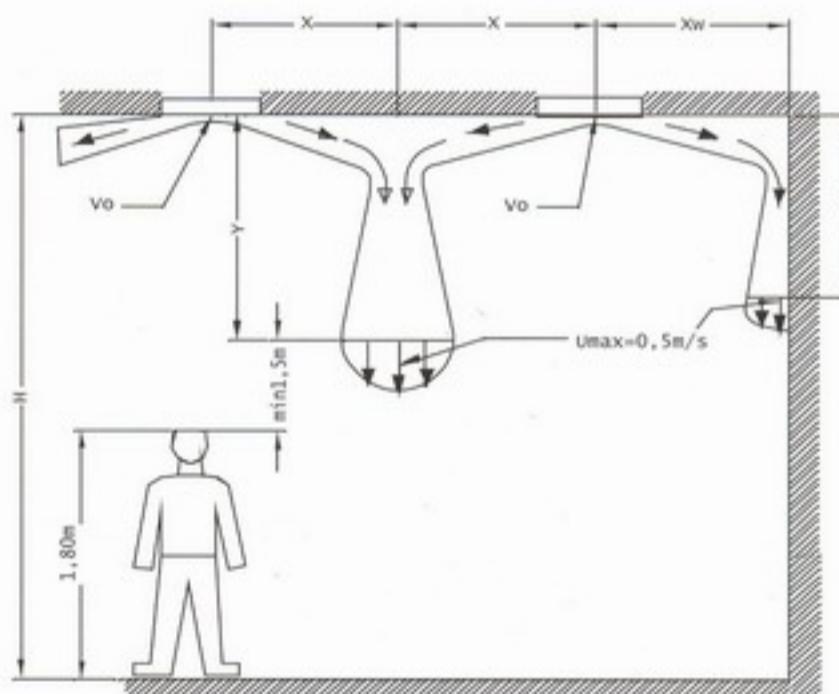
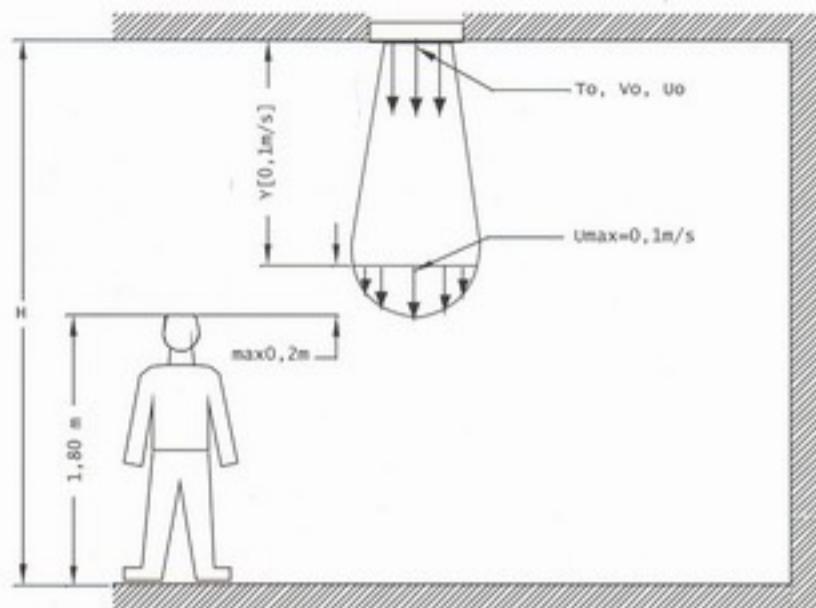
Heating application.

5 identical GR-AA diffusers are selected to be mounted on the ceiling, each providing $1000 \text{ m}^3/\text{h}$ of hot air -throw type A-. From the noise level diagrams it is evident that for 45 dBA the diffusers to be used are GR-AA-500 or larger.

The hot air should be entering the people moving area 1,8 m from the floor- that is 2,2 m from the ceiling. From the non-isothermal air jet diagram of the GR-AA-500 diffuser in vertical air projection for $1000 \text{ m}^3/\text{h}$ and for $\Delta T = 20^\circ\text{C}$, we get a throw of 2,5 m (for terminal velocity 0,1 m/s). Thus, the GR-AA-500 diffuser may be safely used to cover the previous need. For room temperature 25°C , the supply air temperature may rise up to 45°C .

Cooling application

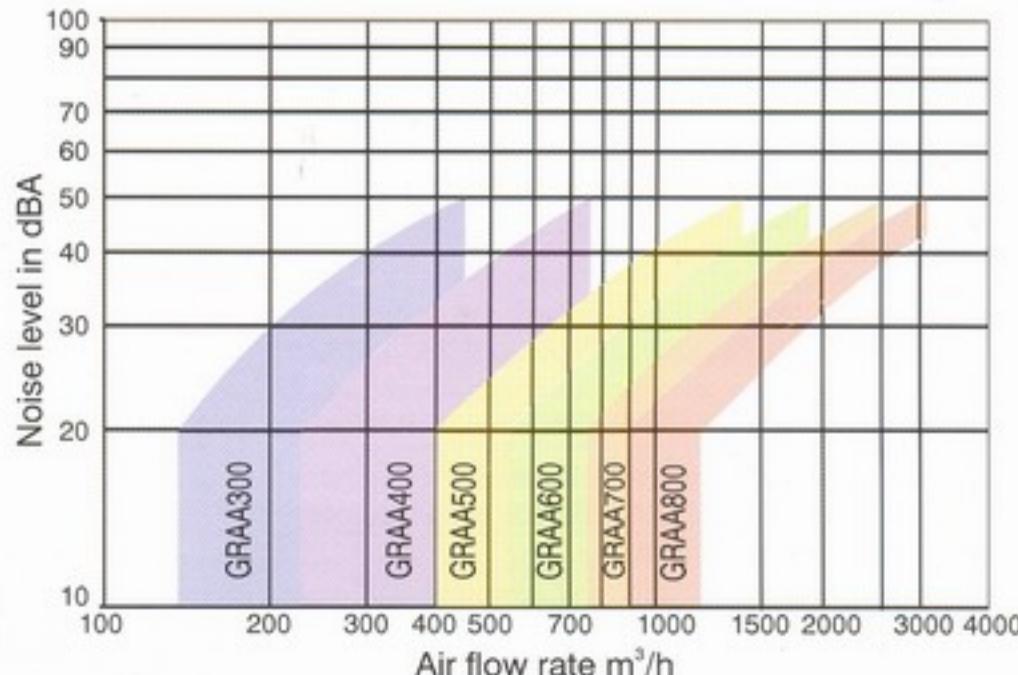
During the summer period we should make sure that no direct cool air streams enter the people moving area. Thus, throw type C should be used. From this throw type selection diagrams the adequate distance X between diffusers for vertical throw not more than 0,5 m is estimated to be less than $1,4 + 1,4 = 2,8 \text{ m}$. In this way we are sure that there are no intense downward flowing air streams due to air jet impingement from neighboring diffusers. The pressure requirement in this case $1000 \text{ m}^3/\text{h}$ is 49 Pa.



Fast selection.

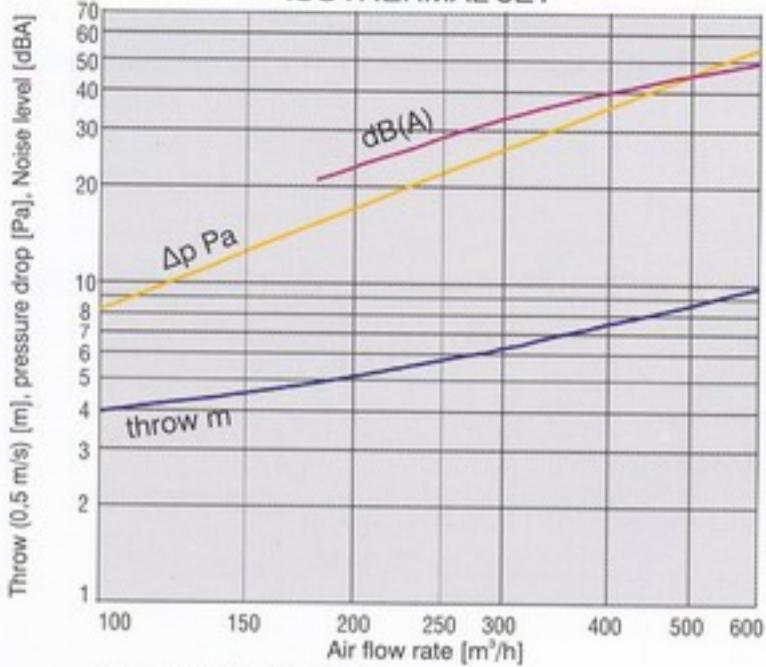
For fast selection of series GR diffusers the adjacent noise level diagram should be used. The way to make a selection is to estimate the adequate flow rate depending on the acceptable noise level.

In case GR diffusers are used in return air applications, the value estimated from the adjacent diagram should be reduced by 9 dBA.

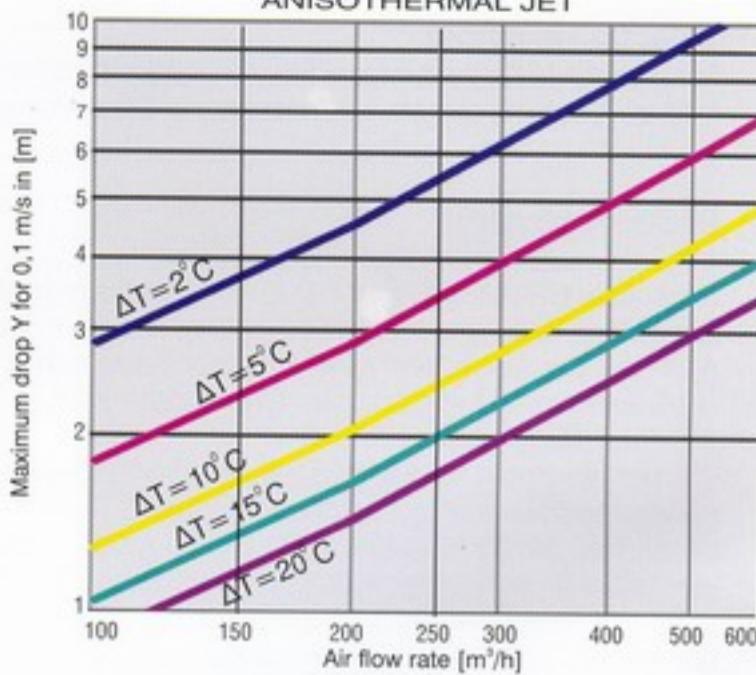


THROW TYPE A

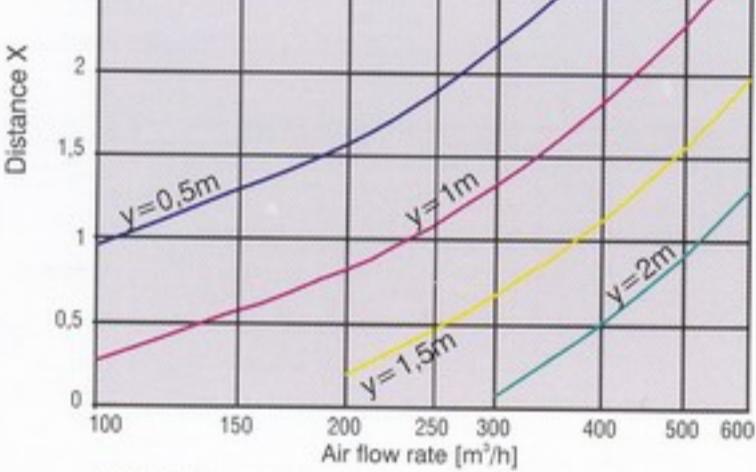
ISOTHERMAL JET



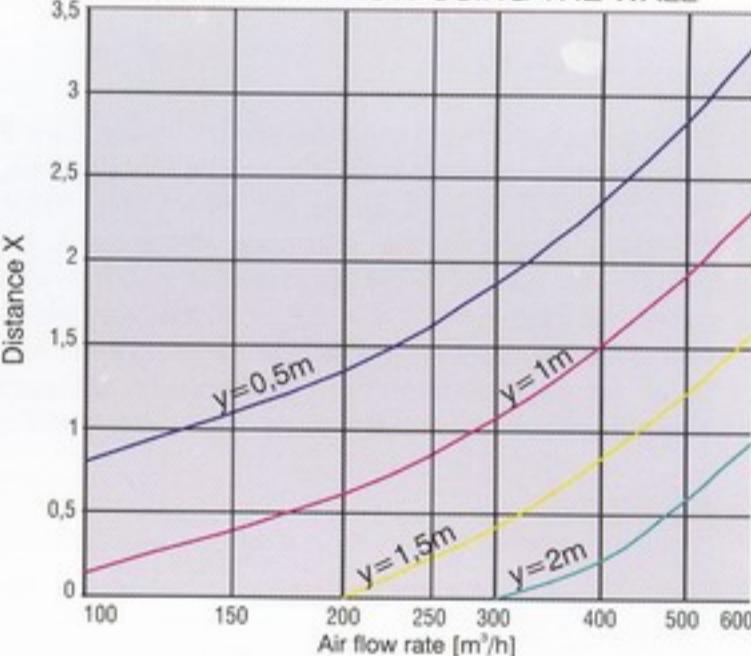
ANISOTHERMAL JET

**THROW TYPE B**

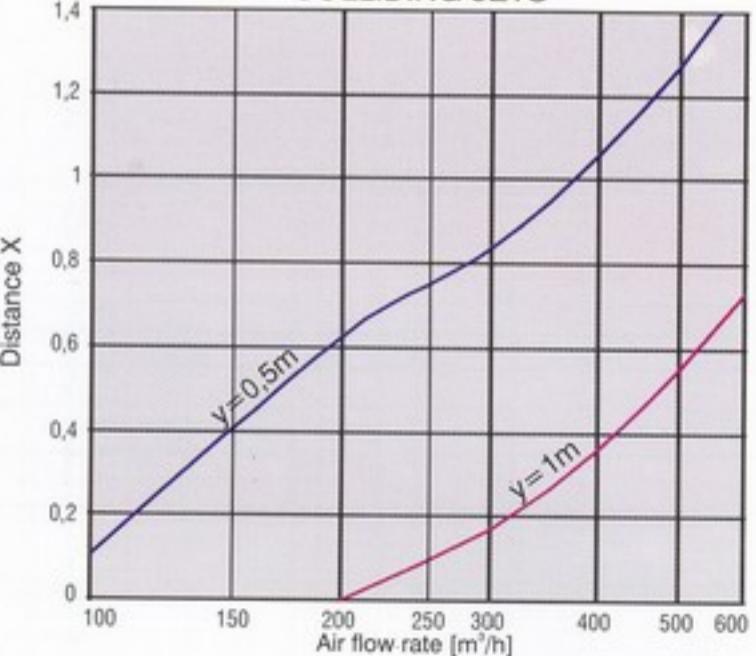
COLLIDING JETS



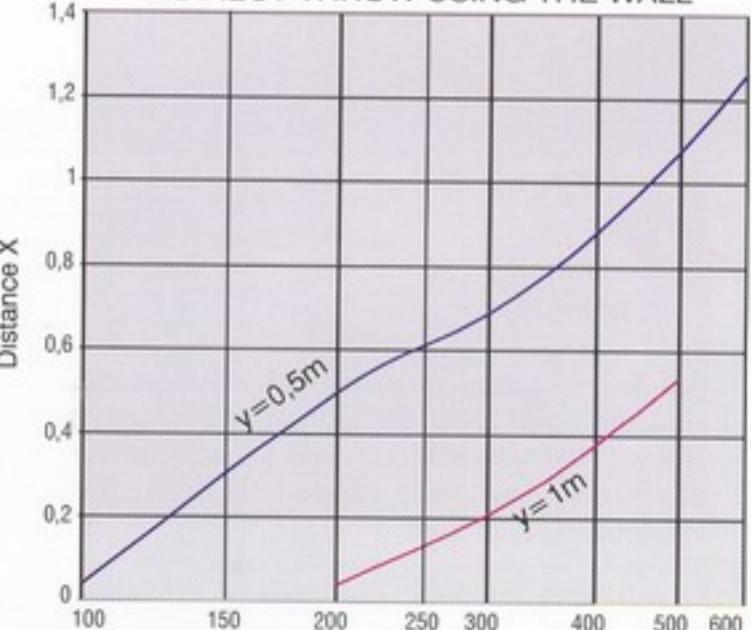
INDIRECT THROW USING THE WALL

**THROW TYPE C**

COLLIDING JETS



INDIRECT THROW USING THE WALL



CIRCULAR OPENING DISTRIBUTION

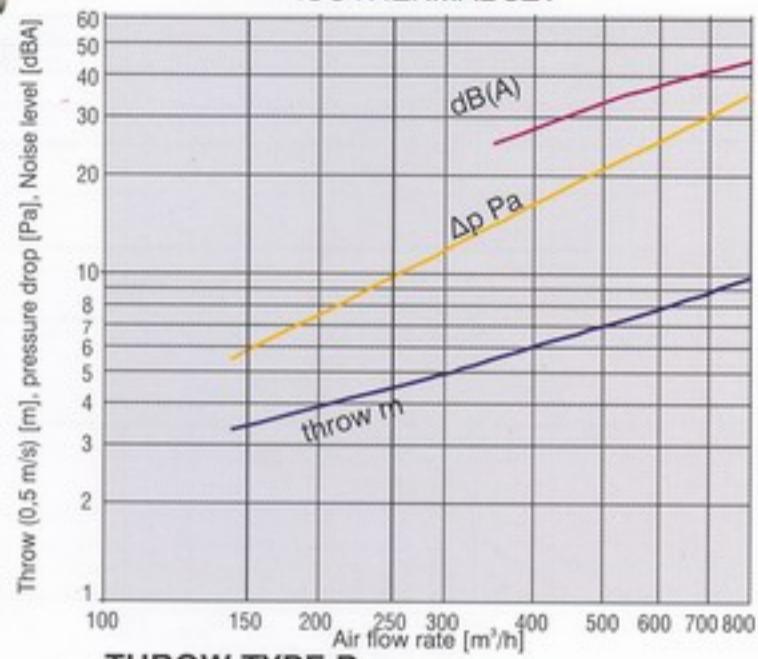
TYPE GR-AR300	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
	1,48	1,1	1,1	5,8
RECTANGLE FRAME DIFFUSERS				
TYPE GR400X250 B	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
	0,8	0,95	0,95	-2,7

For determining the characteristics of GR diffusers of types other than GR-AA-, the correction factors of the table(s) should be used

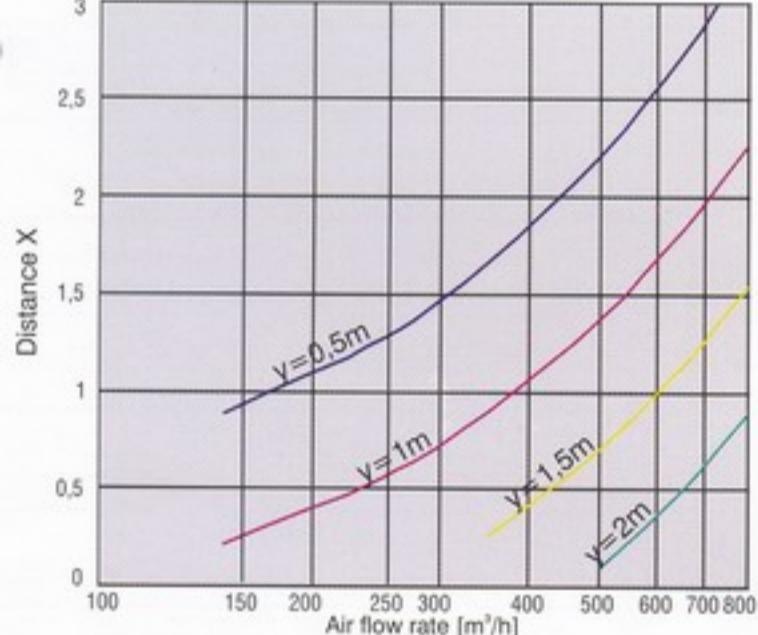
Due to continuous development of its products, AEROGAMMI reserves the right of modifications without prior notice.

THROW TYPE A

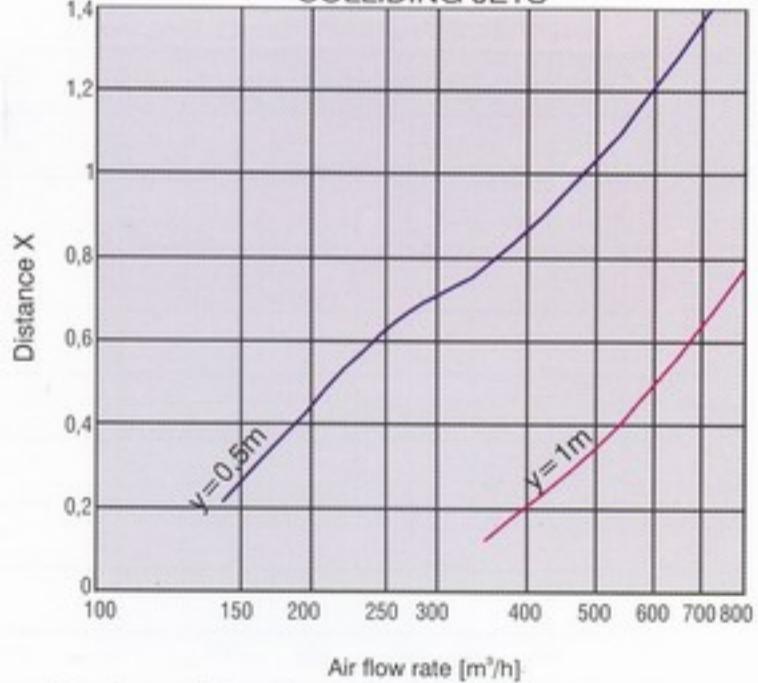
ISOTHERMAL JET

**THROW TYPE B**

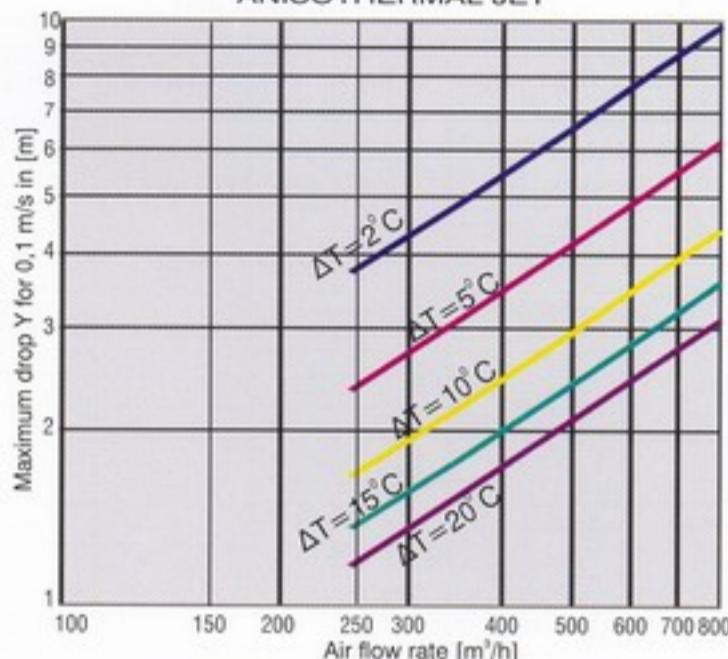
COLLIDING JETS

**THROW TYPE C**

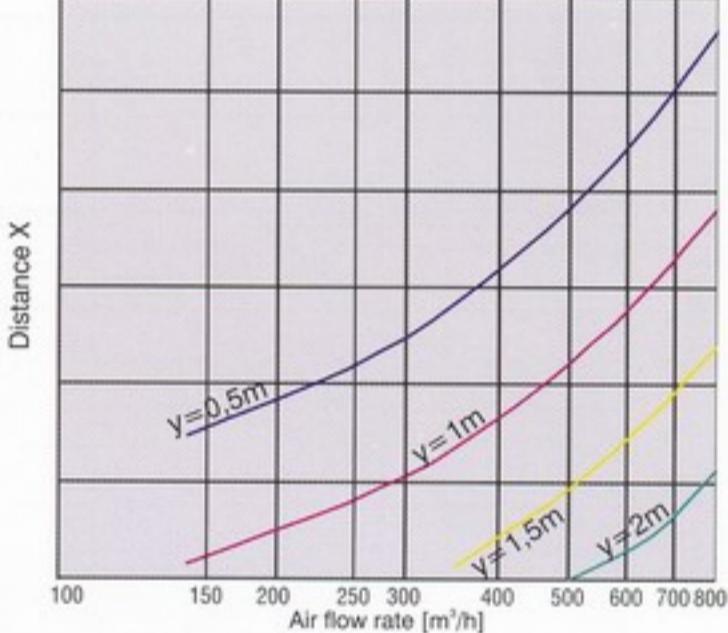
COLLIDING JETS



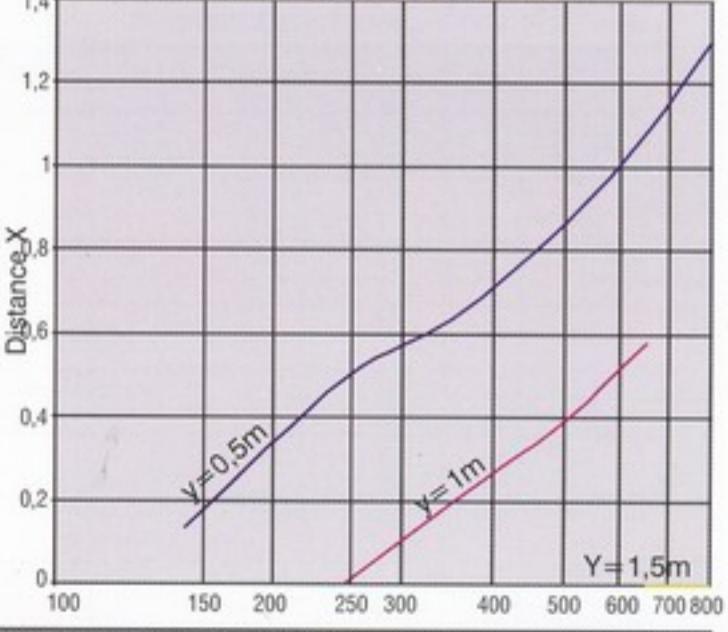
ANISOTHERMAL JET



INDIRECT THROW USING THE WALL



INDIRECT THROW USING THE WALL



RECTANGLE FRAME DIFFUSERS

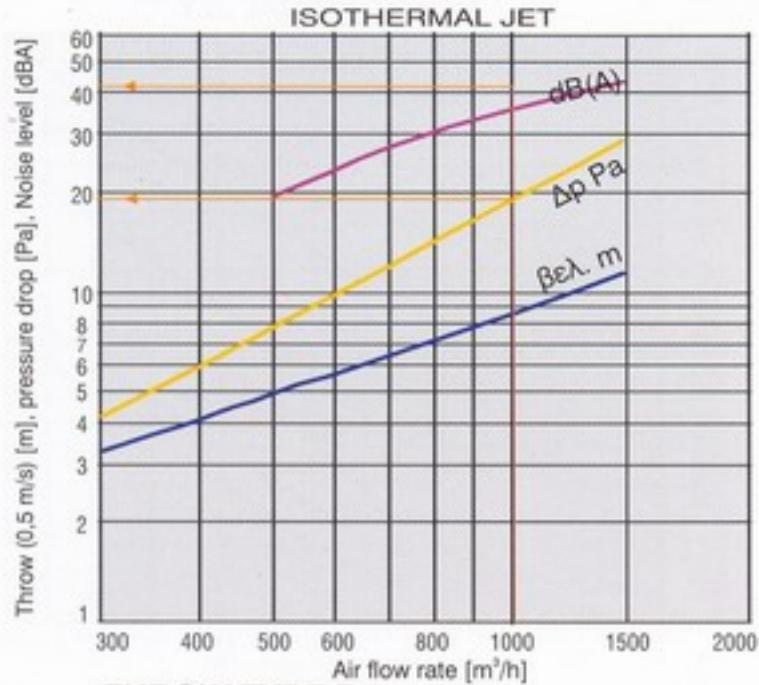
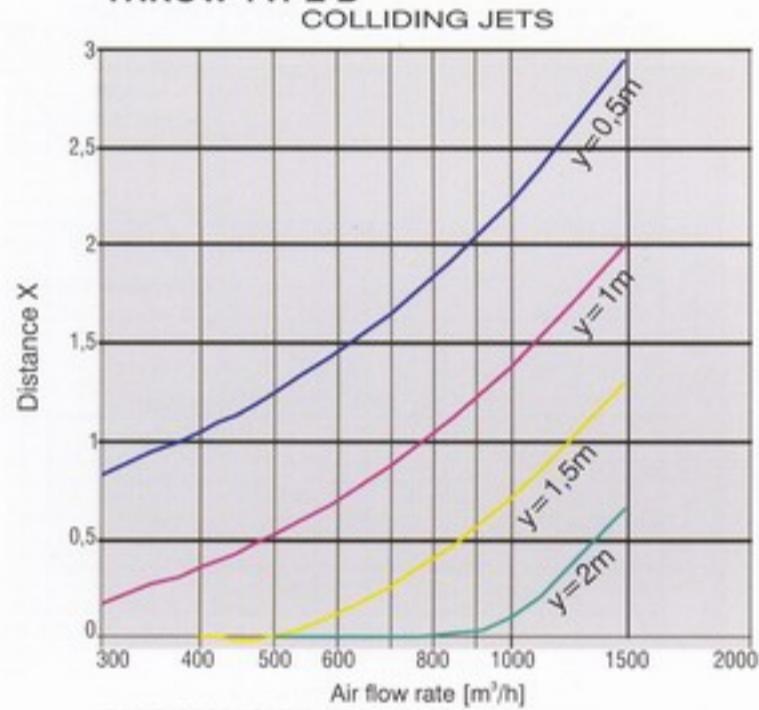
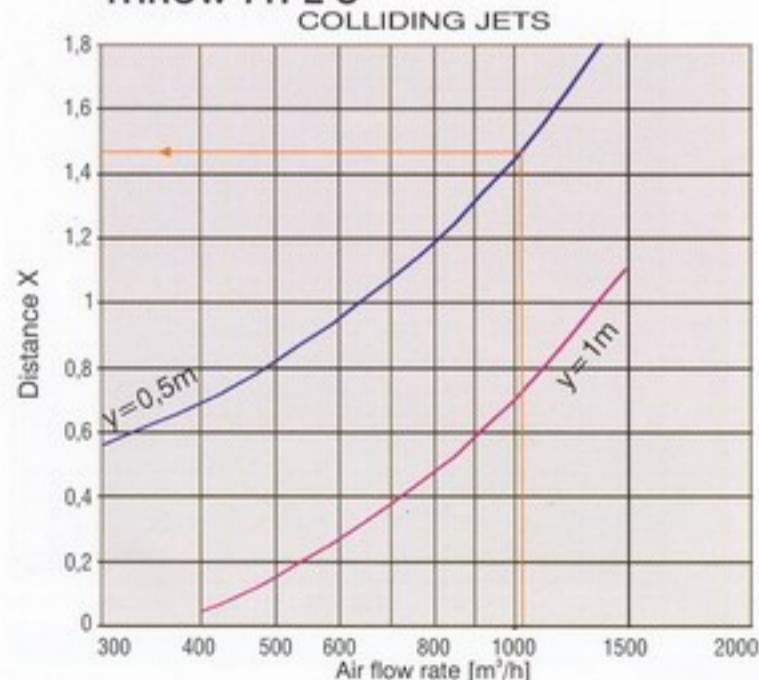
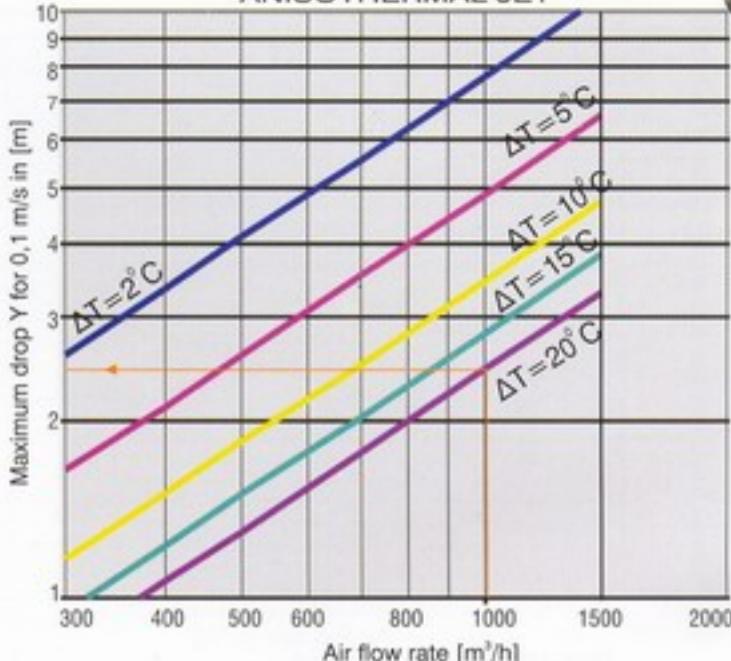
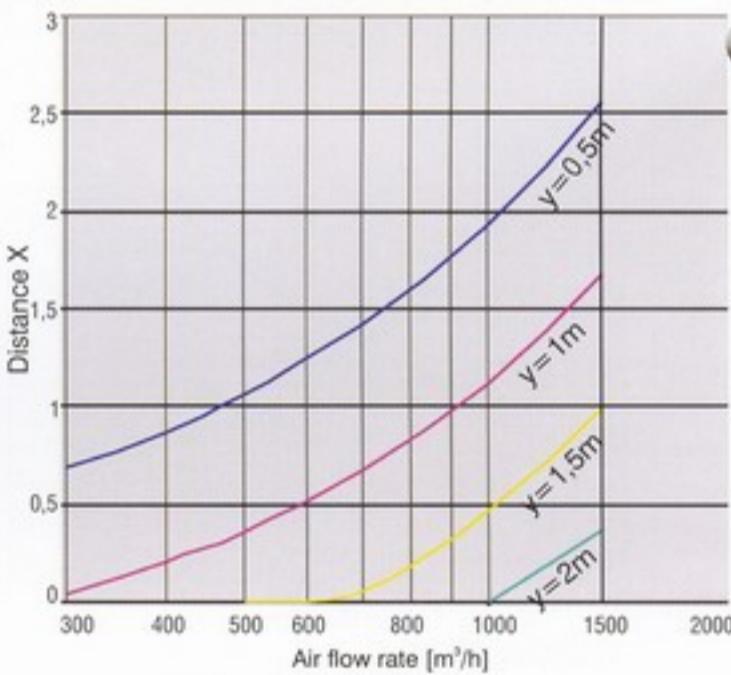
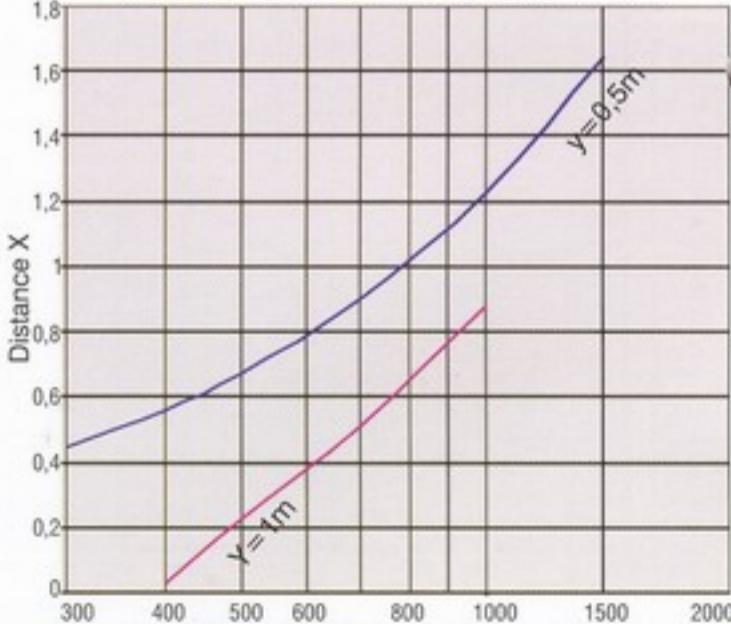
TYPE	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
GR400X300 B	1,4	1,1	1,1	4,9
GR400X350 B	1,1	1	1	1,6
GR500X250 B	1,35	1,1	1,1	4,5
GR500X300 B	1,1	1	1	1,4
GR500X350 B	0,9	0,95	0,95	-1,8
GR600X250 B	1,2	1,05	1,05	2,8
GR600X300 B	1	1	1	-0,3
GR600X350 B	0,8	0,92	0,92	-3,5

For determining the characteristics of GR diffusers of types other than GR-AA-, the correction factors of the table(s) should be used

GR-AR400 CIRCULAR OPENING DISTRIBUTION

TYPE GR-AR400	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
	1,45	1,1	1,1	5,5

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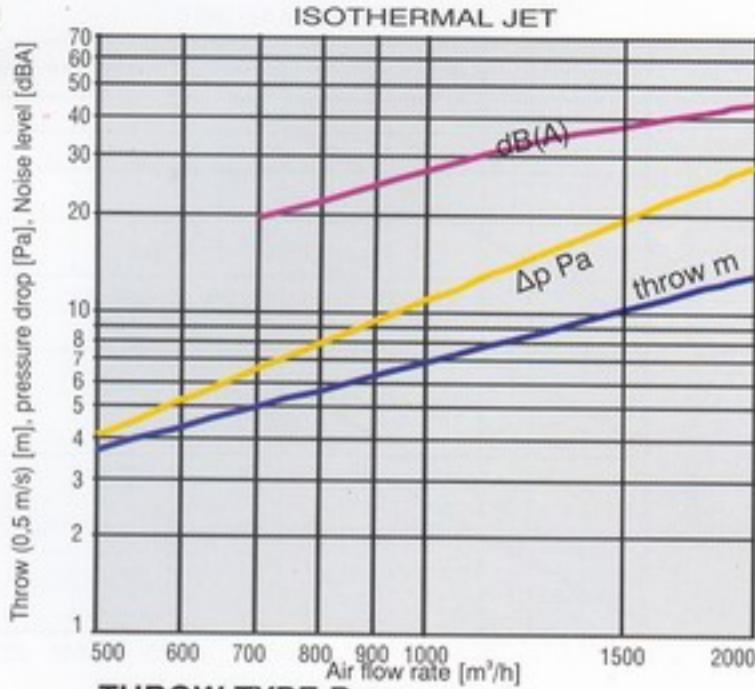
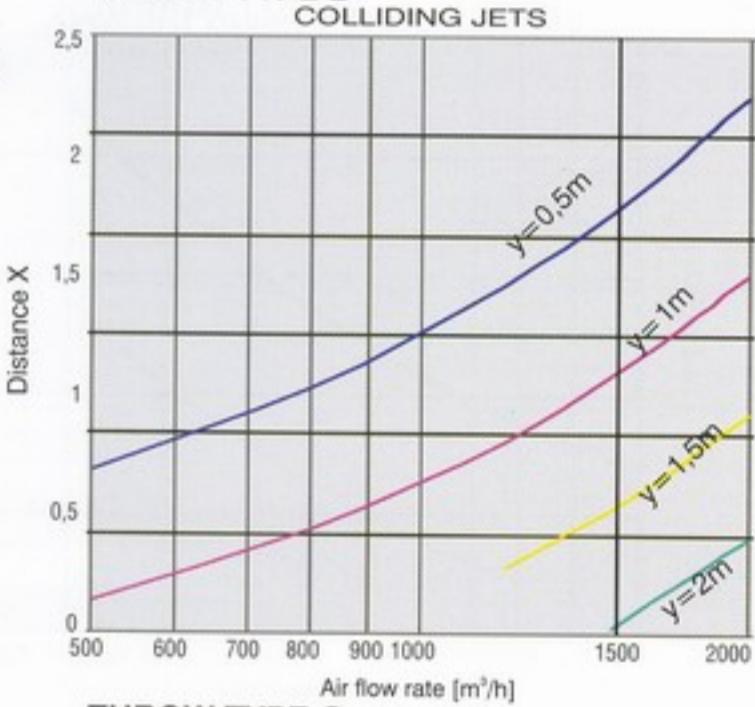
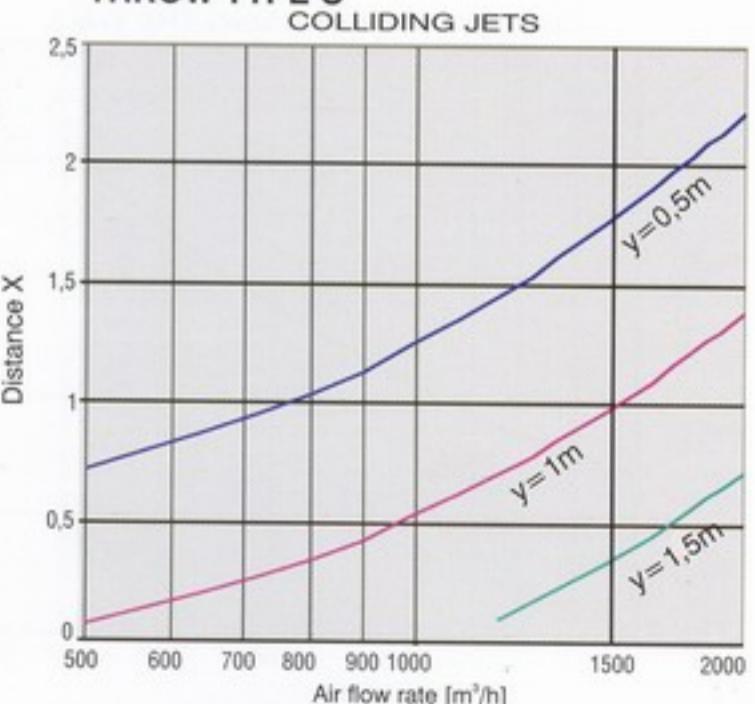
THROW TYPE A**THROW TYPE B****THROW TYPE C****ANISOTHERMAL JET****INDIRECT THROW USING THE WALL****INDIRECT THROW USING THE WALL****RECTANGLE FRAME DIFFUSERS**

TYPE	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
GR700X250 B	2	1.25	1.25	10.4
GR700X300 B	1.6	1.15	1.15	7.2
GR700X350 B	1.35	1.1	1.1	4.4
GR800X250 B	1.8	1.2	1.2	8.9
GR800X300 B	1.5	1.12	1.12	5.7
GR800X350 B	1.2	1.05	1.05	3.0

For determining the characteristics of GR diffusers of types other than GR-AA-, the correction factors of the table(s) should be used

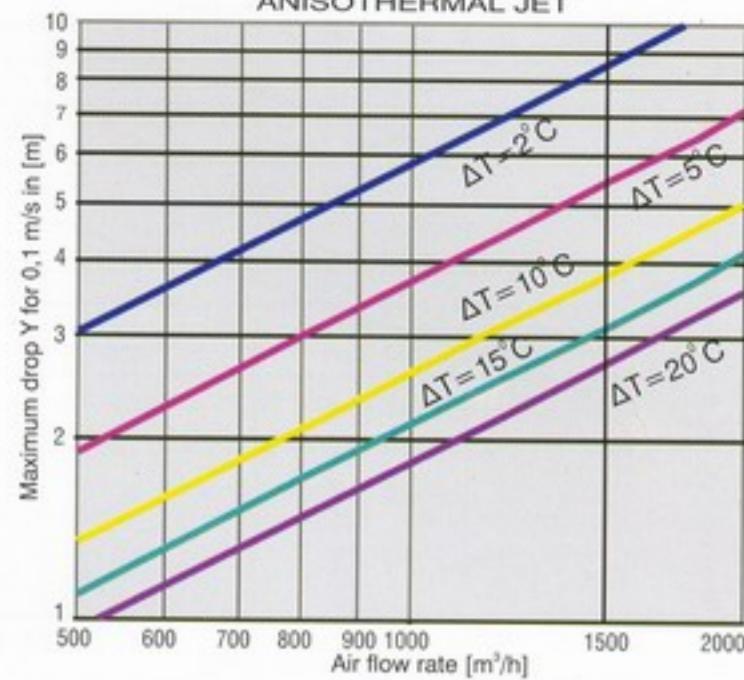
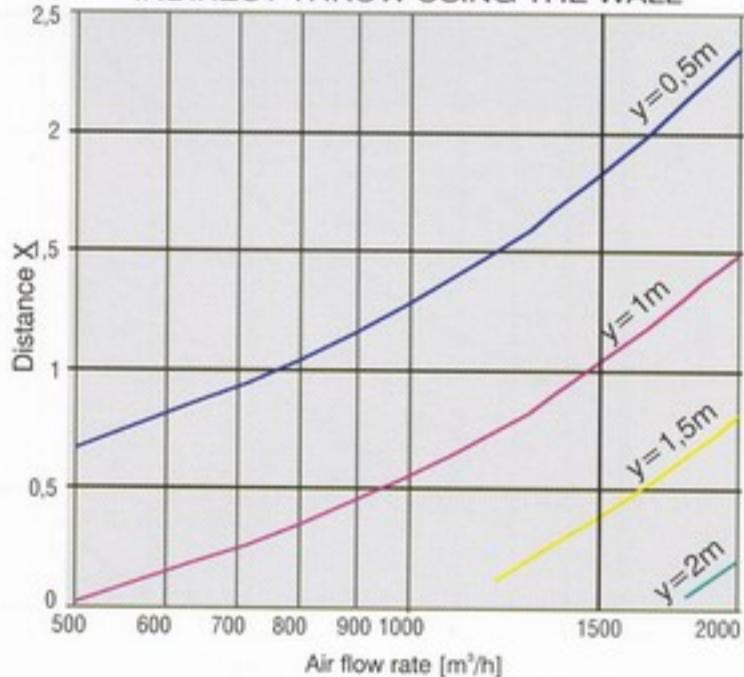
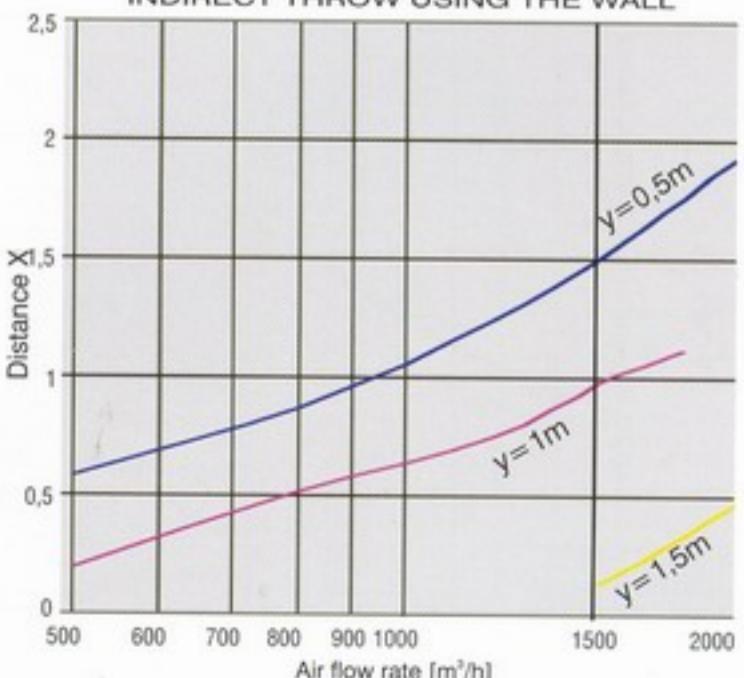
GR-AR500 CIRCULAR OPENING DISTRIBUTION

TYPE GR-AR500	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
	1.42	1.1	1.1	5.2

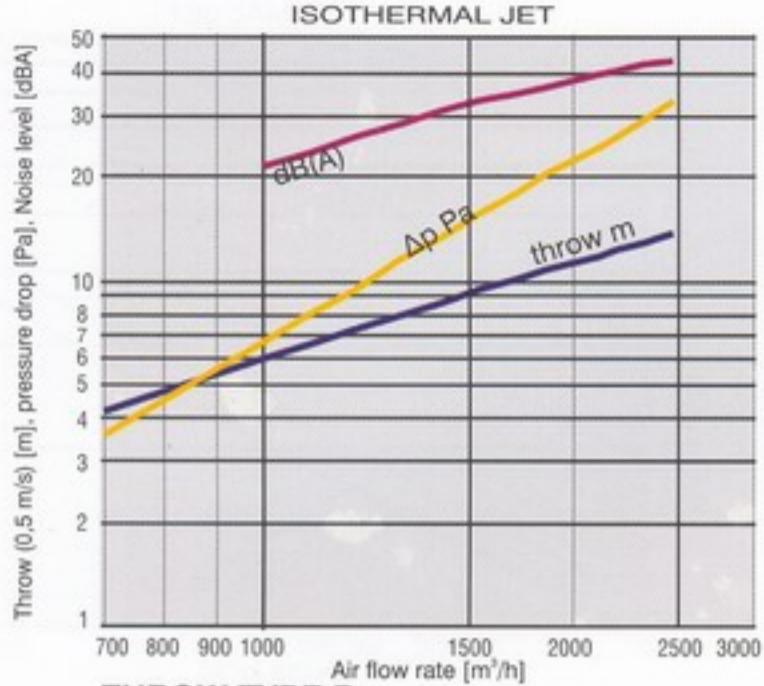
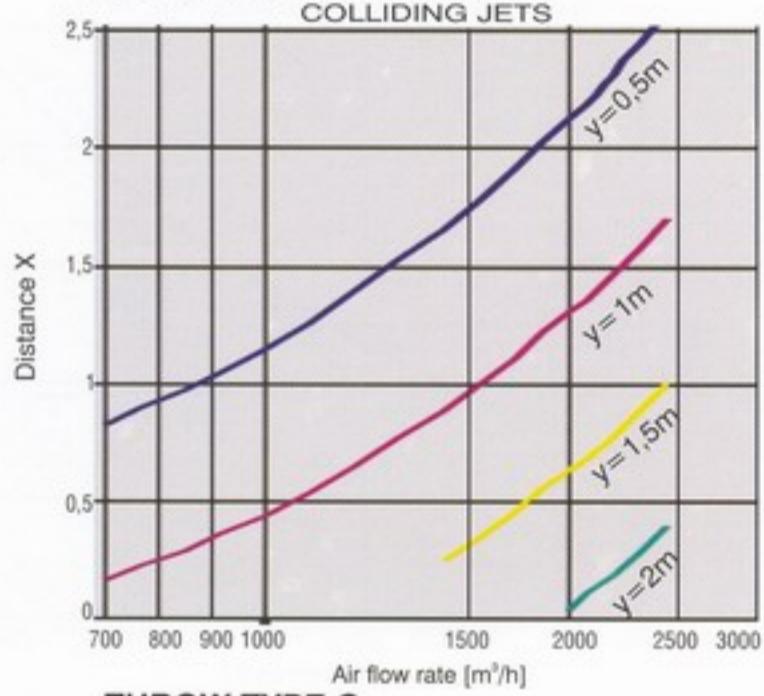
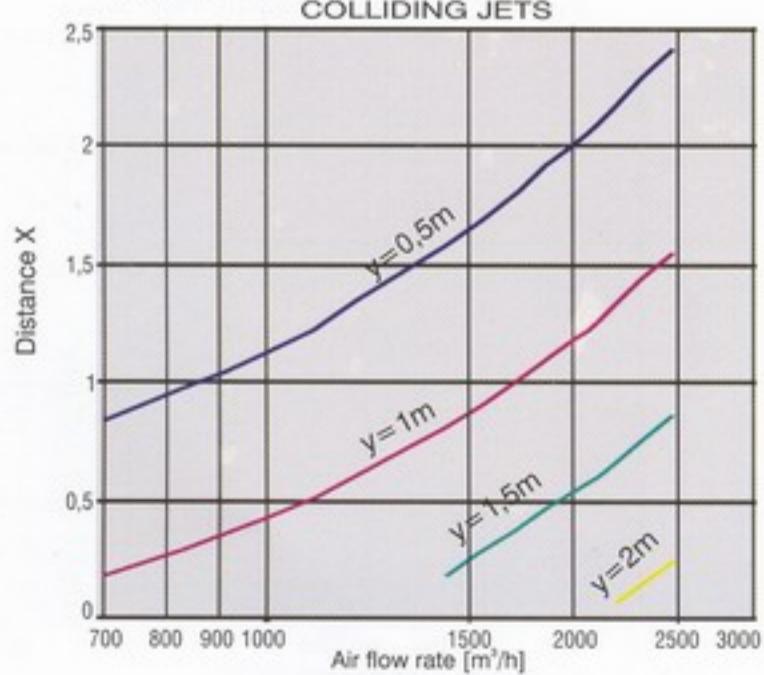
THROW TYPE A**THROW TYPE B****THROW TYPE C**

For determining the characteristics of GR diffusers of types other than GR-AA-, the correction factors of the table(s) should be used

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

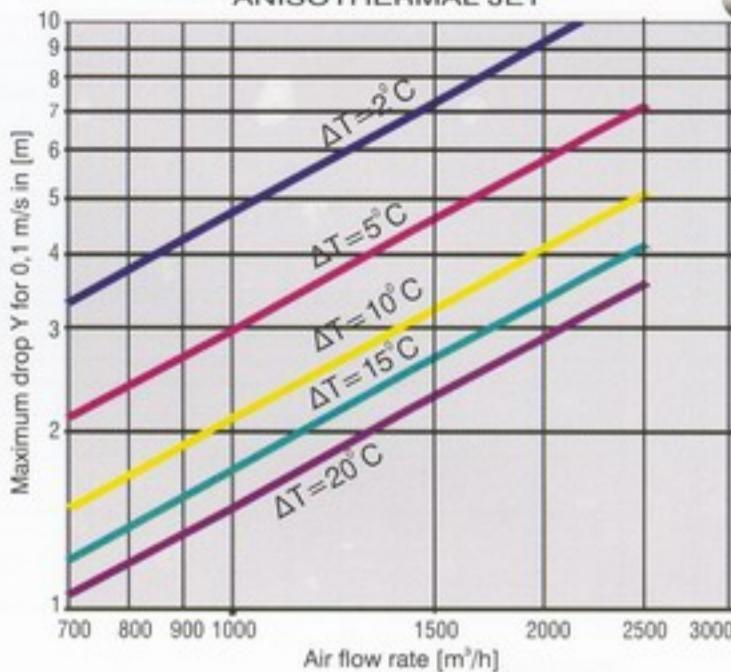
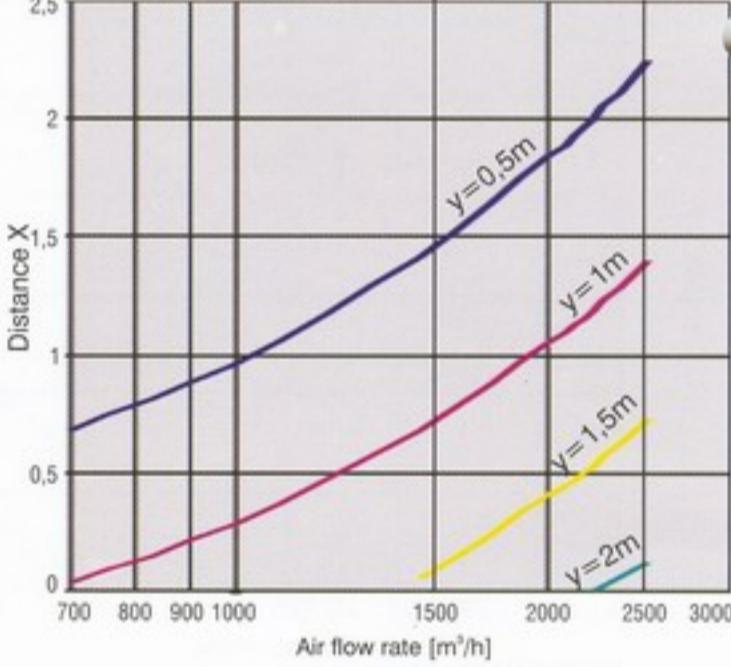
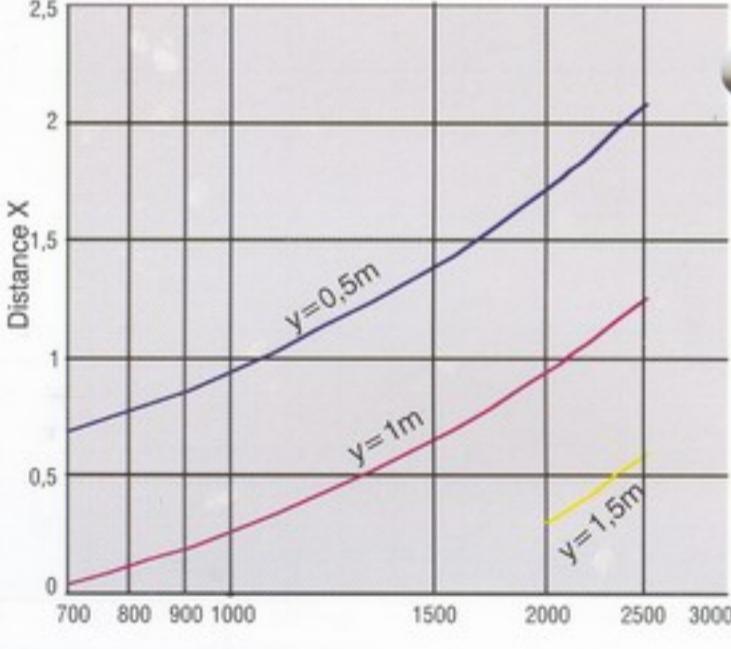
ANISOTHERMAL JET**INDIRECT THROW USING THE WALL****INDIRECT THROW USING THE WALL****GR-AR600 CIRCULAR OPENING DISTRIBUTION**

TYPE GR-AR600	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
	1,4	1,1	1,1	4,7

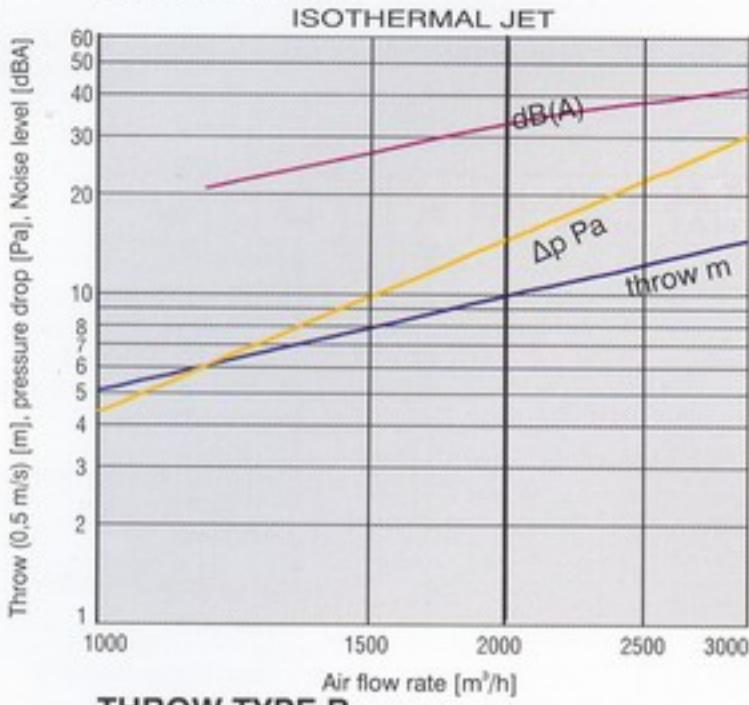
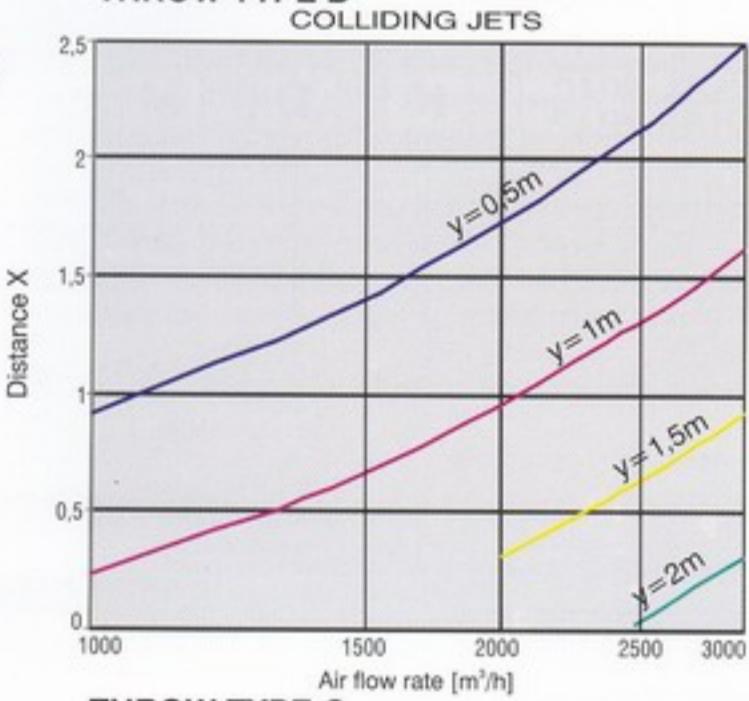
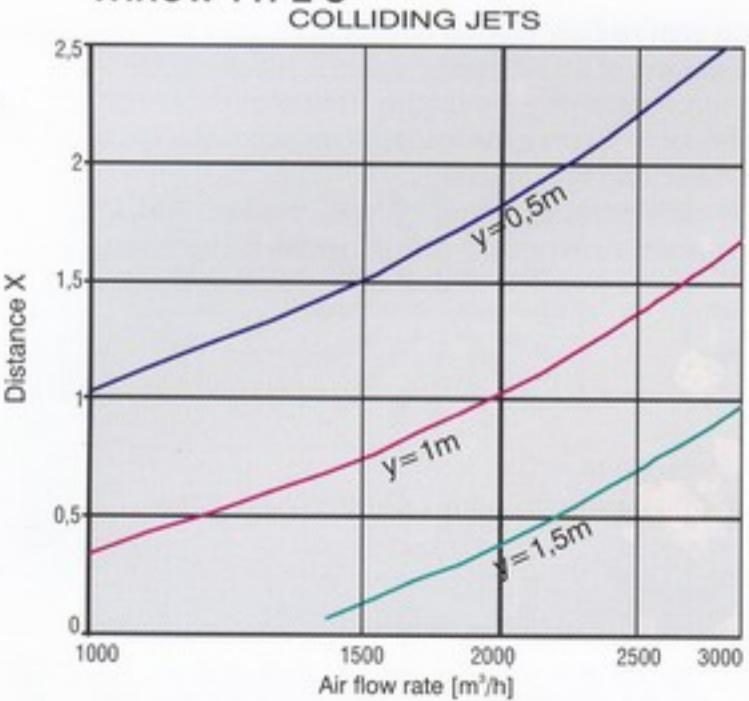
THROW TYPE A**THROW TYPE B****THROW TYPE C**

For determining the characteristics of GR diffusers of types other than GR-AA-, the correction factors of the table(s) should be used

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

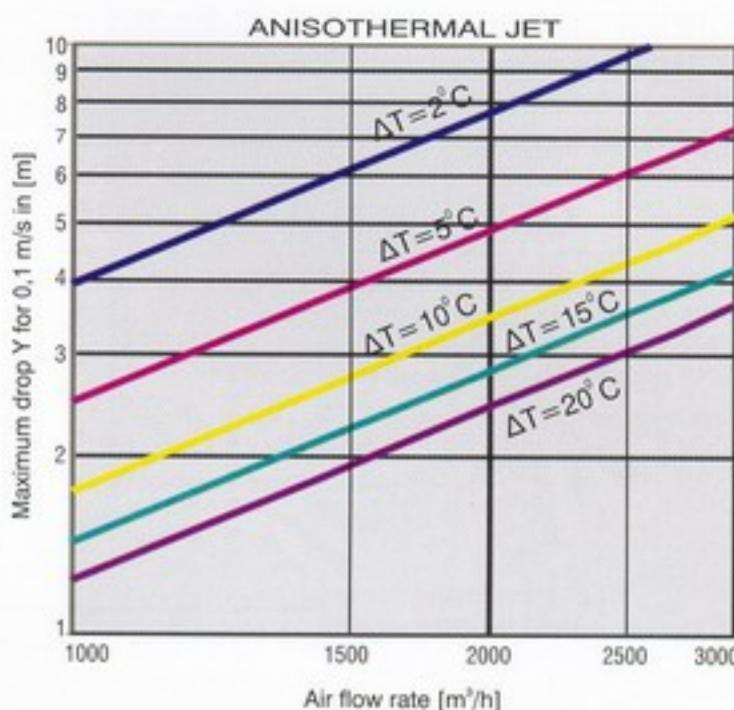
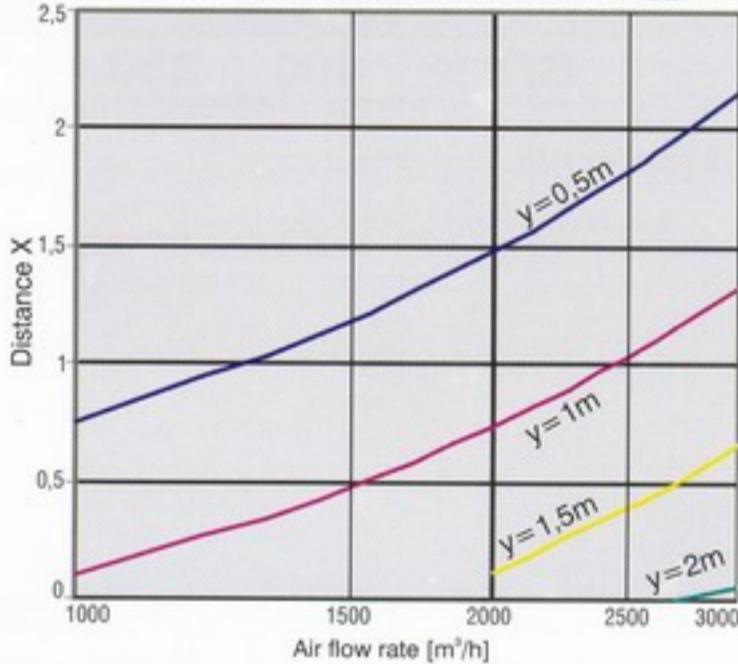
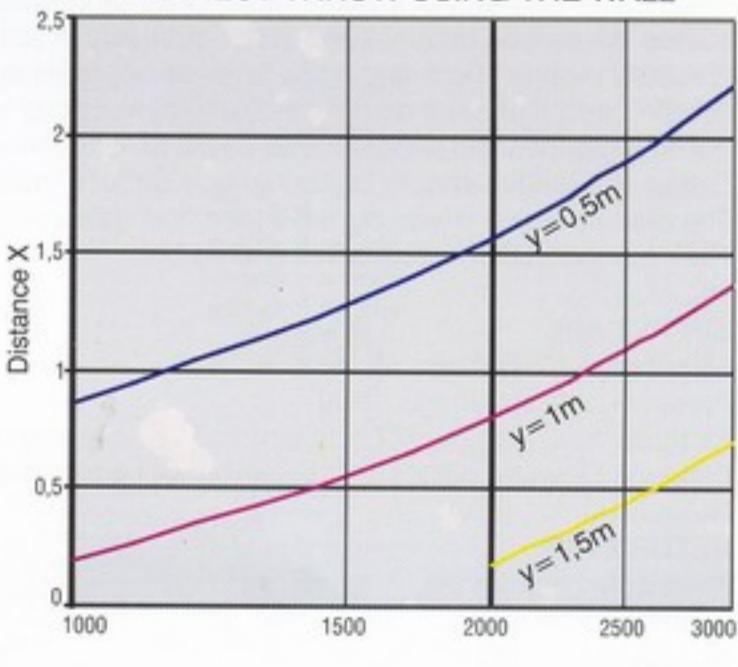
ANISOTHERMAL JET**INDIRECT THROW USING THE WALL****INDIRECT THROW USING THE WALL****GR-AR700 CIRCULAR OPENING DISTRIBUTION**

TYPE GR-AR700	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
	1,4	1,1	1,1	4

THROW TYPE A**THROW TYPE B****THROW TYPE C**

For determining the characteristics of GR diffusers of types other than GR-AA-, the correction factors of the table(s) should be used

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

**INDIRECT THROW USING THE WALL****INDIRECT THROW USING THE WALL****GR-AR800 CIRCULAR OPENING DISTRIBUTION**

TYPE GR-AR800	Pressure coefficient	Throw coefficient	Anisoth. jet coefficient	Quantity to be added for noise level [dBA]
	1,35	1,1	1,1	3,8

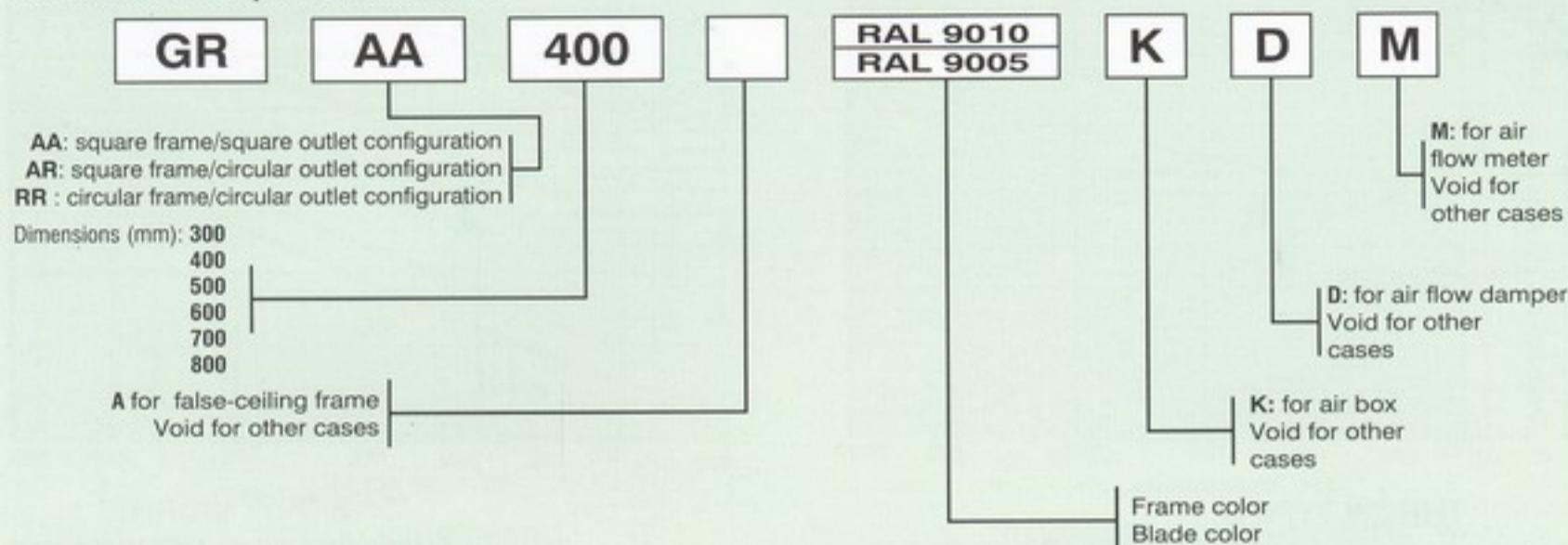
CEILING DIFFUSERS -SERIES GR- Order guidelines

technical description

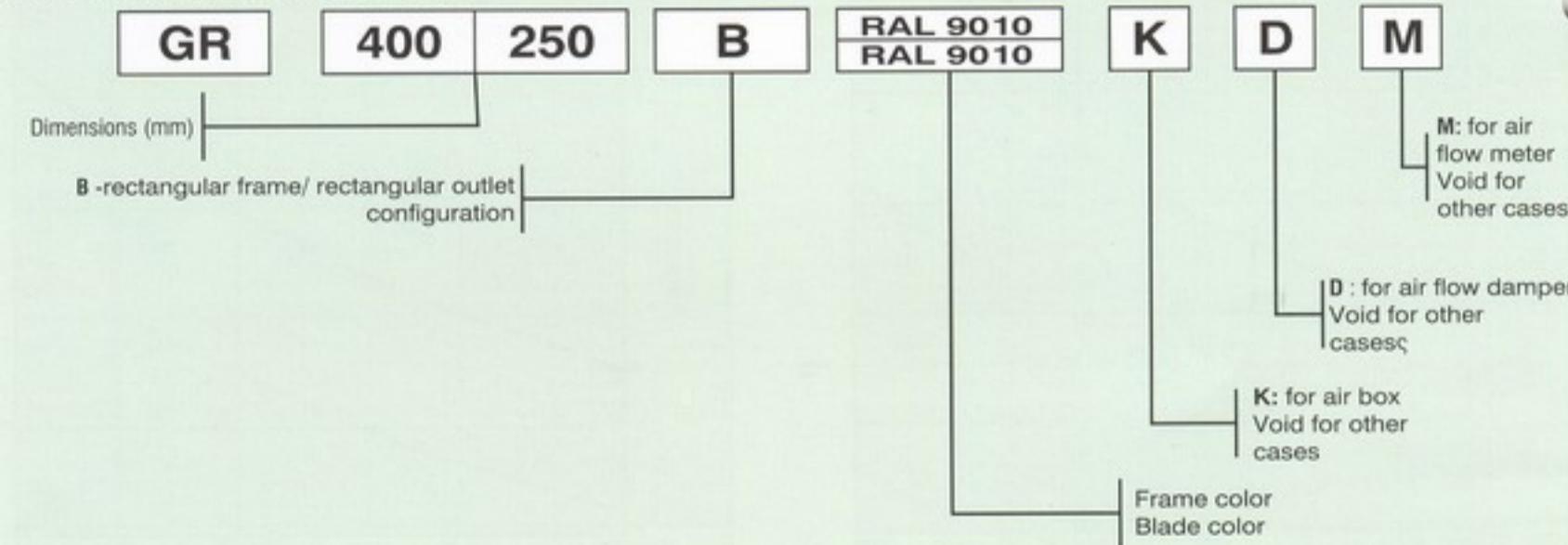
ORDER GUIDELINES GR-AA 400 RAL 9010 RAL 9005 D

A series of numbers and letters is used to order GR series grilles. The characteristics of the air grille are defined according to the following code:

Diffusers with square/round base



Diffusers with rectangular base



Technical description GR

Metal frame diffusers of square, rectangular or circular cross-section with radially placed outlets equipped with adjustable blades. Air can be manipulated either manually or automatically by means of an internally installed mechanism.

Pressure requirements and noise level do not differ substantially when positioning the blades. Diffusers should be coupled with a plenum box of adequate dimensions with or without flow measuring and control devices. Manipulation of the flow damper and supply meter could be done easily even after mounting the diffuser.

Frame and blades should be both made out of metal and electrostatically painted (frame : RAL..., blades : RAL....).

The plenum box is made out of Zinced and galvanized 0,7 mm thick plate. An isolating strip provides air tightness.

Their operational characteristics should be :

SUPPLY AIR

Air supply : [m³/h]

Pressure drop (total) : [Pa]

Air throw : [m] (for 0,1 m/s terminal velocity and temperature difference of .. °C)

Distance between diffusers or between wall and diffuser : ... [m] (for 0,5 m drop from the ceiling, type C throw)

Noise level : [dBA]

RETURN AIR

Air supply : [m³/h]

Pressure drop (total) : [Pa]

Noise level : ... [dBA]



End of Makrigianni street (over ring-road of Thessaloniki)
570 13 Thessaloniki - Tel: +30/2310 682.572 - Fax: +30/2310 685.047
www.aerogrammi.gr, e-mail:info@aerogrammi.gr

BLADE ANGLE ADJUSTMENT WITH ELECTRIC ACTUATOR



AC 220V ON-OFF AC/DC 24V ON-OFF:

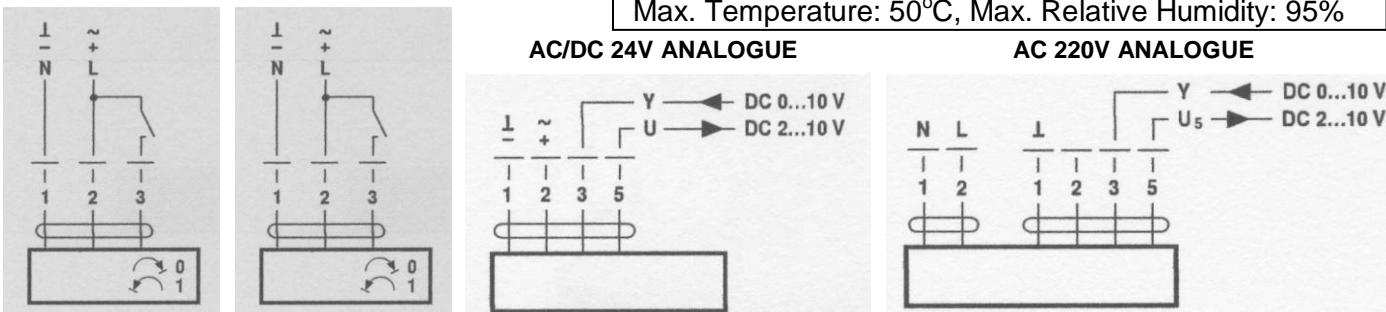
There are two types of actuators where are used for the adjustment of the blades angle: on-off (2 points) or analogue. The on-off actuator allows us, using a switch which gives or interrupts the electric power in the contact No 3, to give to the diffuser blades two different angles. In cooling mode the blades are in side position and all to the same direction (swirl). In heating mode the blades are in vertical position. The analogue actuators allow us, using a 0-10V potentiometer which gives signal in the contact No 3, to adjust the blades angle in any position between two limit positions (cooling (side) – heating (vertical)). In the analogue actuators we use the contact No 5 signal to “read” the position of the electric actuator (position feedback). The actuator installation is possible in the types: GR-AR, GR-AR-A and GR-RR. For example: GR-AR-500-ANALOGUE-24V.

For the electric actuators:

Max. Temperature: 50°C, Max. Relative Humidity: 95%

AC/DC 24V ANALOGUE

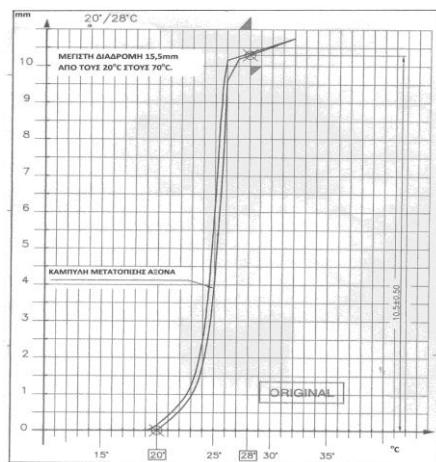
AC 220V ANALOGUE



AUTOMATIC BLADE ANGLE ADJUSTMENT WITH THERMAL ACTUATOR (GR-....-AUTH)



The automatic adjustment of the blades angle is succeeded with a thermal actuator which according to the supply air temperature moves an axis. This movement is very intensive between 20-28°C, outside this temperature area the movement very small.



Usually the supply air temperature in cooling is below 20°C and in heating is over 28°C. We can use this phenomenon with a proper motion transmission mechanism to adjust the blades angle in the position of cooling or heating. The installation of the automatic blade angle adjustment mechanism is possible in the types GR-AR, GR-AR-A and GR-RR up to size 600. The big advantage in this case is that we install the diffuser like a simple one and we forget it, and that we have not the cost of the electric installation like the diffusers with electric actuator.

For example: GR-AR-A-AUTH-400.

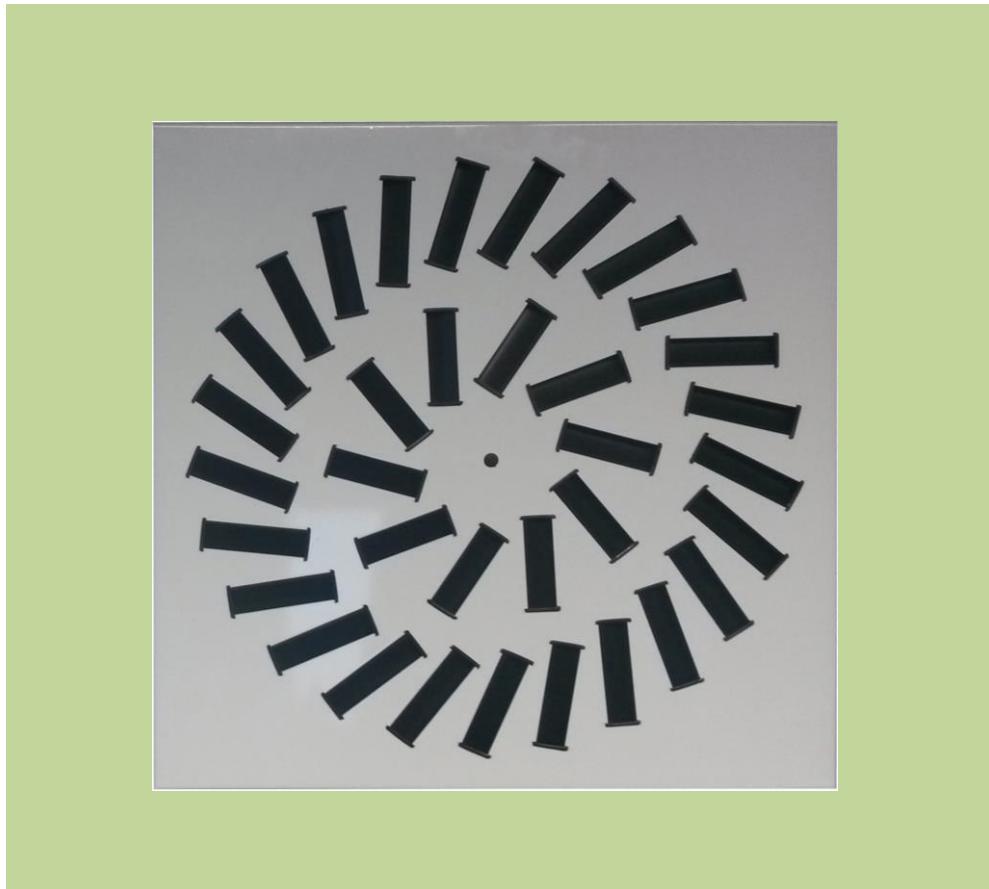


AEROGRAMMI S.A.
DESIGN AND MANUFACTURE OF GRILLES AND SPECIAL AIR CONDITIONING COMPONENTS



CEILING SWIRL DIFFUSER

GR-T





GR-T

DESCRIPTION

The GR-T swirl diffuser is for ceiling installation and supply or return air applications. For low or medium height rooms. With adjustable blades. The air throw could be vertical (heating) or swirl parallel to the ceiling (cooling), this way there is high mixing rate of the supply air with the room air. As a result low air velocity in the living area and high thermal comfort are achieved.

They have square plate (as standard) or round (GR-T-RR, in this case the external diameter of the diffuser is the same with the external dimension of the GR-T in the same size). The square GR-T with smaller size of 595X595mm (outside dimension) they can be manufactured in plate with outside dimensions 595X595mm and keep the same active size (GR-T-A).

MATERIALS

The swirl diffuser GR-T is manufactured by steel sheet electrostatically painted in RAL color. The blades are plastic, black or white.

WAY OF FIXING

The swirl diffuser GR-T when we have false ceiling with gypsum board is fixed with visible screws (standard) or with secret fixing with Π frame (KSP, with extra charge). If there is false ceiling with 600X600mm plates then we can install the versions GR-T-...-595-XT or GR-T-A-....-XT with external dimensions 595X595mm directly in the false ceiling (-XT: without holes for screws).

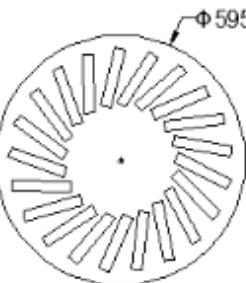
DIMENSIONS

TYPE	BLADES No	PLENUM OPENING (mm)	OUTSIDE DIMENSION (mm)	GR-T-RR OUTSIDE DIAMETER (mm)
GR-T-7/300	7	300X300	340X340	340
GR-T-14/400	14	400X400	440X440	440
GR-T-21/500	21	500X500	540X540	540
GR-T-21/595	21	555X555	595X595	595
GR-T-35/595	35	555X555	595X595	595

WAY OF ORDER

GR-T-_____

Blades No | Size | -XT or -KSP if they exist
Blades color
Plate color
-RR or -A if they exist



GR-T-14/400-A

GR-T-21/595-RR



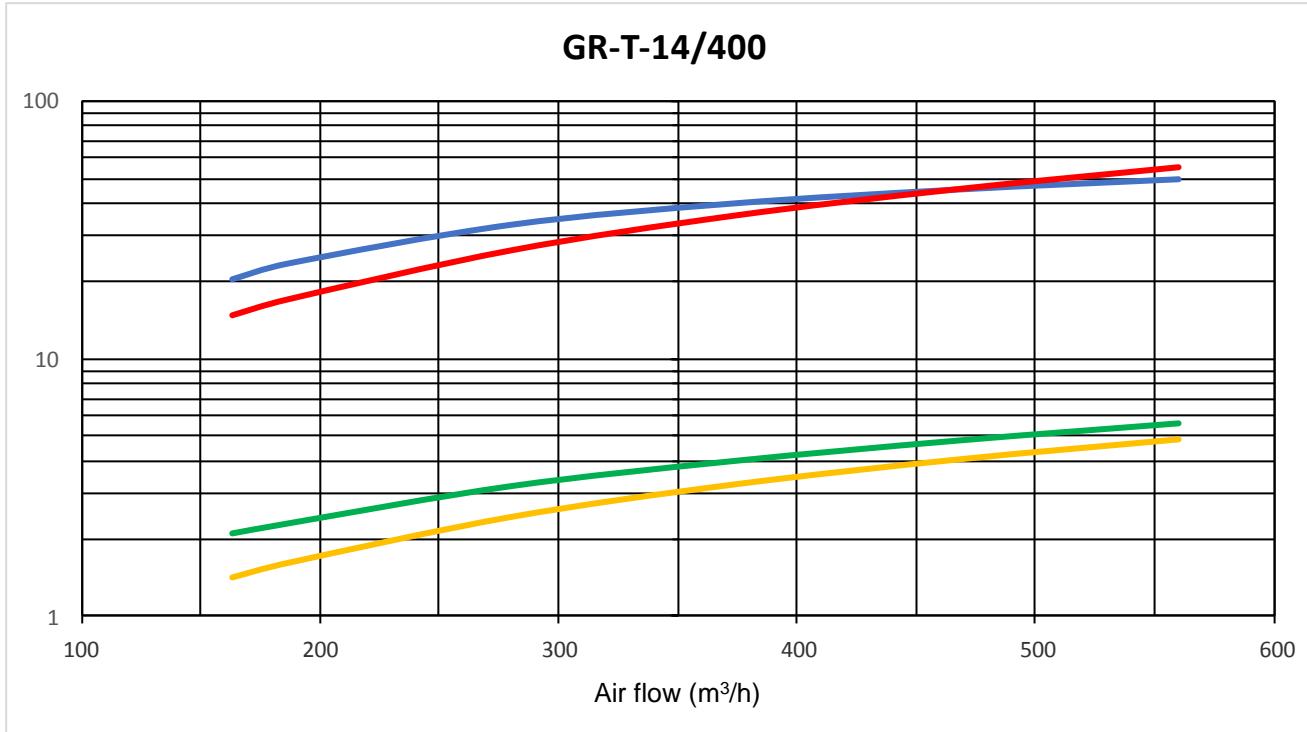
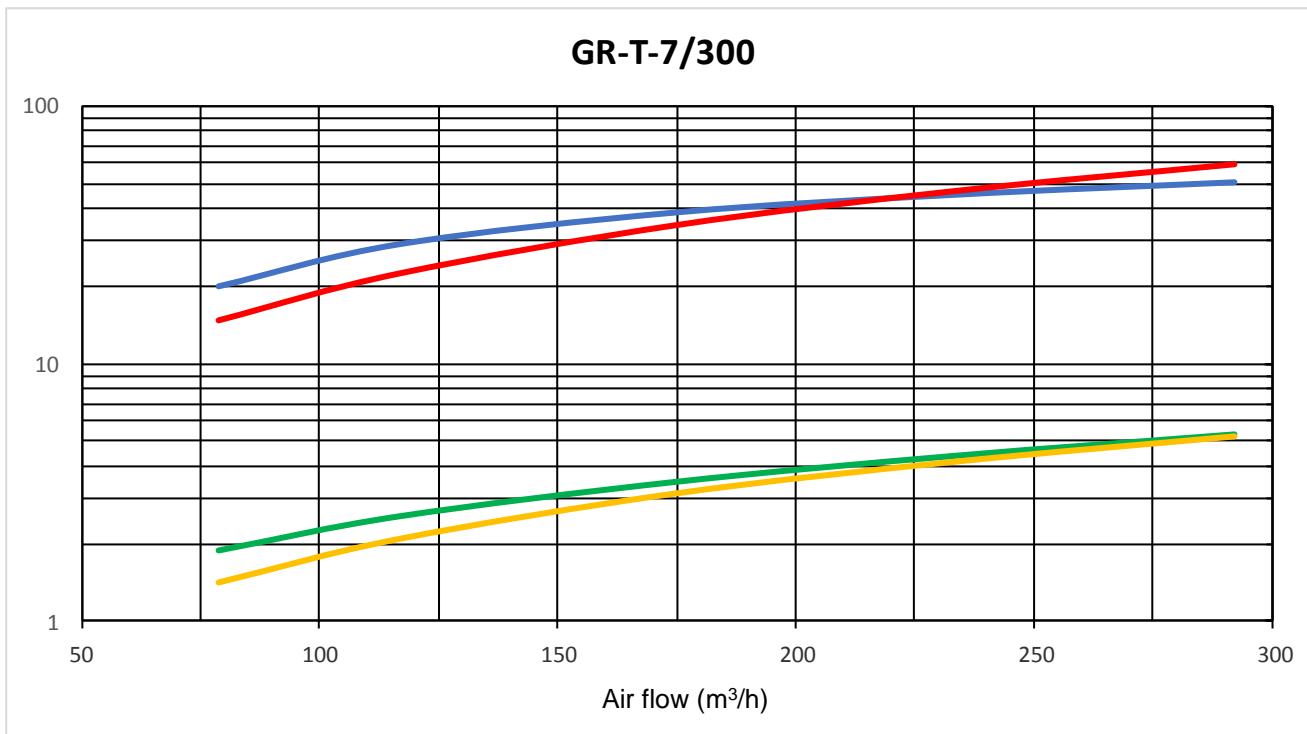
SELECTION DIAGRAMS

In the next diagrams we can see in relation with the airflow for every GR-T dimension:

- The noise Θ in dB(A).
- The pressure drop ΔP in Pa.
- The vertical throw Y for $\Delta T=10K$ (heating) in m.
- The air velocity in the diffuser V in m/sec.

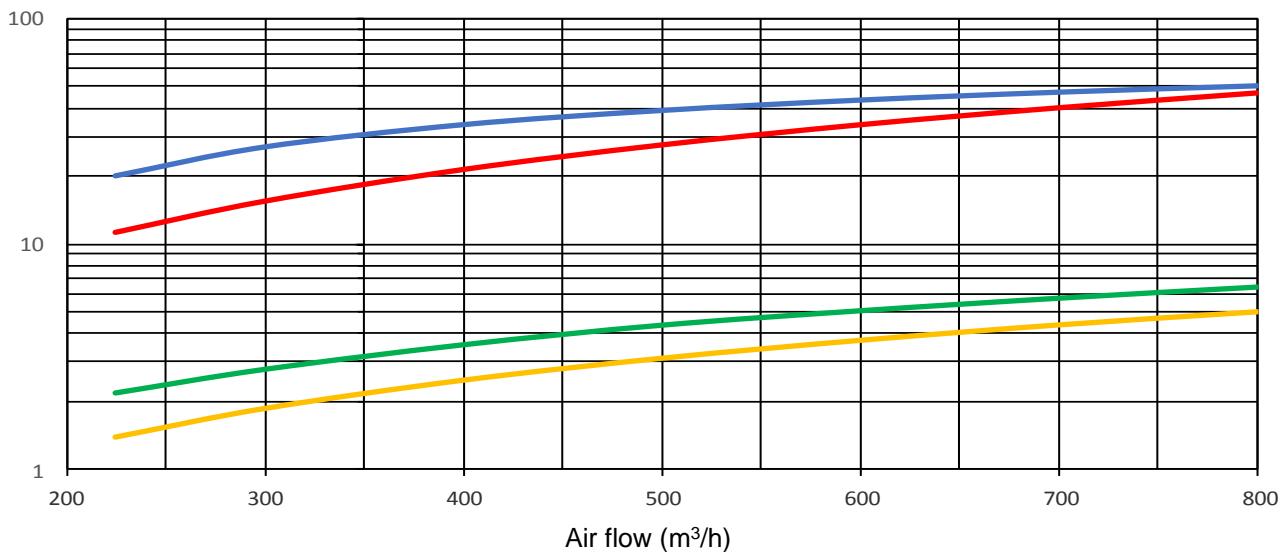
In the types -A and -RR the technical characteristics remain the same.

— Θ (dB(A)) — ΔP (Pa) — Y (m, $\Delta T=10K$ θ.) — V (m/sec)

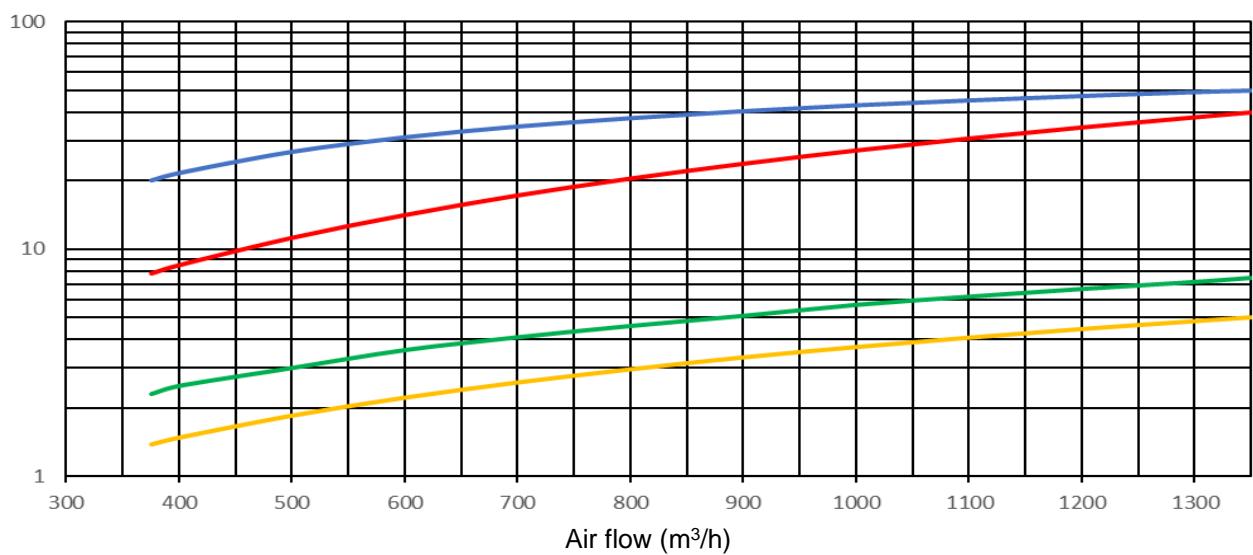




GR-T-21/500



GR-T-21/595



GR-T-35/595

