nad KLIMA

MADE IN CANADA

QAL

Air displacement diffuser

catalog 1.1.5

Table of content

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Refer to the digital version on **www. nadklima.com**

Version 2019

QAL

Description and benefits

The QAL air displacement diffuser is effective as much in areas that require high levels of comfort as in industrial areas.

Adapted to a space's specific needs, the QAL is manufactured in a circular, semi-circular, quarter circular or rectangular shape. The QAL diffuser is composed of a lacquered steel plate, a cover, a plinth, a mechanism dividing the airflow and a spigot adjusting the duct, normally situated in the upper part.

Depending on space and occupant activity, the cooling needs can vary from thirty (30) to fifty (50) W/m^2.

The QAL air displacement diffusers are designed for simple ventilation or cooling caused by air flowing from bottom to top creating a layer of fresh air. Thus the temperature difference should be at most -6˚C.

Due to its density, colder air forms a layer of fresh air at ground level. Heat sources (whether human or mechanical) transmit their heat into the fresh air which is directed towards the ceiling. That allows the freshest air to penetrate the occupied zone. This method of ventilation achieves a bigger comfort by moving stale air towards the ceiling and allowing introduction of fresh air from below.

As a result, we obtain a significant improvement in air quality,which demonstrates the advantages of the QAL diffuser in contrast to other traditional systems.

Benefits

- Low flow velocities in occupied areas

- Increased air quality in occupied areas

- Removal capacity between 30 W/m^2 and 50 W/m^2 (depending on degree of activity)

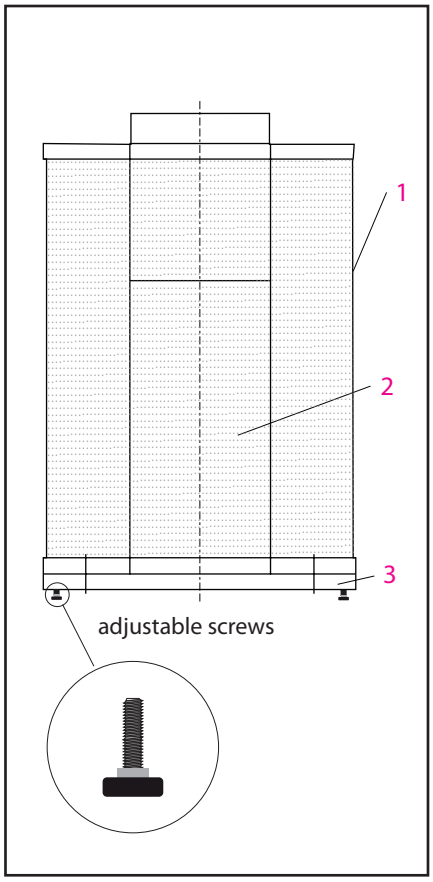
Areas of application

- Individual offices
- Shared offices
- Conference rooms
- Restaurants
- Cinemas
- Gymnasiums
- Industrial workshops
- Laboratories
- Businesses
- Halls

Configuration and mode of operation

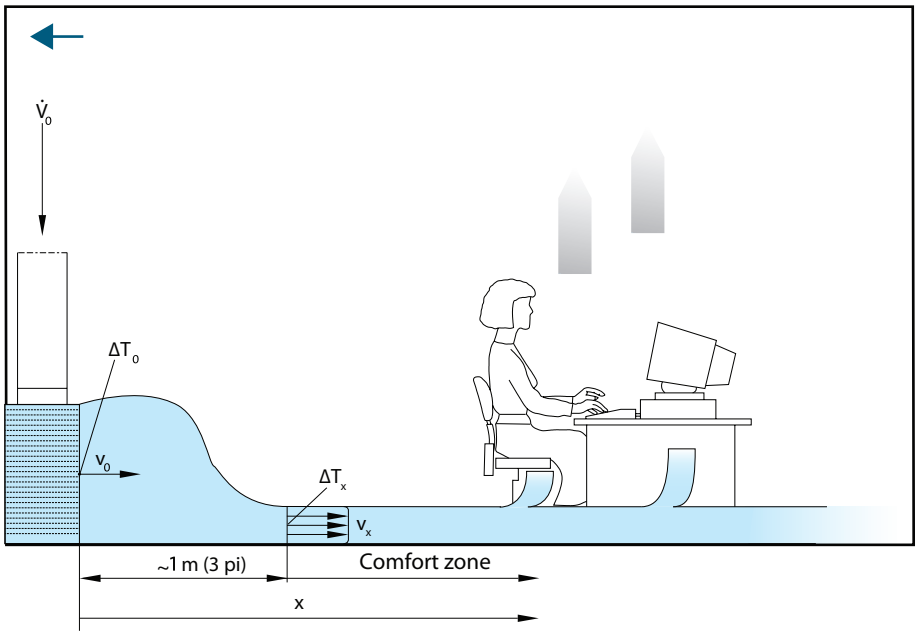
Configuration

The QAL air displacement diffuser is composed of a perforated flat or cylindrical screwed (1) frontal plate (quarter circle, semi-circular or completely circular) and an air dividing mechanism on the main surface (2). The regulatory system allowing height adjustment is found in the diffuser's plinth (3).



Mode of operation

The air dividing mechanism distributes the air flow uniformly across the perforated frontal plate. As a result of its lower temperature and the low outlet air speed is directed downwards without significant mixing with the ambient air and spreads across the floor, forming a thin layer of fresh air. When it meets heat sources in the zone, the air is heated and slowly climbs towards the ceiling.



Installation option

The QAL air displacement diffuser was designed primarily for cooling applications. Generally, the diffusers are installed on area floors to be ventilated.

Also, the QAL's active height does not need to be higher than 2 m (6 ft) to ensure well-being. The shape and variety of possible colors (RAL colors) allow the QAL to be seamlessly integrated with the existing decor while being an architectural area of interest.

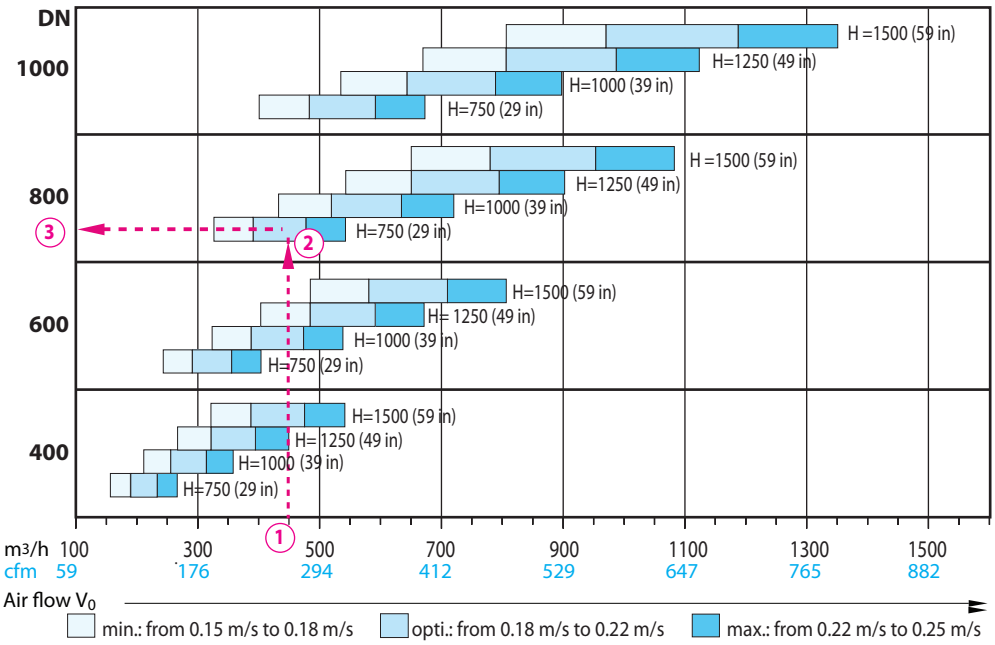
QAL-R in workshop at Nad Klima, Canada

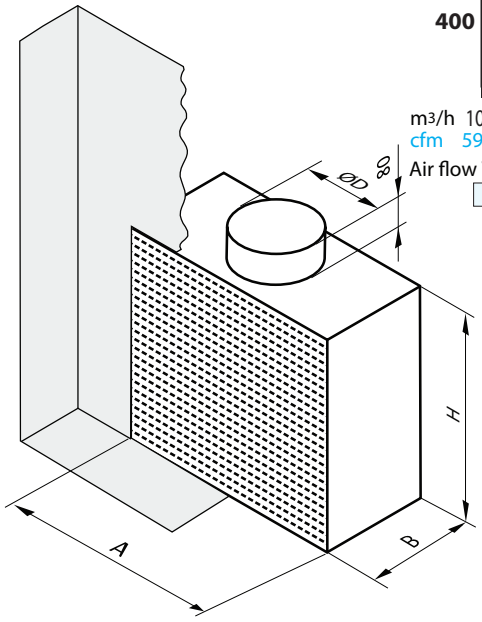
Areas of application, dimensions and aerodynamic data
QAL - L

Wall installation

Areas of application

The three ranges of airflow for the shape, the dimension and the height data are based on the speed of air exiting the diffuser. These speeds represent the diffuser's total surface (at the frontal plate).





V_{min}: Airflow for a velocity loss of 0.15 m/s
V_{max}: Airflow for a velocity loss of 0.25 m/s
V_{nom}: Airflow for a velocity loss of 0.2 m/s
L: Diffuser horizontal distance for ΔT_0 = -2°C.
Then the airflow speed is: ≤ 0.25 m/s

Aerodynamic data

	Height (mm)	$\dot{V}_{min}$ (m³/h)	$\dot{V}_{max}$ (m³/h)	$\dot{V}_{nom.}$ (m³/h)	$\dot{V}_{nom.}$ Δp(Pa)	$\dot{V}_{nom.}$ L_{WA}(dB(A))	$\dot{V}_{nom.}$ L (m)
DN 400	750	160	270	220	4	< 20	1.3
	1000	220	360	290	5	< 20	1.6
	1250	270	450	360	5	< 20	1.8
	1500	320	540	430	5	20	2.0
DN 600	750	240	400	320	4	< 20	1.5
	1000	320	540	430	5	21	1.9
	1250	400	670	540	7	22	2.3
	1500	490	810	650	9	24	2.8
DN 800	750	320	540	430	5	22	1.8
	1000	430	720	580	9	26	2.6
	1250	540	900	720	10	27	3.1
	1500	650	1080	860	12	28	3.7
DN 1000	750	400	680	540	6	25	2.2
	1000	540	900	720	10	27	3.0
	1250	670	1120	900	14	29	3.6
	1500	810	1350	1080	15	30	4,2

Dimensions

	DN 400				DN 600				DN 800				DN 1000			
Size A	406				610				813				1016			
Size B	330				381				381				406			
Size ØD	150	150	200	200	200	200	250	250	200	2250	250	300	250	250	300	300
Size H	750	1000	1250	1500	750	1000	1250	1500	750	1000	1250	1500	750	1000	1250	1500

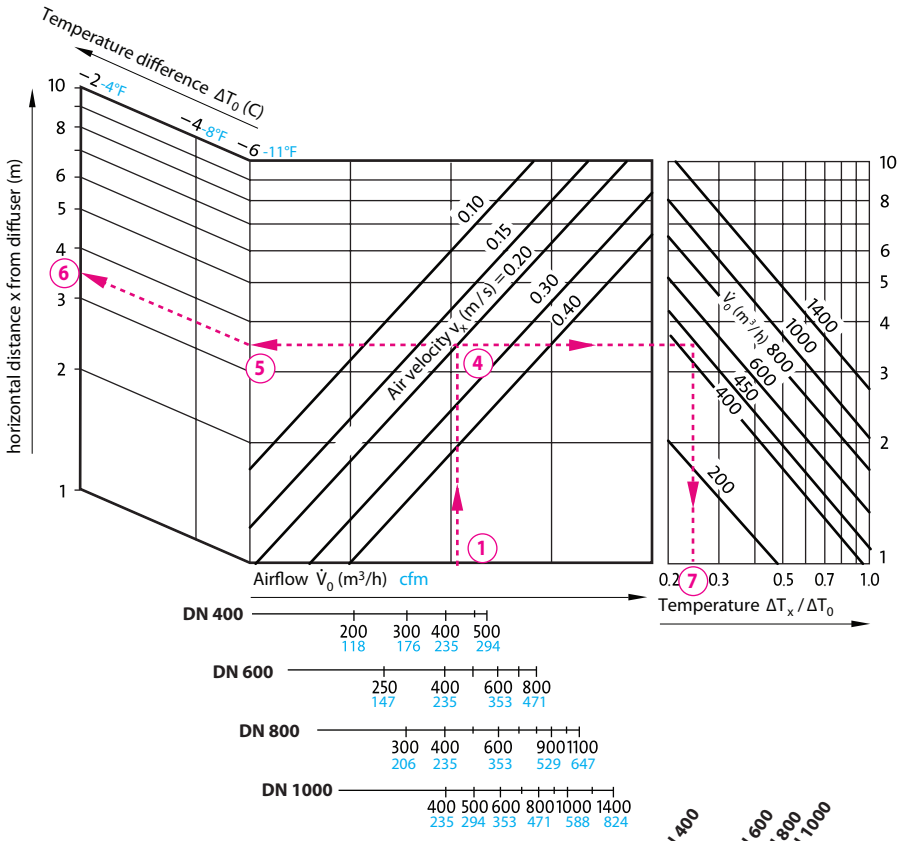
Sizing diagrams
QAL - L

Example

Data
Height: 750 mm (29.5 po) (2)
Flow: 265 cfm 450 m³/h (1)
Temperature difference: - 6°C (5)
Max. airflow velocity at ground level: 0,2 m/s (4)

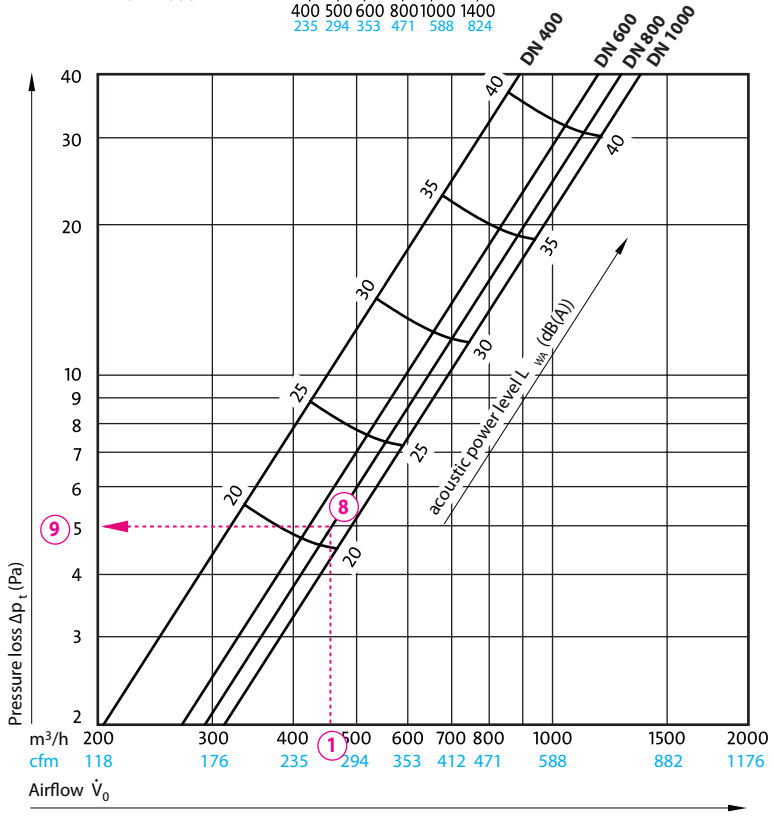
Required
DN: x: $\Delta T_x / \Delta T_0$: Δp_t: L_{WA}

Solution
From the "Areas of application" diagram follow we find DN 800. (3)
From the "Sizing diagram", when applying the correction table, we find:
x = 3.4 m (for V_x x 0.94) (6)
$\Delta T_x / \Delta T_0 = 0.25 \times 0.86 = 0.22$ (7)
$\Delta p_t = 5 \times 1.25 = 6.25$ Pa (9)
$L_{WA} = 21 + 3 = 24$ dB (A) (8)



Correction table

	Height (mm)			
	750	**1000**	**1250**	**1500**
v_x	x 0.94	x 1.00	x 1.04	x 1.07
$\Delta T_x / \Delta T_0$	x 0.86	x 1.00	x 1.11	x 1.22
Δp_t	x 1.25	x 1.00	x 0.80	x 0.65
L_{WA} (dB(A))	+3	± 0	-3	-6

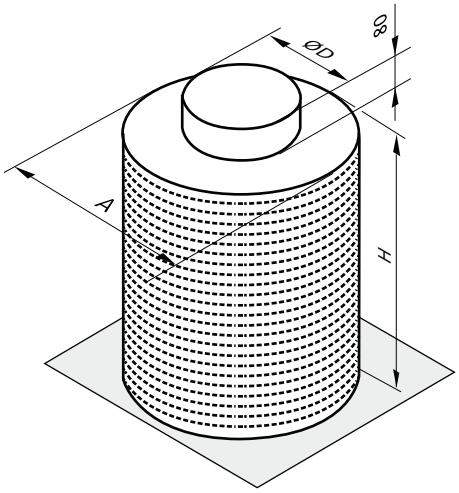


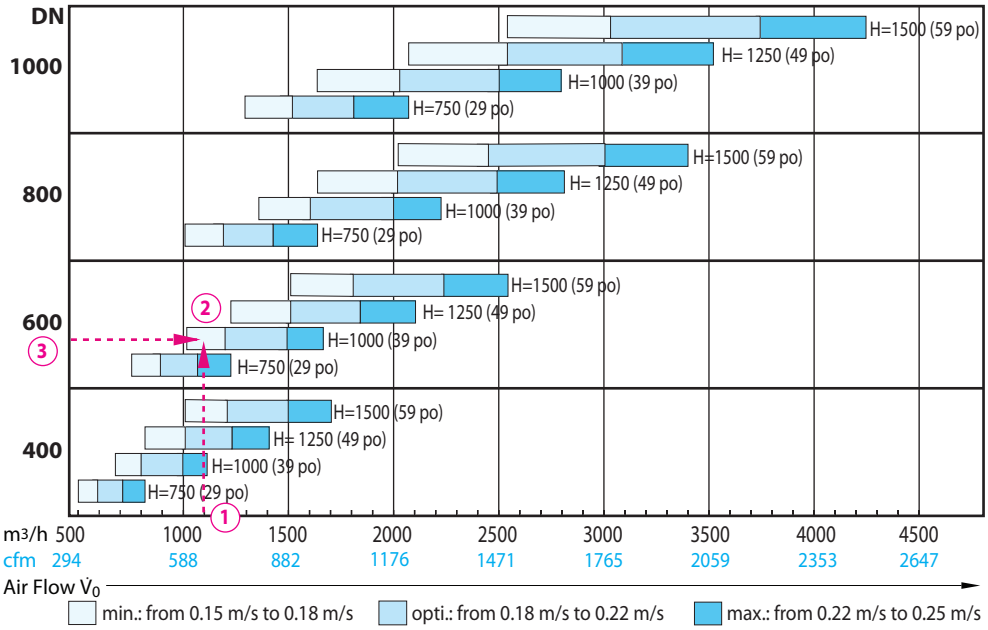
Areas of application, dimensions and aerodynamic data
QAL - R

Round displacement diffuser (360°), floor installation

Areas of application

The three ranges of airflow for the shape, the dimension and the height data are based on the speed of air exiting the diffuser. These speeds represent the diffuser's total surface (at the frontal plate).





Aerodynamic data

Nominal size	Height (mm)	$\dot{V}_{min}$ (m^3/h)	$\dot{V}_{max}$ (m^3/h)	$\dot{V}_{nom.}$ (m^3/h)	$\dot{V}_{nom.}$ Δp(Pa)	$\dot{V}_{nom.}$ L_{WA}(dB(A))	$\dot{V}_{nom.}$ L (m)
DN 400	750 1000 1250 1500	500 680 850 1020	850 1130 1410 1700	680 900 1130 1360	15 20 25 32	28 31 32 34	1,3 1,6 1,9 2,3
DN 600	750 1000 1250 1500	760 1020 1270 1530	1270 1700 2120 2540	1020 1360 1700 2040	19 30 40 41	33 36 38 39	1,5 2,3 2,5 2,8
DN 800	750 1000 1250 1500	1020 1360 1700 2040	1700 2260 2830 3390	1360 1810 2260 2710	25 35 40 50	36 40 41 42	2,0 2,6 3,0 3,5
DN 1000	750 1000 1250 1500	1270 1700 2120 2540	2120 2830 3530 4240	1700 2260 2830 3390	31 36 48 57	38 41 43 45	2,5 3,0 3,7 4,5

V_{min}: Airflow for a velocity of 0.15 m/s
V_{max}: Airflow for a velocity of 0.25 m/s
V_{nom}: Airflow for a velocity of 0.2 m/s
L: Horizontal distance of the diffuser for ΔT_0 = -2°C. Then the airflow is: ≤ 0.25 m/s

Dimensions

	DN 400				DN 600				DN 800				DN 1000			
Size A	406				610				813				1016			
Size ØD	229	280	305	356	254	356	381	406	356	406	457	508	381	457	508	559
Size H	750	1000	1250	1500	750	1000	1250	1500	750	1000	1250	1500	750	1000	1250	1500

Sizing diagrams
QAL - R

Example

Data

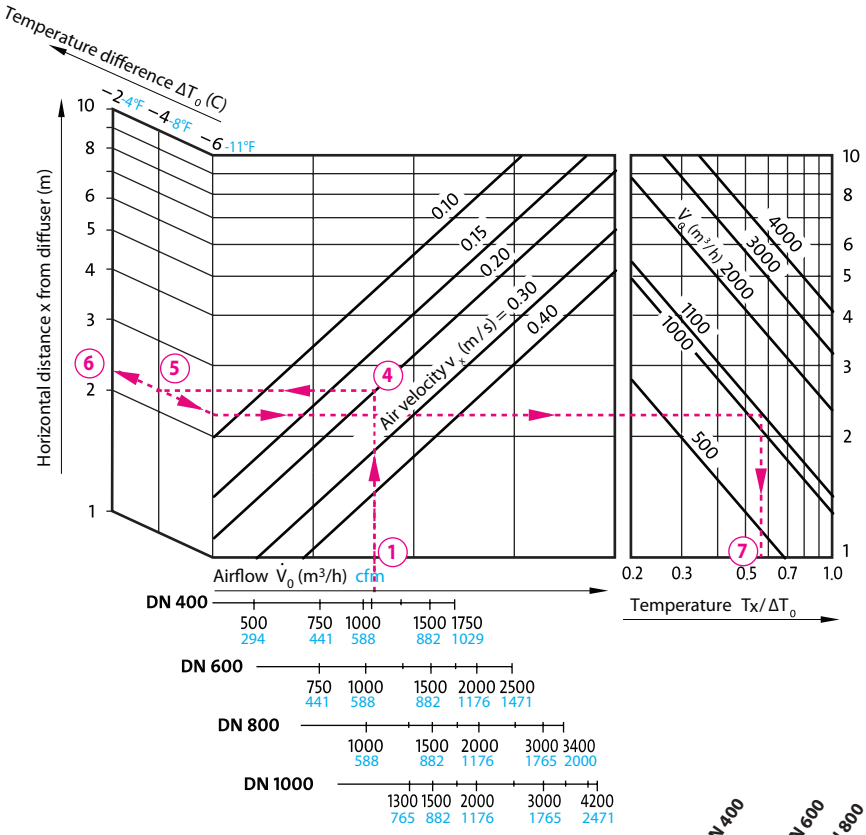
DN: 600 (2)
Flow: 647 cfm 1100 m³/h (1)
Temperature difference: - 4°C (5)
max. airflow speed at ground level: 0.2 m/s (4)

Required

Height: x: ΔT_x / ΔT_0: Δp_t: L_{WA}

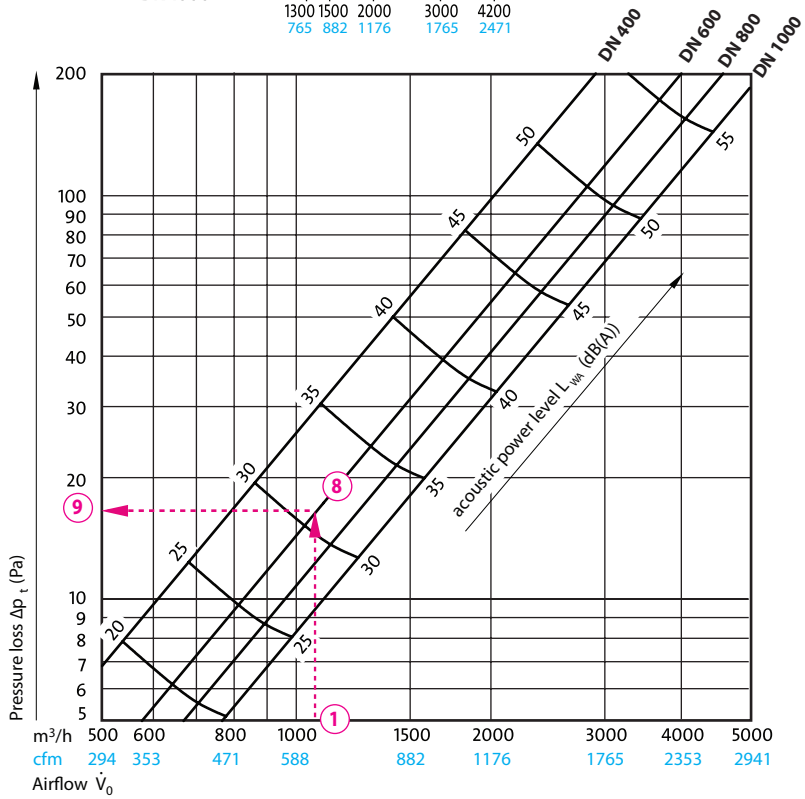
Solution

From the "Ranges of application" diagram we find a height of 1000 mm (39 po). (3)
From the "Sizing diagram", when applying the correction table, we find:
x = 2.3 m (for v_x x 1) (6)
ΔT_x / ΔT_0 = 0.56 x 1 = 0.56 (7)
Δp_t = 17 x 1 = 17 Pa (9)
L_{WA} = 31 + 0 = 31 dB (8)



Correction table

	Height (mm)			
	750	**1000**	**1250**	**1500**
v_x	x 0.94	x 1.00	x 1.04	x 1.07
ΔT_x / ΔT_0	x 0.86	x 1.00	x 1.11	x 1.22
Δp_t	x 1.25	x 1.00	x 0.80	x 0.65
L_{WA} (dB(A))	+3	± 0	-3	-6



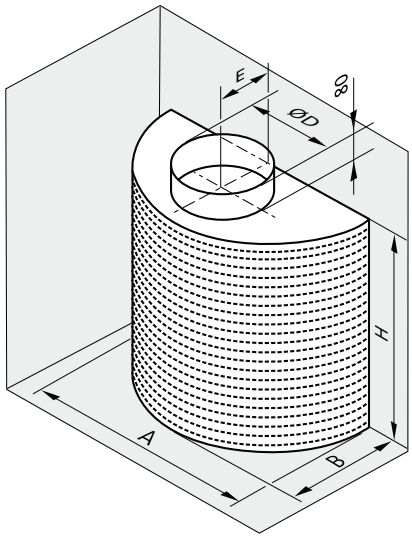
Areas of application, dimensions and aerodynamic data
QAL - H

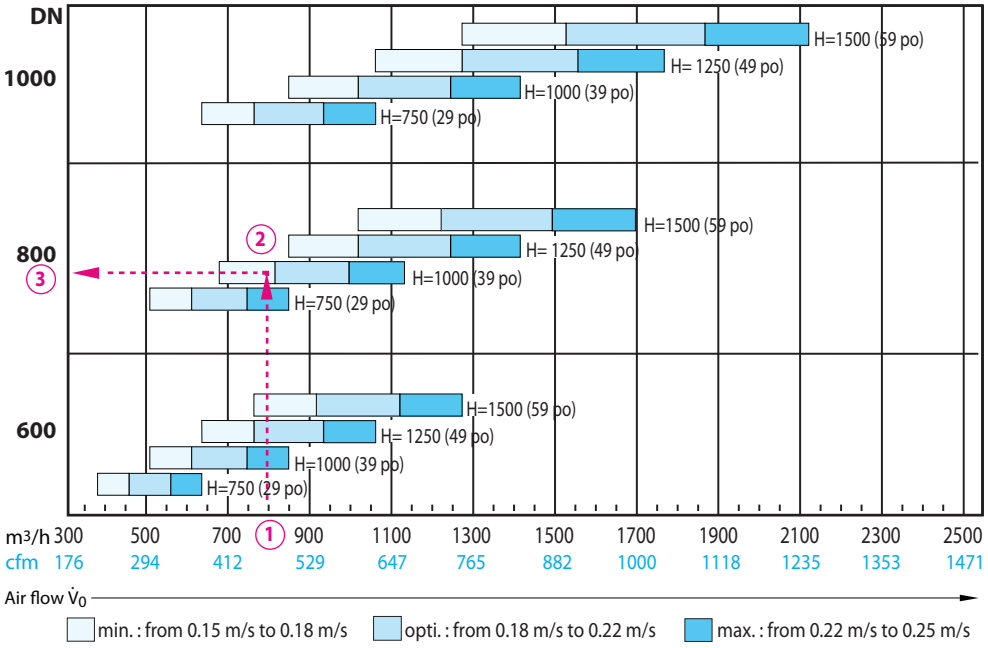
Semi-circular - 180° - wall installation

Areas of application

The 3 air volume flow ranges given for the individual designs, sizes and heights have been determined according to the charge velocities.

These discharge velocities relate to the displacement flow diffuser's overall surface (front panel).





Aerodynamic data

Nominal size	Height (mm)	$\dot{V}_{min}$ (m³/h)	$\dot{V}_{max}$ (m³/h)	$\dot{V}_{nom.}$ (m³/h)	$\dot{V}_{nom.}$ Δp(Pa)	$\dot{V}_{nom.}$ L_{WA} dB(A)	$\dot{V}_{nom.}$ L (m)
DN 600	750 1000 1250 1500	380 510 640 760	640 850 1060 1270	510 680 850 1020	7 11 14 16	< 20 23 25 26	1.0 1.4 1.7 2.0
DN 800	750 1000 1250 1500	510 680 850 1020	850 1130 1410 1700	680 900 1130 1360	11 15 18 23	24 27 29 31	1.2 1.6 1.9 2.3
DN 1000	750 1000 1250 1500	640 850 1060 1270	1060 1410 1770 2120	850 1130 1410 1700	13 16 22 25	26 27 30 32	1.3 1.8 2.1 2.5

V_{min}: airflow for a velocity loss of 0.15 m/s
V_{max}: airflow for a velocity loss of 0.25 m/s
V_{nom}: Airflow for a velocity loss of 0.2 m/s
L: Horizontal distance of the diffuser for ΔT_0 = -2°C
Then the airflow is: ≤ 0.25 m/s

Dimensions

	DN 600				DN 800				DN 1000			
Size A	610				813				1016			
Size B	381				406				508			
Size E	193				203				254			
Size ØD	200	200	250	250	200	250	250	300	250	250	300	300
Size H	750	1000	1250	1500	750	1000	1250	1500	750	1000	1250	1500

Sizing diagrams
QAL - H

Example

Data

Height:	1000 mm (39 in) (2)
Flow:	471 cfm 800 m³/h (1)
Temperature difference:	- 2°C (5)
Distance from the diffuser:	1.5 m (58.5 in) (6)

Required

DN: x: $\Delta T_x / \Delta T_0$: Δp_t: L_{WA}

Solution

From the "Areas of application" diagram we find the DN 800. (3)

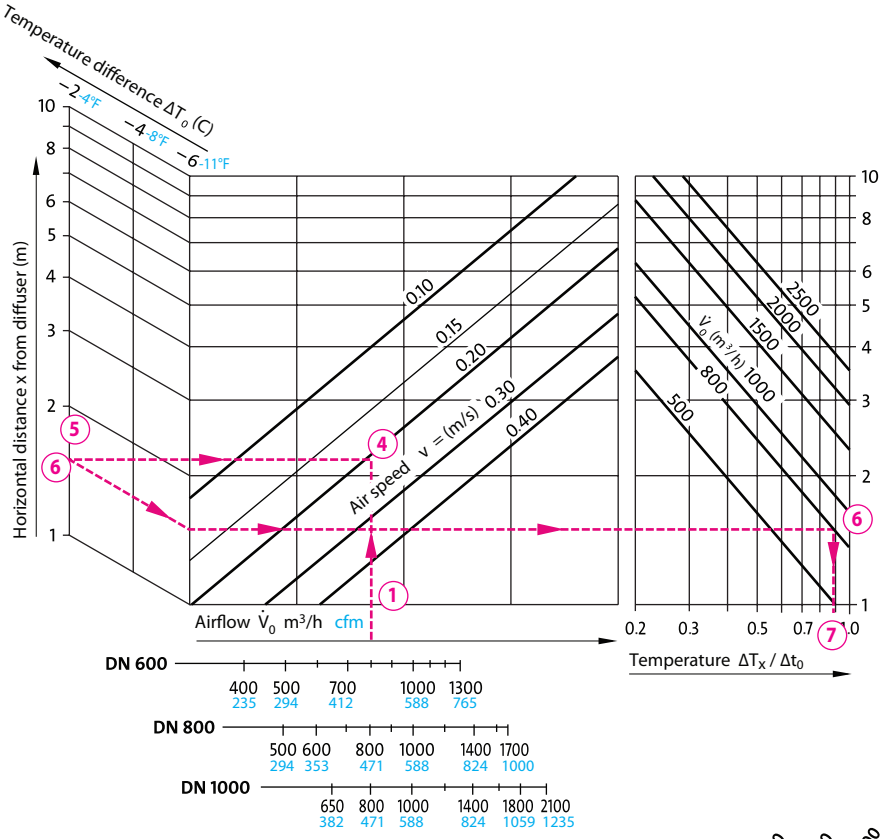
From the "Rating diagram", when applying the correction table, we find:

$v_x = 0.21 \times 1 = 0.21$ m/s (4)

$\Delta T_x / \Delta T_0 = 0.89 \times 1 = 0.89$ (7)

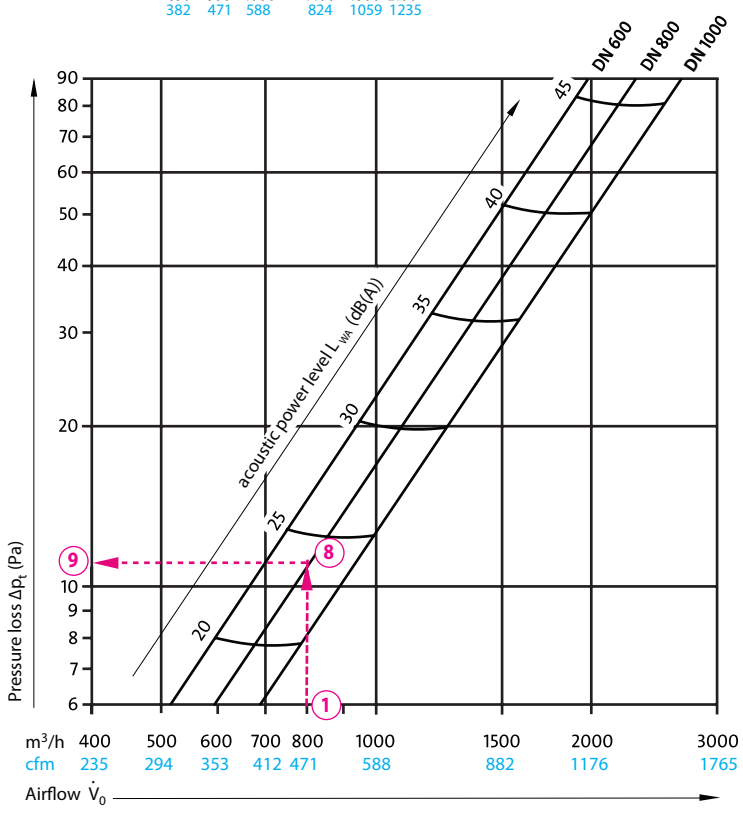
$\Delta p_t = 11 \times 1 = 11$ Pa (9)

$L_{WA} = 24 + 0 = 24$ dB (8)



Correction table

	Height (mm)			
	750	**1000**	**1250**	**1500**
v_x	x 0.94	x 1.00	x 1.04	x 1.07
$\Delta T_x / \Delta T_0$	x 0.86	x 1.00	x 1.11	x 1.22
Δp_t	x 1.25	x 1.00	x 0.80	x 0.65
L_{WA} (dB(A))	+3	± 0	-3	-6



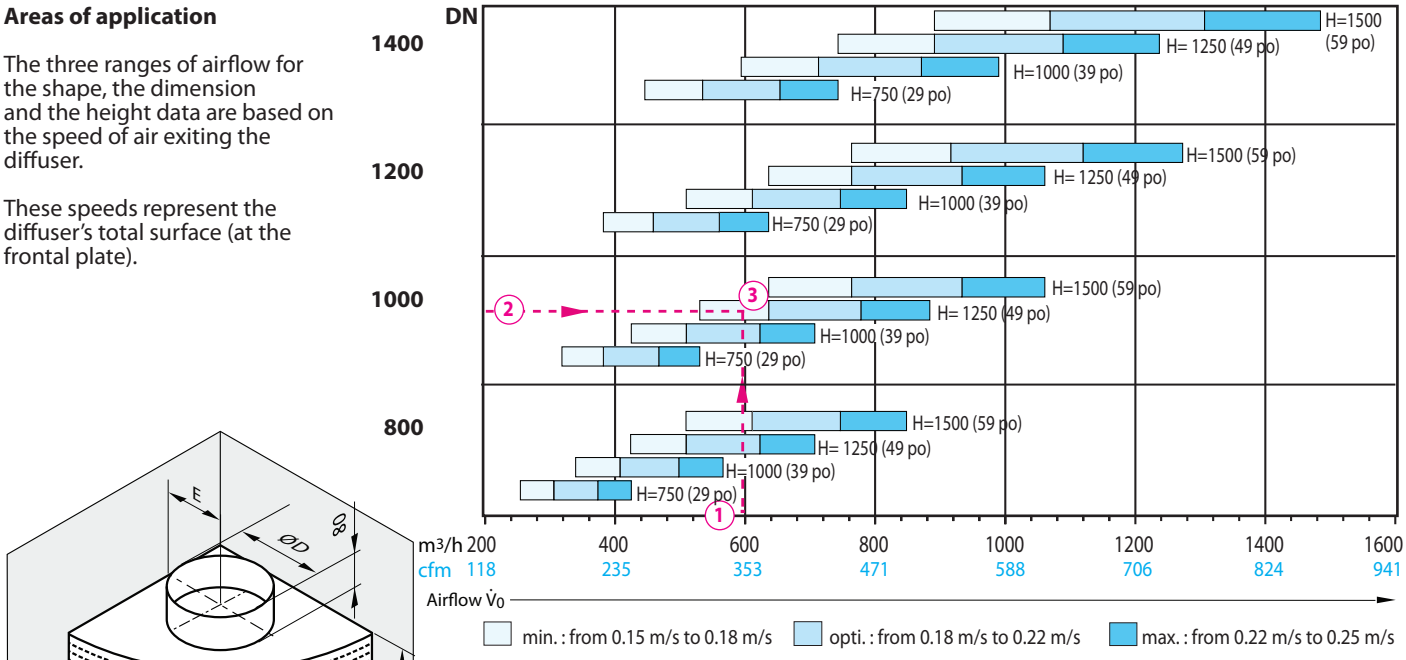
Areas of application, dimensions and aerodynamic data
QAL - V

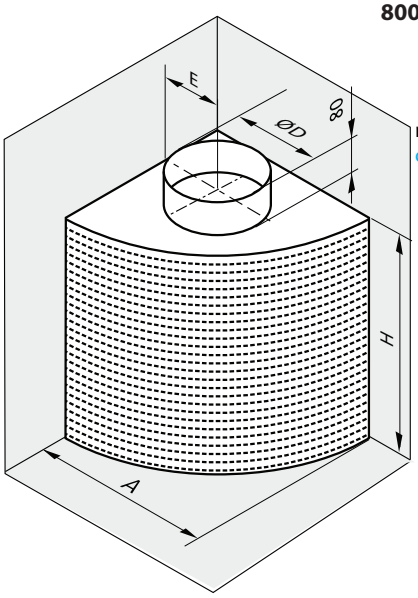
Quarter circle 90°- corner installation

Areas of application

The three ranges of airflow for the shape, the dimension and the height data are based on the speed of air exiting the diffuser.

These speeds represent the diffuser's total surface (at the frontal plate).





V_{min}: airflow for a velocity loss of 0.15 m/s
V_{max}: airflow for a velocity loss of 0.25 m/s
V_{nom}: Airflow for a velocity loss of 0.2 m/s
L: Horizontal distance of the diffuser for ΔT_0 = -2°C. Then the airflow is: ≤ 0.25 m/s

Aerodynamic data

	Height (mm)	$\dot{V}_{min}$ (m³/h)	$\dot{V}_{max}$ (m³/h)	$\dot{V}_{nom.}$ (m³/h)	$\dot{V}_{nom.}$ Δp(Pa)	$\dot{V}_{nom.}$ L_{WA}(dB(A))	$\dot{V}_{nom.}$ L (m)
DN 800	750	250	420	340	10	29	1.4
	1000	340	560	450	15	33	1.8
	1250	420	710	560	20	34	2.1
	1500	510	850	680	23	36	2.5
DN 1000	750	320	530	420	10	30	1.6
	1000	420	710	560	15	33	2.1
	1250	530	880	710	20	34	2.6
	1500	640	1060	850	23	37	3.0
DN 1200	750	380	640	510	11	33	1.7
	1000	510	850	680	18	37	2.2
	1250	640	1060	850	22	38	2.7
	1500	760	1270	1020	26	39	3.1
DN 1400	750	450	740	590	15	35	2.0
	1000	590	990	790	20	37	2.6
	1250	740	1240	990	25	39	3.1
	1500	890	1480	1190	30	41	3.6

Dimensions

	DN 800				DN 1000				DN 1200				DN 1400			
Size A	406				508				610				711			
Size E	203				254				305				356			
Size ØD	200	200	250	300	200	250	250	250	200	250	300	300	250	300	300	356
Size H	750	1000	1250	1500	750	1000	1250	1500	750	1000	1250	1500	750	1000	1250	1500

Sizing diagrams
QAL - V

Example

Data

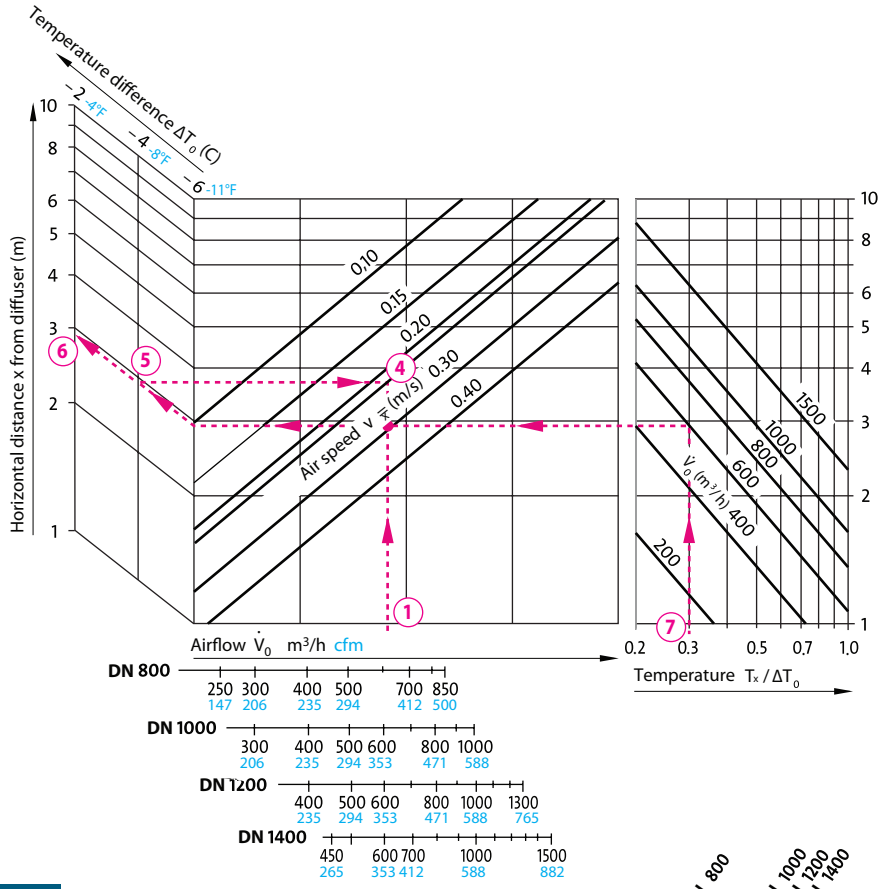
DN:	1000 mm (39 in) (2)
Flow:	353 cfm 600 m³/h (1)
Temperature difference:	- 4°C (5)
Temperature ratio:	$\Delta T_X / \Delta T_0 = 0.3$ (7)

Required

Overall height: v_x: x: Δp_t: L_{WA}

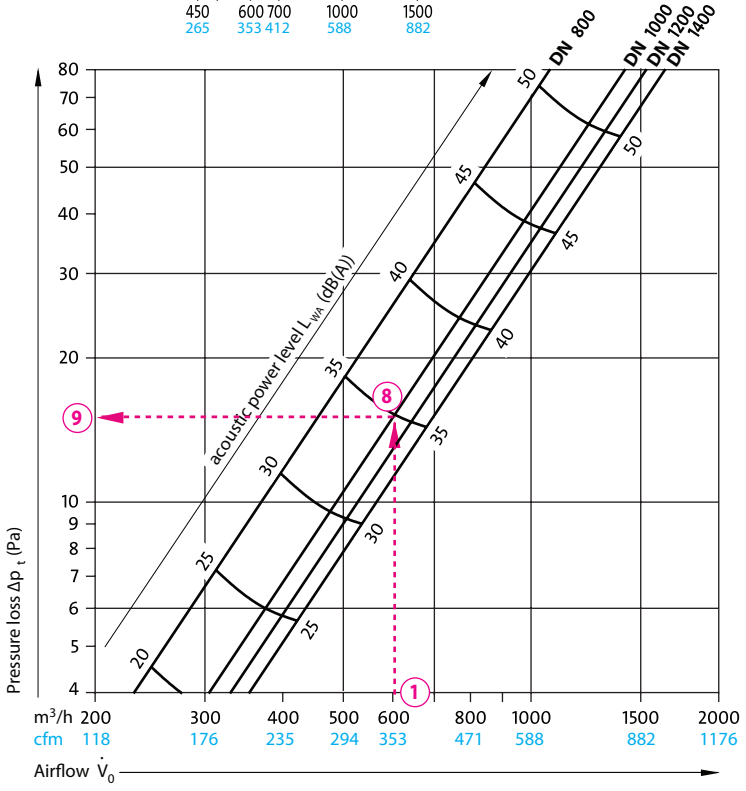
Solution

From the "Areas of application" diagram we find a height of 1250 mm (58.5 in). (3)
From the "Sizing diagram", when applying the correction table,we find:
v_x = 0.23 x 1.04 = 0.24 m/s (4)
x = 2.9 m (6)
Δp_t = 15 x 0.8 = 12 Pa (9)
L_{WA} = 35 - 3 = 32 dB (8)



Correction table

	Height (mm)			
	750	**1000**	**1250**	**1500**
v_x	x 0.94	x 1.00	x 1.04	x 1.07
$\Delta T_x / \Delta T_0$	x 0.86	x 1.00	x 1.11	x 1.22
Δp_t	x 1.25	x 1.00	x 0.80	x 0.65
L_{WA} [dB(A)]	+3	± 0	-3	-6



Specifications

QAL - L

1- Description and physical characteristics

1.1 The linear air displacement diffuser, in a wall shall have a low airflow exit speed and low level of turbulence. It shall be composed of a perforated frontal plate made of galvanised steel, a 21% vested section and an integrated air dividing mechanism.

1.2 The upper and lower covering plates, as well as the side and rear walls, shall be made of galvanised steel. The diffuser's interior joints shall be sealed with silicon.

1.3 Each plate can be painted on the interior and the exterior with powder coated thermo-lacquered paint in the architect's choice of color from the RAL color chart.

2- Performance

The performance of NAD Klima QAL – L diffusers shall be achieved with the help of the diagrams which indicating the loss of pressure, the acoustic power generated, the horizontal trajectory of the airflow as well as the initial and final temperature differential ratios in cooling mode**.**

3- Connection

The connection shall be made with a sleeve placed at the diffuser' s bottom or top.

4- Quality required: NAD Klima QAL – L model

QAL - H

1- Description and physical characteristics

1.1 The semi-circular air displacement diffuser, shall have a low airflow exit speed and low level of turbulence. Mounted in a wall, it shall be composed of a perforated frontal plate made of galvanised steel, a 21% vested section and an integrated air dividing mechanism.

1.2 The upper and lower covering plates, as well as the rear and side walls, shall be made of galvanised steel. The diffuser's interior joints shall be sealed with silicon.

1.3 Each plate can be painted on the interior and exterior with a powder coated paint in the architect's choice of color from the RAL color chart.

2- Performance

The performance of NAD Klima QAL – H diffuser shall be achieved with the help of diagrams indicating the loss or pressure, the acoustic power generated, the horizontal trajectory of the airflow as well as the initial and final temperature differential ratios in cooling mode.

3- Connection

The connection shall be made with a sleeve placed at the diffuser' s bottom or top.

4- Quality required: NAD Klima QAL – H model

QAL - R

1- Description and physical characteristics

1.1 The round air displacement diffuser, shall have a low airflow exit speed and low level of turbulence. Freely mounted, it shall be composed of a perforated frontal plate made of galvanised steel, a 21% vested section and an integrated air dividing mechanism.

1.2 The covering upper and lower plates shall be made of galvanised steel. The diffuser's interior joints shall be sealed in silicon.

1.3 Each plate can be painted on the interior and exterior with powder coated thermo-lacquered paint in the architect's choice of color from the RAL color chart.

2- Performance

The performance of NAD Klima QAL- R diffusers shall be achieved with the help of the diagrams indicating the loss of pressure, the acoustic power generated, the horizontal trajectory of the airflow as well as the initial and final temperature differential ratios in cooling mode.

3- Connection

The connection shall be made with a sleeve placed at the diffuser' s bottom or top.

4- Quality required: NAD Klima QAL – R model.

QAL - V

1- Description and physical characteristics

1.1 The quarter-circular air displacement diffuser, shall have a low airflow exit speed and low level of turbulence. Mounted in a corner, it shall be composed of a perforated frontal plate made of galvanised steel, a 21% vested section and an integrated air dividing mechanism.

1.2 The upper and lower covering plates as well as the rear and side walls shall be made of galvanised steel. The diffuser's interior joints shall be sealed with silicon.

1.3 Each plate can be painted on the interior and exterior with a powder coated paint in the architect's choice of color from the RAL color chart.

2- Performance

The performance of NAD Klima QAL – V diffusers shall be achieved with the help of diagrams indicating the loss or pressure, the acoustic power generated, the horizontal trajectory of the airflow as well as the initial and final temperature differential ratios in cooling mode.

3- Connection

The connection shall be made with a sleeve placed at the diffuser' s bottom or top.

4- Quality required: NAD Klima QAL – V model.

Codification

QAL						**Product**
	L = Linear – encased in a wall R = Round (360˚) – floor installation H = Semi-circular (180˚) – wall installation V = Quarter-circular (90˚) – corner installation					**Configuration**
						Nominal dimension
		0400, 0600, 0800, 1000				**DN : - L, - R**
		0600, 0800, 1000				**DN : - H**
		0800, 1000, 1200, 1400				**DN : - V**
			0750, 1000, 1250, 1500			**Height**
				9003 = White 9010 = Cream 00SB = Solar Black (standard matte black) 00SM = Silver Matte (standard metallic grey) ____ = RAL color (write the RAL color number)		**Diffuser color**
QAL	**-**	**L**	**- 0400**	**- 0750**	**- 9003**		**Example**

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