

DAL382

Ceiling diffuser

catalog 1.1.2





DAL 382

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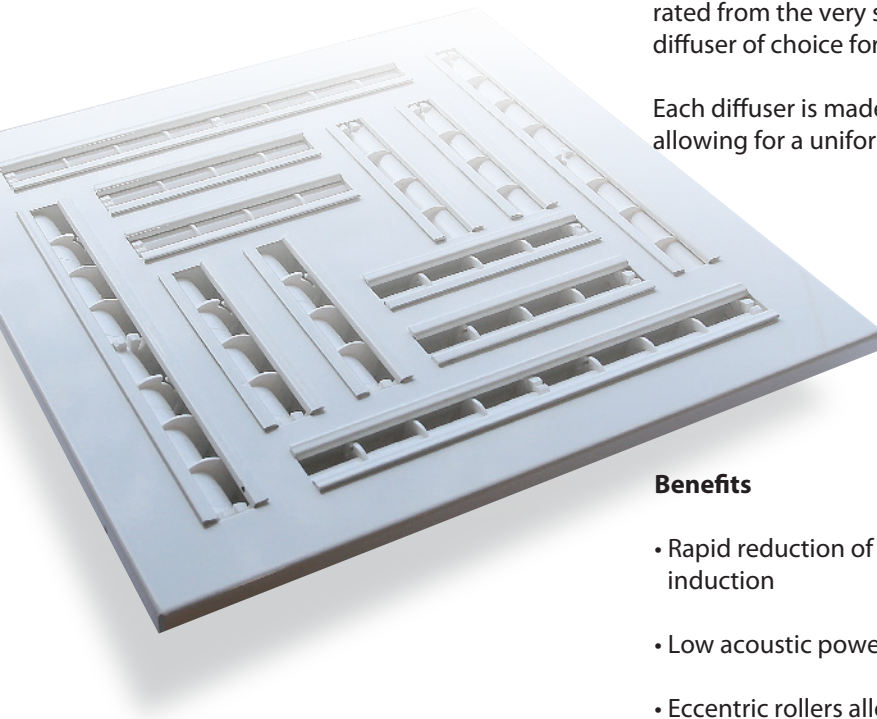
Presentation and benefits

The DAL 382 enables an optimal configuration of the ventilation system, to meet a room's requirements.

Due to the eccentric rollers integrated to the square front plate, a variety of airstream configurations are possible, even after the unit has been installed. The DAL 382's technology provides a high speed discharge of air with low acoustic power.

The DAL 382 has a helical airstream, a stability and a high induction generated from the very start of the vent's outlet. It makes the DAL 382 the diffuser of choice for high air flow rates and variable air volumes.

Each diffuser is made of steel and supplied with a stabilising chamber, allowing for a uniform and silent airflow.



Benefits

- Rapid reduction of flow speed and temperature variations caused by high induction
- Low acoustic power for high airflow rates
- Eccentric rollers allowing for 180 degrees of airflow adjustment
- Possibility of adjusting airflows, even after installation
- Possibility of reducing total airflow rate as much as 30% in VAV
- Approximately 3 times more induction than a conventional 4-way diffuser
- Approximately 3 times less temperature variation in occupied area than a traditional diffuser
- Possibility of eliminating external heating sources due to the diffuser's heating abilities
- Fewer diffusers required
- Allows a reduction in the total number of units required to circulate a fixed volume of air
- Adaptable to systems requiring constant or variable airflows

Areas of application

- Offices and white rooms
- Administrative centers
- Computer rooms
- Meeting rooms
- Multipurpose rooms
- Constant and variable flow systems
- Restaurants
- Entrance halls

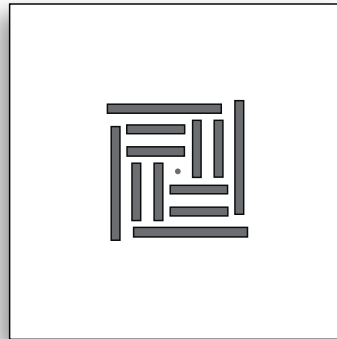
DAL 382

Configurations

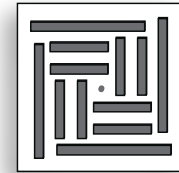
The DAL 382 diffuser is composed of a frontal plate with integrated slots. These slots, receiving the eccentric rollers, are positioned in four (4) groups.

The diffuser is mounted on a plenum. The front plate is attached with a central hidden screw.

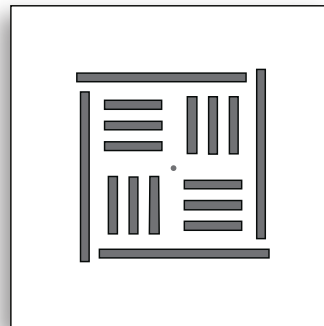
The diffuser is powder coated with a polyester TGIC-free paint, providing a smooth, easy-to-clean, chip and fade resistant finish. The colours are available from the RAL colour chart.



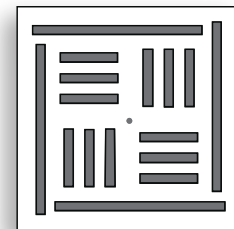
DAL 382 - 300/603



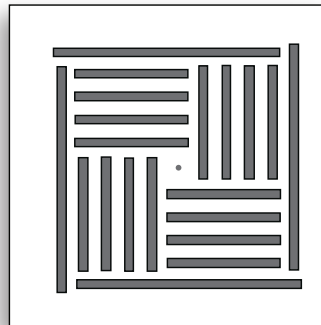
DAL 382 - 300/299



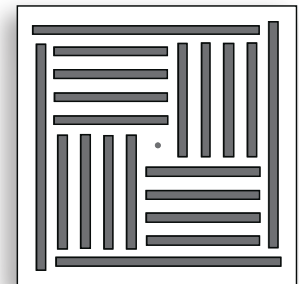
DAL 382 - 400/603



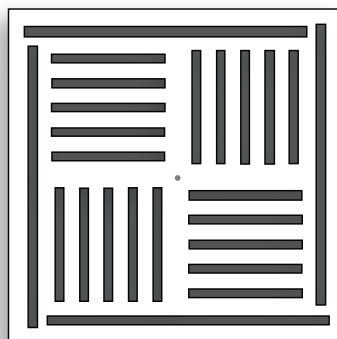
DAL 382 - 400/400



DAL 382 - 500/603



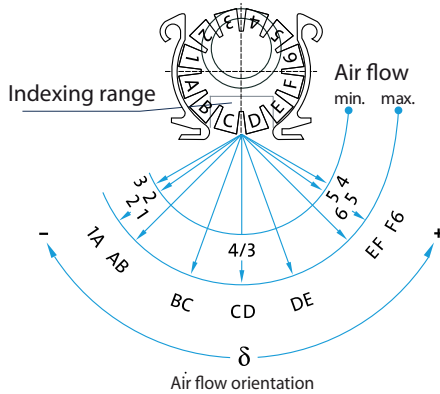
DAL 382 - 500/502



DAL 382 - 600/603

Fonctionnement

Controle of air jet



The 100 mm long eccentric rollers can be rotated on 360 degrees. In standard position (21), the eccentric rollers establish, through the slots' profile, a streamline in which air is carried along. At the roller's outlet, a low pressure zone is created, generating a high rate of induction.

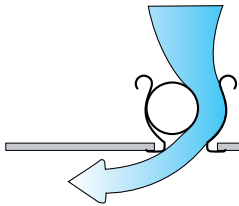
Flow behaviour

The DAL 382 frontal plate has slots arranged in a characteristic star pattern. Turning the rollers individually can produce a multitude of airstream patterns. In this manner, obstacles to efficient air flow can be avoided (lightning fixtures, overhang in ceiling, architectural columns, etc).

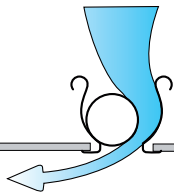
The four (4) groups of slots in the frontal plate's interior regulate the manner in which the exiting jets overlap. That creates a helical air jet with a very high level of induction.

Despite the variety of air flow directions, all stream options have approximately the same acoustic power and pressure drop, due to the eccentric rollers' specific design.

Roller position 1A



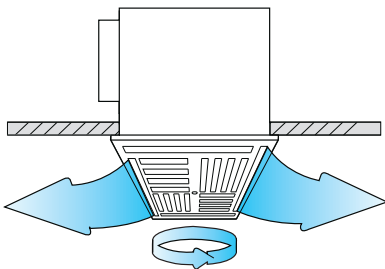
Roller position 21



Roller position 43

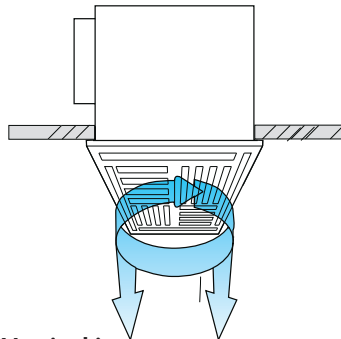


Roller position CD



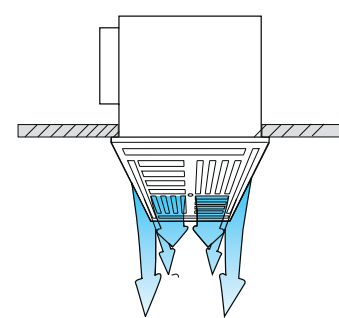
Jet below the ceiling

The exterior slots are set to expel air outwards (21 or 65). The helical jet at the air jet's center creates a high rate of induction below the ceiling (standard setting).



Vertical jet

The exterior slots are configured to expel air towards the diffuser's center (21 or 65). The extremely turbulent interior helical air jet causes a great deal of induction at ceiling height (standard setting).



The distance of the vertical jet

When all center and external rollers are directed downwards without deviation (CD), the helical movement is cancelled. In contrast, it does cause a strong downward airflow. This penetration can be increased when external rollers are orientated towards the center.

Aerodynamic data and range of application

Aerodynamic data

	\dot{V}_O m ³ /h	Minimum space m	Δp Pa	L_{WA} dB(A)*	Noise criteria NC dB **	X_{crit} m
DN 300	150	3.1	17	30	15	2.0
	210	5.3	31	35	22	2.7
	270	7.6	49	40	30	3.5
DN 400	210	2.5	17	30	15	1.8
	315	5.0	33	35	28	2.7
	400	7.0	50	40	35	3.3
DN 500	315	1.2	11	20	-	1.3
	630	5.0	33	40	22	3.3
	780	6.8	47	45	25	4.6
DN 600	630	3.8	23	35	17	2.2
	780	5.2	33	40	22	2.7
	990	7.3	49	45	28	3.9

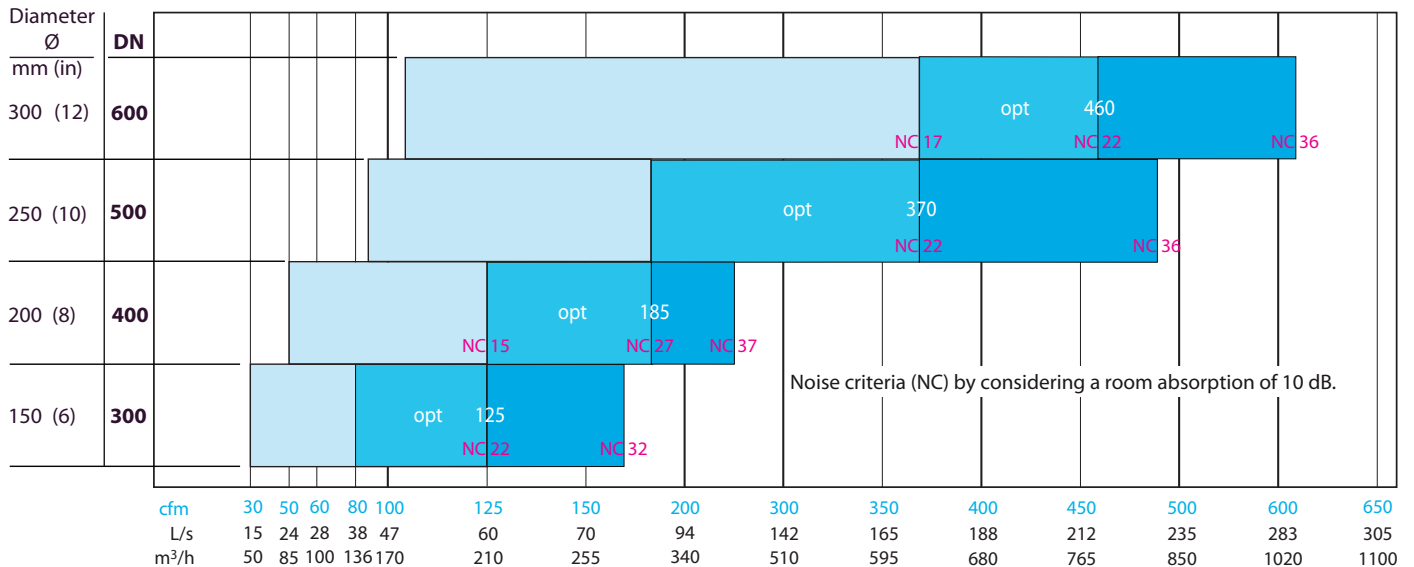
Specifications

- Minimum spacing: 3 m (under ceiling)
- Speed in occupied zone:
 ≤ 0.15 m/s (30 ft/m) at 1.3 m from floor
- Temperature difference: $\Delta T = -10^\circ\text{C}$

* The absorption of the room has not been considered.

** Determined by considering a room absorption of 10 dB.

Range of application



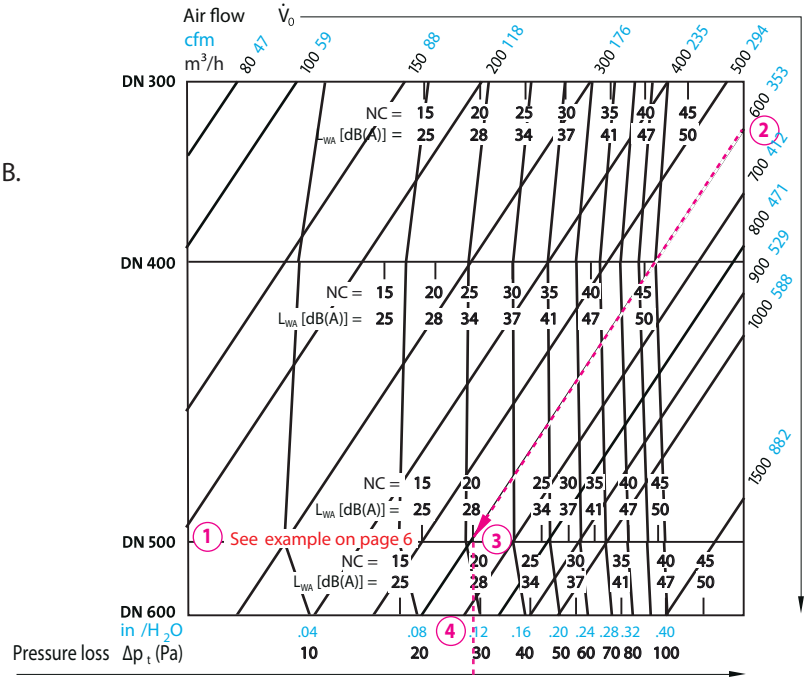
- = **Minimal** scope of application
(For a minimal application in VAV)
- = **Optimal** scope of application
(standard maximum volume for an office building)
- = **Maximum** scope of application
(highest acoustic level at 33 (43 - 10) dB(A))

Performance diagrams Based on an isotherm flow

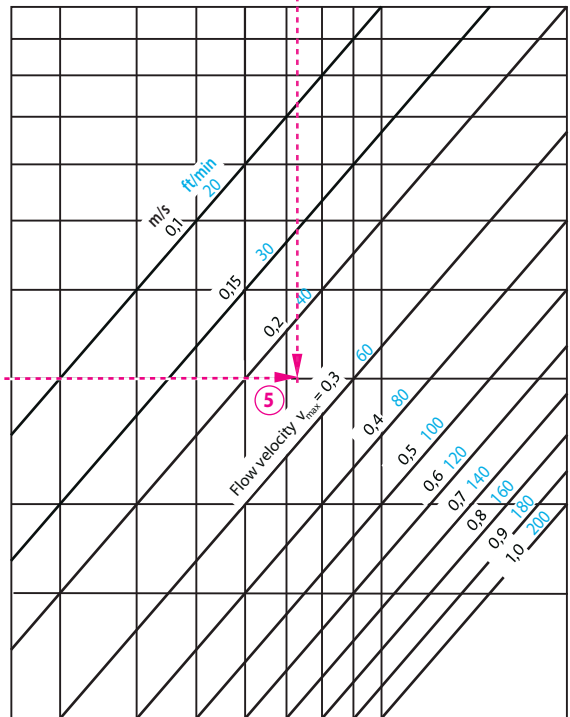
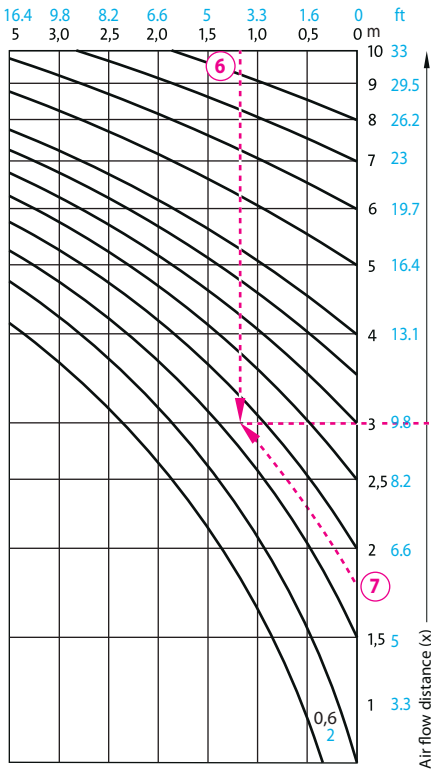
Important

The NC noise criteria and the acoustic power L_{WA} are determined by considering a room absorption of 10 dB.

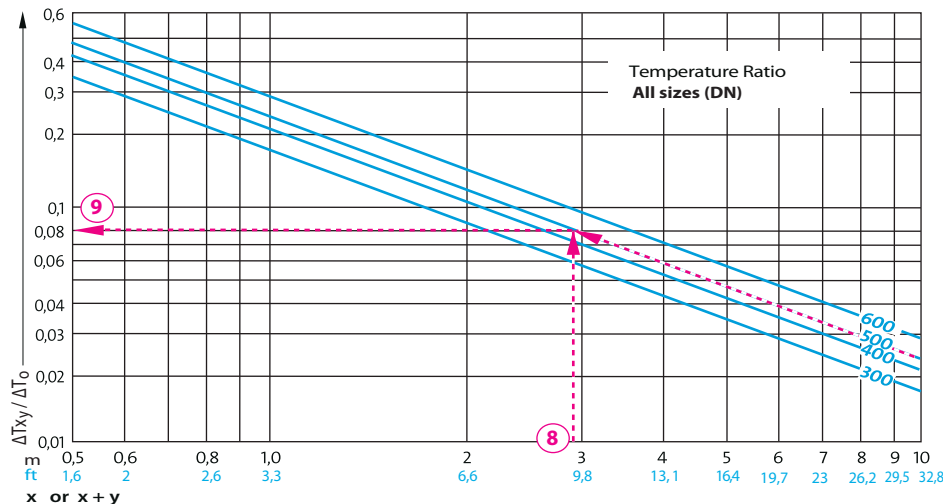
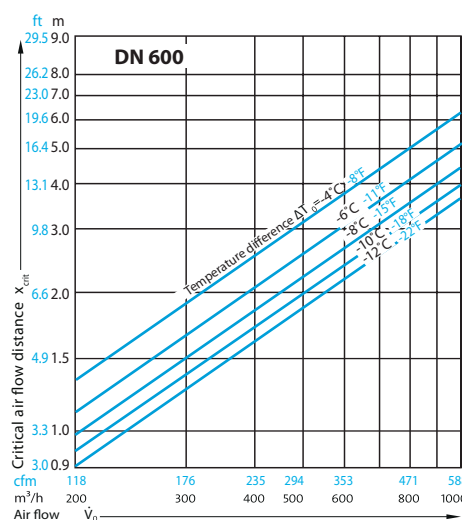
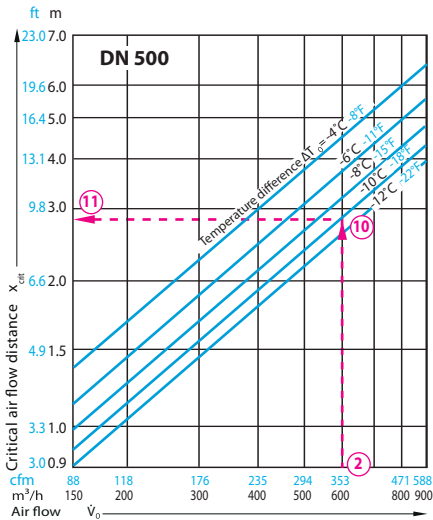
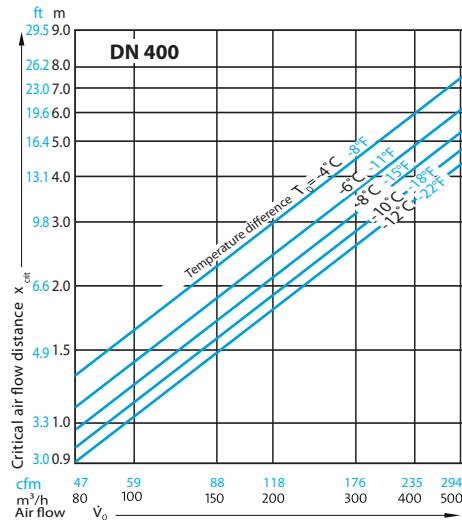
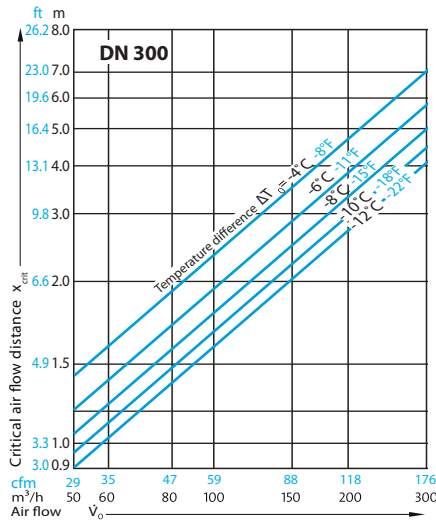
Data's based on an isothermal flow.



Air flow distance after meeting point (y)



Performance diagrams Critical air flow distance on cooling mode



Important

The critical trajectory of the airflow must always be higher than half of the difference between two (2) diffusers.

Specification:

Height of the space: $H = 3 \text{ m}$
 Airflow by diffuser: $\Delta T_0 = -10^\circ\text{C}$
 Maximum cooling: $\Delta T_0 = -10^\circ\text{C}$
 Difference between diffusers: $2 \times 1.7 = 3.4 \text{ m}$

Required:

1. Rated dimension of the diffuser
2. Noise criteria and acoustic power L_{WA}
3. Loss of pressure Δp_t
4. Maximum air speed at head height
5. Maximum temperature difference of ambient air at head height (1.8 m)
6. Critical trajectory of airflow (detachment of the air jet from the ceiling when cooling)

Solution:

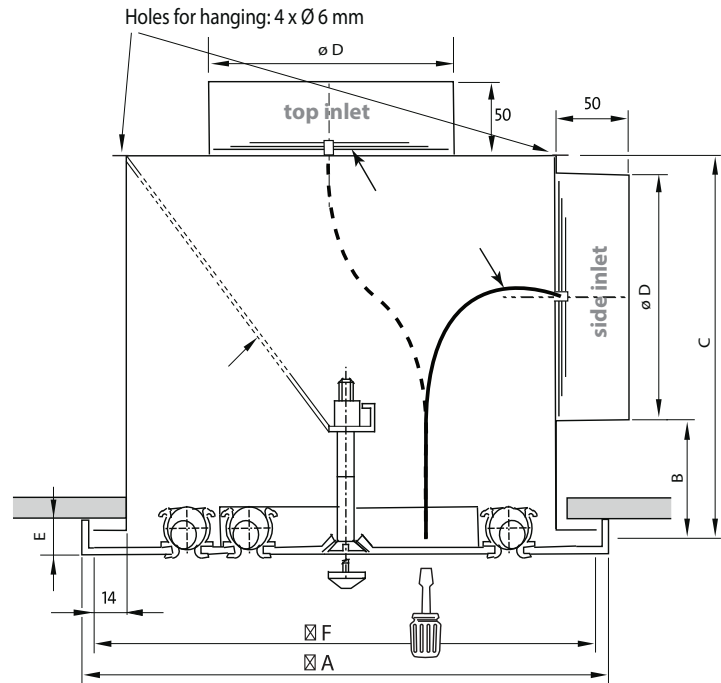
1. From the diagram "scope of application" follows the rated dimension of the DN 500. **(1)**
- 2., 3., 4. From the diagram "Airflow below the ceiling" for the DN 500 diffuser with an airflow of $600 \text{ m}^3/\text{h}$ **(2)** we can assume the following values:
 Noise criteria (NC) = 20 and acoustic power $L_{WA} = 28$ **(3)** (A)
 Total loss of pressure: 20 Pa **(4)**
 Maximum speed at head height: 0.25 m/s **(5)**
 For $y = H - 1.80 = 3.00 \text{ m} - 1.80 \text{ m} = 1.20 \text{ m}$ **(6)**
 and a difference between diffusers of $2 \times 1.70 = 3.40 \text{ m}$ ($x = 1.70 \text{ m}$) **(7)**

5. The diagram "Temperature ratio" gives a temperature ratio of 0.08 for the same airflow trajectory: $(x+y) = 1.70 \text{ m} + 1.20 \text{ m} = 2.90 \text{ m}$ **(8)**
 The maximum temperature difference is then -0.8°C . **(9)**

6. The diagram "Critical airflow trajectory" gives a critical airflow trajectory of 2.8 m **(11)** for the DN 500 diffuser, an airflow of $600 \text{ m}^3/\text{h}$ and a temperature difference of -10°C . **(10)**

Dimensions and weight

DN	300	400	500	600
size \square A	299	400	502	603
size B	51	82	68	66
size C	251	312	347	411
size \varnothing D	150	200	250	300
size E	12	12	12	12
size \square F	296	387	487	584
Weight(kg)	5.0	5.4	7.8	12.7
A_{eff} (m ²)	0.0107	0.0160	0.0321	0.0400



Fireproof damper

DN	300		400		500		600	
Size A	400	603	400	603	502	603	603	603
Size C	400	400	450	450	500	500	560	560
Size \varnothing D	150	150	200	200	250	250	300	300
Size F	396	584	396	584	488	584	584	584
Weight (kg)	11.1	17.0	11.6	17.5	15.0	18.1	20.9	20.9

Classified ULC (Underwriters laboratories of Canada), the DAL 382 diffusers with fire resistant dampers have a fire-resistant rating of 3 hours.

The fire-resistant damper is integrated directly to the plenum. This assembly is designed for installation in either a suspended or gypsum ceiling.



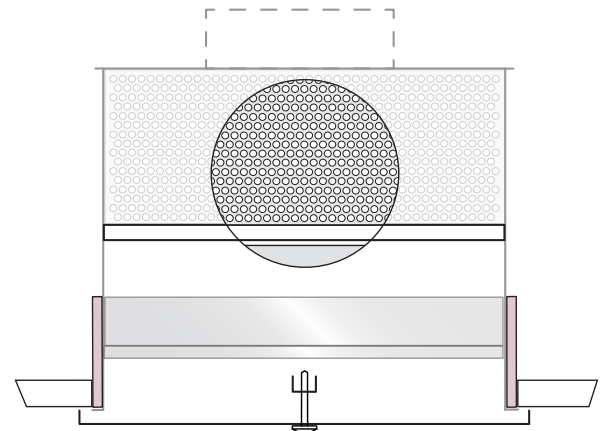
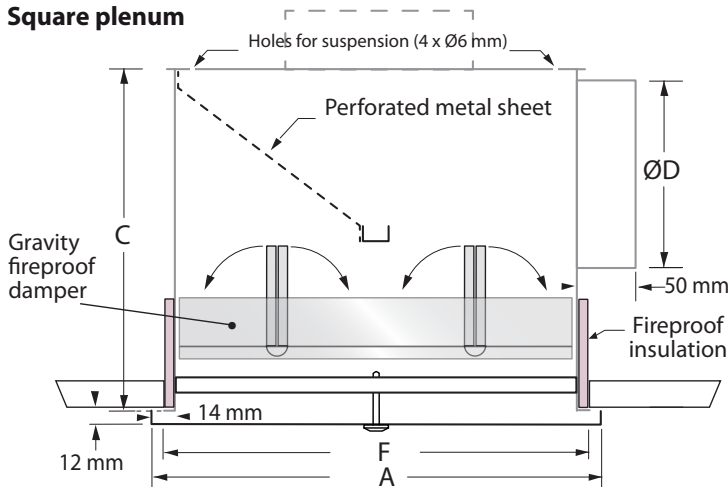
LISTED
Air Terminal Unit
R38924
CAN/ULC - S112.2 et CAN/ULC - S101



CLASSIFIED
CEILING AIR DIFFUSER
FIRE RESISTANCE CLASSIFICATION
ANSI/UL 555C et ANSI/UL 263

Note : Balancing damper not available with fireproof damper.

Square plenum



Specifications

1. Description and physical characteristics

1.1 The high induction swirl airflow diffuser shall be made of 20 ga. galvanized steel. The square front plate shall have integrated eccentric adjustable rollers.

1.2 The 100 mm long eccentric rollers shall have an alphanumeric identification, which will allow adjustment of the air flow pattern over 180 degrees.

1.3 The diffuser's front plate shall be adapted to fit regular North American suspended ceilings or classic gypsum ceilings.

1.4 The diffuser plate shall be adapted for a vertical or horizontal air diffusion.

1.5 The diffuser shall be powder coated with a polyester TGIC-free paint, providing a smooth, easy-to-clean, chip and fade resistant finish. The architect or client shall choose a standard colour from the RAL colour chart.

2. Performance

2.1 The performance shall be guaranteed by using performance curve or simulation software for critical areas. These curves shall indicate the pressure drop, acoustic power generated as well as showing a cross-sectional view illustrating the critical airflow path in cooling, isothermal and heating modes.

2.2 Parameters of guaranteed comfort

2.2.1 The performance statistics of the diffuser shall reflect a maximum air speed of 0.15 m/s (30 ft/m) in occupied zone at 1.3 m (4 ft) from the floor. The performance guarantee shall be demonstrated in plan view, with circles showing the path of the air stream.

2.2.2 The diffuser shall ensure a maximum variance in temperature of -1°C between the air jet and the area occupied at 4 ft (1.3 m) from the floor. To achieve this, the ratio of temperature differential shall perform at a minimum of $\Delta T_{xy} / \Delta T_0 \leq 0.1$ (for an initial differential of $\Delta T_0 = -10^{\circ}\text{C}$).

2.2.3. In cooling, the diffuser shall guaranteed, in variable volume (VAV), a critical distance (X_{crit}) of at least the value indicated in the following table:

Diffuser inlet \varnothing (in)	6	8	10	12
Air flow max. (cfm)	80-150	151-280	281-400	401-600
min. (cfm)	20-40	41-90	91-140	141-200
X critic - ft	1'- 7"	1'- 11"	2'- 3"	2'-7"
(m)	0.5	0.6	0.7	0.8

3. Plenum

3.1 The diffuser shall be delivered with a plenum made and tagged by the diffuser's manufacturer. The plenum shall be constructed from 24 gauge galvanized steel and include a perforated stabilizing (equalizing) plate, which regulates the airflow rate. Four suspension points, adhering to paraseismic standards, shall be integrated in the plenum. The inlet shall be centered on the side or on the top of the plenum, and its size shall be calibrated to accommodate the airflow rate. The joints of the plenum shall be sealed with VOC (volatile organic compounds) emission-free caulking.

3.2 The diffuser front plate shall be attached to the plenum with a central screw.

3.3 When required, the plenum shall be supplied with a damper, adjustable through the finished side of the front plate, in order to adjust air volume.

3.3.1 **Radial damper:** Key with circular pivoting blades on a flexible metallic cable, which shall be adjustable through the front plate of the diffuser, allowing for an air flow adjustment from 0% to 100%.

4. Balancing

4.1 Balancing of DAL 382 diffusers shall be performed by a professionally certified technician, trained in ventilation system balancing.

4.2 The technician shall take into consideration the correction factor of air volume using a balometer.

5. Quality required: NAD Klima model DAL 382



DAL382

Codification

DAL 382		Product
Q = Square		Configuration
300, 400, 500, 600		Nominal dimension
299, 400, 502, 603	(603 for 24" x 24" T-bar)	Outer size
S = Swirl flow V = Vertical flow L = Vertical flow, long reaching B = Roller nozzle (return)		Air flow
W = White rollers (RAL 9003) C = Cream rollers (RAL 9010) B = Black rollers		Roller color
9003 = White 9010 = Cream 00SB = Solar Black (Standard black matte) 00SM = Silver Matte (Standard metallic grey) _____ = RAL color (write RAL color number)		Diffuser color
S = Plenum with side inlet T = Plenum with top inlet X = Without plenum		Plenum
I = With acoustic insulation A = With closed-cell acoustic insulation X = Without insulation		Acoustic insulation
F = With fireproof insulation and fire damper (balancing damper not available) X = Without fireproof insulation and fire damper		Fireproof insulation
R = With radial damper* X = Without damper		Balancing Damper
DAL382 - Q - 300 - 299 - S - W - 9003 - S - X - X - X		Example

Notes:

Blue: Standard

*Not available on oval inlet collar

nad
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