

LINDAB AIR DUCTS & ACCESSORIES.



Air distribution systems

Theory

Mixed ventilation

In mixed ventilation the air is supplied with a relatively high velocity outside the occupied zone, usually from the ceiling or the wall. The high velocity of the supplied air means, that a considerable amount of room-air is circulated as well. The velocity of the supplied air should be kept at a level which ensures that the mixing is effective, but at the same time ensures that the air velocity has fallen to the required level by the time it reaches the occupied zone. This makes demands on the efficiency of the units used as regards to velocity and mixing capacity.

An increase in the supplied air velocity will cause an increase in the sound level. Requirements for a low sound level consequently means a limit on the diffusers efficiency. The temperature and the contamination concentration is roughly the same throughout the room, for both isothermal and cold air.

Mixed ventilation is mostly unaffected by outside influences and can be used for both heating and cooling needs.

Supply of heated air

Since heated air is lighter than the room-air, it takes a considerable energy to force the air into the occupied zone. This means that the requirements for the downward supply air velocity rises with the increase of ceiling height and rising temperatures. When the ceiling height is high, it is usually necessary to blow the air vertically down wards.

Supply of cold air

The heavier cold air, supplied from the ceiling, may lead to excessive air velocity in the occupied zone if the thermal loads are large. The air jets from diffusers (normally horizontal) and the convection streams from the heating sources (people, lighting, machines) result in a velocity in the occupied zone, which in addition to the supplied air velocity from the diffuser, depends on the removed effect per square meter (W/m^2), the distribution on the individual diffusers and the diffusers jet pattern.

The supply of both heated and cold air in the same diffuser, from the ceiling cannot normally fulfil requirements for temperature gradient, ventilation efficiency and velocity in the occupied zone at the same time.

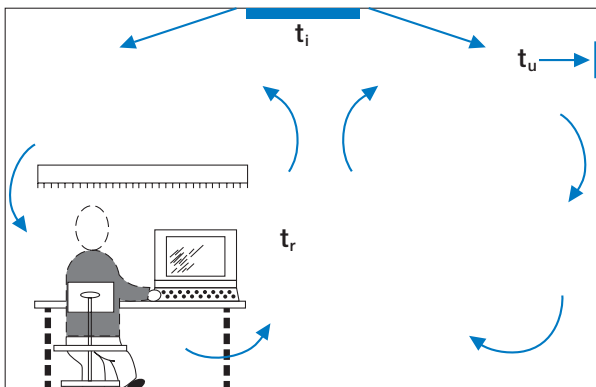


Fig. 1, Illustration of mixed ventilation.

The solution to this problem may be motorized diffusers, which can change the jet patterns. Another option is to dimension the diffusers to suit the cooling situation in question, and then add vertical nozzles for supply of heated air.

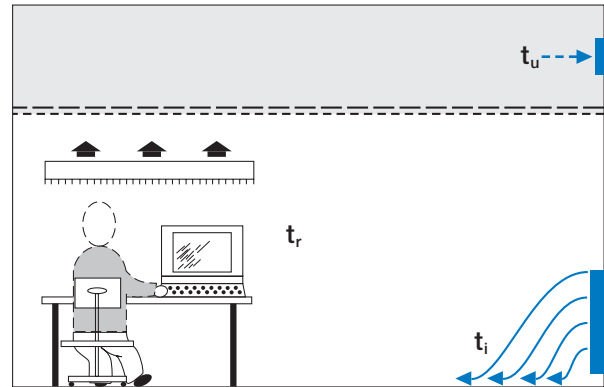


Fig. 2, Illustration of displacement ventilation.

Displacement ventilation

When using displacement ventilation, it is the thermal forces from the heating sources in the room, that control the air distribution. The air is supplied directly into the occupied zone at floor level - at low velocity and a cooling temperature. The air spreads across the floor, and displaces the hot, contaminated air, which is forced to the ceiling by the convection flow from the heating sources. Exhaust units should be placed in the ceiling, where a hot "contaminated" layer is formed.

The ventilation efficiency of displacement ventilation is larger than the mixed ventilation owing to this stratification of the air. The difference is increased with the ceiling height. The increased temperature efficiency means, that cooling power can be saved, or that the cooling effect of the outside air can be used better, since the exhaust air is warmer and consequently will transport more effect from the room. In normal circumstances displacement ventilation is not suitable for heating purposes.

The near-zone of the units depends primarily on the amount of supplied air, the cooling temperature and the placement of the unit. Within the recommended air flow area, the units size has no practical influence on the near-zone. The near-zone geometry can however be altered to suit the individual needs just by adjusting the nozzles.

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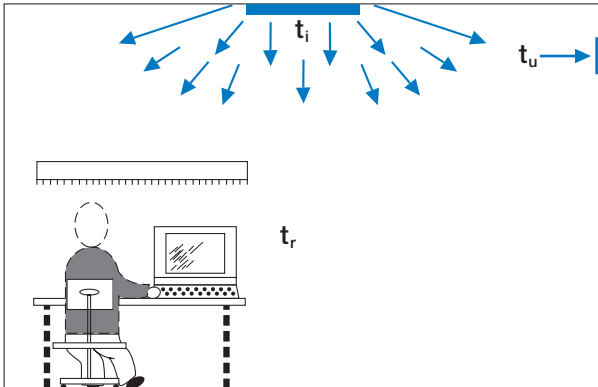


Fig. 3, Illustration of low impulse supply air.

Low-impulse supply air

By using low-impulse supply air, cold air from the ceiling is supplied at a low velocity. The clean air displaces the contaminated air.

The best result is obtained by distributing the supplied air flow in small portions spread out over the entire ceiling.

The system cannot be used for heating.

Choice of air distribution system

The different systems have their advantages and disadvantages. These should be considered carefully before choosing a system solution.

All the system solutions have one thing in common: the more units used, and the better the distribution of units in the room the better the thermal and atmospheric comfort achieved.

The advantages and disadvantages are outlined below.

Mixed ventilation

- + Can be used for cooling and heating
- + Large induction allows supply air with a larger cooling temperature.
- + Largely the same temperature and air-quality through out the room, ie. a small temperature gradient and a small concentration gradient.
- + Stable flow pattern.
- + Flexibility with regards to placement of the diffusers.
- + No reduction of useful area (near-zone).
- Risk of short-circuits/low ventilation efficiency (particularly for heating).
- More power required for cooling.
- Risk of draft when large cooling effect.

Displacement ventilation

- + High ventilation - and temperature efficiency.
- + High air quality in the occupied zone.
- + Low velocity in the occupied zone, although not in the near-zone.
- + Suitable for cooling of rooms with high ceiling height.
- Less freedom with regard to furniture positioning, and the room space is reduced due to the diffusers near-zone.
- Low induction.
- Large vertical temperature gradient.
- Heating is not possible.

Low impulse

- + No reduction of useful area.
- + Suitable for large air replacement with limited cooling temperature.
- + High local efficiency.
- Low induction.
- Heating is not possible.
- Risk of short-circuit when the exhaust is in the ceiling.

Air distribution systems

Theory

Choice of air distribution system

		Mixed							Displacement			Low-impulse	
		Nozzles	Grilles	wall diffusers	Ceiling diff. w. one slot	Perf. diffusers	Cone diffusers	Swirl diffusers	Slot diffusers	Wall diffusers	Floor diffusers	Under seat supply	
Office	Heat + cold 0-30 W/m ² 30-60 W/m ² >60 W/m ²			••	•• ••• ••	•• ••• ••	•• ••• ••	••• ••• ••	•	•• ••	••• ••		
Audience	Conference rooms Cinema Auditoria Restaurants Educational estab. Exhibition halls				•	•• •	•• •	•• •		••• •• •• •• ••	••• •• •• ••	••• ••	
Stores	Shops Supermarkets	• •	• •	••	•• •••	••• •••	••• •••	••• •••	•				
	Sportshalls Swimming baths	••• •••	•• ••			•	••	••		•			
	Industrial kitchens				•	••	••	••		••			••
	Laboratories				•	••	••	••		••			••
	"Clean room" Homes Institutions		•• ••	•• ••	• ••• •••	•• ••• •••	••	•••	••	••			

• Usable •• Good ••• Best

Choice of air distribution system in industrial environments

Ventilation need	Heating need	Cooling need	Mixed ventilation	Displacement ventilation	Low-impulse
✱	✱	✱	X		
✱	✱✱	✱	X		
✱	✱✱	✱✱	X		
✱	✱	✱✱		X	X
✱✱	✱	✱	X		X
✱✱	✱✱	✱	X		
✱✱	✱✱	✱✱	X		
✱✱	✱	✱✱		X	X

✱ Little need ✱✱ Large need

Mix ventilation

Theory

Mixed ventilation

An air distribution unit must supply a certain amount of air, in order to provide adequate ventilation. At the same time requirements for sound pressure, air velocity and temperature gradient in the occupied zone must be respected. In order to fulfill these requirements, certain planning guidelines are necessary. The most important ones are specified below. When choosing a diffuser, values such as pressure loss, sound level and air throw have to be taken into account. This data is specified for each individual product separately.

The selection and performance data contained in the Lindab catalogue are the result of measurements conducted in Lindabs laboratory using modern precision instruments. The conditions are rarely as ideal in practice as in a laboratory, since constructional choices, furnishing, placement of air distribution units etc. have a great influence on the distribution of the air in the room. Lindab offers to test the conditions in practice by conducting full-scale testing, which is very useful when large and complicated projects are being planned.

Descriptions

A	Total room absorption	[m ²]
b _h	Maximum horizontal spread to final velocity 0,2 m/s	[m]
b _v	Maximum vertical spread to final velocity 0,2 m/s	[m]
F	Free cross-section (q/v ₀ , where v ₀ is measured)	[m ²]
K _{ok}	Octave correction value for sound power level	[dB]
l _{0,2}	Air throw to terminal velocity 0,2 m/s	[m]
l _{0,0}	Turning point at vertical supply air	[m]
l _b	Distance from the unit to point of maximum spread	[m]
L _A	A-balanced sound pressure level	[dB(A)]
L _{WA}	A-balanced sound power level	[dB(A)]
L _{wok}	Sound power level in octave-bands	[dB]
L _p	Sound pressure level	[dB]
L _w	Sound power level	[dB]
ΔL	Sound attenuation	[dB]
D	Room attenuation	[dB]
Δp _t	Total pressure loss	[Pa]
q	Air flow	[m ³ /h], [l/s]
Δt	Temperature difference between supply air temperature and room air temperature	[K]
v ₀	Supply velocity	[m/s]
v _x	Jet velocity at distance 'x' from centre of diffuser	[m/s]
v _{term}	Thermal maximum velocity in the occupied zone	[m/s]

Pressure loss

The diagram shows the total pressure loss for the diffuser (at ρ = 1,2 kg/m³), meaning the sum of static and dynamic pressure (incl. a possible plenum box) connected to a straight air duct with a length of 1 m and the same dimensions as the diffuser.

Sound level

The diagrams show the A-balanced sound power level L_{WA} for diffuser and possible plenum box connected with a straight air duct with a length of 1 m and the same dimensions as the diffuser.

Sound pressure level is a measurement for the power of the sound, ie. the pressure vibrations we perceive, while the sound power level is a parameter to characterize the source of the sound. Both are normally noted in the unit dB (decibels), which can cause some confusion.

Sound pressure (L_p)

Is a measure of the intensity of the sound, characterized by pressure vibrations, perceived by the ear or measured with a microphone on a noise meter. Sound pressure is measured in Pascal (Pa) and is usually noted as sound pressure level in decibels (dB) or dB(A).

Sound power (L_w)

The power, a sound source (eg. a machine) sends out in the shape of a sound. The sound effect is measured in Watt (W) and is usually noted as sound effect level in decibels (dB) or dB(A).

In the catalogue, sound properties of the diffusers are specified as sound power level.

$$\text{Sound power level } L_w = 10 \times \log \frac{N}{N_{re}} \text{ [dB]}$$

N is the actual sound power [W], which is sent out in the shape of pressure vibrations and N_{re} = 10⁻¹² W which is the reference sound power.

$$\text{Sound pressure level: } L_p = 20 \times \log \frac{P}{P_{re}} \text{ [dB]}$$

P is the actual sound pressure [N/m²] and p_{re} = 2 × 10⁻⁵ N/m² is the reference sound pressure.

Room attenuation D [dB] is the difference between sound power level and the sound pressure level

$$L_p = L_w - D$$

The A-balanced sound power level, L_{WA} is calculated to sound power level in the individual octave-bands by

$$L_{wok} = L_{WA} + K_{ok}$$

K_{ok} is a correctional value. K_{ok} is noted in tabular form for each unit.

Sound attenuation

Is noted for each unit, and refers to the reduction in sound power level between duct and room (incl. end-reflection).

Isothermal supply air

All technical data refer to isothermal conditions.

Air throw

The air throw l_{0,2} is defined as the largest distance between the centre of the unit and the terminal velocity 0,2 m/s. The values specified for air throw l_{0,2} correspond to diffusers mounted in the ceiling. (Fig. 4)

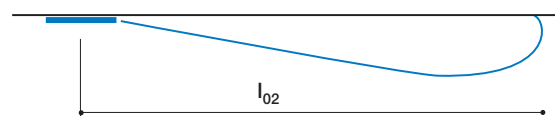


Fig. 4. Air throw l_{0,2} for diffusers mounted in ceiling

Mix ventilation

Theory

Suspended mounting, ie. diffusers mounted more than 300 mm from the ceiling (Figure 5), reduces the air throw by 20 %, so that $l_{0,2}$ suspended = $0,8 \times l_{0,2}$.

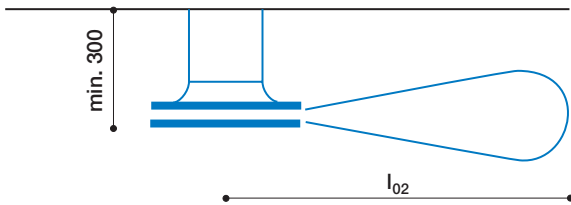


Fig.5, Suspended diffuser.

For grilles $l_{0,2}$ applies for mounting more than 800 mm from the ceiling. (Figure 6).

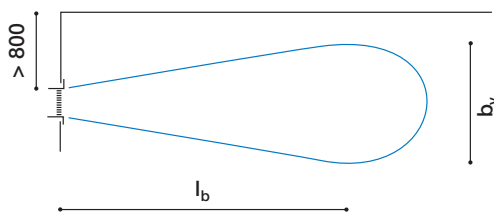


Fig. 6, Air throw for grilles mounted more than 800 mm from ceiling.

Should a grille be mounted less than 300 mm from the ceiling (Figure 7) the air throw $l_{0,2}$ is extended by 40%, so that $l_{0,2}$ grilles by ceiling = $1,4 \times l_{0,2}$.

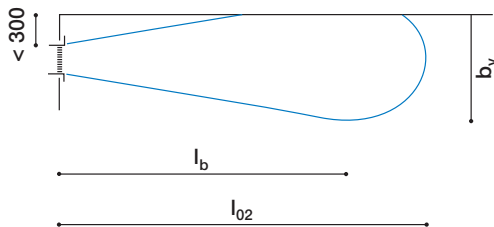


Fig.7, Air throw for grille mounted less than 300 mm from ceiling.

Spread

The maximum vertical spread b_v specifies the largest vertical distance between the ceiling and the terminal velocity 0,2 m/s (Figure 8).

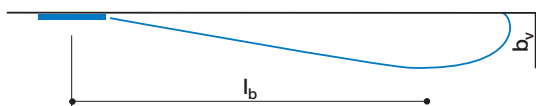


Fig.8, Vertical spread.

The horizontal spread is noted as b_h and specifies the maximum horizontal spread of the air jet for the terminal velocity 0,2 m/s (Figure 9). The distance between the unit and the point of largest jet width is noted as l_b . b_v , b_h and l_b are specified for each unit as a function of the air throw $l_{0,2}$.

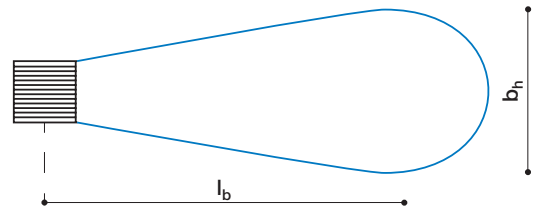


Fig. 9, Horizontal spread.

Coanda effect

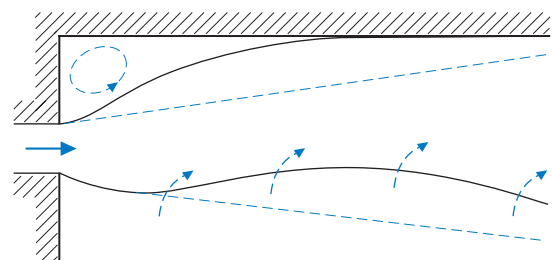


Fig. 10, Air flow with Coanda effect.

When the air is supplied parallel to a surface (eg. a ceiling) negative pressure occurs between the air jet and the ceiling, causing the jet to “stick” to the ceiling (this is known as the Coanda effect). (Figure 10). This effect is of great importance, particularly when supplying cooling air.

To achieve the greatest possible Coanda effect, the air should be supplied in small quantities to each unit, with the widest possible spread on the ceiling and the greatest possible velocity.

This means that the best method is always to supply the air from the diffuser in a full 360°-pattern without side covers. In particular, linear diffusers (MTL) are divided into active and inactive sections to avoid drop.

Velocity in the jet

The air velocity of the core jet can be calculated within a limited area, using the following formula:

$$v_x = \frac{l_{0,2} \times 0,2}{x} \Leftrightarrow x = \frac{l_{0,2} \times 0,2}{v_x}$$

Where x is the distance in metres between the unit and the point in the core jet where the air velocity is v_x m/s.

Example

A diffuser has an air throw of $l_{0,2} = 3$ m. The distance to the point where the jet velocity is 0,3 m/s is calculated as follows:

$$x = \frac{3 \text{ m} \times 0,2 \text{ m/s}}{0,3 \text{ m/s}} = 2 \text{ m}$$

Mix ventilation

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Thermal supply air

The catalogue values for air throws are valid in the case of isothermal supply air.

When using cold or heated supply air the thermal forces work by forcing the jet downwards (cooling) or giving the jet a lift (heating). A description of the jet flow would require a determination of the ratio of temperature difference and supplied air velocity (in the jet-theory expressed by Archimedes number). If a more detailed calculation of supply air velocities is needed - where this is factored in - in addition to a visual of the jet flow from the diffusers, we refer you to the software programme DIMcomfort.

The general rule below for horizontal and vertical supply air with cold- or heated air, can however be used for correction of the air throw in a more simple calculation.

Horizontal supply air at the ceiling

1. When air is supplied horizontally with cold air, the air throws are reduced by 1,5% per degree (Figure 11), while the vertical spread b_v is increased.
2. When air is supplied horizontally with heated air, the air throws are increased with 2% per degree (Figure 11).

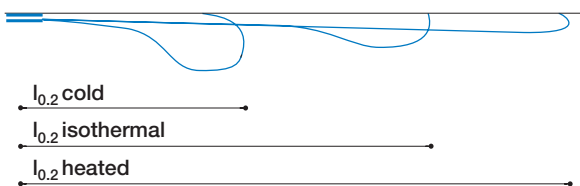


Fig. 11, Air throw $l_{0,2}$ for diffusers mounted in ceiling.

Vertical supply air at the ceiling

The throw lengths for vertical supply air is are valid for isothermal conditions.

1. When air is supplied at a cooling temperature the throw length is increased. The throw length is doubled at $\Delta t = -10^\circ\text{C}$.
2. When air is supplied with heated air, the throw length is reduced. The throw length is halved at $\Delta t = 10^\circ\text{C}$.

For products, which can be set for vertical supply air, there are also other separate turning point diagrams for heated air ($\Delta t = +5\text{K}$, $+10\text{K}$ and possibly $+15\text{K}$) for turning point $l_{0,0}$ in addition to the other product data.

Dimensioning mixed ventilation

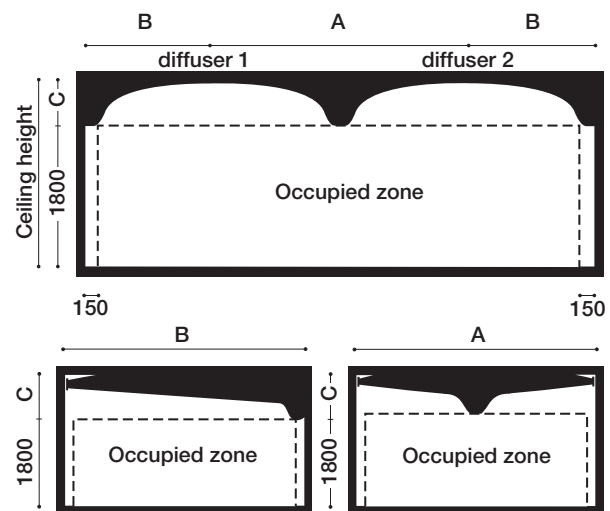


Fig. 12, Planning of mixed ventilation.

In order to avoid velocities more than 0,2 m/s in the occupied zone, the diffusers must be dimensioned so that the air throw $l_{0,2}$ has the right ratio to the distance A, B and C (Figure 12). If there are two opposing diffusers the following formula must be observed.

$$0,75 \times \left(\frac{A}{2} + C\right) \leq l_{0,2} \leq \left(\frac{A}{2}\right) + C$$

In the case of a diffuser blowing towards a wall the following formula must be observed

$$0,75 \times (B + C) \leq l_{0,2} \leq B + C$$

If two or more diffusers with a parallel delivery of supply air (1-way or 2-way) are placed with a spacing A between them, which is less than b_h , the air throw increases in accordance with the following formula :

$$l_{0,2} \text{ (corrected)} = K \times l_{0,2}$$

where K is the correctional factor to be read from Figure 13.

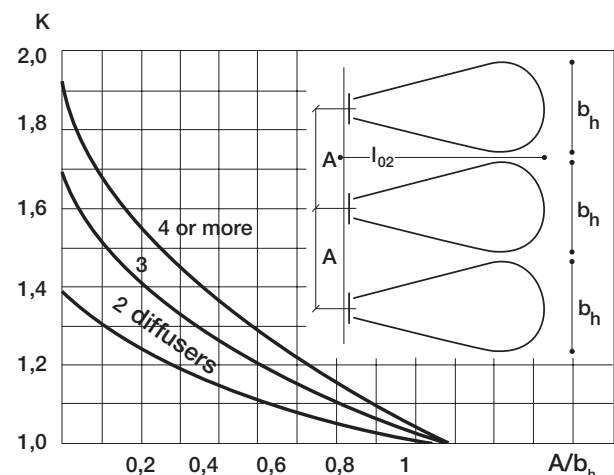


Fig. 13, Planning mixed ventilation

Mix ventilation

Theory

For nozzles and suspended diffusers with 1-way supply of air, the lift or drop of the jet as a consequence of heating or cooling supplied air can be read in *Figure 14*.

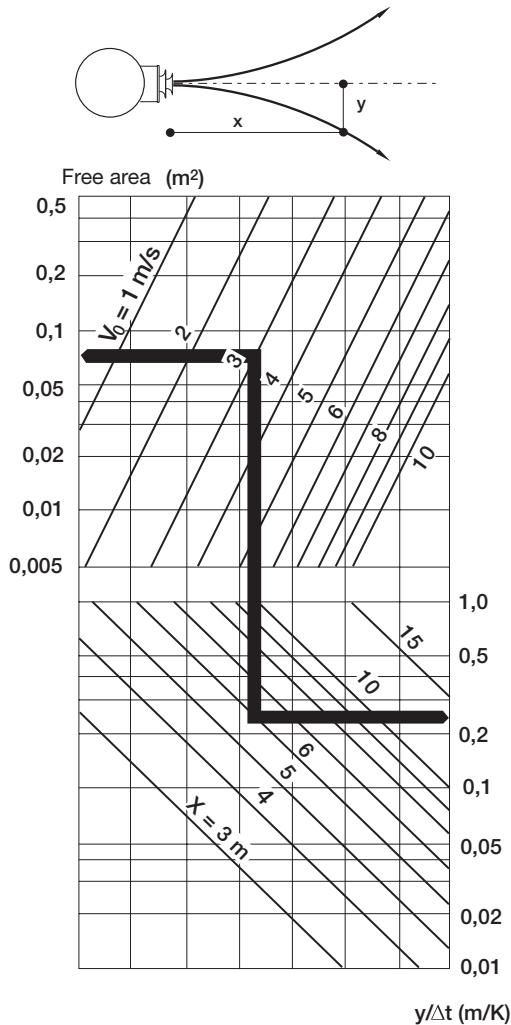


Fig. 14, Planning mixed ventilation.

Example

A nozzle has a free area of 0,075 m².

With an air volume of 756 m³/h a supplied air velocity of $v_0 = 3 \text{ m/s}$ ($v_0 = q / A_0$) is achieved.

Figure 14 has a thick horizontal line between $A_0 = 0,075 \text{ m}^2$ and $v_0 = 3 \text{ m/s}$.

By following the thick line straight down to $x = 6 \text{ m}$ and then horizontal to the right, the ratio between y (lift/drop) and Δt (temperature difference between supplied air and room air) can be read to be 0,24.

With a temperature difference of 10 K a lift/drop at $y = 0,24 \text{ m/K} \times 10 \text{ K} = 2,4 \text{ m}$ at a distance of $x = 6 \text{ m}$ from the nozzle is achieved.

To avoid the jet being deflected by possible obstacles, the minimum distances in *Figure 15* must be observed.

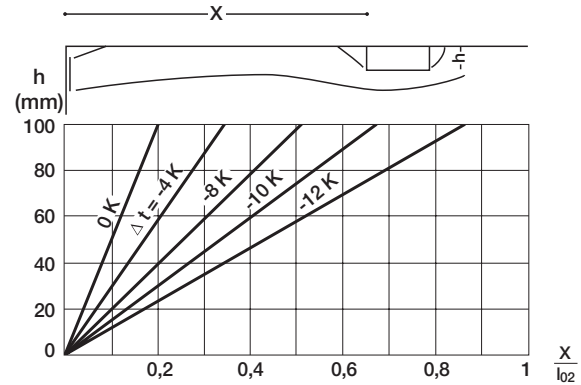


Fig. 15, Air throw $l_{0,2}$ for diffusers.

Mix ventilation

Theory

Heat loads in the room create upward convection flows, and in the same manner downward cold convection flows are created from the supplied air.

The calculated maximum velocity v_{term} in the occupied zone, which occurs due to thermal flows is shown in Figure 16. These flows depend on the heat load in the room (W/m^2) in addition to the distribution of the supplied air (number of diffusers and jet pattern), but not of the impulse of the supplied air. Furthermore the velocity depends on the ceiling height.

The determination of the maximum velocity in the occupied zone is made by the help of an empirical model from the heat load (W/m^2), number of diffusers ($W/diffuser$) and air pattern (1-, 2-, 3-, 4-way) at a ceiling height of 2,5 m.

If there is any doubt regarding a project, or special conditions need investigating, Lindab offers to test the conditions by conducting a full-scale test, which will often hold great value in the case of bigger and more complex constructional tasks.

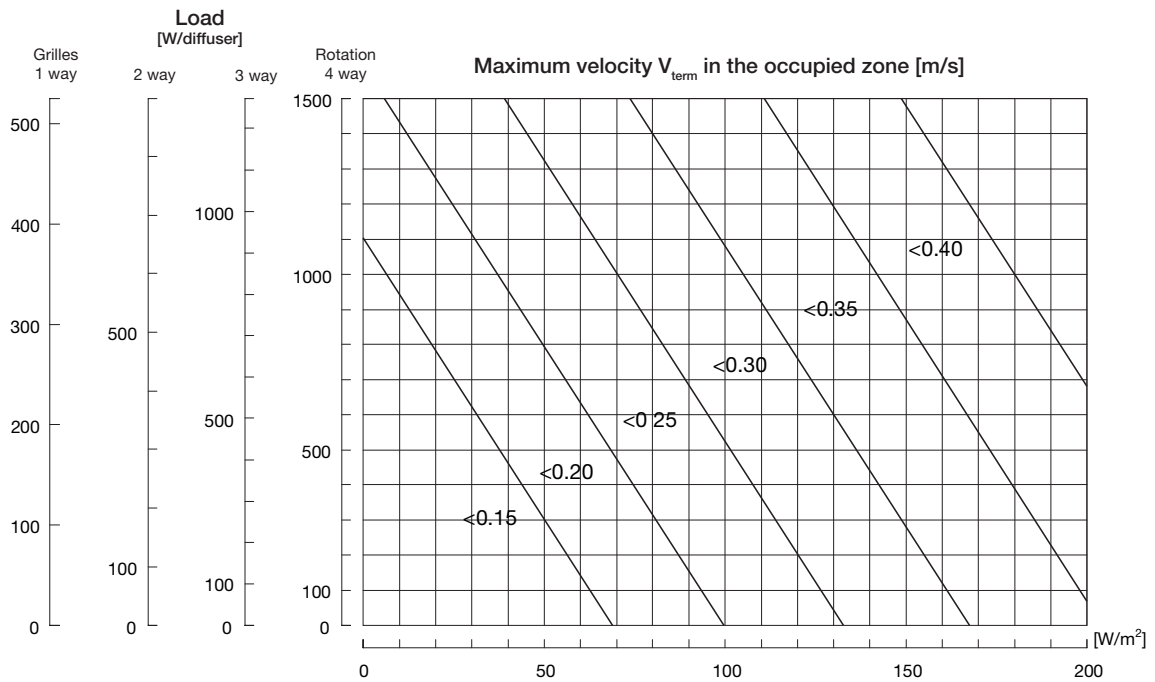


Fig. 16 a, Thermal maximum velocity in the occupied zone. The diagram is advisory and valid for ceiling heights of 2,5 m.

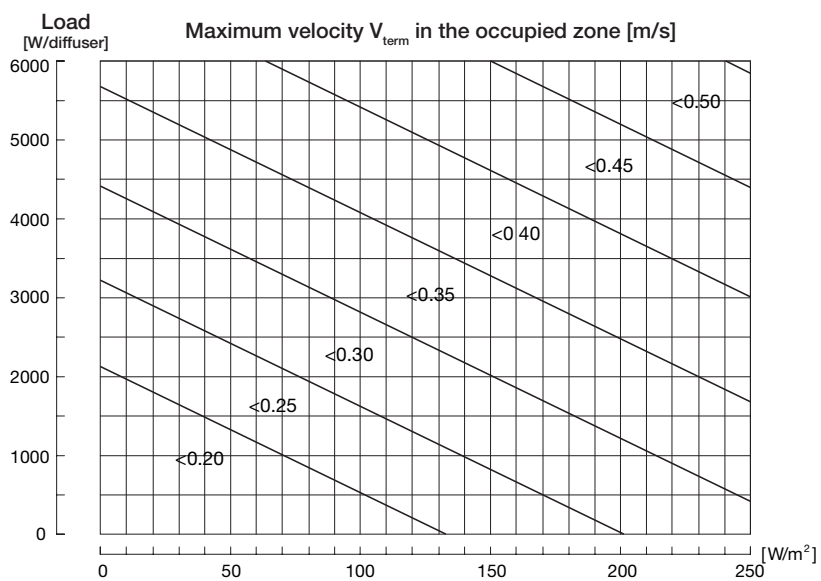


Fig. 16 b, Thermal maximum velocity in the occupied zone. The diagram is advisory and valid for ceiling heights > 4 m.

Mix ventilation

Theory

Calculation example

Room: L × B × H = 10 m × 6 m × 4 m

Thermal load:

10 pers., sitting activity (10 × 130 W) = 1300 W (22 W/m²)

10 table lamps of 60 W (10 × 60 W) = 600 W (10 W/m²)

10 machines of 100 W (10 × 100 W) = 1000 W (17 W/m²)

Total = 2900 W (48 W/m²)

In order to achieve a satisfactory air quality in the room, the typical calculations determine that the ventilation should have a supply air of 4-10 l/s per person in addition to 0,4 l/s per m² floor area. If 10 l/s is used, the following necessary air volume can be calculated.

$q_{\min} =$

10 persons × 10 l/s per person + 60 m² × 0,4 l/s per. m²

= 124 l/s

If the ventilation at the same time has to remove the collective heat load in the room, it is necessary to have a temperature difference Δt between the supply air and the room/ exhaust air.

Δt can be determined to be :

$$\Delta t = \frac{2900 \text{ W}}{\frac{124 \text{ l/s}}{1000 \text{ l/m}^3} \times 1,2 \text{ kg/m}^3 \times 1007 \text{ J/kg/K}} = 19,4 \text{ K}$$

Since Δt of almost 20 K is very likely to cause thermal discomfort, eg. due to drop from a ceiling diffuser, it is recommended to increase the air volume and use less Δt between supply and room temperature.

If $\Delta t = 6 \text{ K}$ is chosen the air volume can be determined to be :

$$q = \frac{2900 \text{ W}}{6 \text{ K} \times 1,2 \text{ kg/m}^3 \times 1007 \text{ J/kg/K}} \times 1000 \text{ l/m}^3 = 400 \text{ l/s}$$

Displacement ventilation

Theory

Displacement ventilation

A displacement unit should add a certain amount of air to properly ventilate the room, and at the same time meeting the requirements for sound level, air velocity and temperature gradient in the occupied zone. In order to meet these requirements, planning guidelines are needed, and the most important ones are stated hereafter. When choosing a unit, the demands on pressure loss, sound level and air throw should be made clear. These data can be found for each individual product. The selection- and performance data shown in Lindabs catalogue is the result of measurements carried out in Lindabs laboratory and are all conducted with modern and accurate measuring devices. In practice the conditions are rarely as ideal as in a laboratory, since the constructional environments, furnishing, placement of the air distribution units etc. has a great influence on the jet pattern spread in the room. Lindab attempts to test the conditions in practice by carrying out full-scale testing, which is often very valuable in the case of bigger and complicated tasks.

Descriptions

$a_{0,2}$	Width of near-zone	[m]
$b_{0,2}$	Length of near-zone	[m]
ϵ_i	Temperature efficiency	[-]
K_{ok}	Octave Correction value for sound power level	[dB]
L_A	A-balanced sound pressure level	[dB(A)]
L_{WA}	A-balanced sound power level	[dB(A)]
L_{Wok}	Sound power level in octave bands	[dB]
L_p	Sound pressure level	[dB]
L_w	Sound power level	[dB]
ΔL	Sound attenuation	[dB]
D	Room attenuation	[dB]
Δp_t	Total pressure	[Pa]
q	Air flow	[m ³ /h], [l/s]
t_s	Supply air temperature	[°C]
t_r	Room temperature (1,1 m over the floor)	[°C]
t_u	Exhaust air temperature	[°C]
Δt	Temperature difference between room air and supply air	[K]
v_x	Velocity at distance x from the centre of the unit	[m/s]

Vertical temperature distribution

Due to the stratified flow, displacement ventilation causes a big difference in temperature throughout the room. In comfort ventilation, where the heating sources are placed in the bottom part of the room, the temperature gradient, meaning the temperature rise per m (K/m) will be bigger in the lower part of the room, and smaller in the upper part. The simplest models for description of the vertical tempera-

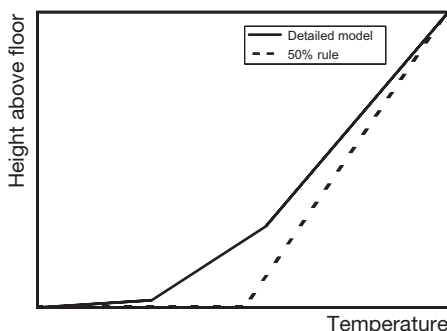


Fig. 17, Comparison of models for description of the vertical temperature distribution

ture distribution are the so-called “%-rules“.

The most used one is the 50%-rule, in which it is assumed, that half of the temperature rise from supply air to exhaust air occurs at the floor, and the other half occurs up through-out the room (see Figure 17). The model is a good one, as a first evaluation of the most typical rooms and units, but because of the simplicity it does not precise determine the temperature gradient in the occupied zone.

Lindab recommends the use of a more detailed model instead. One that describes the variation of the temperature gradient up through the room. A close assumption is that the temperature gradient in the occupied zone is half of the temperature difference between the room air and the supply air. The model is based on a number of full scale tests, and factors in the temperature efficiency and the fact that the temperature gradient is larger in the lower part of the room than in the upper part.

Temperature efficiency

The efficiency in displacement ventilation is due to the stratification. The difference is increased at larger ceiling heights. The effect taken from the room is proportional to the temperature difference between supply air and exhaust air ($t_u - t_r$).

Since the exhaust temperature (t_u) is higher than the room temperature (t_r) in displacement ventilation, the same effect can be taken from the room at a higher supply air temperature (t_s) than with mixed ventilation, where $t_u \leq t_r$. This means that cooling effect can be spared, or that it is possible to use the cooling effect of the outer air more efficiently.

Displacement ventilation is furthermore partly self-regulating at varying thermal loads, because a rising load first and foremost will give a higher temperature gradient and consequently a higher temperature at the ceiling.

The temperature efficiency is given at:

$$\epsilon_i = \frac{t_u - t_r}{t_s - t_r} \times 100\%$$

With displacement ventilation it is the case that $\epsilon_i > 100\%$ ($t_u \geq t_r$),

while $\epsilon_i \leq 100\%$ at mixed ventilation ($t_u \leq t_r$).

By ideal mixing $\epsilon_i = 100\%$ ($t_u = t_r$).

Pressure loss

The diagrams show the total pressure loss for the unit (at $p = 1,2 \text{ kg/m}^3$), meaning the sum of static and dynamic pressure, connected to a straight air duct with a length of 1 m and the same dimension as the diffuser.

Sound level

The diagrams show the A-balanced sound power level L_{WA} for a diffuser connected with a straight air duct with a length of 1 m and the same dimensions as the diffuser.

Sound pressure level is a measurement of the result of the sound, ie. the pressure vibrations we perceive, while the sound power level is a parameter to characterize the source of the sound. Both are normally noted in the unit dB (decibels), which can cause some confusion.

Displacement ventilation

Theory

Sound pressure (L_p)

Is a measure of the intensity of the sound, characterized by pressure vibrations, perceived by the ear or measured with a microphone on a noise meter. Sound pressure is measured in Pascal (Pa) and is usually noted as sound pressure level in decibels (dB) or dB(A).

Sound power (L_w)

The power, a sound source (eg. a machine) sends out in the form of a sound. The sound effect is measured in Watt (W) and is usually noted as sound effect level in decibels (dB) or dB(A).

In Lindabs catalogue sound properties of the units are named sound power level.

Sound power level: $L_w = 10 \times \log \frac{N}{N_{re}}$ [dB]

where N is the actual sound power [W], which is sent out in the shape of pressure vibrations and $N_{re} = 10^{-12}$ W is the reference sound power.

Sound pressure level: $L_p = 20 \times \log \frac{p}{p_{re}}$ [dB]

where p is the actual sound pressure [N/m²] and $p_{re} = 2 \times 10^{-5}$ N/m² which is the reference sound pressure.

Room attenuation D [dB] is the difference between sound power level and sound pressure level. $L_{w_{ok}} = L_w - D$

The A-balanced sound power level, L_{WA} is calculated to sound power level in the individual octave bands by :

$L_p = L_{WA} + K_{ok}$,

K_{ok} being a correctional value. K_{ok} is specified in tabular form for each individual unit.

Sound attenuation

Specified for each individual diffuser, the reduction of sound power level from air duct to room (including end reflection).

Near-zone

The area around the unit, where the air velocity is above 0,2 m/s, is referred to as the near-zone.

The size of the near-zone is specified for each unit at a cooling temperature of $\Delta t = t_r - t_i = 3K$.

The near-zone length (a_n) and - width (b_n) is valid for evenly distributed thermal loads.

Dimensioning displacement ventilation

To plan a ventilation system by displacement principle, which “works” on the basis of thermal powers, and where the supply air is added directly to the occupied zone, makes special demands on dimensioning and placement of the air distribution units. They should, as such, never be placed directly by a powerful heating source, like a radiator. Powerful sunlight can also disturb the system, and in some cases make it function as a mixed ventilation system. Large, cold walls - or window surfaces in the room can also cause a back-flow of contaminated air to the occupied zone.

The system is not suitable for heating purposes, and consequently requires heating and ventilation to be separate. Exhaust should always take place as high up in the room as possible.

If in any doubt about a project, or if there are any points to be analysed, Lindab offers to test the conditions in practice by conducting full-scale tests, which is often of great value, at bigger and complicated tasks.

Convection flow

The supplied air flow should at least be the same as the total convection flow in the room (Figure 18). If the supplied air flow is less than this the convection flow will draw contaminated air from above down into the occupied zone (Figure 19).

The following factors affect the convection flow:

- The shape and surface of the heat source
- The surface temperature of the heat source
- Convective proportion of the heating output emitted
- Mean temperature of the room
- The level of the contaminated zone in relation to the level of the heat sources in the room

The convection flow from people, lighting, and machinery can be determined from the output and the placement of the heat sources in the room (see Table 1 and Table 2).

Table 1, Convection flows for people based on experiences

Activity	met	Heat output W	airflow l/s	
			1.2 above floor	1.8 above floor
Sitting, relaxing	1,0	100	8-10	-
Sitting activity	1,2	130	10-12	-
Light act., standing	1,6	170	-	25-30
Medium act., standing	2,0	200	-	30-35
High act. standing	3,0	300	-	35-40

Met: metabolism, 1 met = 58 W/m² body surface.

Table 2, Convection flows for various heat sources.

Heating source	Airflow l/s pr. W	
	1.2 above floor	1.8 above floor
Table lamps	0,10	0,20
Ceiling lights	-	-
Machines	0,10	0,20
Sunlight	0,11	0,22

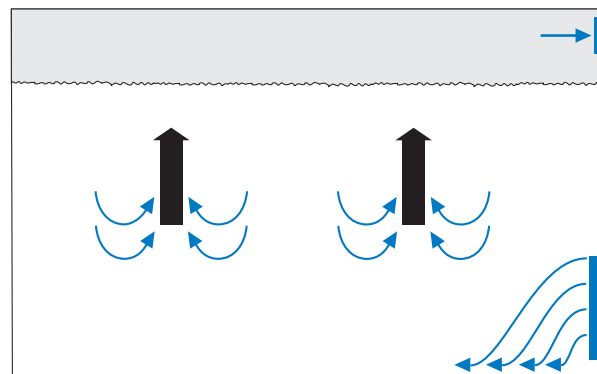


Fig. 18, Displacement ventilation with sufficient air flow.

Displacement ventilation

Theory

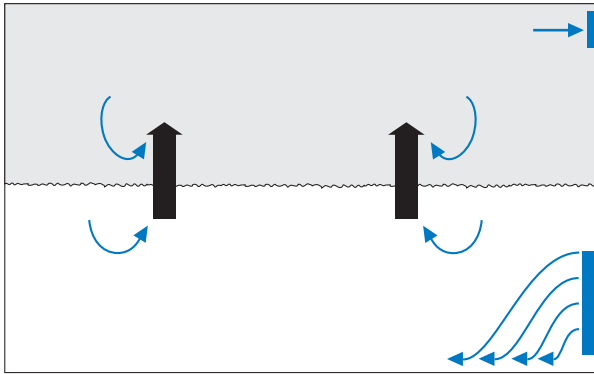


Fig. 19, Displacement ventilation with insufficient air flow.

Temperature gradient

The demands made on thermal comfort in the occupied zone places a limit on the size of the temperature gradient. Table 3 show the maximum gradient recommended by Lindab Comfort at various levels of activity.

Further more the corresponding maximum cooling temperature ($t_r - t_i$) is mentioned when using Lindabs COMDIF-units. The temperature gradient in the occupied zone (K/m) can with a small margin be set at half of the cooling temperature $t_r - t_i$ (K).

Table 3, Recommended temperature gradients and cooling temperatures

Activity	Max. temperature gradient (K/m)	Max. undertemperature $t_r - t_i$ (K)
Sitting, relaxing	1,5	3,0
Sitting activity	2,0	4,0
Light act., standing	2,5	5,0
Medium activity	3,0	6,0
High activity	3,5	7,0

Near-zone

The size of the near-zone is specified for each unit in the catalogue. If several units are placed close to one another, the near-zone will increase (Figure 20).

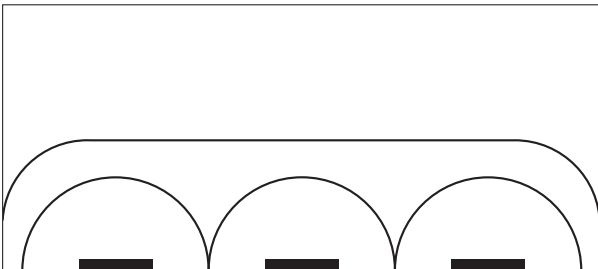


Fig. 20, Diffusers placed too close, limiting the individual diffusers induction.

A big air flow from one unit can result in a too big near-zone (Figure 21). If the air is instead distributed on two units, smaller near-zones are the result. (Figure 22).

To achieve the smallest possible near-zones, and thus the best possible use of the room, the air flow should be distributed evenly in the room with as many units as possible.



Fig. 21, Too great air flow on one diffuser results in a too big near zone.



Fig. 22, Less air flow per diffuser and smaller near zones.

More units

When several units are placed too close to one another by the same wall, the near-zone is increased as shown in Figure 20, since jet streams can form between the units. In a certain distance from the units however, a continuous jet flow will be formed with a near constant velocity. This end-velocity is dependent on the total airflow per m wall and the cooling temperature. In Figure 23 this end-velocity can be read. It will often be an advantage to distribute the air on units placed on adjacent walls at a 90 degree angle. In this case, the units should also be placed evenly along the walls, since of course jets also form between too closely placed units around the corner of a wall.

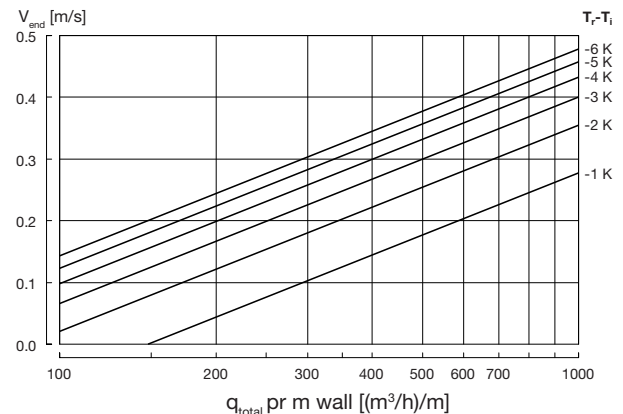


Fig. 23, End velocity at continuous jet flow.

Displacement ventilation

Theory

Output

In order to calculate the output which can be removed from the room by a displacement system, the temperature difference $t_u - t_r$, has to be known (depends on the thermal load, ceiling height and cooling temperature ($t_r - t_i$)).

By calculating the temperature efficiency and the necessary difference in temperature $t_u - t_i$ the heating sources close to the ceiling (eg. lighting) are accounted for by 50% of the output.

From Figure 24 the temperature efficiency ϵ_t can be read at different combinations of ceiling height and heat loads.

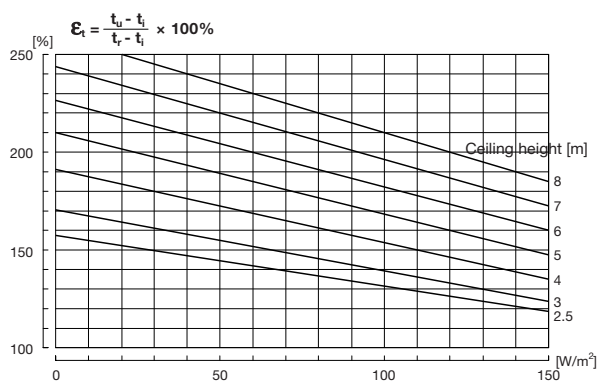


Fig. 24, Temperature efficiency is dependent on ceiling height and heat load.

Calculation example

Room: L × B × H = 10 m × 6 m × 4 m

Thermal load:	
10 pers., sitting activity (10 × 130 W)	= 1300W (22 W/m ²)
10 table lamps of 60 W (10 × 60 W)	= 600 W (10 W/m ²)
10 machines of 100 W (10 × 100 W)	= 1000 W (17 W/m ²)
Total	= 2900 W (48 W/m²)

Minimum air flow (from Table 1 and Table 2):

$$q_{min} = 10 \text{ pers.} \times 11 \text{ l/s/pers.} + 10 \text{ table lamps} \times 60 \text{ W/table lamps} \times 0,1 \text{ l/s/W} + 10 \text{ machines} \times 100 \text{ W/machines} \times 0,1 \text{ l/s/W} = 270 \text{ l/s}$$

Required temperature difference ($t_u - t_i$):

$$t_u - t_i = \frac{2900 \text{ W}}{\frac{270 \text{ l/s}}{1000 \text{ l/m}^3} \times 1,2 \text{ kg/m}^3 \times 1007 \text{ J/kg/K}} = 8,9 \text{ K}$$

From Figure 24 the temperature efficiency can be read at $\epsilon_t = 178\%$ by a ceiling height of 4 m and a heat load of 48 W/m².

Consequently the temperature difference $t_r - t_i$ can be determined by using the formula:

$$\epsilon_t = \frac{t_u - t_i}{t_r - t_i} \Leftrightarrow t_r - t_i = \frac{t_u - t_i}{\epsilon_t} = \frac{8,9 \text{ K}}{1,78} = 5 \text{ K}$$

which gives a temperature gradient in the occupied zone of 2,5 K/m (since the temperature gradient in the occupied zone can be set to the half of the cooling temperature $t_r - t_i$).

Lindab recommends a temperature gradient of <2 K/m and therefore the air flow should be increased.

A temperature gradient of 2 K/m gives $t_r - t_i = 4 \text{ K}$ and with unchanged temperature efficiency of 178% the acceptable temperature difference is $t_u - t_i = 7,1 \text{ K}$.

To remove the thermal load of 2900 W the air flow must be changed to:

$$q = \frac{2900 \text{ W}}{7,1 \text{ K} \times 1,2 \text{ kg/m}^3 \times 1007 \text{ J/kg/K}} \times 1000 \text{ l/m}^3 = 337 \text{ l/s}$$

Planning of sound level

Theory

Planning sound level

The diagrams in the catalogue specify the A-weighted sound effect level L_{WA} for diffusers connected to a straight air duct with a length of 1 m and the same dimension as the diffuser.

The actual sound pressure level that we hear is determined as shown below.

Key

A	Total room absorption	[m ²]
K_{ok}	Octave correction value for sound power level	[dB]
L_A	A-balanced sound pressure level	[dB(A)]
L_{WA}	A-balanced sound power level	[dB(A)]
L_{Wok}	Sound power level in octave bands	[dB]
L_p	Sound pressure level	[dB]
D	Room attenuation	[dB]
L_w	Sound power level	[dB]
V	Room volume	[m ³]
T_s	Reverberation time	[-]
D	Room attenuation	[dB]
Q	Direction factor	[-]
Δ	Increase in sound power level at a given number of identical units	[dB]
r	Distance to closest unit	[m]
α	Absorption factor	[-]
n	Number of units	[-]

Sound pressure level

The collective sound effect L_w from a number of similar diffusers is found through a logarithmic multiplication of the number of diffusers with the sound power level from an individual diffuser

$$L_w = L_{w1} \otimes n$$

where L_{w1} is the sound power level from an individual diffuser [dB] and n is the number of diffusers.

The collective sound power can, by help of Figure 25 be calculated as $L_w = L_{w1} + \Delta$ where Δ is the increase of sound power level for a given number of identical diffusers.

n	1	2	3	4	5	6	7	8	9	10	15
Δ	0	3.0	4.8	6.0	7.0	7.8	8.5	9.0	9.0	10.0	11.8

Fig. 25, Increase of sound power level (logarithmic multiplication) by a number of identical sound sources

With the knowledge of the sound sources and the absorption area of the room, the attenuation of the room is determined by Figure 26, Figure 27 and Figure 28 at one or several identical sound sources in the room.

The actual sound pressure level is the difference between the sound power level and the room attenuation where L_p is the sound pressure level [dB], L_w is the sound power level [dB] and D is the room attenuation [dB].

In the case of different sound sources in the same room, the sound pressure level is found at a given point by a logarithmic addition of the sound pressure levels for the individual sound sources (Figure 29).

A can also be calculated from reverberation time by using the formula:

$$A = 0.16 \times \frac{V}{T_s}$$

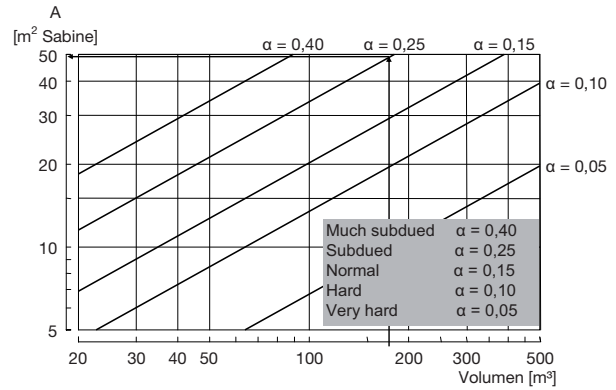


Fig. 26, Direction factor for different placements of sound sources and the relationship between the room volume and equivalent sound-absorption area

Calculation example

In a room with the dimensions $L \times B \times H = 10 \text{ m} \times 7 \text{ m} \times 2,5 \text{ m}$ four diffusers are mounted in the ceiling. Each diffuser gives off a sound power level of 29 dB(A). The room is attenuated, which gives an absorption area of $A \sim 50 \text{ m}^2$ Sabine (Figure 26). The sound pressure level needs to be calculated 1,5 m above the floor.

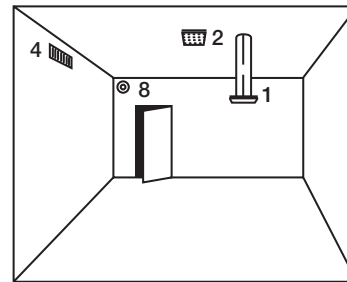
Sound power from the four diffusers: $L_w = 29 \otimes 4 = 29 + 6 = 35 \text{ dB(A)}$ (Figure 25)

For diffusers mounted in the ceiling the direction factor $Q = 2$ and consequently becomes (Figure 27).

$$\sqrt{n} / \sqrt{Q} = 1,4$$

At the height of 1,5 m over the floor the distance to the closest diffuser is $r = 1 \text{ m}$, and therefore the room attenuation can be determined to be $D = 9 \text{ dB}$ via Figure 28.

The sound pressure level in the room: $L_A = 35 \text{ dB(A)} - 9 \text{ dB} = 26 \text{ dB(A)}$.



n	1	2	3	4	5	6	7	8	9	10	15
Q	\sqrt{n} / \sqrt{Q}										
1	1.0	1.4	1.7	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.9
2	0.7	1.0	1.2	1.4	1.6	1.7	1.9	2.0	2.1	2.2	2.7
4	0.5	0.7	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.9
8	0.4	0.5	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.4

Fig. 27, Direction factor for different placements of sound sources and the ratio between \sqrt{n} / \sqrt{Q} as a function of number of sound sources and direction factor (picture).

Planning of sound level

Theory

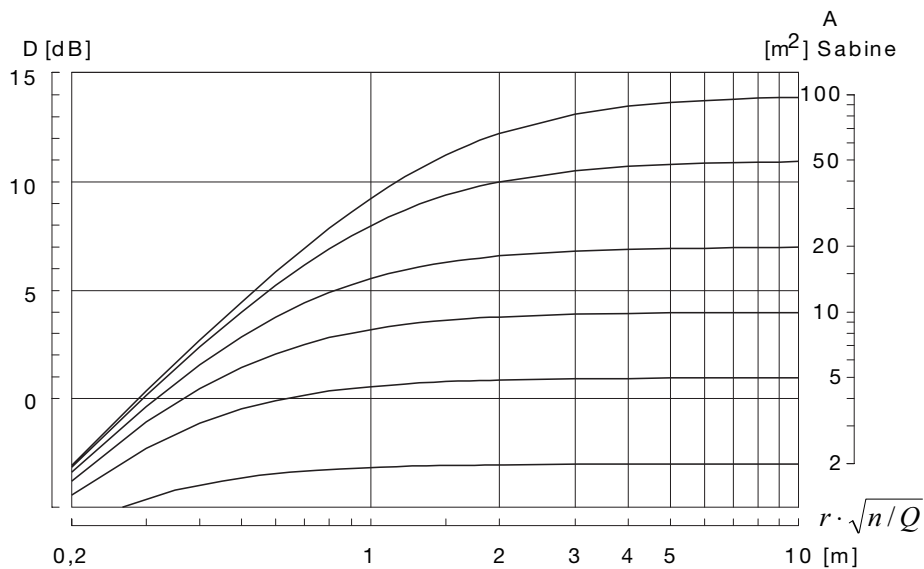


Fig. 28, Room dampening as a function of area of absorption and number of sound sources.

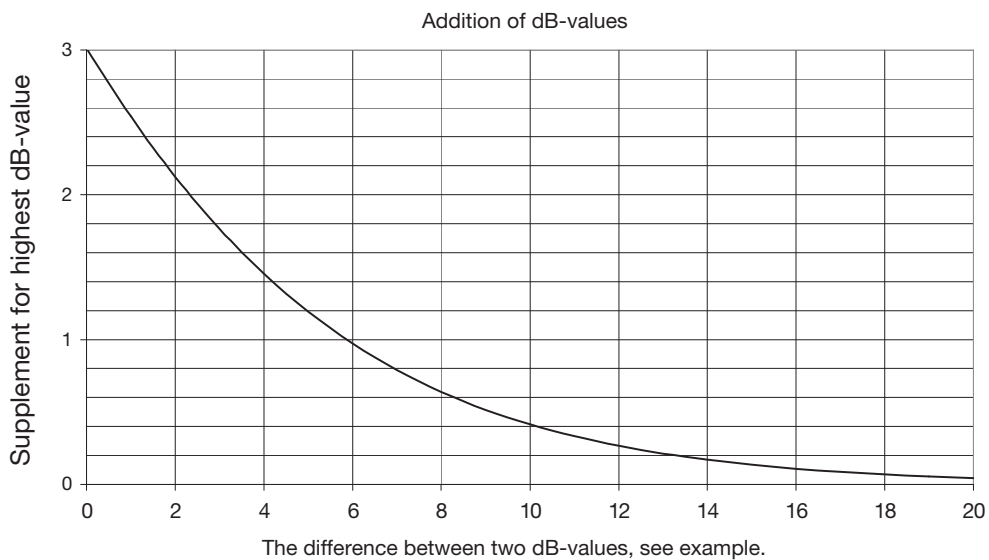


Fig. 29, Addition of sound levels (logarithmic addition of sound effect level or sound pressure level).

E.g. two sources at 41 dB and 47 dB;
 difference is $47 - 41 = 6$;
 from graph: 6 on X-axis = 1 on Y-axis;
 $47 + 1 = 48$ dB resultant level.

Multi-cone diffuser

FKD



Description

FKD is an adjustable circular multi-cone diffuser, which is typically used for supply air. The diffuser can be switched between horizontal and vertical supply air and is therefore ideal for the supply of both heated and cooled air. Installing an FKD diffuser up to size 400 in a plenum box type MB can help to achieve a stable airflow to the diffuser as well as realise the potential for individual adjustment. Damper type B is an unique linear cone damper which allows to use the full operational area (0-100%) and allows to balance with a high pressure drop over the box with low sound generation. Furthermore the construction of the damper gives an accurate and reliable measurement. Damper type C has a rotating blade damper for supply air. Typically used in applications that don't require a high balancing pressure in the plenum box.

- Suitable for supply air
- Vertical or horizontal supply air pattern
- Plenum box with several damper options

Maintenance

The multi-cone insert can be removed to enable cleaning of internal parts or to gain access to the duct or box. The visible parts of the diffuser can be wiped with a damp cloth.

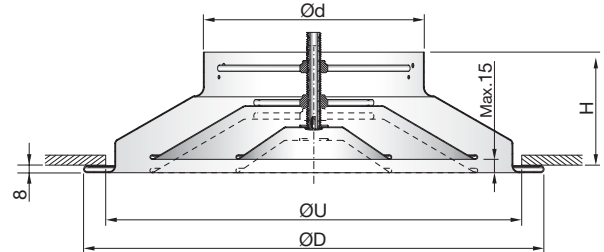
Order code

Product	FKD - aaa
Type	FKD
Connection dim.	Ø160-630

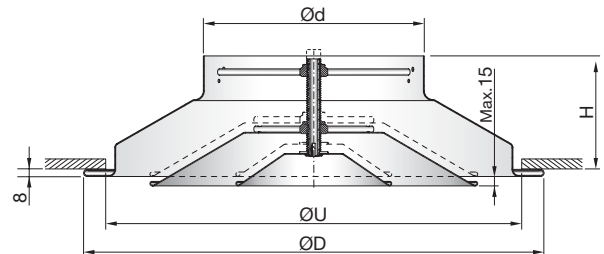
Example: FKD-200

Dimensions

Vertical



Horizontal



FKD Ød mm	ØD mm	H mm	ØU* mm	Free area A		m kg
				Vertical m ²	Horizontal m ²	
160	335	97	288	0,0298	0,0304	0,7
200	423	110	370	0,0431	0,0456	0,9
250	517	122	461	0,0622	0,0684	1,2
315	640	138	576	0,091	0,1041	1,8
355	730	177	656	0,1108	0,1293	2,6
400	776	177	700	0,1349	0,1606	3,1
450	825	177	755	0,1637	0,199	3,4
500	917	177	825	0,1948	0,241	4,3
630	1045	177	963	0,285	0,3667	7,4

ØU* = Cutting dimension

Number of cones:	size 160–355 :	2
	size 400–500 :	3
	size 630 :	4

Materials and finish

Material:	Aluminium
Standard finish:	Powder-coated
Standard colours:	RAL 9003 and RAL 9010, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

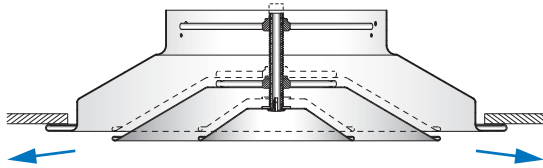
Multi-cone diffuser

FKD

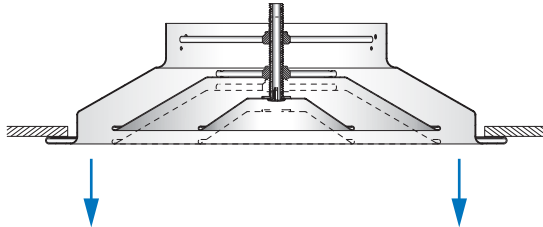
Dispersal patterns

FKD is supplied for vertical supply air as standard. The dispersal pattern can be altered to horizontal supply air by setting the inner part of the diffuser to its lowest position.

Horizontal

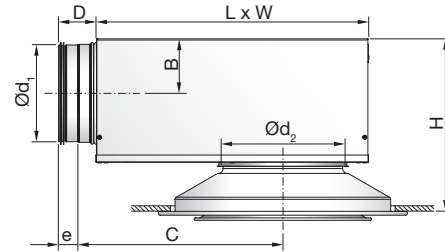


Vertical



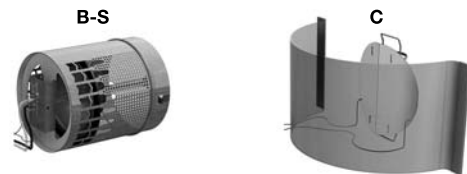
Accessories

FKD + MB Plenum box



Ød ₁ mm	Ød ₂ mm	B	C	D	e	H*	L	W
100	160	62	245	78	40	221 - 243	310	260
125	160	75	291	78	40	246 - 268	376	310
125	200	75	291	78	40	257 - 281	376	310
160	160	92	352	78	40	280 - 302	459	380
160	200	92	352	78	40	291 - 315	459	380
160	250	92	352	78	40	305 - 327	459	380
200	200	112	425	78	40	332 - 356	565	460
200	250	112	425	78	40	346 - 368	565	460
200	315	112	425	78	40	363 - 384	565	460
250	250	137	514	118	60	396 - 418	698	540
250	315	137	514	118	60	413 - 434	698	540
250	400	137	514	118	60	440 - 473	698	540
315	315	170	675	118	60	478 - 499	858	540
315	400	170	675	118	60	505 - 538	858	540

Damper options



Order code

Product	MB	a	bbb	ccc	S
Type	MB				
Damper					
B = Linear cone damper					
C = Blade damper supply					
Duct connection Ød ₁					
Ø100-315					
Diffuser dimension Ød ₂					
Ø160-400					
Function (Only for B damper)					
S = Supply air					

Example 1: FKD-200+MBB-160-200-S

Example 2: FKD-200+MBC-160-200

Multi-cone diffuser

FKD

Technical data

Following FKD+plenum box data are valid for MBB-S.
For MBC data, go to www.lindQST.com .

Capacity

Air flow q_v [l/s] and [m³/h], total pressure Δp_t [Pa], throw $l_{0,2}$ [m] and sound power level L_{WA} [dB(A)] can be seen in the diagrams.

Throw $l_{0,2}$

Throw $l_{0,2}$ [m] can be seen in the diagram for isothermal air at a speed of 0.2 m/s.

Frequency-related sound power level

The sound power level in the frequency band is defined as $L_{wok} = L_{WA} + K_{ok}$. K_{ok} values are specified in charts beneath the diagrams on the following pages. K_{ok} values for FKD without a box can be found in a separate supplement.

Sound attenuation

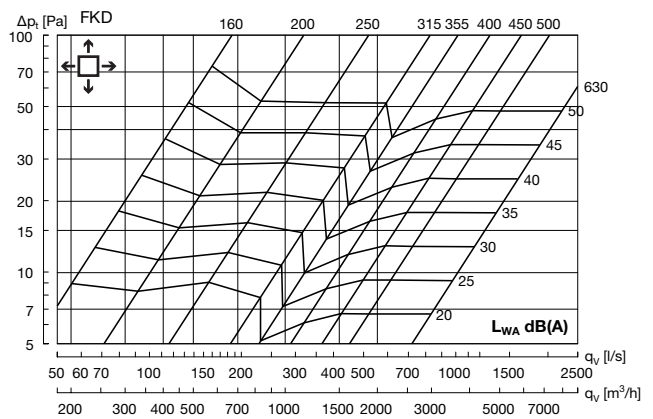
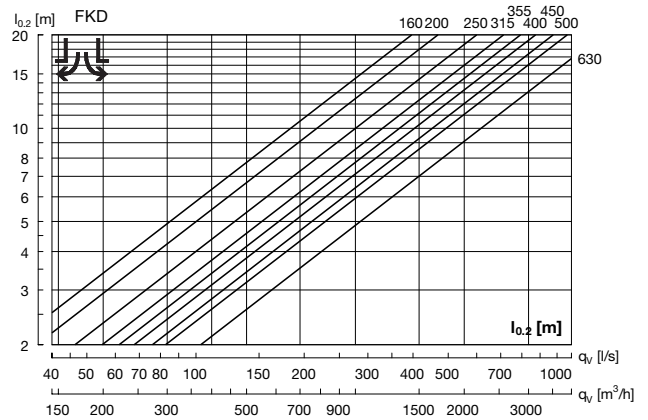
Sound attenuation of the diffuser ΔL from duct to room, including end reflection, see table below.

FKD + MBB-S		Centre frequency Hz							
duct	FKD	63	125	250	500	1K	2K	4K	8K
$\varnothing d_1$	$\varnothing d_2$								
100	160	20	16	5	15	17	17	16	19
125	160	13	13	8	19	13	16	16	19
125	200	15	11	6	15	12	14	16	17
160	160	16	17	10	18	17	18	20	21
160	200	15	14	7	19	15	16	18	19
160	250	17	16	4	16	15	16	16	18
200	200	13	10	6	15	18	15	19	17
200	250	13	9	4	12	17	13	17	16
200	315	13	8	3	8	16	14	16	15
250	250	14	8	8	15	17	17	17	18
250	315	13	6	5	13	15	15	16	17
250	400	12	4	3	12	13	14	14	15
315	315	7	9	8	12	17	16	17	21
315	400	7	8	7	11	16	14	16	19

Balancing

Balancing data is contained in a separate brochure.

Horizontal



Multi-cone diffuser

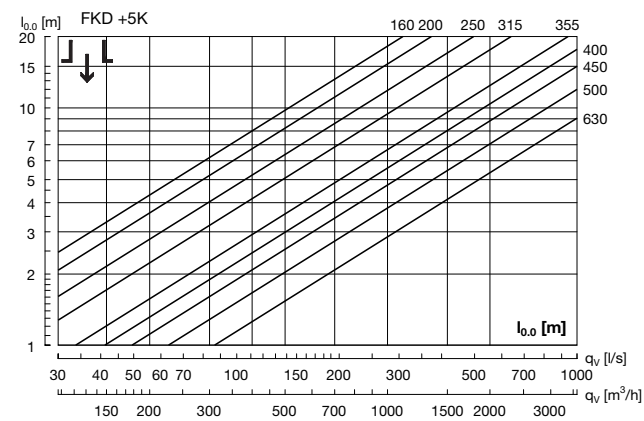
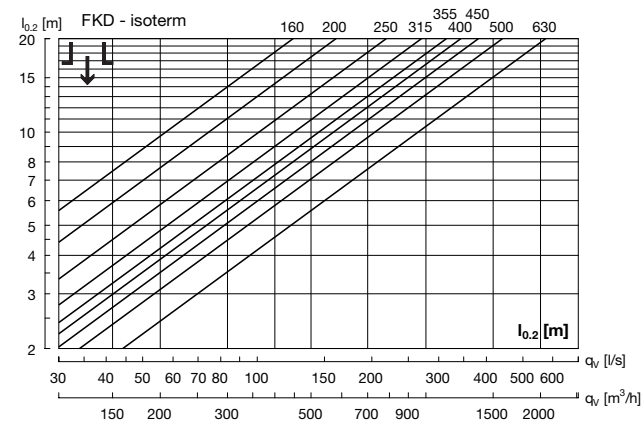
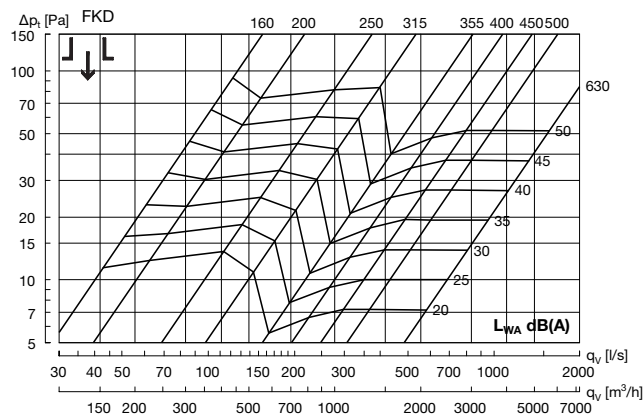
FKD

Technical data

Throw $l_{0,2}$ / turning point $l_{0,0}$

Throws $l_{0,2}$ [m] can be seen in the diagrams for isothermal air at a speed of 0.2 m/s. Turning point $l_{0,0}$ [m] can be seen in the diagrams for heated air, +5 K, +10 K respectively.

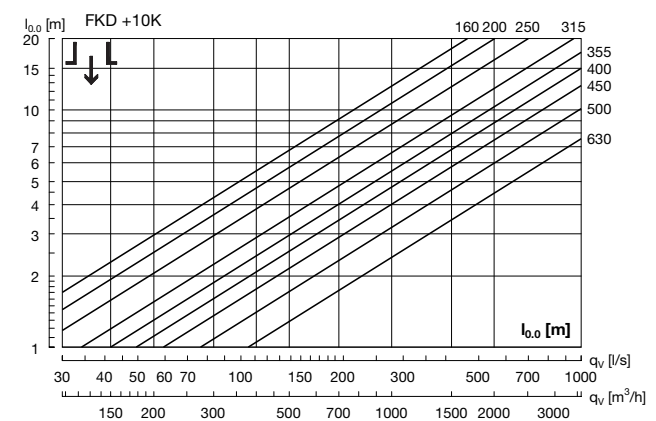
Vertical



Vertical supply air correction sound power level (L_{WA}) and pressure loss (Δp_t)

On the following pages you can find diagrams for all sizes FKD+MBB-S horizontal supply air. When Vertical supply air values are wanted, use the correction factors in the table below.

FKD + MBB-S		Vertical supply air Correction factor	
duct $\varnothing d_1$	FKD $\varnothing d_2$	L_{WA}	Δp_t
100	160	3	x 1,2
125	160	1	x 1,2
125	200	1	x 1,1
160	160	5	x 1,5
160	200	3	x 1,3
160	250	0	x 1,1
200	200	1	x 1,3
200	250	5	x 1,2
200	315	0	x 1,1
250	250	1	x 1,3
250	315	2	x 1,3
250	400	1	x 1,1
315	315	4	x 1,4
315	400	3	x 1,2

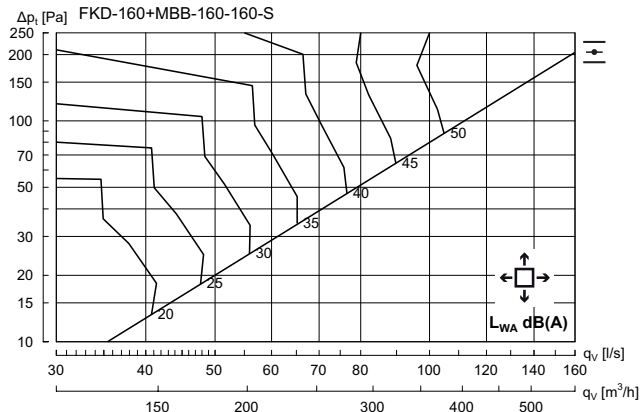


Multi-cone diffuser

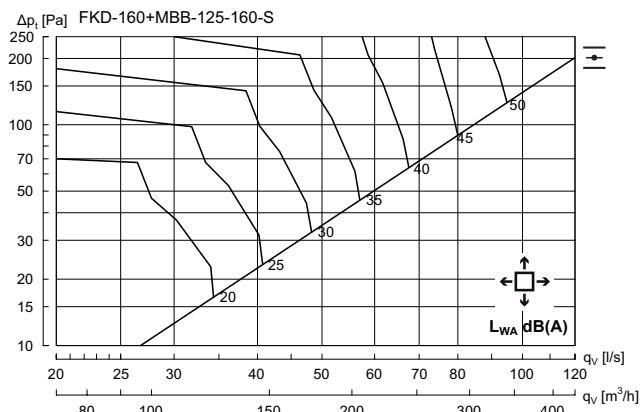
FKD

Technical data

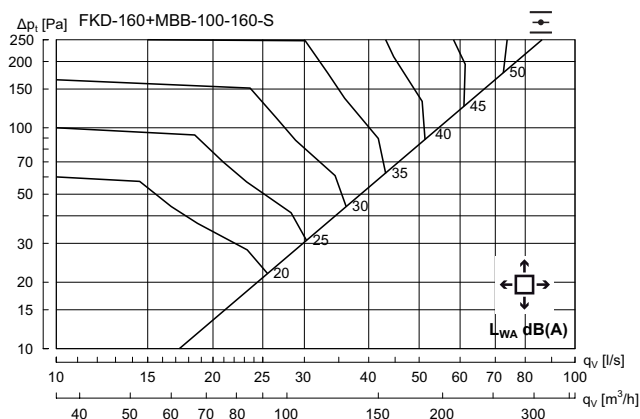
FKD 160 + MBB-S Horizontal



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	7	0	-6	-4	-9	-22	-31

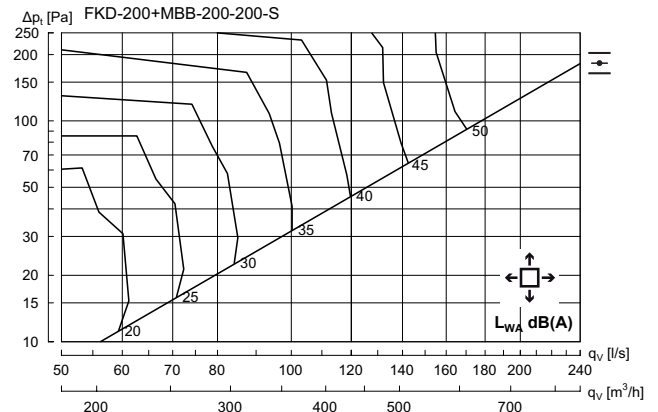


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	10	5	2	-5	-5	-9	-18	-25

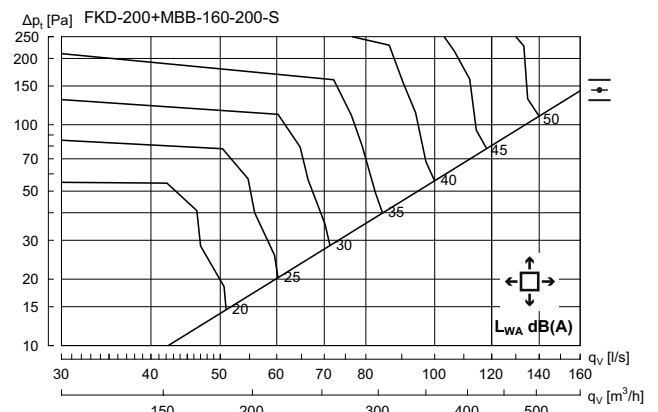


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	9	4	2	-3	-5	-9	-16	-22

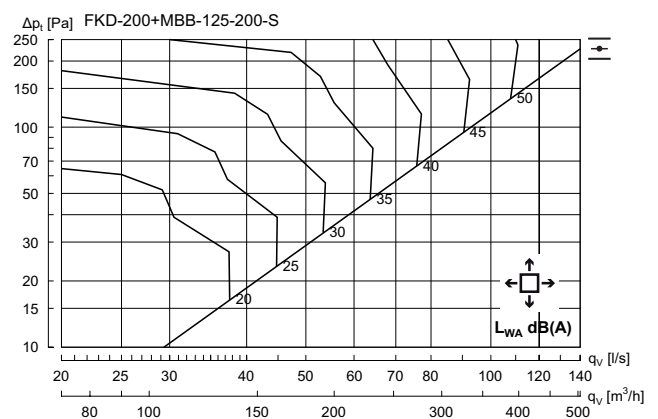
FKD 200 + MBB-S Horizontal



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	5	-2	-5	-3	-12	-22	-28



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	5	1	-5	-4	-11	-20	-25



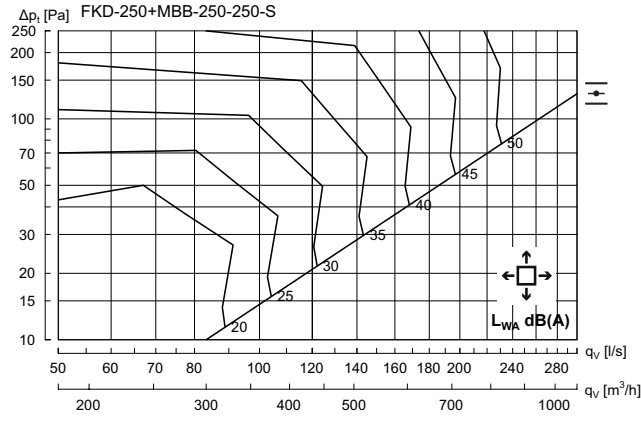
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	4	1	-4	-4	-10	-16	-23

Multi-cone diffuser

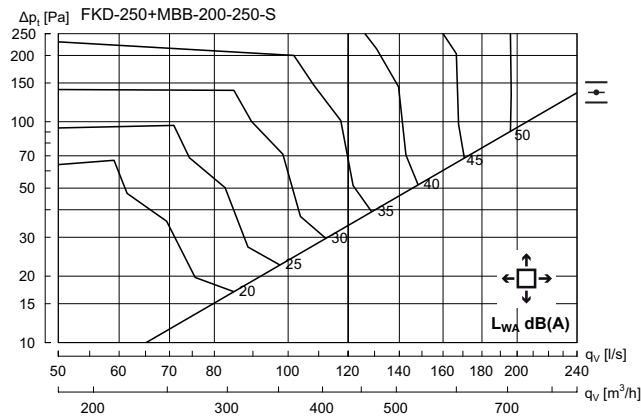
FKD

Technical data

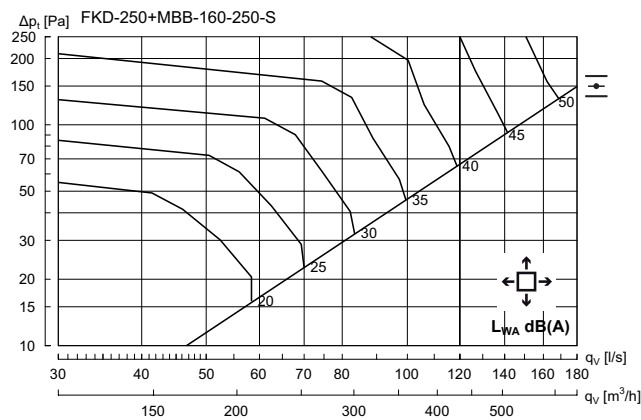
FKD 250 + MBB-S Horizontal



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	5	-2	-4	-3	-13	-20	-26

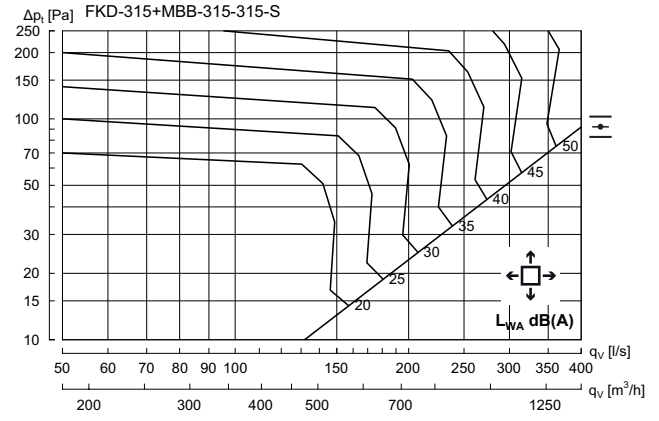


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	5	-2	-3	-3	-12	-19	-24

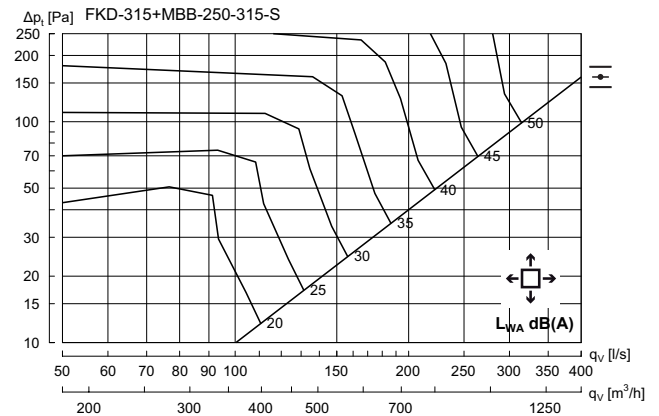


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	4	0	-3	-4	-12	-18	-24

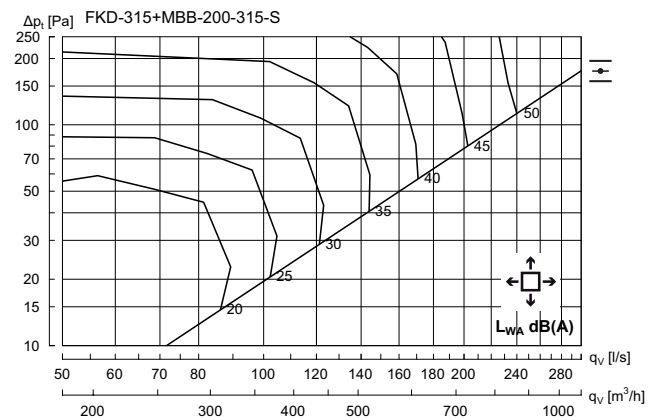
FKD 315 + MBB-S Horizontal



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	14	3	0	-2	-4	-14	-20	-26



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	5	-1	-2	-4	-12	-19	-21



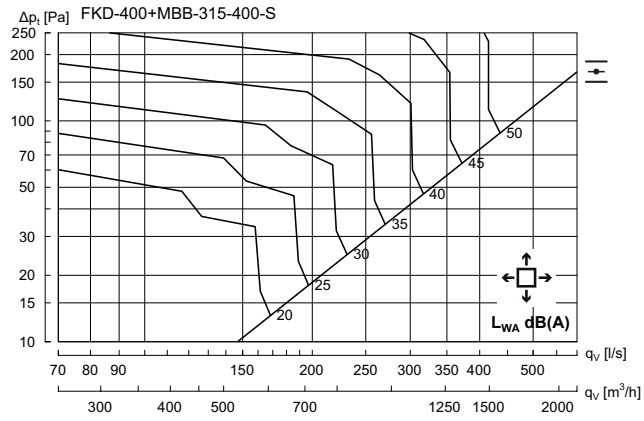
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	9	5	-1	-2	-5	-11	-18	-24

Multi-cone diffuser

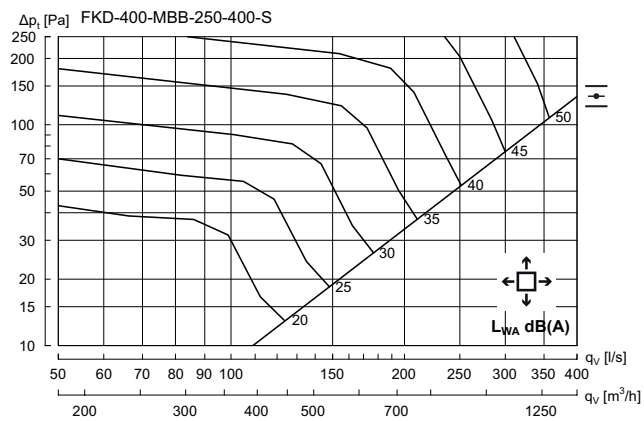
FKD

Technical data

FKD 400 + MBB-S Horizontal



Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	11	4	1	-1	-6	-12	-17	-24



Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	9	4	1	-1	-6	-12	-17	-25

Swirl diffuser

RCW



Description

RCW is a rotation diffuser particularly suitable for rooms with a high ceiling.

The diffuser is equipped with adjustable blades, so the supply air pattern can be changed from vertical to horizontal.

The blade settings can be adjusted manually, or the function can be automated using various types of motor. RCW with manual blade adjustment is supplied as standard with a blade setting of 30°.

The motorized models are supplied as standard with a blade setting from 30° to 75°. In the motorized versions, RCW can be supplied with an electric on/off motor, a modulating motor or a thermal actuator, where the supply air pattern is changed in step with the supply air temperature

- Suitable for both cooling and heating
- Horizontal and vertical dispersal pattern
- High induction
- Can be supplied with an electric motor
- Can be supplied with a thermal actuator

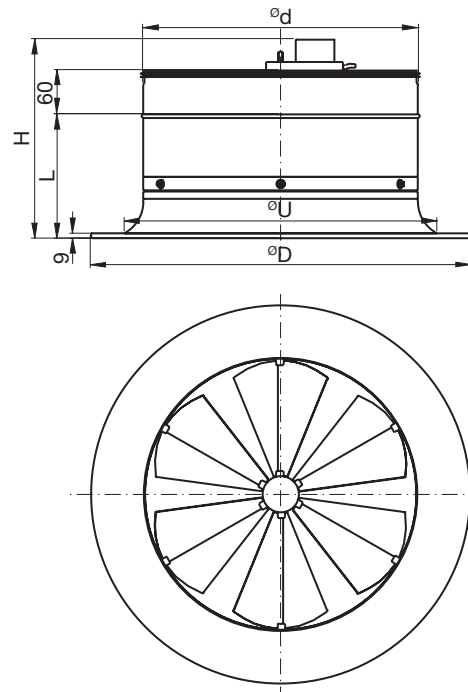
Maintenance

The visible parts of the diffuser can be wiped with a damp cloth. For other maintenance, see installation instructions.

Order code

Product Type	RCW	a	bbb	A
Manual	0			
Motorized - modulating	1			
Motorized- on/off	2			
Thermal actuator	3			
Size				
Version				

Dimensions



Ød Size	ØD mm	H mm	L mm	ØU mm	Weight * kg
250	360	240	143	285	2.40
315	460	267	168	365	3.10
400	560	292	178	450	4.40
500	670	341	226	570	6.80
630	870	391	273	740	9.90

* Motorized models weigh approx. 1 kg more than the weight stated in the table above.

Motor type

RCW-1 Ød	Motor
315-400	NM24A-MF-F
500-630	LH24A-MF60

RCW-2 Ød	Motor
250-400	NM24A-F
500-630	LH24A60

Materials and finish

Material: Aluminium & steel
 Standard finish: Powder-coated
 Standard colour: RAL 9010 Gloss 30

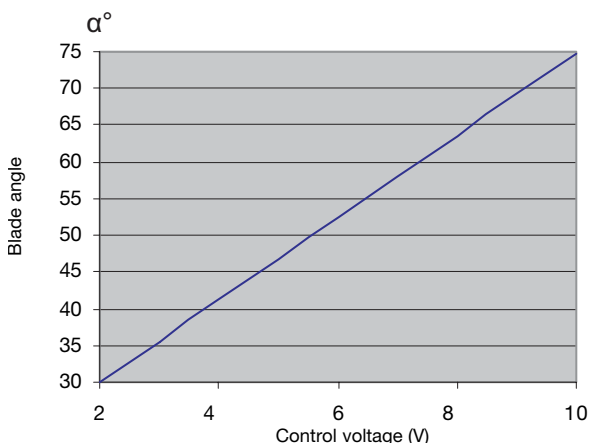
Available in other colours. Please contact Lindab's sales department for further information.
 Other blade settings can be supplied on request.

Swirl diffuser

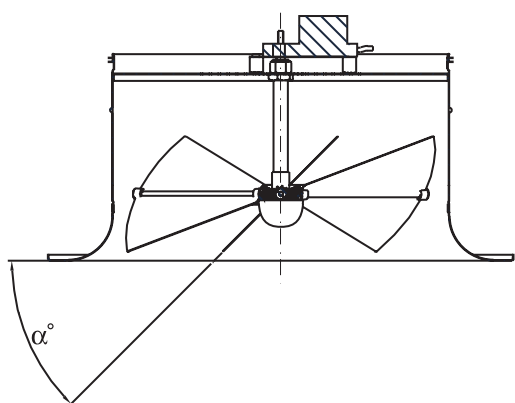
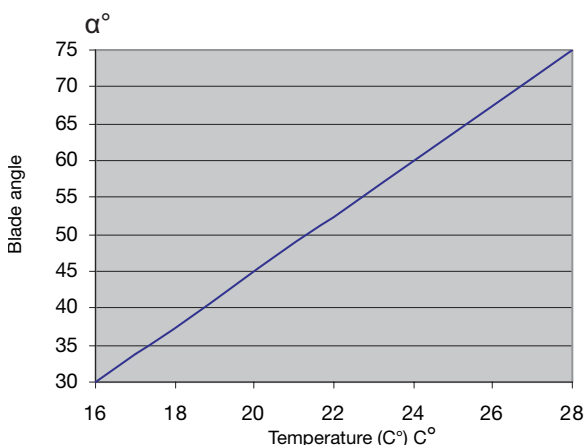
RCW

Technical data

RCW with electric modulating motor



RCW with thermal actuator



Capacity

Volume flow q_v [l/s] and [m³/h], total pressure Δp_t [Pa], throw $l_{0,2}$ [m] and sound power level L_{WA} [dB(A)] can be seen in the diagrams.

Throw $l_{0,2}$ / turning point $l_{0,0}$

Throw $l_{0,2}$ [m] can be seen in the diagrams for isothermal air at a speed of 0.2 m/s. Turning point $l_{0,0}$ [m] can be seen in the diagrams for heated air, +5 K, +10 K and +15 K respectively.

Frequency-related sound effect level

The sound effect level in the frequency band is defined as $L_{WA} + K_{ok}$. K_{ok} values are specified in charts beneath the diagrams on the following pages.

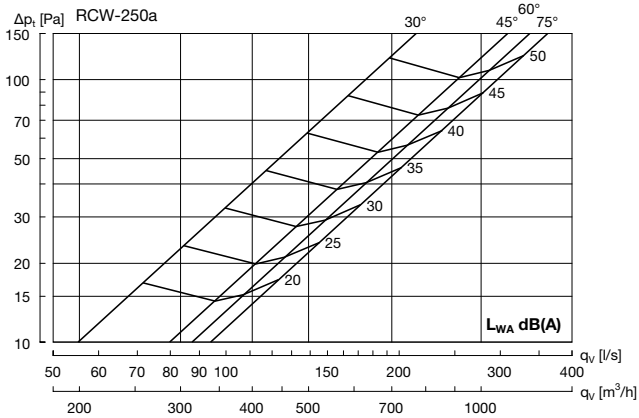
Quick selection

Size	Angle	q_v	q_v	P_t	$l_{0,2}$	$l_{0,0}$
		[l/s]	[m ³ /h]	[Pa]	isotherm [m]	+10K [m]
$L_{WA} = 40$						
250	30°	138	498	63	10	
250	75°	138	498	22		5
315	30°	237	854	65	6	
315	75°	237	854	24		6
400	30°	361	1299	60	5	
400	75°	361	1299	22		6
500	30°	453	1630	52	5	
500	75°	453	1630	13		5
630	30°	818	2943	57	6	
630	75°	818	2943	17		7
$L_{WA} = 50$						
250	30°	192	692	121	13	
250	75°	192	692	42		7
315	30°	329	1183	124	8	
315	75°	329	1183	46		8
400	30°	513	1846	122	7	
400	75°	513	1846	44		8
500	30°	636	2290	103	6	
500	75°	636	2290	25		6
630	30°	1136	4088	110	8	
630	75°	1136	4088	32		9
$L_{WA} = 60$						
250	30°	267	962	234	18	
250	75°	267	962	81		10
315	30°	455	1638	238	10	
315	75°	455	1638	88		11
400	30°	729	2623	247	11	
400	75°	729	2623	89		12
500	30°	893	3216	203	8	
500	75°	893	3216	49		9
630	30°	1577	5679	213	11	
630	75°	1577	5679	62		12

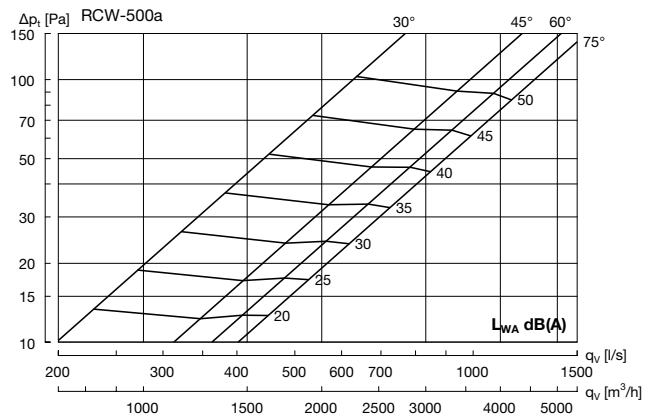
Swirl diffuser

RCW

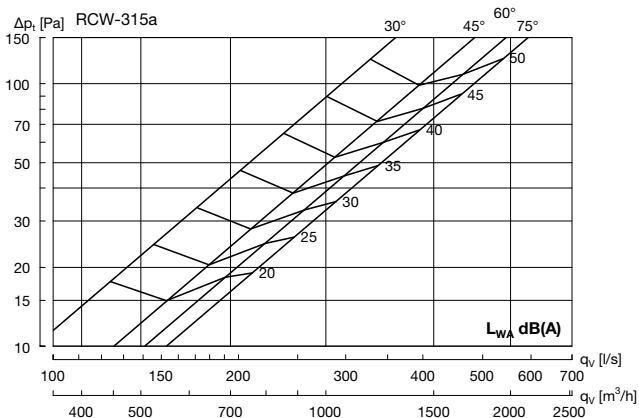
Technical data



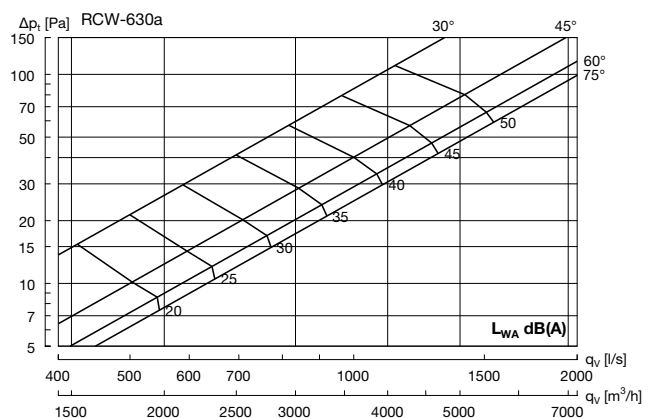
Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	7	1	-2	-2	-4	-9	-18	-21



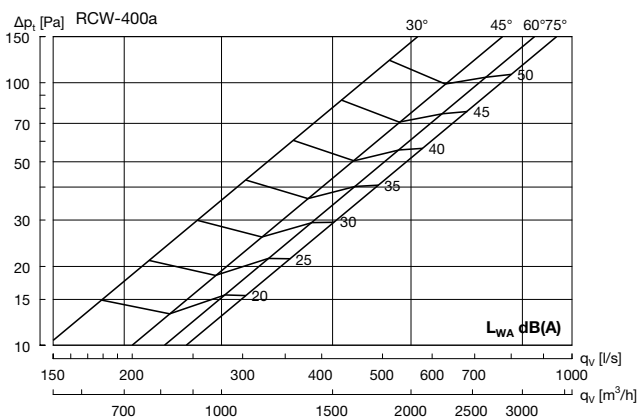
Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	12	1	-2	-1	-4	-12	-20	-22



Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	10	2	-1	-3	-4	-10	-17	-21



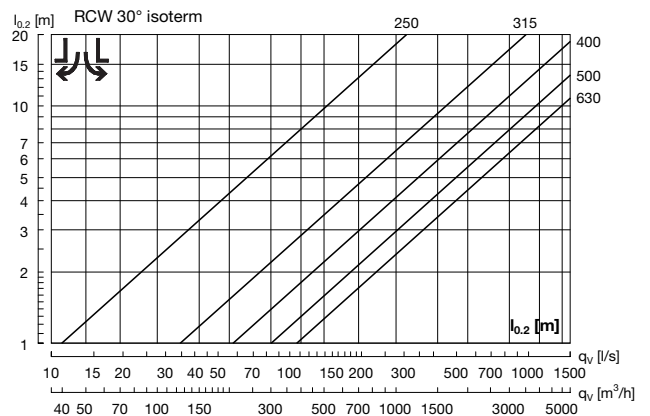
Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	15	5	0	-2	-5	-12	-18	-22



Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	12	1	-2	-2	-3	-13	-20	-23

Throw $l_{0.2}$ horizontal

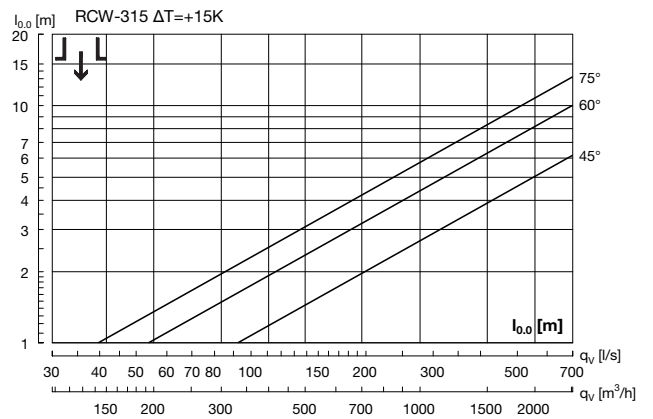
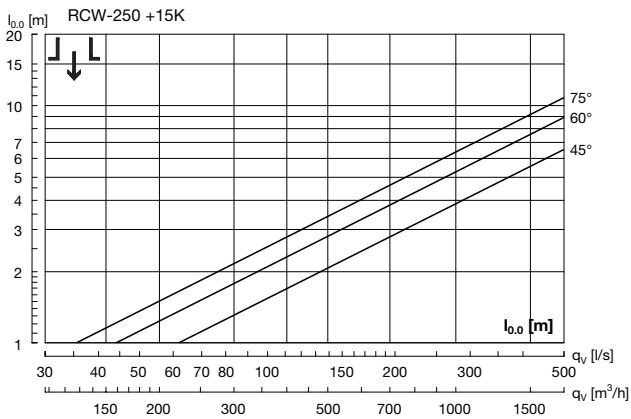
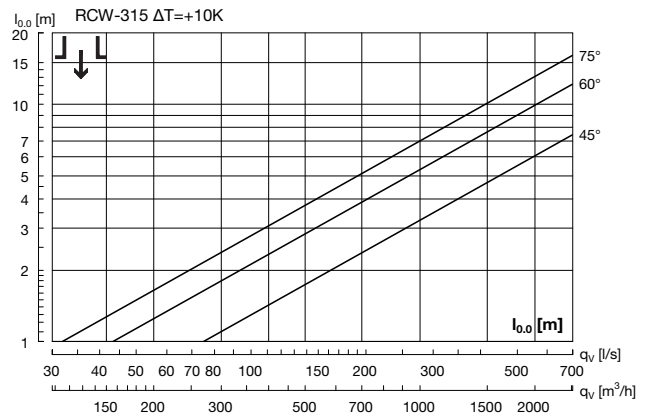
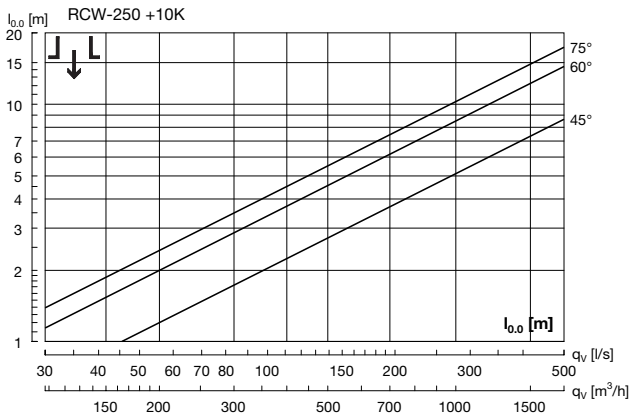
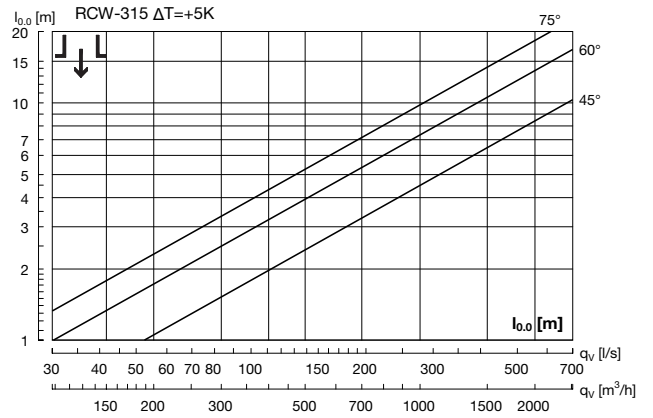
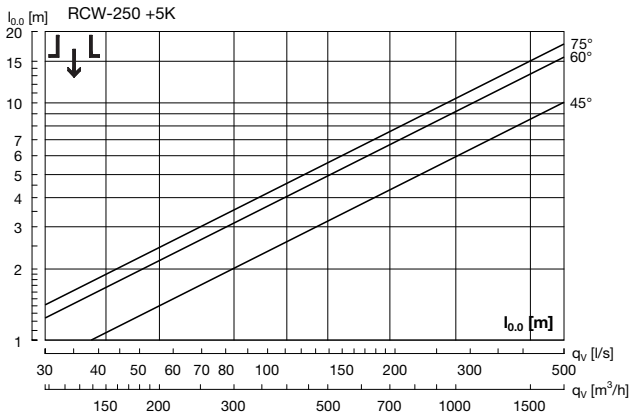
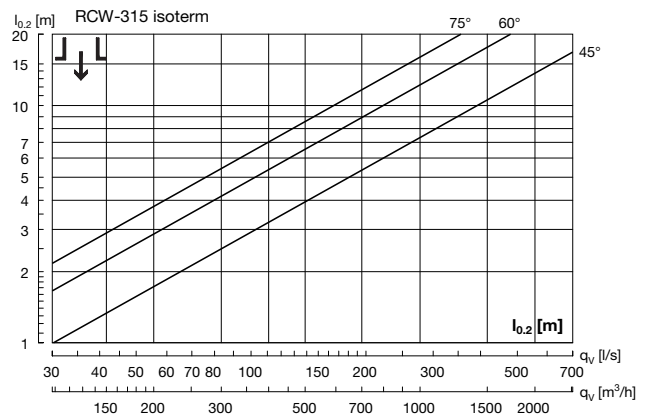
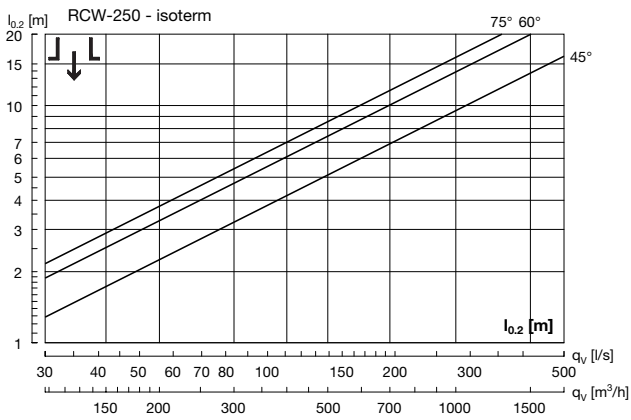
Horizontal throw $l_{0.2}$ is specified for free suspension. If the diffuser is installed < 300 mm from the ceiling, the value must be multiplied by 1.4.



Swirl diffuser

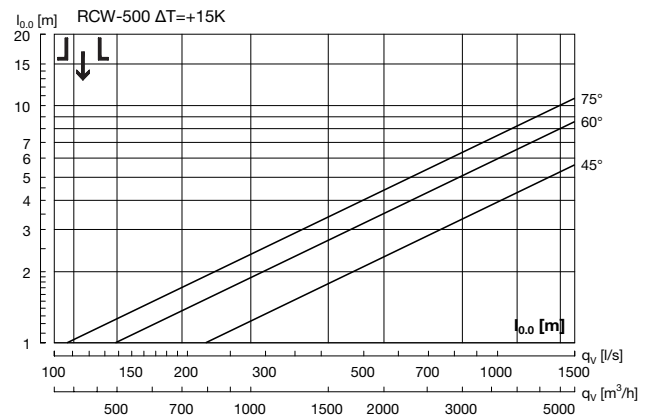
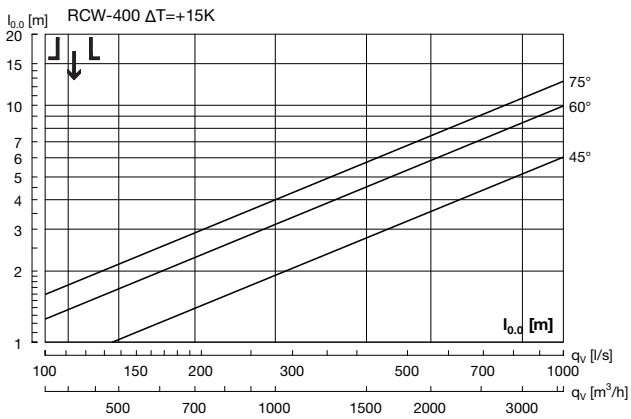
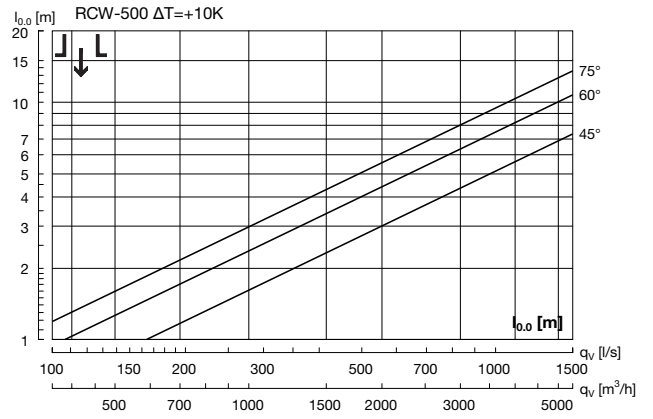
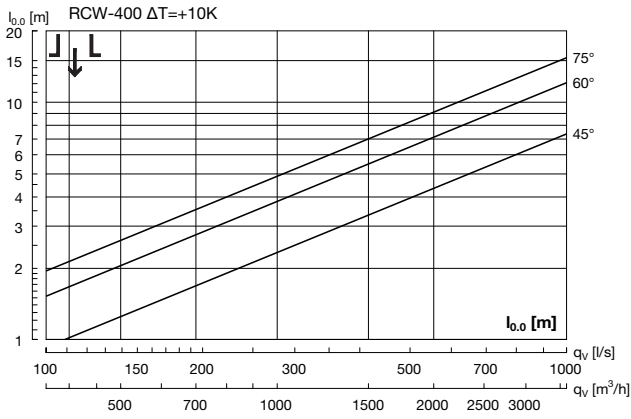
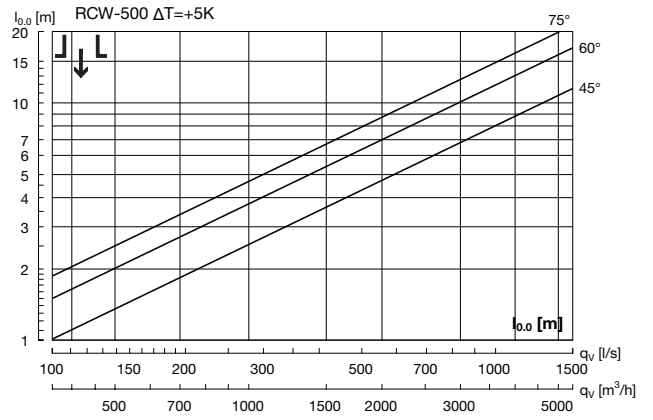
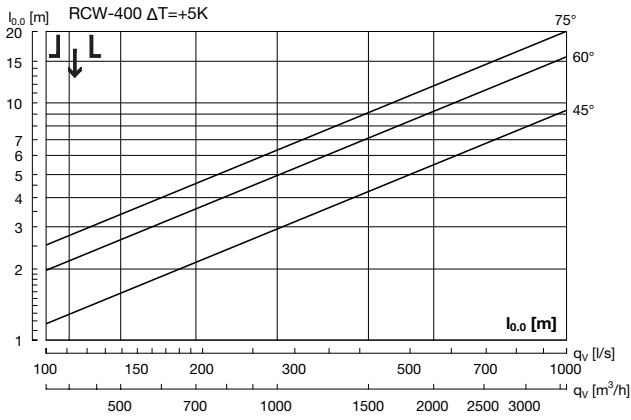
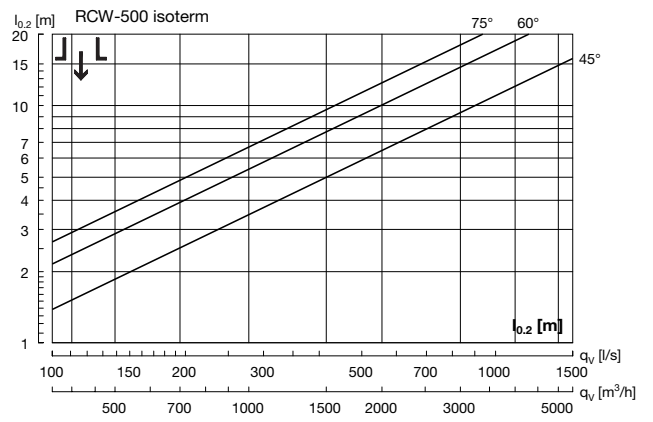
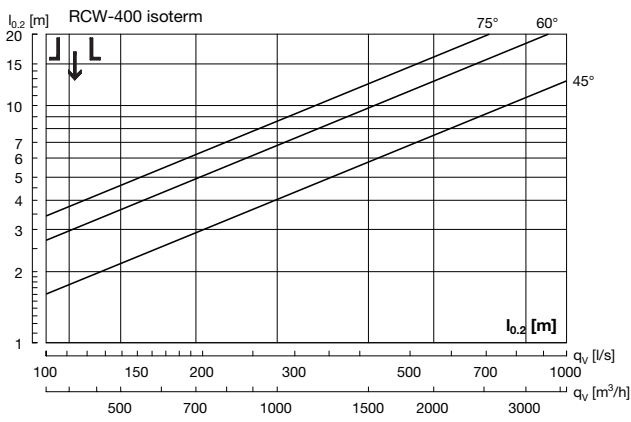
RCW

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Swirl diffuser

RCW

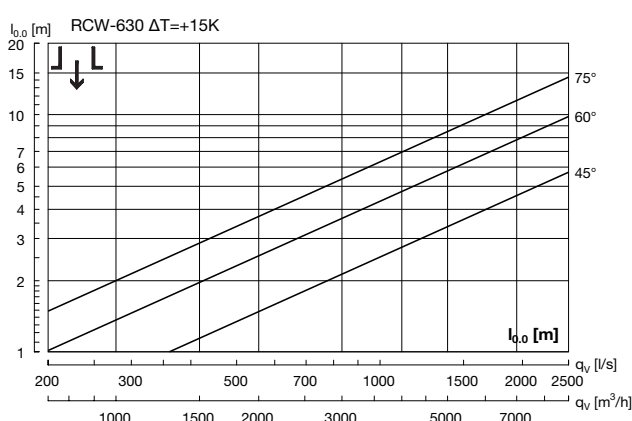
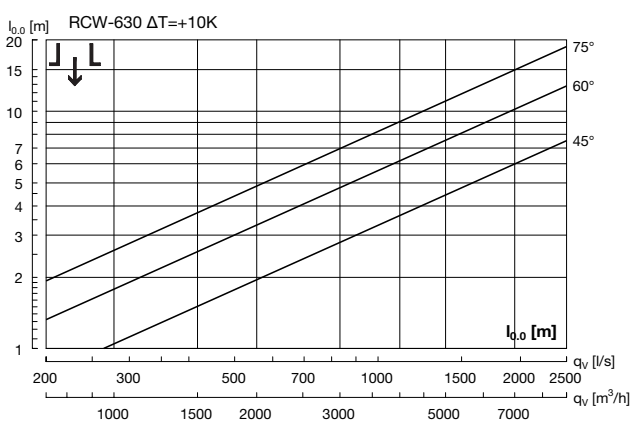
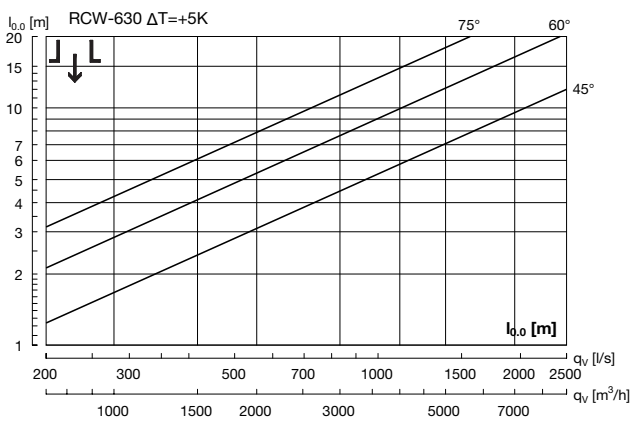
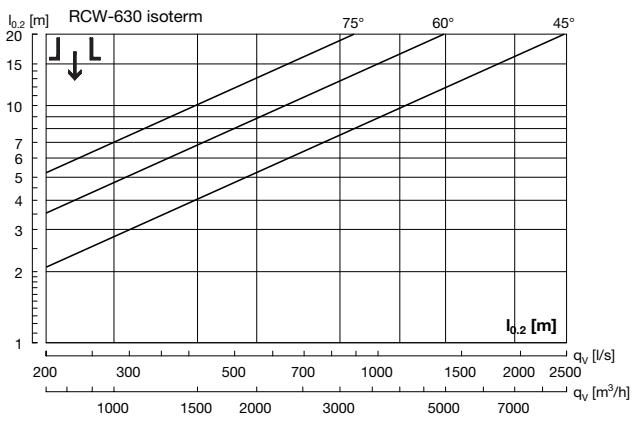


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Swirl diffuser

RCW

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Swirl diffuser

RCWB



Description

RCWB is a rotation diffuser (RCW) with integral box, particularly suitable for rooms with a high ceiling.

The diffuser is equipped with adjustable blades, so the supply air pattern can be changed from vertical to horizontal. The blade settings can be adjusted manually, or the function can be automated using various types of motor.

RCWB with manual blade adjustment is supplied as standard with a blade setting of 30°.

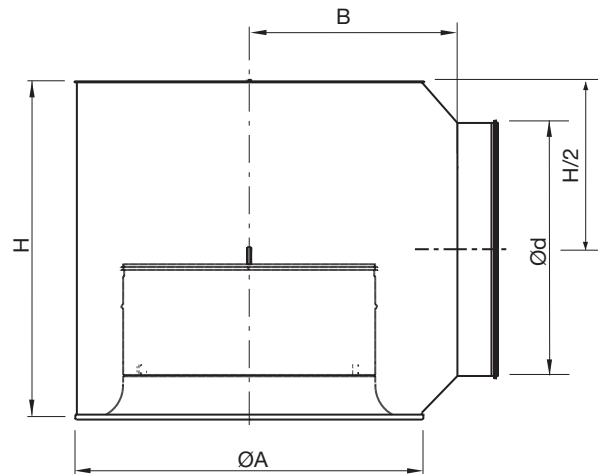
The motorized models are supplied as standard with a blade setting from 30° to 75°. In the motorized versions, RCWB can be supplied with an electric on/off motor, a modulating motor or a thermal actuator, where the supply air pattern is changed in step with the supply air temperature.

- Suitable for both cooling and heating
- Horizontal and vertical dispersal patterns
- High induction
- Can be supplied with an electric motor
- Can be supplied with a thermal actuator

Order code

Product Type	RCWB	a	bbb	c	A
Manual	0				
Motorized - modulating	1				
Motorized- on/off	2				
Thermal actuator	3				
Galvanised box	0				
Box RAL 9010	1				
Size					
Version					

Dimensions



Ød Size	ØA mm	H mm	B mm	Weight * kg
250	360	415	250	5.70
315	460	480	300	8.20
400	560	570	350	11.8
500	670	670	412	17.2
630	870	800	500	25.7

* Motorized models weigh approx. 1 kg more than the weight stated in the table above.

Motor type

RCWB-1 Ød	Motor
315-400	NM24A-MF-F
500-630	LH24A-MF60

RCWB-2 Ød	Motor
250-400	NM24A-F
500-630	LH24A60

Maintenance

The visible parts of the diffuser can be wiped with a damp cloth. For other maintenance, see installation instructions.

Materials and finish

Material: Aluminium & steel
 Standard finish: Powder-coated
 Standard colour: RAL 9010 Gloss 30
 Box: Hot-galvanised steel

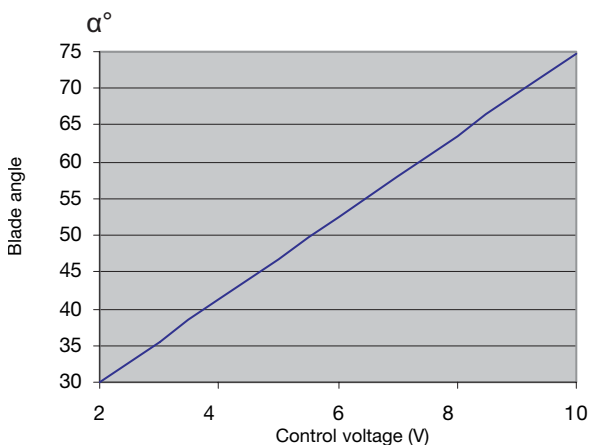
Available in other colours. Please contact Lindab's sales department for further information.

Swirl diffuser

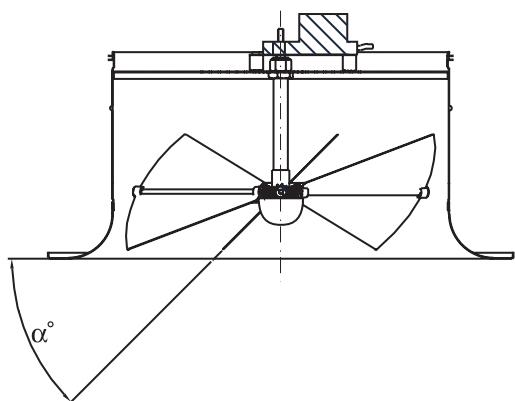
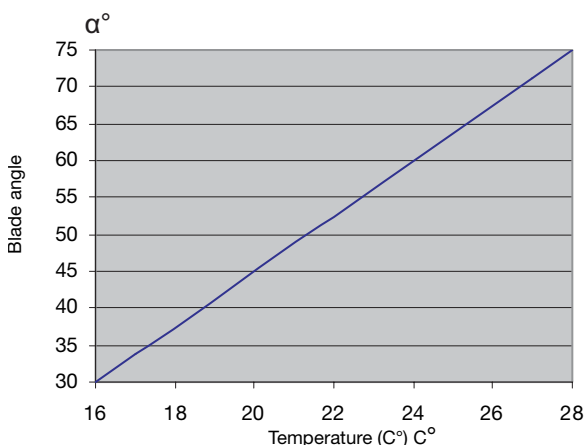
RCWB

Technical data

RCWB with electric modulating motor



RCWB with thermal actuator



Capacity

Volume flow q_v [l/s] and [m³/h], total pressure Δp_t [Pa], throw $l_{0,2}$ [m] and sound power level L_{WA} [dB(A)] can be seen in the diagrams.

Throw $l_{0,2}$ / turning point $l_{0,0}$

Throw $l_{0,2}$ [m] can be seen in the diagrams for isothermal air at a speed of 0.2 m/s. Turning point $l_{0,0}$ [m] can be seen in the diagrams for heated air, +5 K, +10 K and +15 K respectively.

Frequency-related sound effect level

The sound effect level in the frequency band is defined as $L_{WA} + K_{ok}$. K_{ok} values are specified in charts beneath the diagrams on the following pages.

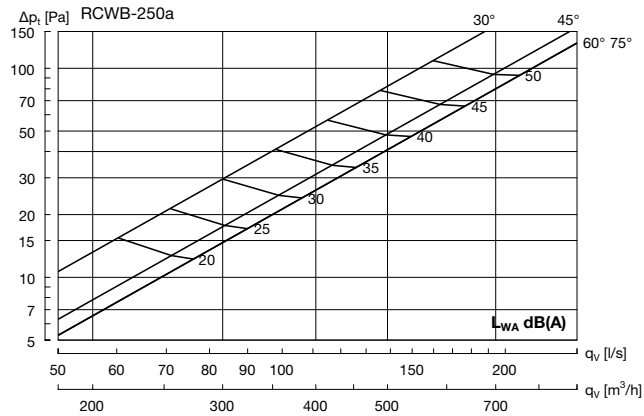
Quick selection

Size	Angle	q_v	q_v	P_t	$l_{0,2}$	$l_{0,0}$
		[l/s]	[m ³ /h]	[Pa]	isotherm [m]	+10K [m]
L_{WA} = 40						
250	30°	115	415	57	8	
250	75°	115	415	28		5
315	30°	187	672	53	5	
315	75°	187	672	29		5
400	30°	290	1043	49	4	
400	75°	290	1043	27		5
500	30°	403	1451	47	4	
500	75°	403	1451	22		4
630	30°	605	2178	39	5	
630	75°	605	2178	19		5
L_{WA} = 50						
250	30°	160	575	108	11	
250	75°	160	575	54		6
315	30°	257	924	101	6	
315	75°	257	924	54		7
400	30°	397	1428	91	6	
400	75°	397	1428	50		7
500	30°	565	2034	91	6	
500	75°	565	2034	43		6
630	30°	861	3098	80	7	
630	75°	861	3098	39		7
L_{WA} = 60						
250	30°	221	796	208	15	
250	75°	221	796	103		8
315	30°	353	1271	190	8	
315	75°	353	1271	103		9
400	30°	543	1954	170	8	
400	75°	543	1954	93		9
500	30°	792	2851	180	8	
500	75°	792	2851	85		8
630	30°	1224	4407	161	9	
630	75°	1224	4407	78		10

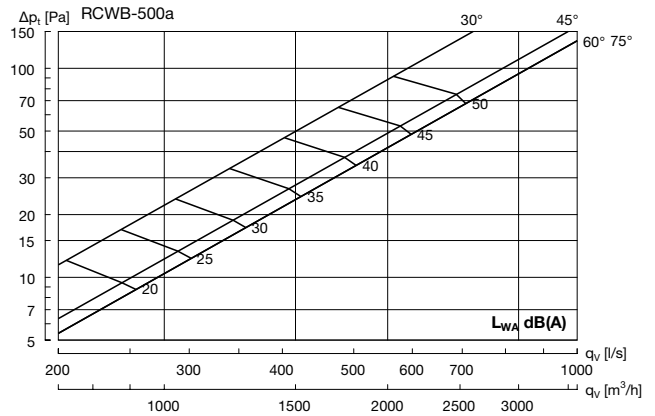
Swirl diffuser

RCWB

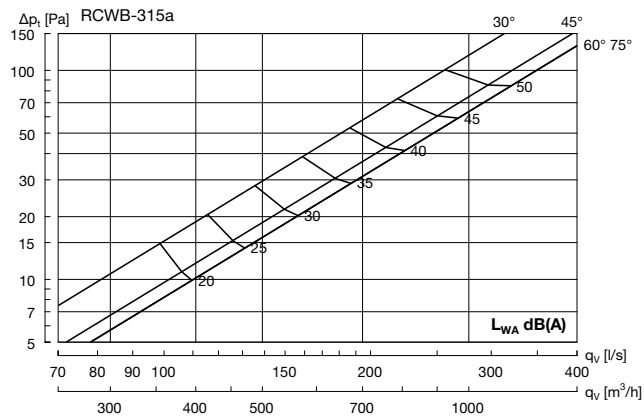
Technical data



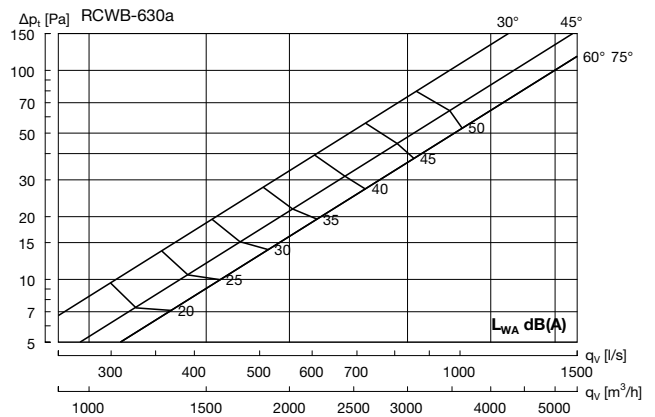
Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	5	0	-5	-4	-3	-9	-17	-26



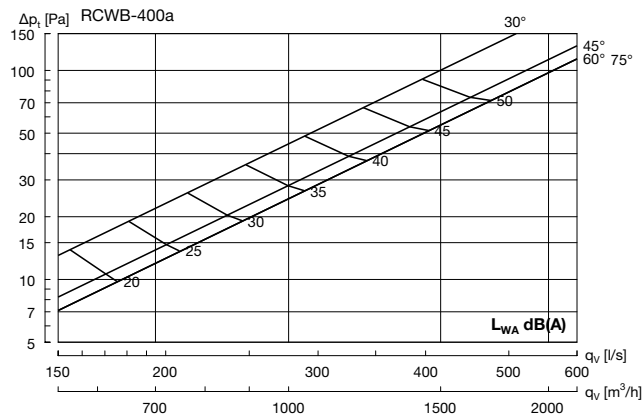
Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	8	2	-3	-2	-4	-11	-21	-30



Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	7	-1	-4	-3	-3	-10	-19	-27



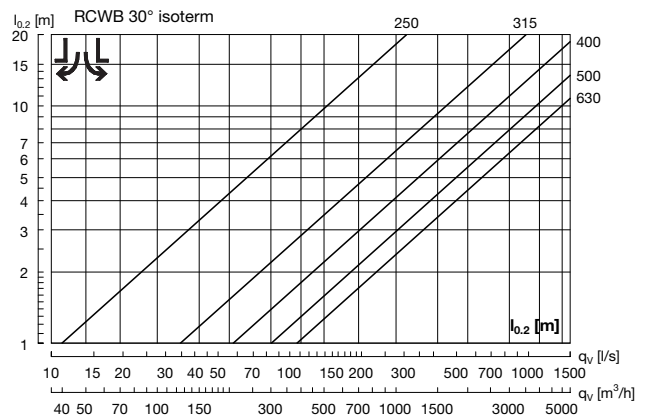
Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	7	-1	-3	-1	-4	-13	-24	-33



Hz	63	125	250	500	1K	2K	4K	8K
K_{sk}	8	0	-5	-2	-3	-11	-20	-28

Throw $l_{0.2}$ horizontal

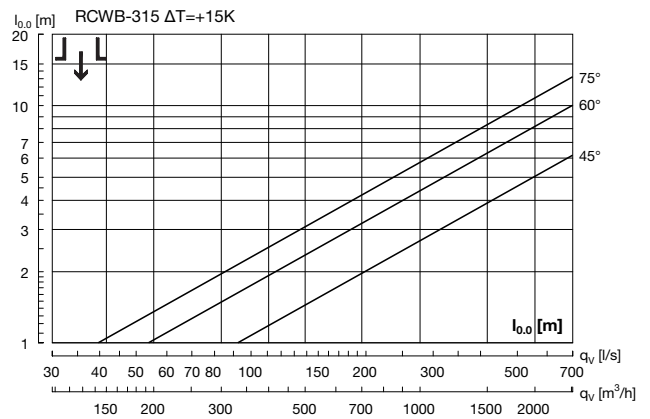
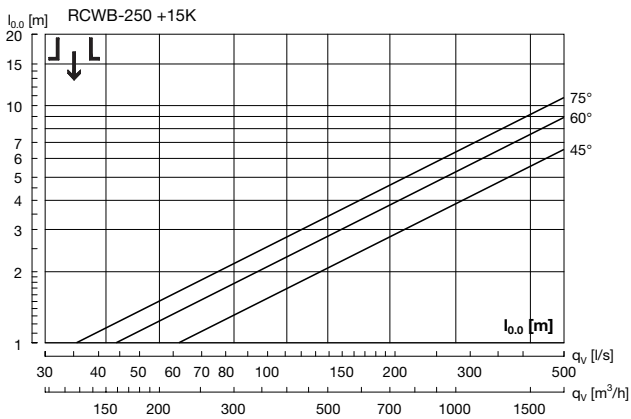
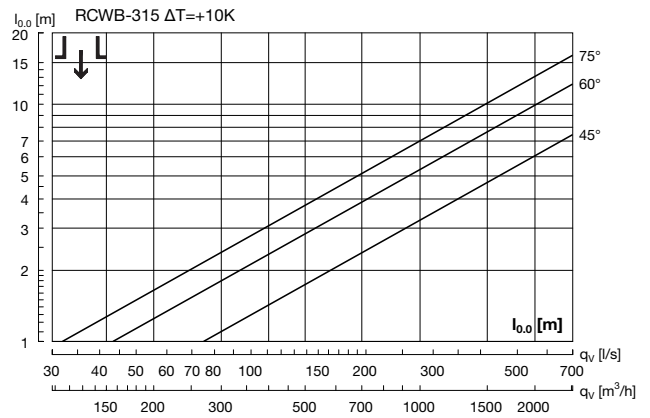
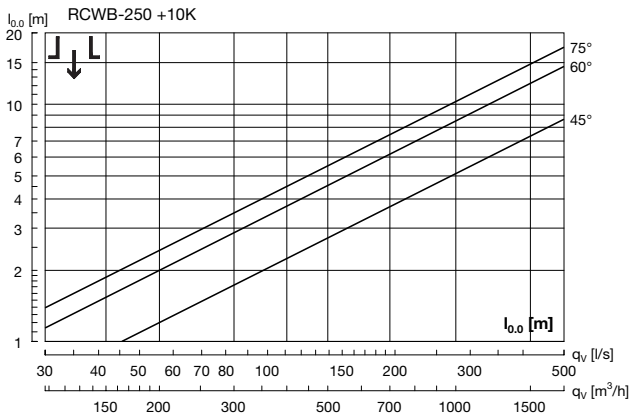
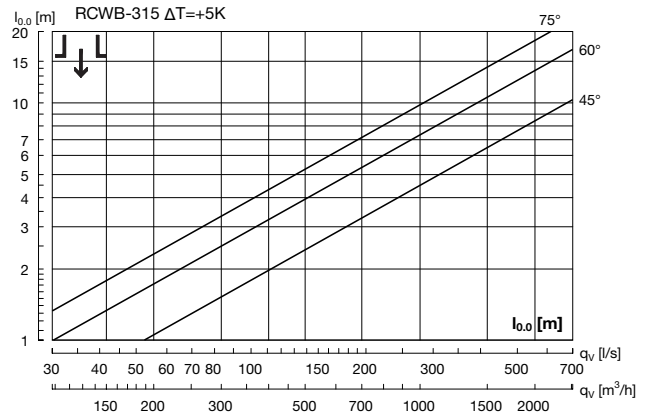
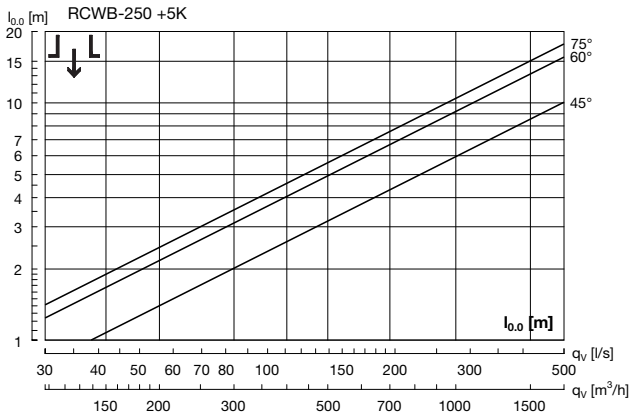
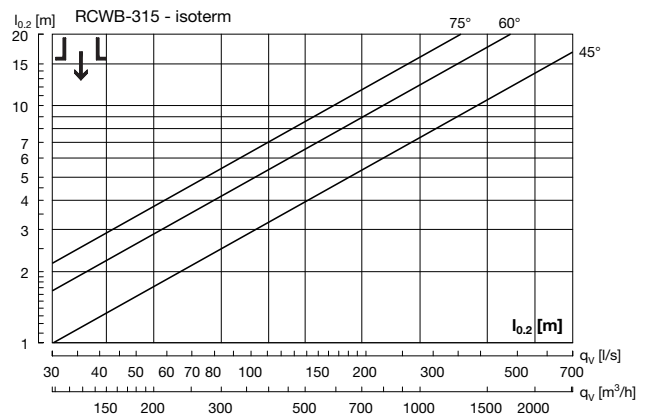
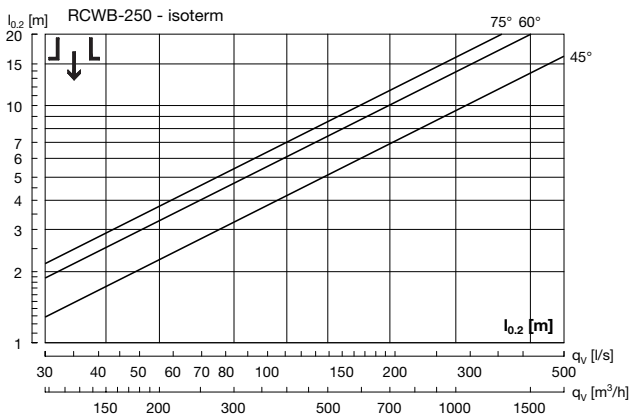
Horizontal throw $l_{0.2}$ is specified for free suspension. If the diffuser is installed < 300 mm from the ceiling, the value must be multiplied by 1.4.



Swirl diffuser

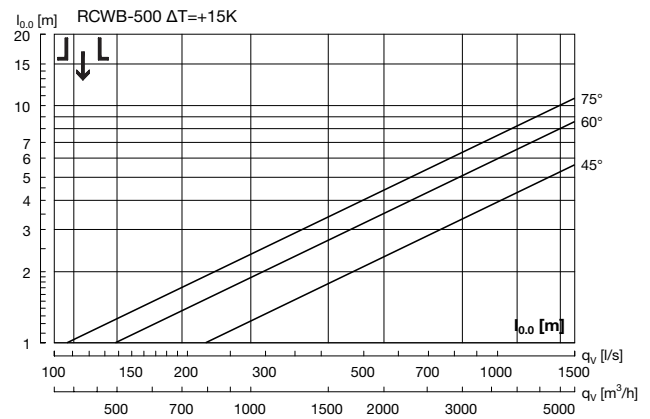
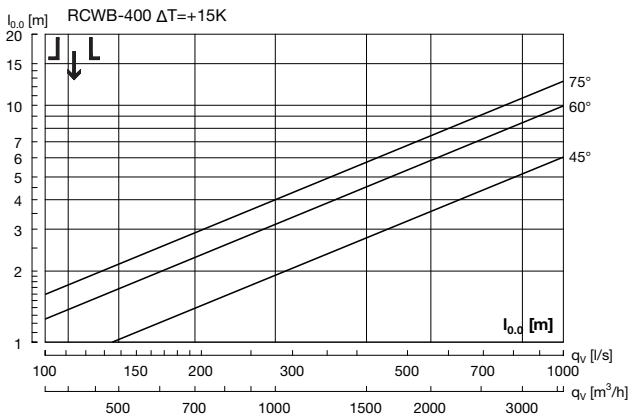
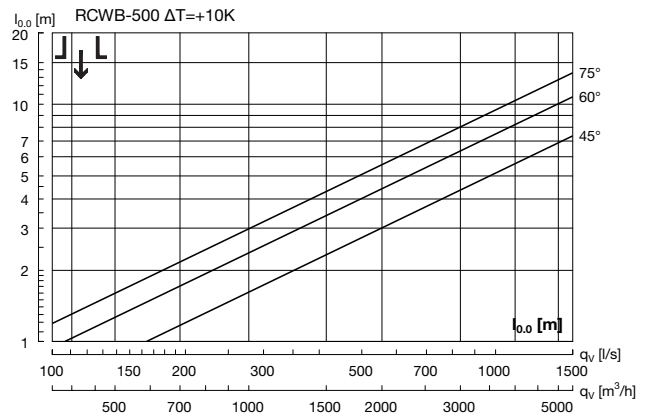
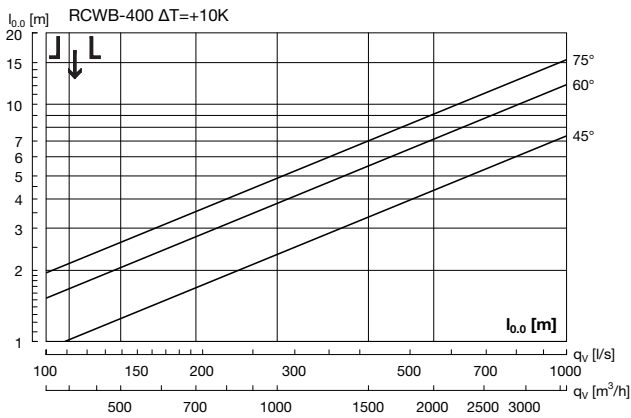
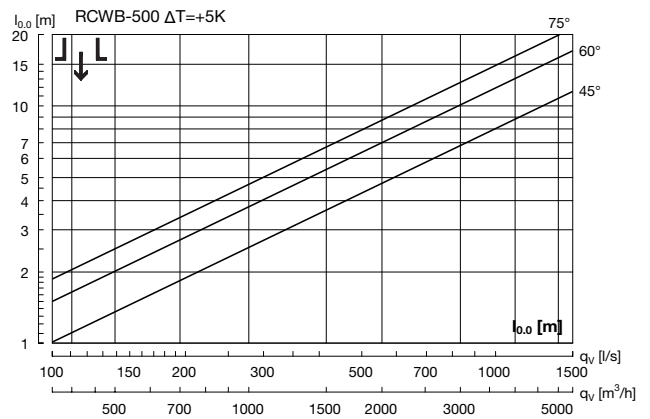
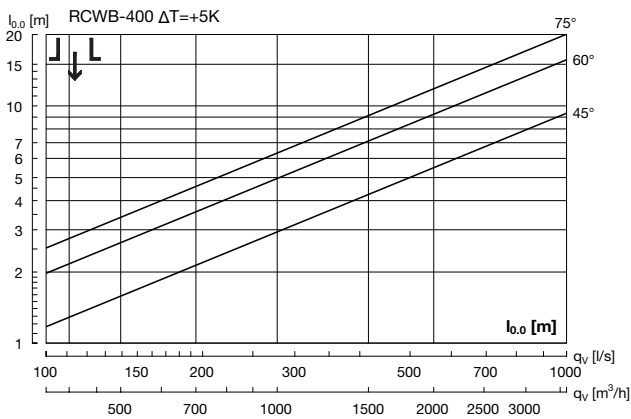
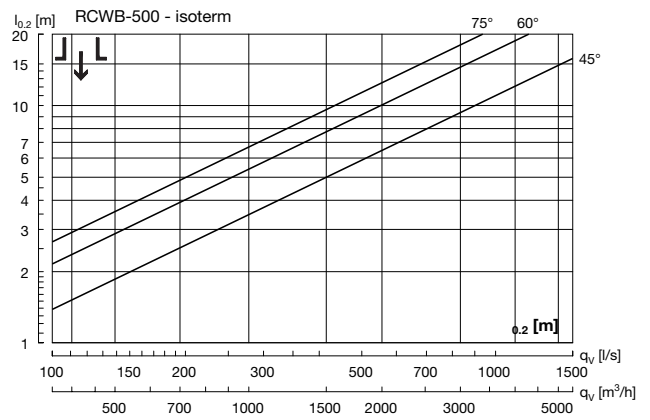
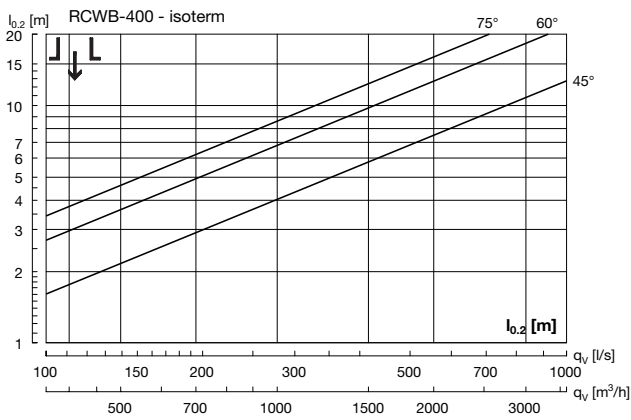
RCWB

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Swirl diffuser

RCWB

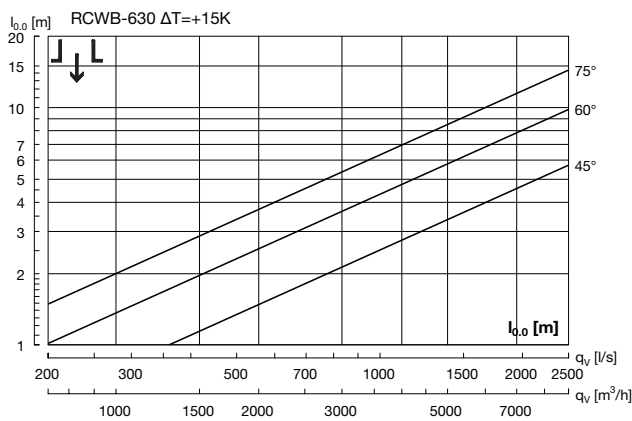
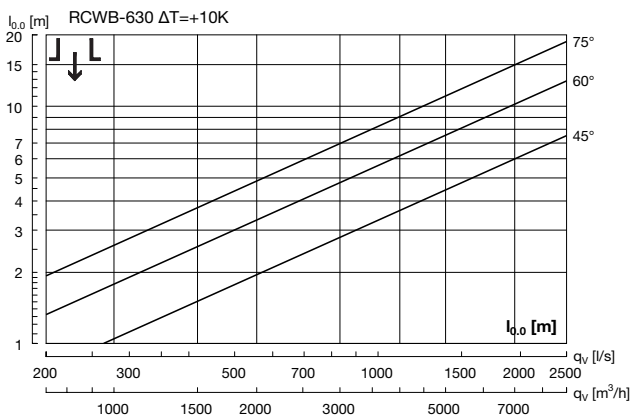
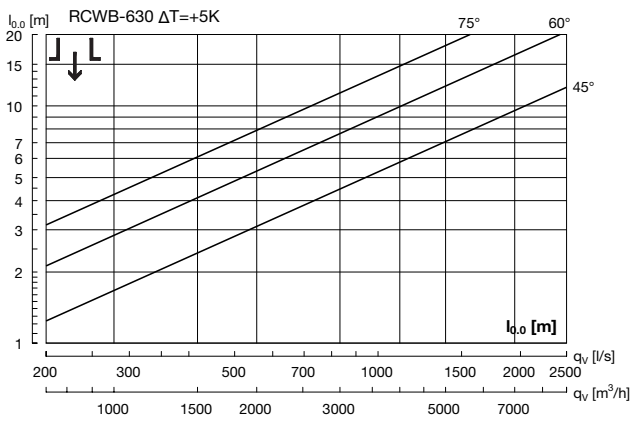
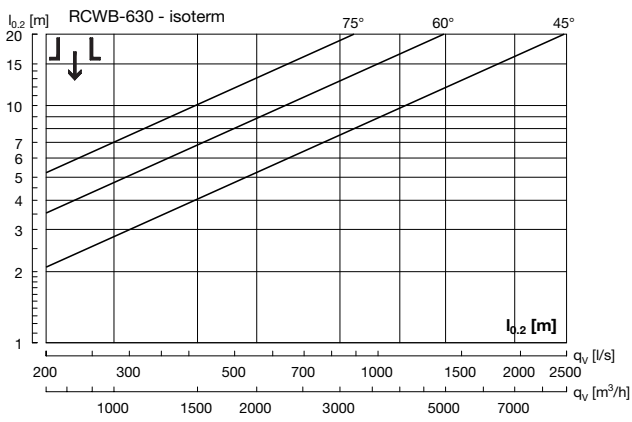


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Swirl diffuser

RCWB

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Plain diffuser

CRL



Description

CRL is a circular diffuser with an unperforated adjustable face plate and can be used for both supply and extract air. The diffuser can be switched between horizontal and vertical supply air, and is therefore suitable for the horizontal supply of cooled air or vertical supply of heated air. The CRL can be equipped with accessories of various types in order to achieve optimal function.

Installing a CRL diffuser in a plenum box type MB can help to achieve a stable airflow to the diffuser as well as realise the potential for individual adjustment.

Damper type B is an unique linear cone damper which allows to use the full operational area (0-100%) and allows to balance with a high pressure drop over the box with low sound generation. Furthermore the construction of the damper gives an accurate and reliable measurement.

Damper type C and E are with rotating blade dampers for respectively supply and extract. Typically used in applications that don't require a high balancing pressure in the plenum box.

- Suitable for both supply and extract air
- Suitable for horizontal or vertical supply air patterns
- Plenum box with several damper options

Maintenance

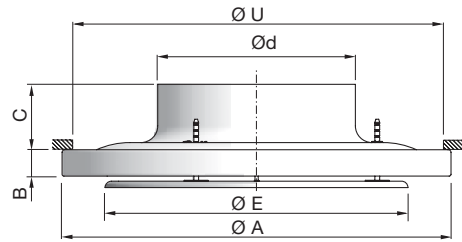
The face plate can be removed to enable cleaning of internal parts or to gain access to the duct or plenum box. The visible parts off the diffuser can be wiped with a damp cloth.

Order code

Product	CRL	aaa
Type	CRL	
Connection dim. Ød	Ød 100-400	

Example: CRL-200

Dimensions



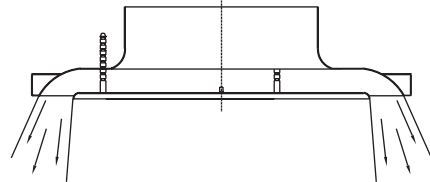
CRL Ød	ØA	B	C	ØE	ØU*	m
mm	mm	mm	mm	mm	mm	kg
100	188	15	60	146	170	0.30
125	238	20	65	180	210	0.50
160	288	25	65	220	255	0.60
200	388	28	72	300	355	1.10
250	488	33	82	380	390	1.60
315	588	33	97	490	465	2.50
400	720	40	100	590	670	3.80

* ØU = Ceiling grid opening

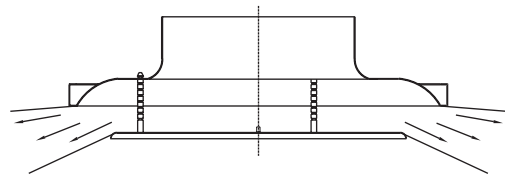
Dispersal patterns

CRL is supplied with vertical supply air as standard.

The dispersal pattern can be changed to horizontal supply air by moving the face plate.



Vertical supply air.



Horizontal supply air.

Materials and finish:

- Grille box: Aluminium
- Face plate: Galvanised steel
- Standard finish: Powder-coated
- Standard colours:RAL 9003 and RAL 9010, gloss 30

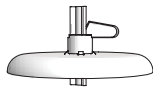
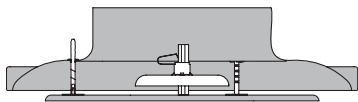
The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Plain diffuser

CRL

Accessories

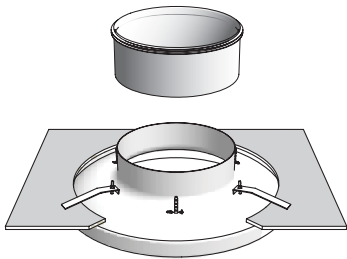
CAZ - Balancing damper



MBZ - Extension piece



DCZ - Mounting brackets (set)

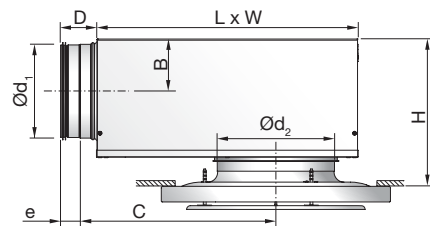


Order code - accessories

Product aaa bbb
 Type _____
 Size _____

Example: CAZ-125

CRL + MB plenum box



Ød ₁	Ød ₂	B	C	D	e	H*	L	W
mm		mm						
100	100	62	245	78	40	175 - 210	310	260
100	125	62	245	78	40	175 - 205	310	260
100	160	62	245	78	40	175 - 205	310	260
125	125	75	291	78	40	200 - 230	376	310
125	160	75	291	78	40	200 - 230	376	310
125	200	75	291	78	40	210 - 245	376	310
160	160	92	352	78	40	235 - 265	459	380
160	200	92	352	78	40	245 - 280	459	380
160	250	92	352	78	40	250 - 290	459	380
200	200	112	425	78	40	285 - 320	565	460
200	250	112	425	78	40	290 - 332	565	460
200	315	112	425	78	40	290 - 345	565	460
250	250	137	514	118	60	340 - 380	698	540
250	315	137	514	118	60	340 - 395	698	540
250	400	137	514	118	60	370 - 400	698	540
315	315	170	675	118	60	405 - 460	858	540
315	400	170	675	118	60	435 - 465	858	540

USING CRL + MBB => ALWAYS USE MBZ

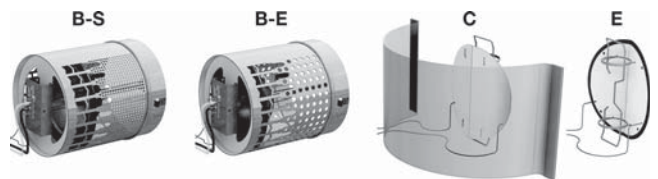
* Using accessory MBZ the H dimension will increase:

Ød₂ = 100 - 200 mm => H +40 mm

Ød₂ = 250 - 315 mm => H +60 mm

Ød₂ = 400 mm => H +80 mm

Damper options



Order code

Product MB a bbb ccc d
 Type _____
 MB _____
Damper _____
 B = Linear cone damper
 C = Blade damper supply
 E = Blade damper extract
Duct connection Ød₁ _____
 Ø100-315 _____
Diffuser dimension Ød₂ _____
 Ø100-400 _____
Function (Only for B damper) _____
 S = Supply air E = Extract

Example 1: CRL-200+MBB-160-200-S

Example 2: CRL-200+MBC-125-200

Plain diffuser

CRL

Technical data

Following CRL+plenum box data are valid for MBB-S/-E. For MBC and MBE data, go to www.lindQST.com.

Capacity

Air flow q_v [l/s] and [m³/h], total pressure Δp_t [Pa], throw $l_{0,2}$ [m] and sound power level L_{WA} [dB(A)] can be seen in the diagrams.

Frequency-related sound power level

The sound power level in the frequency band is defined as $L_{WA} + K_{ok}$. K_{ok} values are specified in charts beneath the diagrams on the following pages.

Quick selection, supply air

CRL + MBB-S		$\Delta p_t \geq 50$ Pa 30 dB(A)		$\Delta p_t \geq 50$ Pa 35 dB(A)	
duct $\varnothing d_1$	CRL $\varnothing d_2$	l/s	m ³ /h	l/s	m ³ /h
100	100	26	94	31	112
100	125	35	126	42	151
100	160	42	151	50	180
125	125	46	166	54	194
125	160	58	209	68	245
125	200	62	223	75	270
160	160	67	241	81	292
160	200	86	310	105	378
160	250	96	346	121	436
200	200	107	385	127	457
200	250	135	486	160	576
200	315	146	526	177	637
250	250	151	544	183	659
250	315	161	580	215	774
250	400	185	666	252	907
315	315	206	742	263	947
315	400	227	817	309	1112

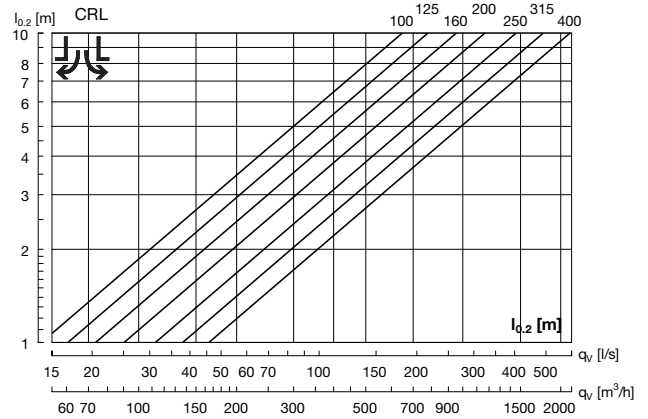
Sound attenuation

Sound attenuation of the diffuser ΔL from duct to room, including end reflection, see table below.

CRL + MBB-S/-E		Centre frequency Hz							
duct $\varnothing d_1$	CRL $\varnothing d_2$	63	125	250	500	1K	2K	4K	8K
100	100	20	17	7	20	19	20	20	22
100	125	21	16	6	18	19	18	19	21
100	160	21	16	5	15	17	18	18	18
125	125	18	13	7	20	12	19	19	20
125	160	15	14	8	19	12	17	17	19
125	200	14	12	6	16	14	16	17	16
160	160	18	17	10	18	16	18	21	20
160	200	15	14	7	19	17	18	19	19
160	250	15	15	4	15	13	14	16	18
200	200	14	10	7	14	19	16	20	17
200	250	15	9	5	14	19	16	17	16
200	315	13	8	4	11	16	15	16	15
250	250	16	8	7	16	18	18	18	17
250	315	11	7	6	16	17	17	16	16
250	400	15	6	5	10	14	16	15	15
315	315	8	10	9	14	18	18	17	21
315	400	8	8	8	11	16	17	16	19

Throw $l_{0,2}$

The throw is specified at a terminal velocity of 0.2 m/s. Diagram below shows throw $l_{0,2}$ for horizontal supply air.



Correction throw $l_{0,2}$ for vertical supply air

CRL $\varnothing d$	Correction factor
100	3,1
125	2,7
160	2,7
200	2,7
250	2,6
315	2,4
400	2,3

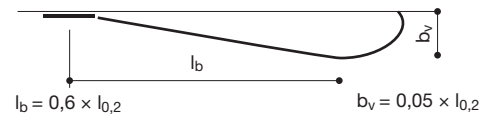
Air jet distribution

l_b = Distance from the diffuser to the point where there is maximum dispersal.

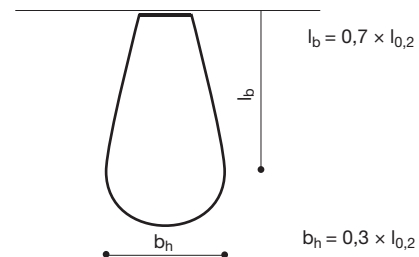
b_v = Depth of the air jet on a vertical plane.

b_h = Width of the air jet on a horizontal plane

Horizontal supply air pattern



Vertical supply air pattern



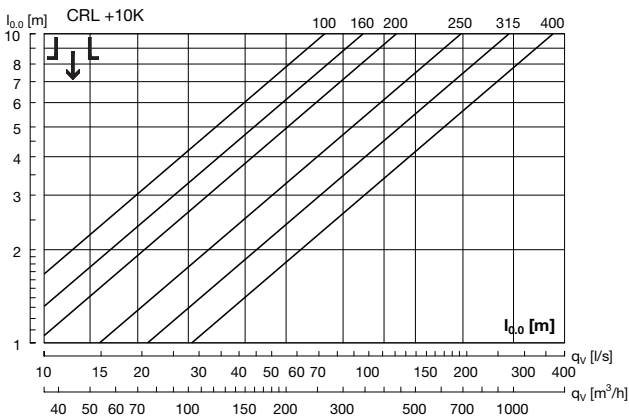
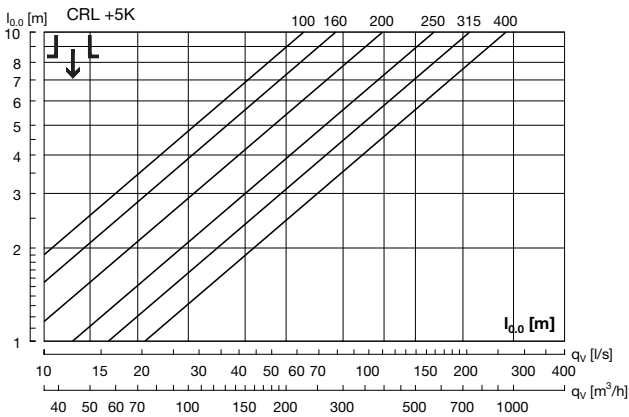
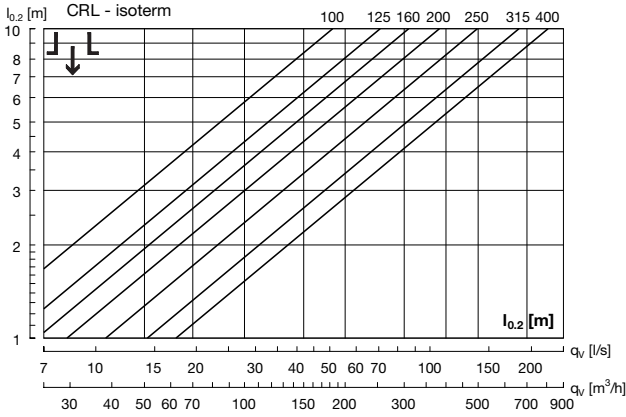
Plain diffuser

CRL

Technical data

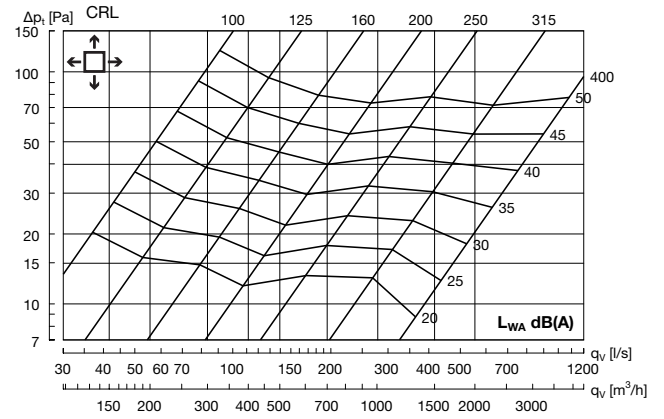
Throw $l_{0,2}$ / turning point $l_{0,0}$

Throw $l_{0,2}$ [m] is specified at a speed of 0.2 m/s. Turning point $l_{0,0}$ [m] is specified for +5 K, +10 K respectively.

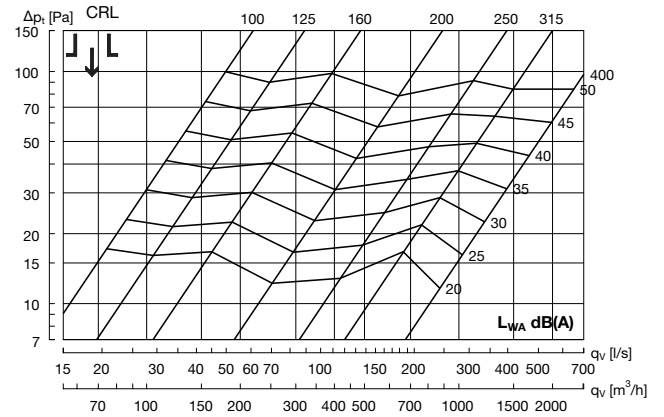


CRL without box - Supply air

Supply air - horizontal



Supply air - vertical

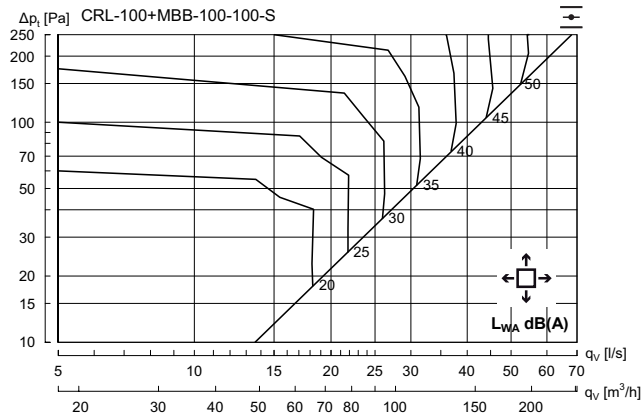


Plain diffuser

CRL

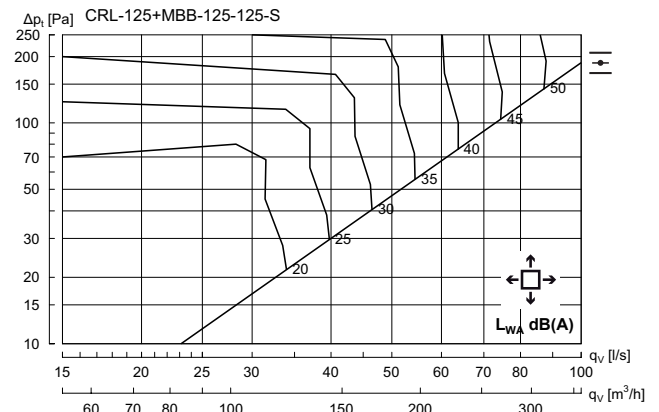
Technical data

CRL 100 + MBB-S - Supply air

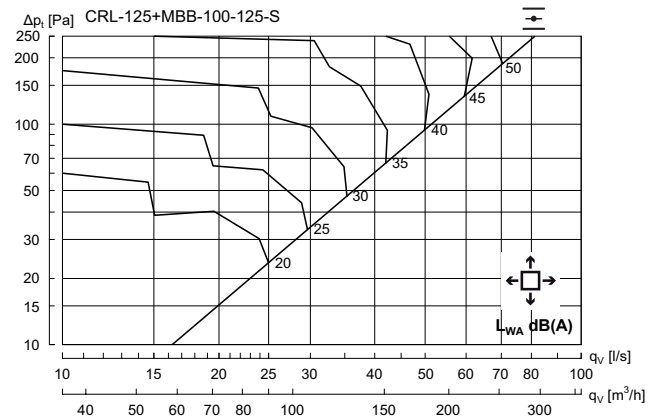


Hz	63	125	250	500	1K	2K	4K	8K
K _{ok}	12	8	5	-7	-8	-14	-17	-22

CRL 125 + MBB-S - Supply air



Hz	63	125	250	500	1K	2K	4K	8K
K _{ok}	11	9	3	-5	-6	-14	-20	-24



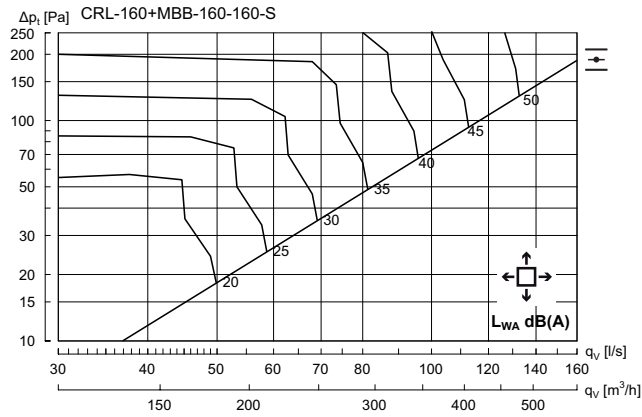
Hz	63	125	250	500	1K	2K	4K	8K
K _{ok}	13	8	3	-5	-7	-11	-15	-19

Plain diffuser

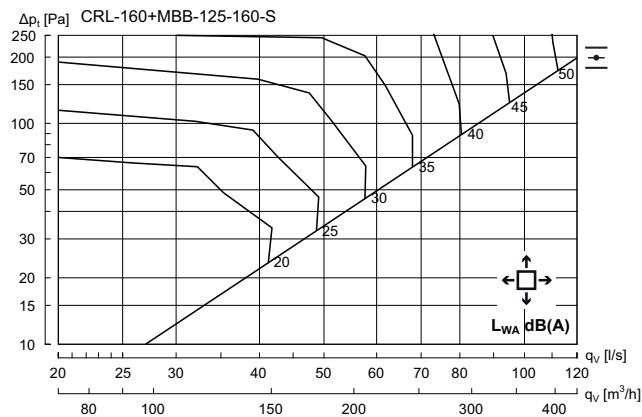
CRL

Technical data

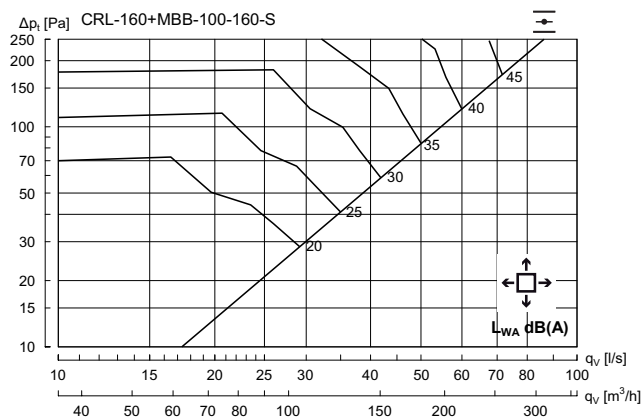
CRL 160 + MBB-S - Supply air



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	12	3	-7	-7	-15	-20	-23

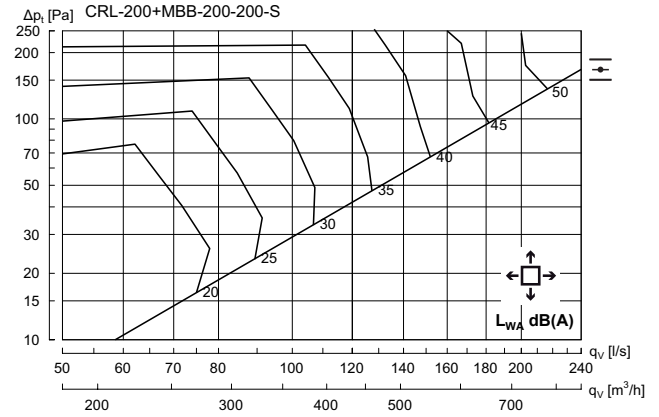


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	8	3	-5	-6	-11	-17	-22

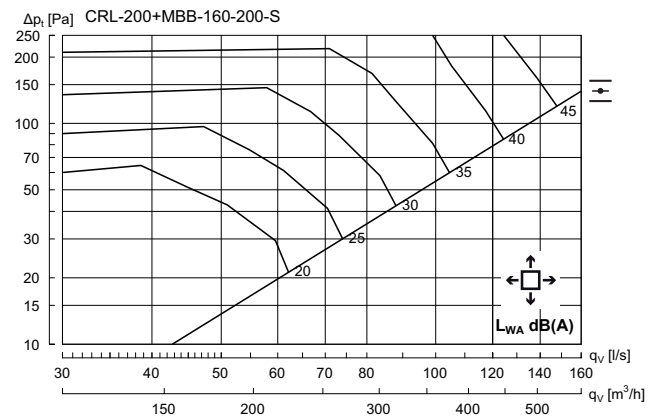


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	9	3	1	-3	-5	-9	-15	-19

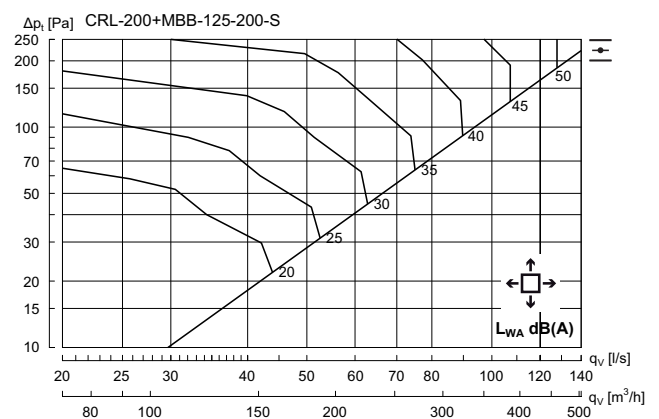
CRL 200 + MBB-S - Supply air



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	11	1	-3	-7	-15	-20	-24



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	8	1	-4	-5	-10	-18	-22



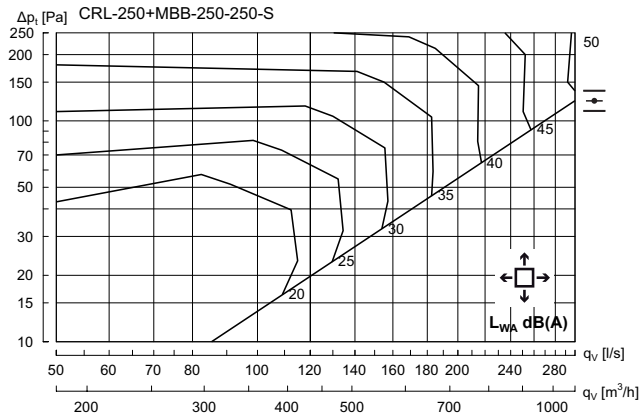
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	10	5	1	-4	-5	-10	-16	-20

Plain diffuser

CRL

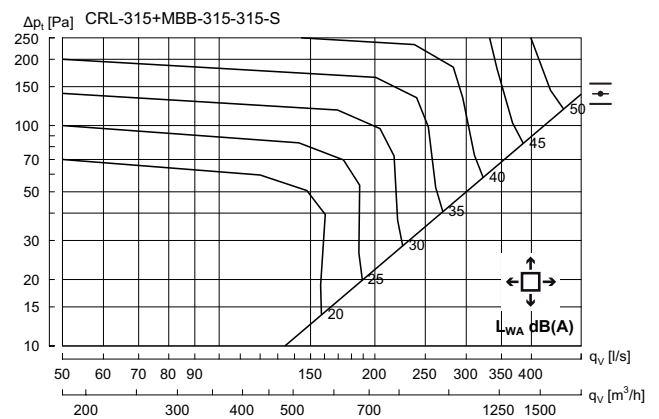
Technical data

CRL 250+ MBB-S - Supply air

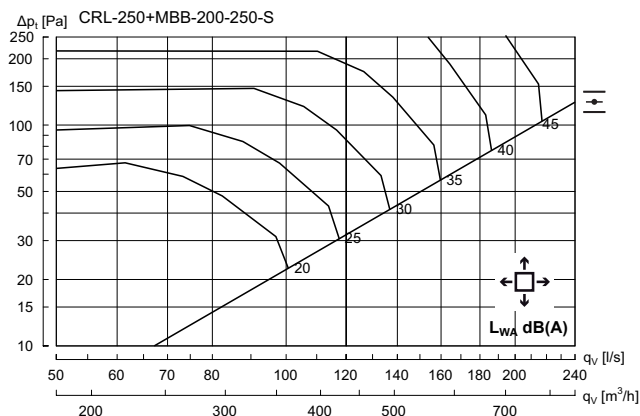


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	15	7	0	-2	-6	-12	-16	-21

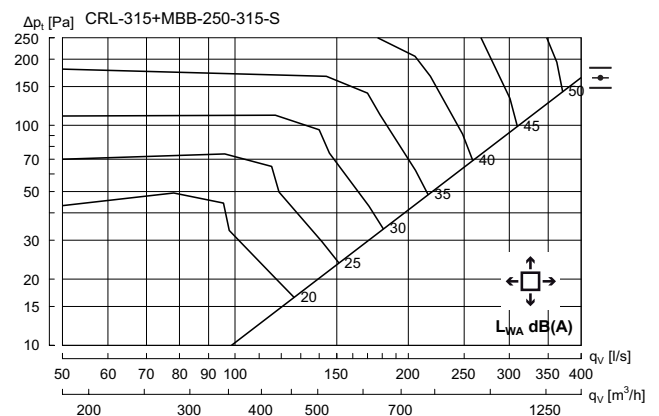
CRL 315 + MBB-S - Supply air



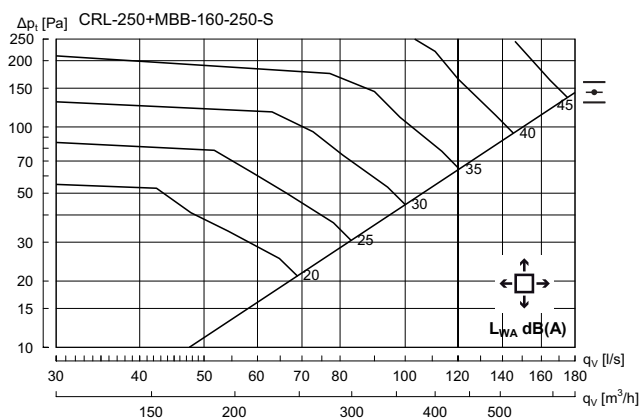
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	15	4	1	-2	-6	-13	-17	-16



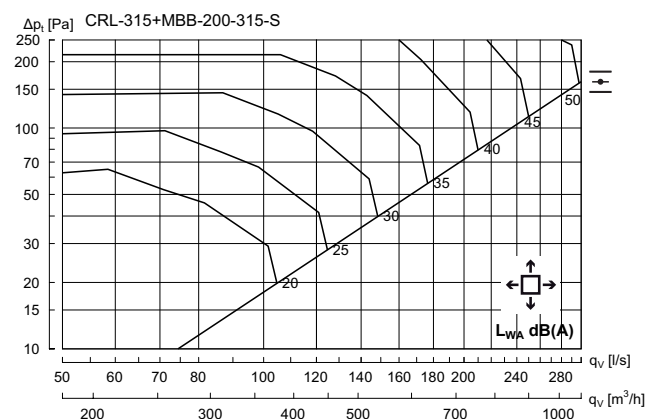
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	7	-1	-2	-5	-12	-17	-22



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	6	-1	-2	-5	-12	-17	-23



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	6	1	-3	-5	-10	-15	-21



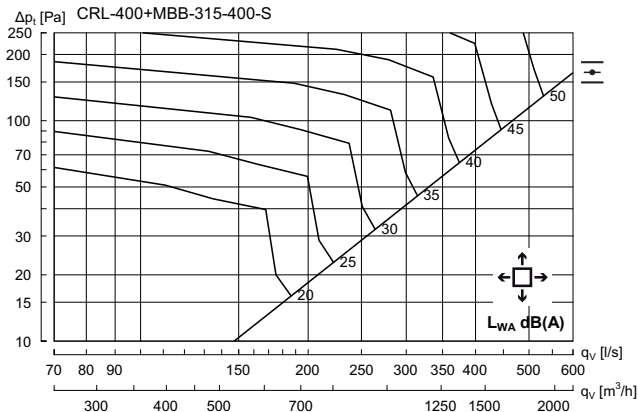
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	7	0	-3	-6	-10	-16	-21

Plain diffuser

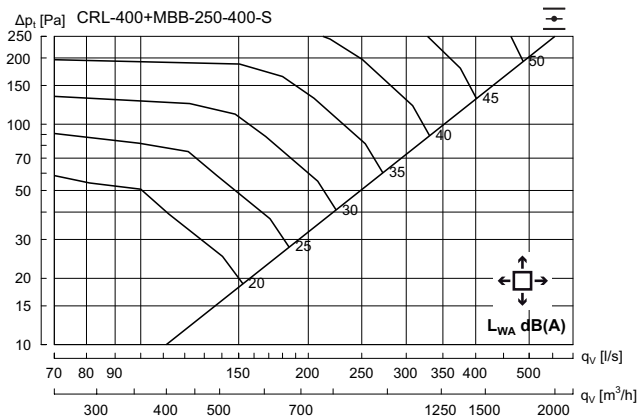
CRL

Technical data

CRL 400+ MBB-S - Supply air



Hz	63	125	250	500	1K	2K	4K	8K
K _{sk}	11	3	0	-3	-5	-10	-14	-23



Hz	63	125	250	500	1K	2K	4K	8K
K _{sk}	8	4	-1	-3	-4	-10	-14	-20

CRL + MBB-S - Supply air

Correction vertical supply air, sound power level (L_{WA}) and pressure loss (Δp_t)

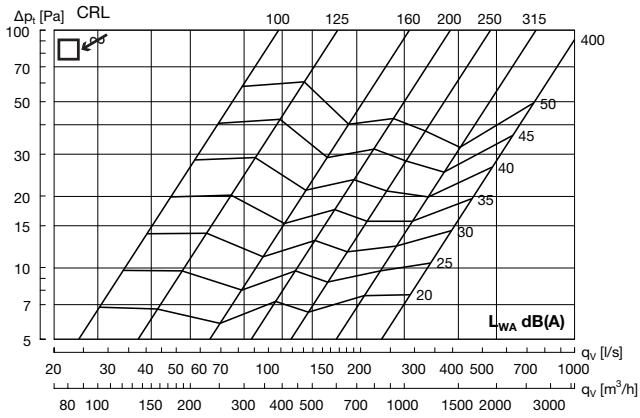
CRL + MBB-S		Correction factor	
duct	CRL	Vertical supply air	
Ød ₁	Ød ₂	L _{WA}	Δp _t
100	100	+ 6	x 1,3
100	125	+ 8	x 1,3
100	160	+ 3	x 1,1
125	125	+ 1	x 1
125	160	+ 8	x 1,2
125	200	+ 1	x 1
160	160	+ 10	x 1,5
160	200	+ 3	x 1,1
160	250	+ 0	x 1
200	200	+ 7	x 1,3
200	250	+ 0	x 1
200	315	+ 1	x 1
250	250	+ -2	x 1
250	315	+ 0	x 1
250	400	+ 0	x 1,1
315	315	+ -2	x 1,1
315	400	+ 3	x 1,2

Plain diffuser

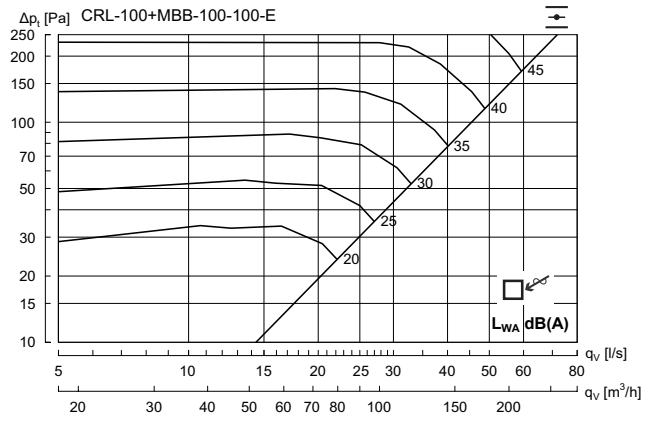
CRL

Technical data

CRL without box - Extract air



CRL 100 + MBB-E - Extract air



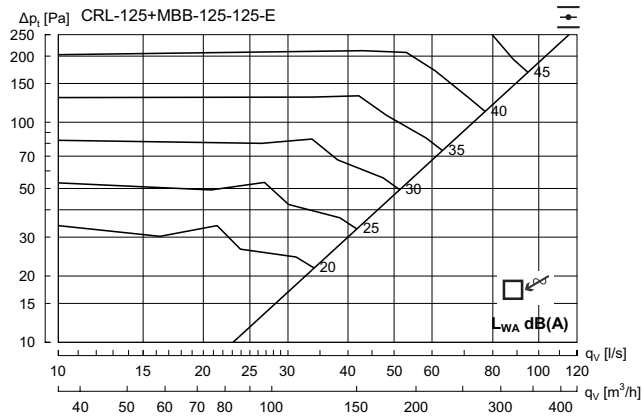
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	0	2	-2	-6	-11	-15	-22

Plain diffuser

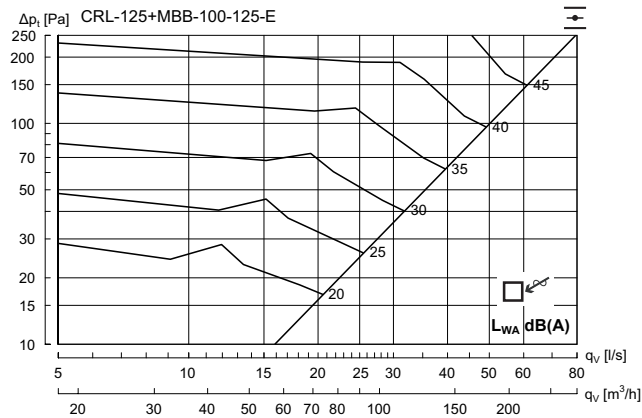
CRL

Technical data

CRL 125 + MBB-E - Extract air

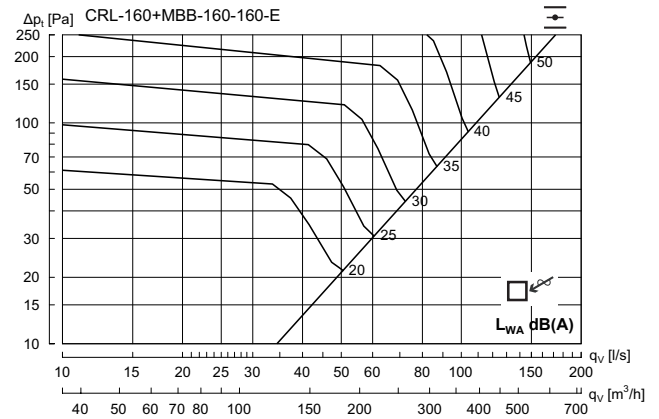


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	14	5	-1	-3	-4	-12	-15	-21

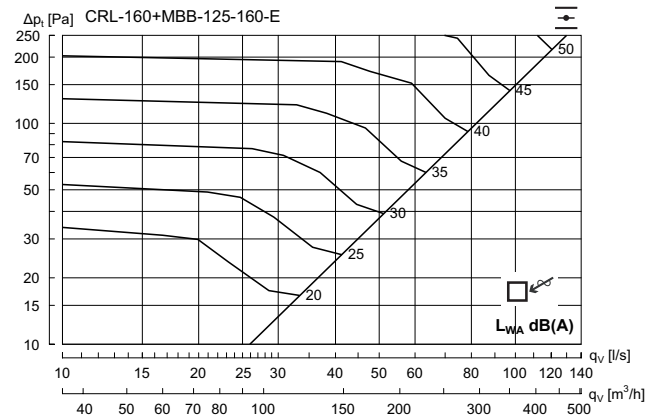


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	0	4	-3	-8	-11	-17	-22

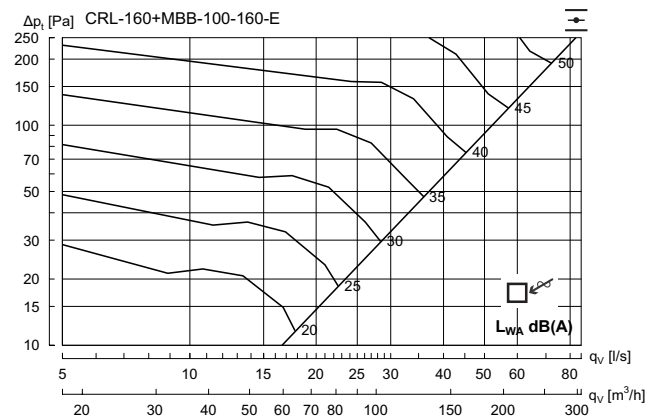
CRL 160 + MBB-E - Extract air



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	14	4	-1	-4	-4	-10	-16	-24



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	6	1	-3	-5	-12	-15	-21



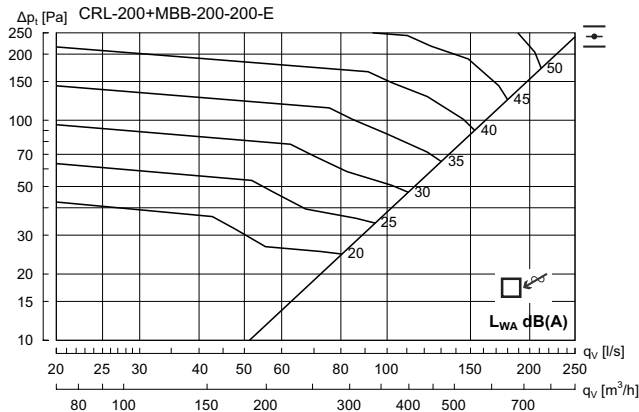
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	0	5	-3	-9	-12	-19	-23

Plain diffuser

CRL

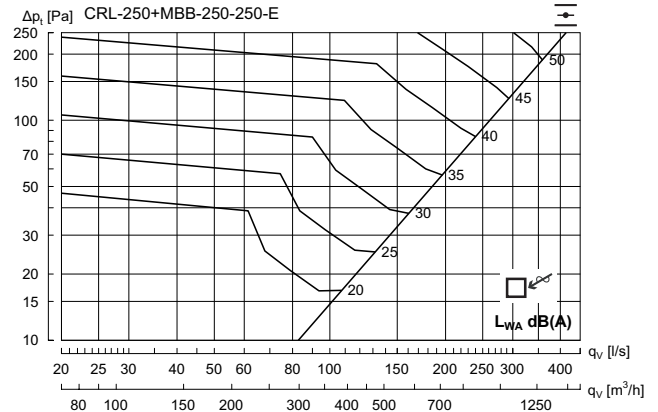
Technical data

CRL 200 + MBB-E - Extract air

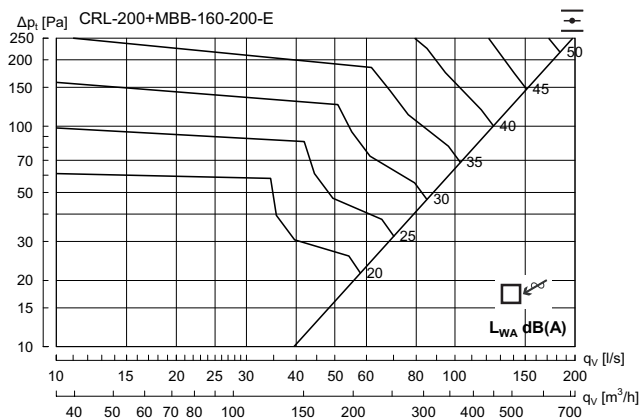


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	15	5	-1	-3	-6	-9	-16	-25

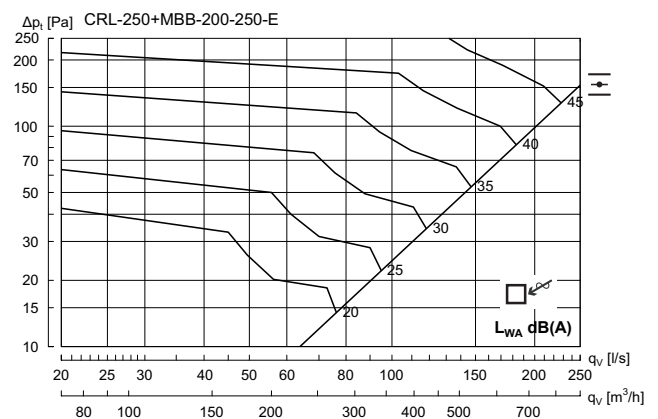
CRL 250 + MBB-E - Extract air



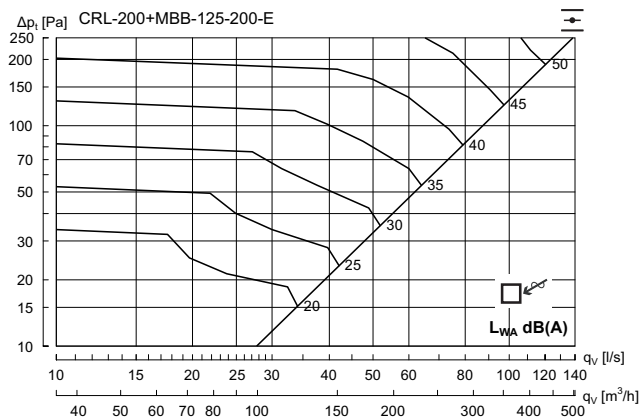
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	6	2	-2	-7	-11	-15	-24



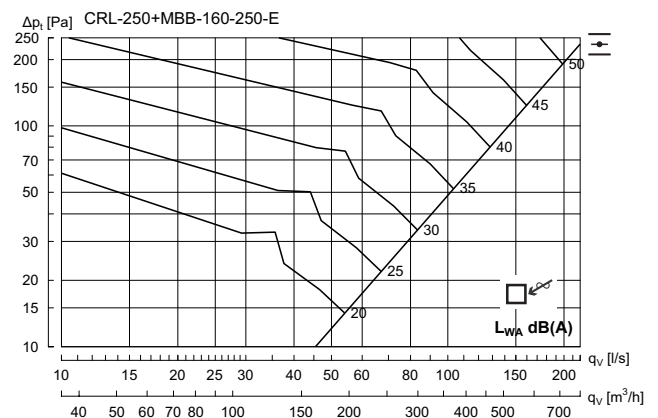
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	14	5	0	-3	-5	-9	-15	-20



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	5	1	-3	-6	-10	-13	-22



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	9	2	1	-2	-5	-9	-14	-19



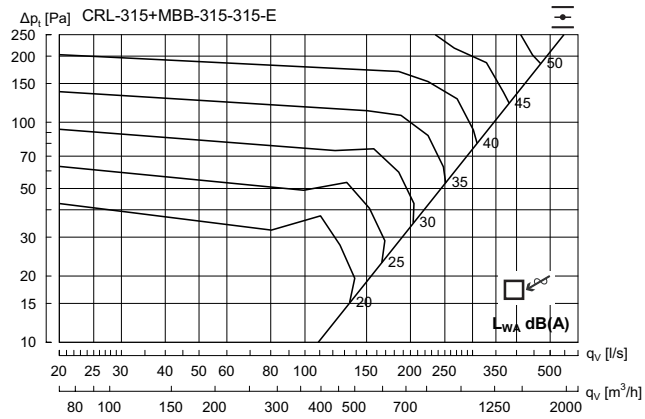
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	5	1	-3	-5	-11	-14	-20

Plain diffuser

CRL

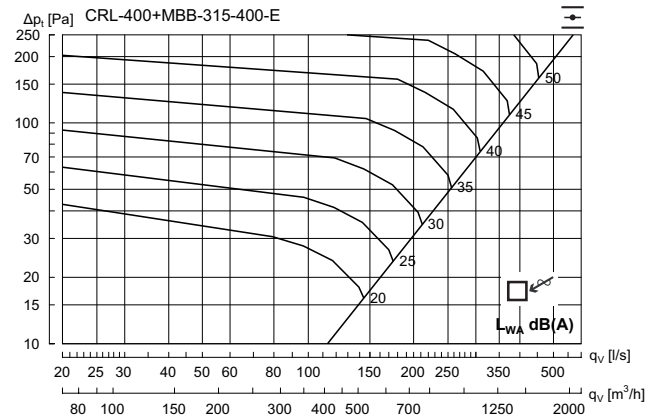
Technical data

CRL 315 + MBB-E - Extract air

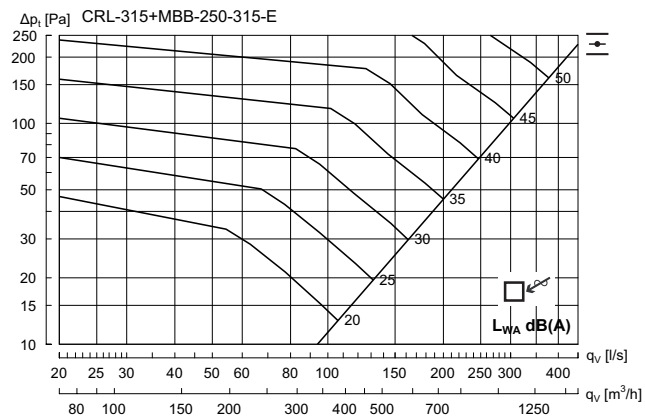


Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	5	2	-3	-6	-10	-15	-25

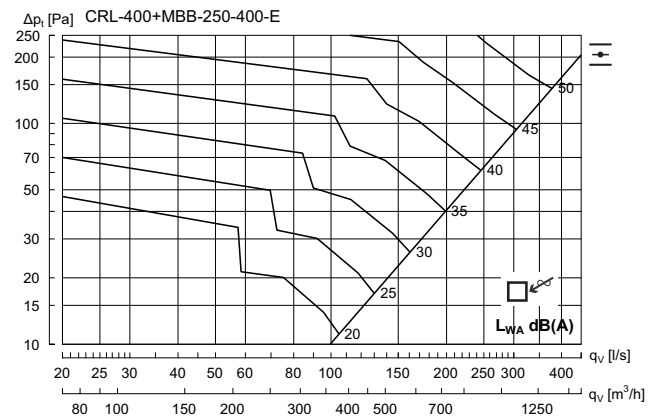
CRL 400 + MBB-E - Extract air



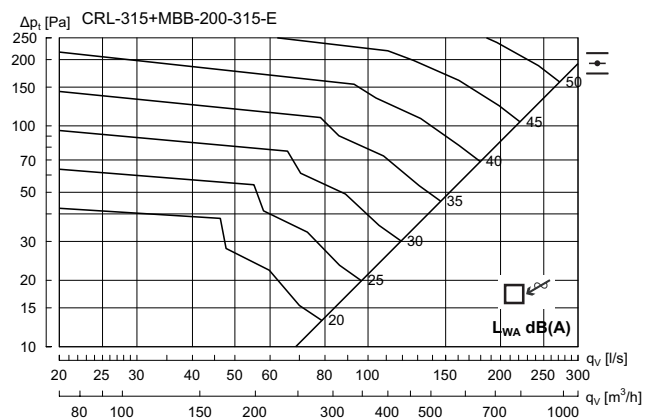
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	11	5	2	-2	-7	-11	-15	-25



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	9	5	2	-3	-6	-10	-16	-22



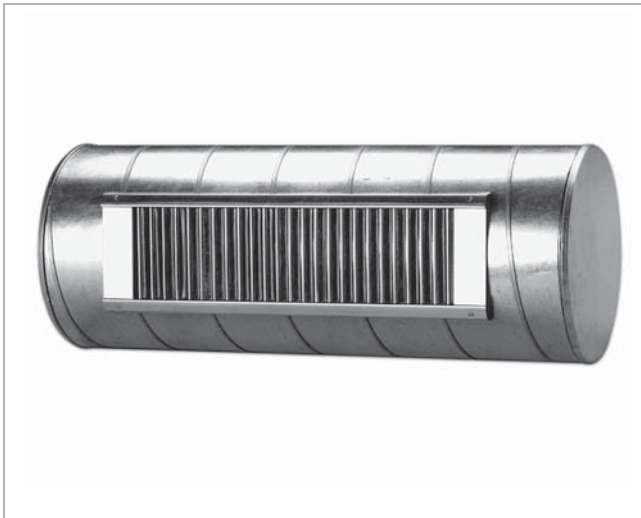
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	9	6	2	-2	-6	-12	-16	-24



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	13	5	0	-3	-5	-10	-15	-22

Circular duct grille

RGS



Description

RGS is a rectangular ventilation grille with vertical adjustable bars for direct installation in circular ducts. The grille can be used for both supply and exhaust air. The grille can be supplied with horizontal directional bars, straight or slanting sliding damper or blade damper. The grille is designed so that the grille flanges always fit tight to the duct regardless of the duct diameter. RGS is made of hot-galvanised steel plate and is put together without welding. This means that the grille can be used without further surface treatment. The exterior of the grille thus matches the duct surface.

- Can be used for both supply and exhaust air
- Installed directly in circular duct
- Can be fitted with many types of accessory

Maintenance

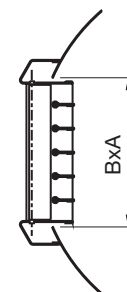
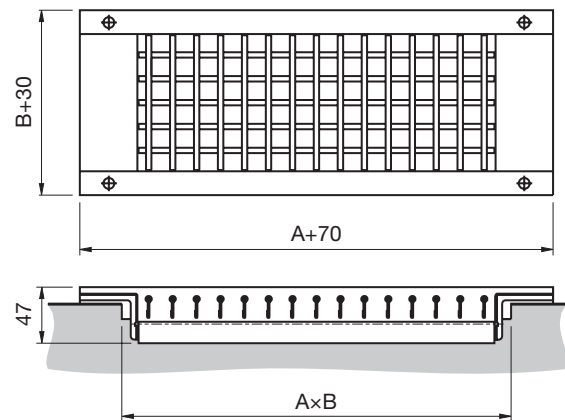
The grille should be removed to gain access to the duct.

Order code

Product	RGS	a	bbb	ccc
Type				
Accessories				
A - measure				
B - measure				

A x B = Cutting dimension

Dimensions



A x B = Cutting dimension

Screws included.

Materials and finish

- Grille: Hot-galvanised steel
- Sliding damper: Electro-galvanised steel
- Blade damper: Electro-galvanised steel

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

Circular duct grille

RGS

Dimensions

Measure		Min duct measure mm	Free area F(m ²)	C - Measure mm	RGS 1 Weight kg
A	x B				
325	X 75	160	0.017	106	1.10
325	X 75	160	0.017	106	1.10
325	X 150	315	0.034	106	1.40
325	X 225	500	0.056	106	2.20
425	X 75	160	0.023	116	1.40
425	X 125	250	0.037	116	1.80
425	X 150	315	0.045	116	1.90
425	X 225	500	0.074	116	3.00
525	X 75	160	0.028	126	1.70
525	X 125	250	0.047	126	2.00
525	X 150	315	0.056	126	2.30
525	X 225	500	0.093	126	3.40
625	X 75	160	0.034	131	1.90
625	X 125	250	0.056	131	2.40
625	X 150	315	0.068	131	2.60
625	X 225	500	0.112	131	3.70
825	X 75	160	0.045	151	2.40
825	X 125	250	0.074	151	3.10
825	X 150	315	0.093	151	3.50
825	X 225	500	0.148	151	5.10
1025	X 75	200	0.056	186	2.90
1225	X 75	200	0.068	186	3.20
1225	X 125	250	0.112	186	4.00
1225	X 150	315	0.136	186	4.40
1225	X 225	500	0.224	186	6.30

Use

RGS-2

Suitable for supply and exhaust air. The grille is equipped with a single adjustment damper and has a lower sound level than RGS-6.

RGS-3

As RGS-2 with horizontal directional bars specifically for supply air.

RGS-4

The grille is suitable for exhaust only.

RGS-6 Slanting sliding damper

Suitable for supply and exhaust air. The grille is equipped with a slanting sliding damper, which means the air is distributed evenly over the whole grille.

RGS-7

As RGS-6 with horizontal directional bars specifically for supply air.

Accessories

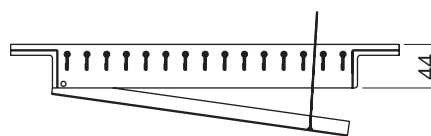
RGS-0, without accessories.



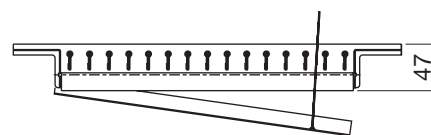
RGS-1, With directional bars.



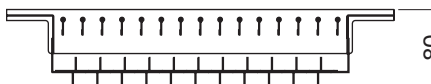
RGS-2, With blade damper.



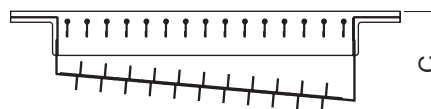
RGS-3, With directional bars and blade damper.



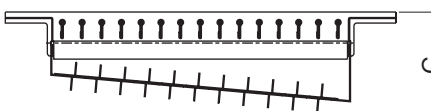
RGS-4, With straight sliding damper.



RGS-6, With slanting sliding damper.



RGS-7, With directional bars and slanting sliding damper.



Circular duct grille

RGS

Technical data


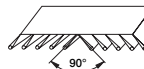
Effective speed v_0

The diagram for throw (see next page) specifies effective speed v_0 [m/s] as a function of the volume flow q [m³/h, l/s] for each grille size with 0° bar setting.

Throw $l_{0,2}$

The diagram for throw (see next page) specifies the throw $l_{0,2}$ [m] at an average terminal velocity of 0.2 m/s, 0° bar setting without ceiling effect. (Distance from grille to ceiling greater than 800 mm.)

Table 1: Correction for dispersal:

Bar setting		
Correction factor V_0	1,1	1,2
Correction factor $l_{0,2}$	0,8	0,5

Ceiling effect

If the distance from grille to ceiling is less than 300 mm, the throw $l_{0,2}$ must be multiplied by 1.4.

Total pressure p_t

The diagram "Pressure – sound level" page 414 states the grille's total pressure p_t [Pa].

Sound effect level L_{WA}

The diagram "Pressure – sound level" states the grille's sound effect level L_{WA} [dB(A)] at a free area of 0.05 m².

Table 2: Correction for free area:

Correction free area											
F [m ²]	0,02	0,025	0,03	0,04	0,05	0,06	0,08	0,1	0,13	0,17	0,2
correction [dB]	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6

Duct speed v_k

Pressure and sound effect level are stated for different duct speeds v_k [m/s].

For duct speeds $v_k < 1$ m/s, the sound values L_{WA} must be corrected by -7 dB.

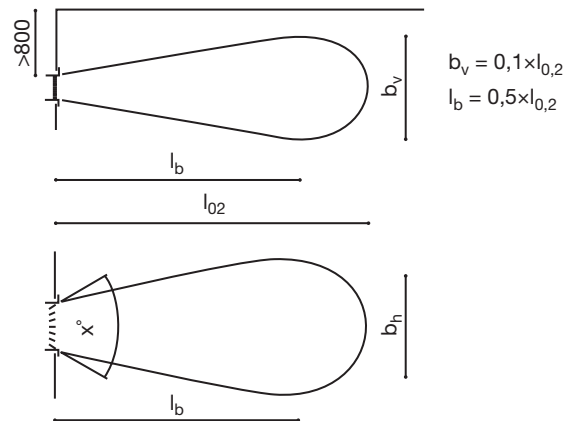
The diagrams on the following pages are in table form. See dimensioning tables.

The values apply to grilles with 0° dispersal.

Table 3: Correction for dispersal:

Bar setting	45°	90°
Pressure	x1,15	x1,3
Sound power level	+1	+2

Air jet dispersal



$$\begin{aligned}
 X = 0^\circ : b_h &= 0.3 \times l_{0,2} & l_b &= 0.5 \times l_{0,2} \\
 X = 45^\circ : b_h &= 0.4 \times l_{0,2} & l_b &= 0.5 \times l_{0,2} \\
 X = 90^\circ : b_h &= 0.6 \times l_{0,2} & l_b &= 0.5 \times l_{0,2}
 \end{aligned}$$

$l_{0,2}$: catalogue values

Sample calculation 1

Room width: $W = 6$ m, Room height: $H = 2.6$ m
 Volume flow per grille: 300 m³/h
 Duct speed $v_k = 4$ m/s
 Speed in the occupied zone: < 0.25 m/s

From next page:

$$v_x = \frac{l_{0,2}}{B + C} \times 0,2 \quad C = H - 1,8 = 0,8 \text{ m}$$

$$v_x = \leq 0,25 \text{ m/s} \quad B + C = 6,8 \text{ m}$$

$$l_{0,2} \leq (B + C) \times \frac{v_x}{0,2} \leq 6,8 \times \frac{0,25}{0,20} \leq 8,5 \text{ m}$$

The diagram "Effective speed v_0 - Throw $l_{0,2}$ " (next pages):

$$\begin{aligned}
 \text{Grille } 625 \times 75: & \quad l_{0,2} = 8.0 \text{ m} \\
 & \quad v_0 = 2.5 \text{ m/s}
 \end{aligned}$$

Pressure loss and sound effect level:

The diagram "Pressure – Sound level": 100% open damper

$$\begin{aligned}
 v_0 &= 2.5 \text{ m/s} & v_k &= 4.0 \text{ m/s} \\
 p_t &= 23 \text{ Pa} \\
 L_{WA} &= 44 \text{ dB(A)}
 \end{aligned}$$

$$\begin{aligned}
 \text{Free area:} & \quad 0.034 \text{ m}^2 \\
 \text{Correction table 2:} & \quad - 2
 \end{aligned}$$

$$L_{WA} = 44 - 2 = 42 \text{ dB(A)}$$

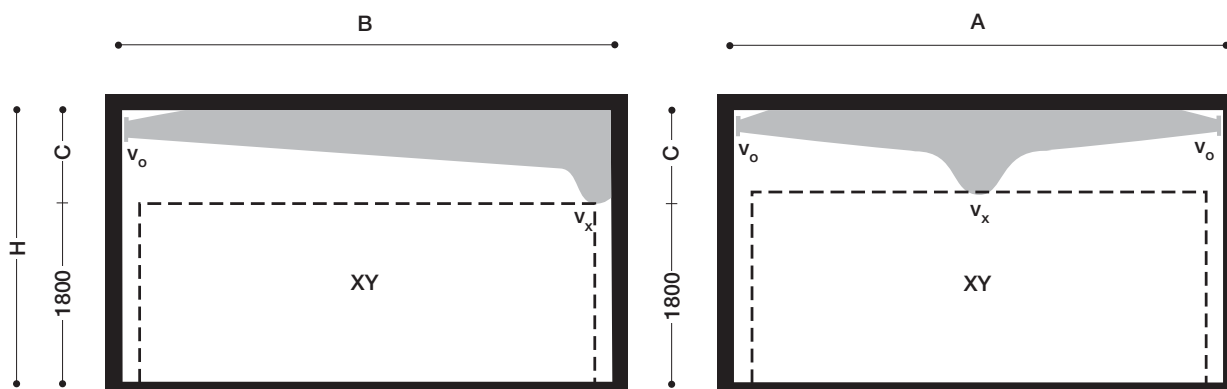
The diagram "Pressure – Sound level": 50% open damper:

$$\begin{aligned}
 p_t &= 42 \text{ Pa} \\
 L_{WA} &= 50 - 2 = 48 \text{ dB(A)}
 \end{aligned}$$

Circular duct grille

RGS

Technical data - Supply air



XY = occupied zone

Final velocities

The speed in occupied zone v_x :

$$v_x = \frac{l_{0,2}}{B + C} \times 0,2 \text{ m/s} \quad v_x = \frac{l_{0,2}}{\frac{A}{2} + C} \times 0,2 \text{ m/s}$$

Terminal velocity v_x at distance X:

$$v_x = \frac{l_{0,2} \times 0,2}{X}$$

Other terminal velocities v_x :

The distance to the point where the speed has decreased to

v_x is:

$$X = K \times l_{0,2}$$

Table 4:

v_x	0,15	0,2	0,25	0,3	0,35	0,4
K	1,33	1,0	0,8	0,67	0,57	0,5

Sample calculation 2

Room: Width: W = 7 m, Height: 2.7 m

$$C = 2.7 - 1.8 = 0.9 \text{ m}$$

Grille: 825 x 75 Volume flow: 400 m³/h

Throw according to the diagram on the next page:

$$l_{0,2} = 9.0 \text{ m}$$

The speed in the occupied zone:

$$v_x = \frac{l_{0,2}}{B + C} \times 0,2 = \frac{9,0}{7,9} \times 0,2 = 0,23 \text{ m/s}$$

The speed 4 m from the grille is:

$$v_x = \frac{l_{0,2} \times 0,2}{B + C} = \frac{9 \times 0,2}{4} = 0,45 \text{ m/s}$$

The distance to the point where the speed has decreased to 0,3 m/s is:

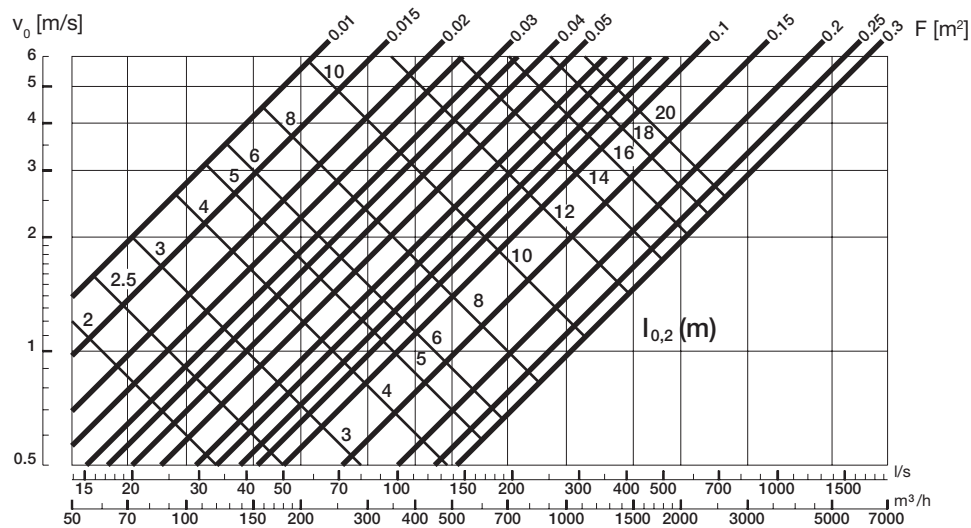
$$0,67 \times l_{0,2} = 0,67 \times 9 = \underline{6,0 \text{ m}}$$

Circular duct grille

RGS

Technical data - Supply and exhaust air

Effective speed v_0 - Throw $l_{0,2}$



Sample calculation 3

Grille 1025 x 75

Volume flow: 500 m³/h

Supply air speed: $v_0 = 2.7$ m/s

Throw: $l_{0,2} = 10.0$ m

With 90° dispersal: (See table 1, previous page)

$v_0 = 1.2 \times 2.7 = 3.2$ m/s

$l_{0,2} = 0.5 \times 10.0 = 5.0$ m.

1

2

3

4

5

6

7

8

9

10

11

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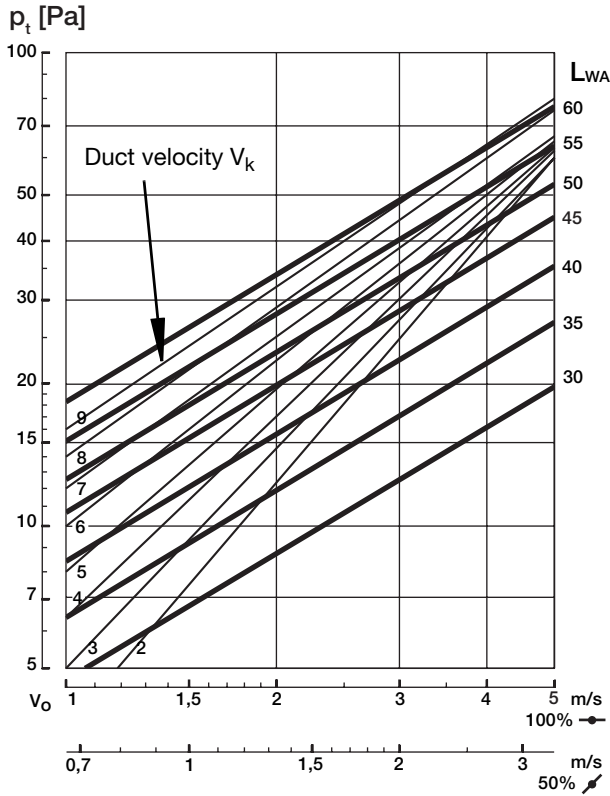
Circular duct grille

RGS

Technical data - Supply and exhaust air

Pressure - Sound level

RGS with accessories 4, 6 and 7



Correction

Correction for RGS with accessories 2 and 3.

Table 5:

Total pressure p_t	x 0,75	Pa
Sound power level L_{WA}	-3	dB(A)

Table 6: Correction for free area.:

Correction free area											
F [m²]	0,02	0,025	0,03	0,04	0,05	0,06	0,08	0,1	0,13	0,17	0,2
correction [dB]	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6

Sample calculation 4

RGS-6 625 x 75 Area: 0.034 m²

Volume flow: 250 m³/h

Supply air speed: $v_0 = 2.0$ m/s

Duct speed: $v_k = 4$ m/s

100% open damper:

$p_t = 17$ Pa
 $L_{WA} = 42$ dB

Table 6:

0.03 m²: -2 dB
 $L_{WA} = 42 - 2 = 40$ dB

50% open damper:

$p_t = 30$ Pa
 $L_{WA} = 47 - 2 = 45$ dB

Dimensioning tables for RGS

The following pages contain dimensioning tables for RGS with accessories 4, 6 and 7.

Correction for RGS with accessories 2 and 3 - see table 5.

Explanation for dimensioning tables

1. Volume of air (m³/h)
2. Throw
3. Duct speed
4. 100% open damper
5. 50% open damper
6. Volume of air (l/s)
7. Pressure loss
8. Sound level
9. Pressure loss
10. Sound level

1	q: 1200 m³/h - 333 l/s			6		
2	l ₀₂ : 11,0 m					
3	v_k -m/s	3	6	9		
4	100%	p_t	10	16	24	7
		L_w	40	51	62	8
5	50%	p_t	17	25	35	9
		L_w	46	56	64	10

Circular duct grille

RGS

Technical data-Supply and exhaust air

Dimensioning table with accessories 4, 6 and 7

B dimension: 75 mm

325x75 0,017 m ²	q: 75 m ³ /h - 21 l/s l _{0,2} : 2,0 m				q: 100 m ³ /h - 28 l/s l _{0,2} : 3,0 m				q: 150 m ³ /h - 42 l/s l _{0,2} : 4,5 m				q: 200 m ³ /h - 56 l/s l _{0,2} : 7,0 m				q: 250 m ³ /h - 69 l/s l _{0,2} : 9,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		50%		100%		50%		100%		50%		100%		50%		100%		50%	
	p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W	
425x75 0,023 m ²	q: 100 m ³ /h - 28 l/s l _{0,2} : 2,5 m				q: 150 m ³ /h - 42 l/s l _{0,2} : 4,5 m				q: 200 m ³ /h - 56 l/s l _{0,2} : 5,5 m				q: 250 m ³ /h - 69 l/s l _{0,2} : 7,0 m				q: 300 m ³ /h - 83 l/s l _{0,2} : 9,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		50%		100%		50%		100%		50%		100%		50%		100%		50%	
	p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W	
525x75 0,028 m ²	q: 150 m ³ /h - 42 l/s l _{0,2} : 3,9 m				q: 200 m ³ /h - 56 l/s l _{0,2} : 5,5 m				q: 250 m ³ /h - 69 l/s l _{0,2} : 7,5 m				q: 300 m ³ /h - 83 l/s l _{0,2} : 9,0 m				q: 350 m ³ /h - 97 l/s l _{0,2} : 10,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		50%		100%		50%		100%		50%		100%		50%		100%		50%	
	p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W	
625x75 0,034 m ²	q: 200 m ³ /h - 56 l/s l _{0,2} : 5,0 m				q: 250 m ³ /h - 69 l/s l _{0,2} : 6,5 m				q: 300 m ³ /h - 83 l/s l _{0,2} : 8,5 m				q: 350 m ³ /h - 97 l/s l _{0,2} : 9,5 m				q: 400 m ³ /h - 111 l/s l _{0,2} : 10,5 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		50%		100%		50%		100%		50%		100%		50%		100%		50%	
	p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W	
825x75 0,045 m ²	q: 250 m ³ /h - 69 l/s l _{0,2} : 5,2 m				q: 300 m ³ /h - 83 l/s l _{0,2} : 7,0 m				q: 400 m ³ /h - 111 l/s l _{0,2} : 9,0 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 10,5 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 12,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		50%		100%		50%		100%		50%		100%		50%		100%		50%	
	p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W	
1025x75 0,056 m ²	q: 300 m ³ /h - 83 l/s l _{0,2} : 6,0 m				q: 400 m ³ /h - 111 l/s l _{0,2} : 8,5 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 10,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 11,5 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 13,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		50%		100%		50%		100%		50%		100%		50%		100%		50%	
	p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W	
1225x75 0,068 m ²	q: 400 m ³ /h - 111 l/s l _{0,2} : 7,0 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 9,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 10,5 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 11,5 m				q: 800 m ³ /h - 222 l/s l _{0,2} : 13,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		50%		100%		50%		100%		50%		100%		50%		100%		50%	
	p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W		p _t		L _W	



Circular duct grille

RGS

Technical data- Supply and exhaust air

Dimensioning table with accessories 4, 6 and 7

B dimension: 125 mm

325x125 0,028 m ²	q: 150 m ³ /h - 42 l/s l _{0,2} : 3,9 m				q: 200 m ³ /h - 56 l/s l _{0,2} : 5,5 m				q: 250 m ³ /h - 69 l/s l _{0,2} : 7,5 m				q: 300 m ³ /h - 83 l/s l _{0,2} : 9,0 m				q: 350 m ³ /h - 97 l/s l _{0,2} : 10,0 m								
	v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9								
	100%		p _t 11 16 25	L _W 33 44 55		100%		p _t 14 22 32	L _W 36 46 56		100%		p _t 21 28 38	L _W 39 48 57		100%		p _t 25 35 48	L _W 41 50 57		100%		p _t 35 43 55	L _W 45 52 58	
	50%		p _t 20 28 38	L _W 39 47 56		50%		p _t 28 37 47	L _W 42 50 57		50%		p _t 38 47 60	L _W 46 52 58		50%		p _t 47 55 68	L _W 49 53 59		50%		p _t 69 78 89	L _W 54 58 61	
425x125 0,037 m ²	q: 200 m ³ /h - 56 l/s l _{0,2} : 4,5 m				q: 250 m ³ /h - 69 l/s l _{0,2} : 6,0 m				q: 300 m ³ /h - 83 l/s l _{0,2} : 7,5 m				q: 350 m ³ /h - 97 l/s l _{0,2} : 9,0 m				q: 400 m ³ /h - 111 l/s l _{0,2} : 10,0 m								
	v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9								
	100%		p _t 10 16 24	L _W 34 45 56		100%		p _t 12 20 28	L _W 36 46 55		100%		p _t 19 26 36	L _W 40 49 57		100%		p _t 22 29 39	L _W 40 50 59		100%		p _t 27 35 48	L _W 43 51 58	
	50%		p _t 17 25 35	L _W 39 49 57		50%		p _t 26 35 46	L _W 42 49 57		50%		p _t 34 44 56	L _W 46 52 59		50%		p _t 43 52 62	L _W 47 53 59		50%		p _t 51 56 74	L _W 51 53 59	
525x125 0,047 m ²	q: 250 m ³ /h - 69 l/s l _{0,2} : 5,2 m				q: 300 m ³ /h - 83 l/s l _{0,2} : 7,0 m				q: 400 m ³ /h - 111 l/s l _{0,2} : 9,0 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 10,5 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 12,0 m								
	v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9								
	100%		p _t 10 16 24	L _W 35 46 57		100%		p _t 12 20 29	L _W 37 47 56		100%		p _t 21 28 38	L _W 41 50 59		100%		p _t 27 35 48	L _W 44 52 59		100%		p _t 37 46 57	L _W 48 55 60	
	50%		p _t 17 25 35	L _W 40 50 58		50%		p _t 26 31 43	L _W 43 52 59		50%		p _t 38 47 60	L _W 48 54 60		50%		p _t 51 56 74	L _W 52 54 61		50%		p _t 72 82 93	L _W 57 60 63	
625x125 0,056 m ²	q: 300 m ³ /h - 83 l/s l _{0,2} : 6,0 m				q: 400 m ³ /h - 111 l/s l _{0,2} : 8,5 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 10,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 11,5 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 13,0 m								
	v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9								
	100%		p _t 10 16 24	L _W 36 47 58		100%		p _t 14 22 32	L _W 39 49 59		100%		p _t 21 28 38	L _W 42 51 60		100%		p _t 27 35 48	L _W 45 53 60		100%		p _t 35 43 55	L _W 48 55 61	
	50%		p _t 17 25 35	L _W 41 51 59		50%		p _t 28 37 47	L _W 45 53 60		50%		p _t 38 47 60	L _W 49 55 61		50%		p _t 51 56 74	L _W 53 55 61		50%		p _t 69 78 89	L _W 57 61 64	
825x125 0,074 m ²	q: 400 m ³ /h - 111 l/s l _{0,2} : 7,5 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 9,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 11,0 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 11,5 m				q: 800 m ³ /h - 222 l/s l _{0,2} : 13,0 m								
	v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9								
	100%		p _t 10 16 24	L _W 36 47 58		100%		p _t 12 20 28	L _W 39 49 58		100%		p _t 19 26 36	L _W 43 52 60		100%		p _t 22 29 39	L _W 43 53 62		100%		p _t 27 35 48	L _W 46 54 62	
	50%		p _t 17 25 35	L _W 42 52 60		50%		p _t 26 35 46	L _W 45 52 60		50%		p _t 34 44 56	L _W 49 55 61		50%		p _t 43 52 62	L _W 50 56 62		50%		p _t 51 56 74	L _W 54 56 62	
1025x125 0,093 m ²	q: 500 m ³ /h - 139 l/s l _{0,2} : 8,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 9,5 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 10,5 m				q: 800 m ³ /h - 222 l/s l _{0,2} : 12,0 m				q: 1000 m ³ /h - 278 l/s l _{0,2} : 14,0 m								
	v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9								
	100%		p _t 10 16 24	L _W 37 48 59		100%		p _t 12 20 29	L _W 40 50 59		100%		p _t 16 23 33	L _W 40 52 61		100%		p _t 20 28 38	L _W 44 53 62		100%		p _t 27 35 48	L _W 47 55 63	
	50%		p _t 17 25 35	L _W 43 53 61		50%		p _t 26 31 43	L _W 46 55 62		50%		p _t 29 39 50	L _W 48 56 63		50%		p _t 38 45 60	L _W 51 57 63		50%		p _t 51 56 74	L _W 55 57 63	
1225x125 0,112 m ²	q: 600 m ³ /h - 167 l/s l _{0,2} : 9,0 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 10,0 m				q: 800 m ³ /h - 222 l/s l _{0,2} : 11,5 m				q: 1000 m ³ /h - 278 l/s l _{0,2} : 13,0 m				q: 1200 m ³ /h - 333 l/s l _{0,2} : 15,0 m								
	v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9				v _k -m/s 3 6 9								
	100%		p _t 10 16 24	L _W 38 49 60		100%		p _t 12 19 27	L _W 41 51 62		100%		p _t 14 22 32	L _W 42 52 62		100%		p _t 21 28 38	L _W 45 54 63		100%		p _t 27 35 48	L _W 48 56 64	
	50%		p _t 17 25 35	L _W 44 54 62		50%		p _t 21 30 41	L _W 46 55 63		50%		p _t 28 37 47	L _W 52 58 63		50%		p _t 38 47 60	L _W 52 58 64		50%		p _t 51 56 74	L _W 56 58 64	

Circular duct grille

RGS

Technical data-Supply and exhaust air

Dimensioning table with accessories 4, 6 og 7

B dimension: 225 mm

325x225 0,056 m ²	q: 300 m ³ /h - 83 l/s l _{0,2} : 6,0 m				q: 400 m ³ /h - 111 l/s l _{0,2} : 8,5 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 10,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 11,5 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 13,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		p _t		100%		p _t		100%		p _t		100%		p _t		100%		p _t	
	L _W		36 47 58		L _W		39 49 59		L _W		42 51 60		L _W		45 53 60		L _W		48 55 61	
50%		p _t		50%		p _t		50%		p _t		50%		p _t		50%		p _t		
L _W		41 51 59		L _W		45 53 60		L _W		49 55 61		L _W		53 55 61		L _W		57 61 64		
425x225 0,074 m ²	q: 400 m ³ /h - 111 l/s l _{0,2} : 7,5 m				q: 500 m ³ /h - 139 l/s l _{0,2} : 9,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 11,0 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 11,5 m				q: 800 m ³ /h - 222 l/s l _{0,2} : 13,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		p _t		100%		p _t		100%		p _t		100%		p _t		100%		p _t	
	L _W		36 47 58		L _W		39 49 58		L _W		43 52 60		L _W		43 53 62		L _W		46 54 62	
50%		p _t		50%		p _t		50%		p _t		50%		p _t		50%		p _t		
L _W		42 52 60		L _W		45 52 60		L _W		49 55 61		L _W		50 56 62		L _W		54 56 62		
525x225 0,093 m ²	q: 500 m ³ /h - 139 l/s l _{0,2} : 8,0 m				q: 600 m ³ /h - 167 l/s l _{0,2} : 9,5 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 10,5 m				q: 800 m ³ /h - 222 l/s l _{0,2} : 12,0 m				q: 1000 m ³ /h - 278 l/s l _{0,2} : 14,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		p _t		100%		p _t		100%		p _t		100%		p _t		100%		p _t	
	L _W		37 48 59		L _W		40 50 59		L _W		40 52 61		L _W		44 53 62		L _W		47 55 63	
50%		p _t		50%		p _t		50%		p _t		50%		p _t		50%		p _t		
L _W		43 53 61		L _W		46 55 62		L _W		48 56 63		L _W		51 57 63		L _W		55 57 63		
625x225 0,112 m ²	q: 600 m ³ /h - 167 l/s l _{0,2} : 9,0 m				q: 700 m ³ /h - 194 l/s l _{0,2} : 10,0 m				q: 800 m ³ /h - 222 l/s l _{0,2} : 11,0 m				q: 1000 m ³ /h - 278 l/s l _{0,2} : 13,0 m				q: 1200 m ³ /h - 333 l/s l _{0,2} : 15,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		p _t		100%		p _t		100%		p _t		100%		p _t		100%		p _t	
	L _W		38 49 60		L _W		41 51 62		L _W		42 52 62		L _W		45 54 63		L _W		48 56 64	
50%		p _t		50%		p _t		50%		p _t		50%		p _t		50%		p _t		
L _W		44 54 62		L _W		46 55 63		L _W		48 56 63		L _W		52 58 64		L _W		56 58 64		
825x225 0,148 m ²	q: 800 m ³ /h - 222 l/s l _{0,2} : 9,5 m				q: 1000 m ³ /h - 278 l/s l _{0,2} : 11,5 m				q: 1200 m ³ /h - 333 l/s l _{0,2} : 13,0 m				q: 1400 m ³ /h - 389 l/s l _{0,2} : 15,0 m				q: 1600 m ³ /h - 444 l/s l _{0,2} : 17,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		p _t		100%		p _t		100%		p _t		100%		p _t		100%		p _t	
	L _W		39 50 61		L _W		42 52 61		L _W		46 55 63		L _W		46 56 64		L _W		49 57 65	
50%		p _t		50%		p _t		50%		p _t		50%		p _t		50%		p _t		
L _W		45 55 63		L _W		48 55 63		L _W		52 58 65		L _W		53 59 65		L _W		57 59 65		
1025x225 0,186 m ²	q: 1000 m ³ /h - 278 l/s l _{0,2} : 11,0 m				q: 1200 m ³ /h - 333 l/s l _{0,2} : 12,0 m				q: 1400 m ³ /h - 389 l/s l _{0,2} : 13,5 m				q: 1600 m ³ /h - 444 l/s l _{0,2} : 15,0 m				q: 1800 m ³ /h - 500 l/s l _{0,2} : 17,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		p _t		100%		p _t		100%		p _t		100%		p _t		100%		p _t	
	L _W		40 51 62		L _W		43 53 62		L _W		43 55 64		L _W		47 56 65		L _W		48 57 66	
50%		p _t		50%		p _t		50%		p _t		50%		p _t		50%		p _t		
L _W		46 56 64		L _W		49 58 65		L _W		51 59 66		L _W		54 60 66		L _W		56 61 66		
1225x225 0,224 m ²	q: 1200 m ³ /h - 333 l/s l _{0,2} : 11,0 m				q: 1400 m ³ /h - 389 l/s l _{0,2} : 12,0 m				q: 1600 m ³ /h - 444 l/s l _{0,2} : 14,0 m				q: 1800 m ³ /h - 500 l/s l _{0,2} : 15,5 m				q: 2000 m ³ /h - 556 l/s l _{0,2} : 17,0 m			
	v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s				v _k -m/s			
	100%		p _t		100%		p _t		100%		p _t		100%		p _t		100%		p _t	
	L _W		40 51 62		L _W		43 53 64		L _W		44 54 64		L _W		47 56 64		L _W		47 56 65	
50%		p _t		50%		p _t		50%		p _t		50%		p _t		50%		p _t		
L _W		46 56 64		L _W		48 57 65		L _W		50 58 66		L _W		53 59 66		L _W		54 60 66		

Nozzle diffuser

GTI



Description

GTI is a flexible supply air nozzle that is suitable for ventilation of large areas. The nozzle can be used for both heated and cooled air and can be adjusted from diffused to concentrated supply air patterns. The supply air pattern can be adjusted by turning the insert in relation to the central line of the nozzle. The nozzle is equipped with Lindab Safe and can be installed directly into a circular duct, fitting, wall or duct side.

- Flexible nozzle for cooling and heating
- Adjustable dispersal pattern
- Simple installation

Maintenance

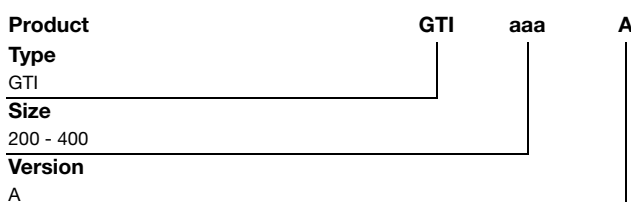
The visible parts of the diffuser can be wiped with a damp cloth.

Materials and finish

Insert: Steel
 Connection: Galvanised steel
 Standard finish: Powder-coated
 Standard colour: RAL 9010, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

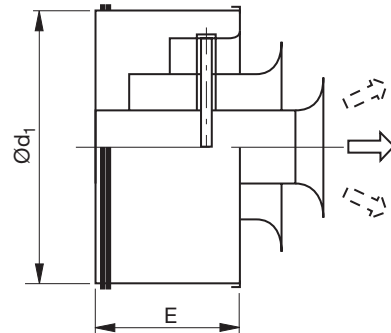
Order code



Example: GTI - 250 - A

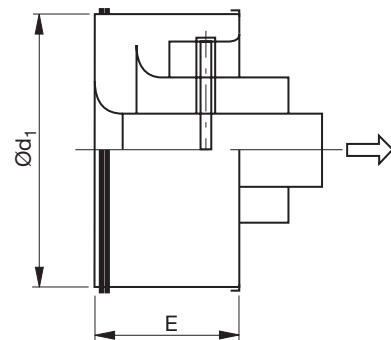
Dimensions

Installation 0



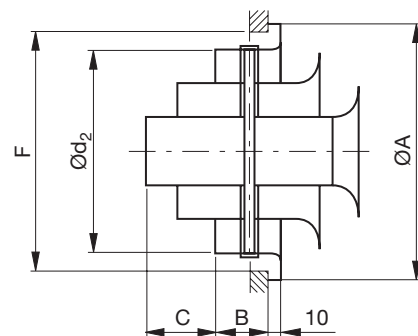
Diffused supply air – for installation in a circular duct or fitting. Supplied adapted to this form of installation as standard.

Installation 1



Concentrated supply air – for installation in a circular duct or fitting. The insert is turned 180 degrees.

Installation 2



Diffused supply air – for installation in a wall or duct side. Remove the external pipe.

Size	ØA mm	B mm	C mm	Ød ₁ mm	E mm	F mm	Ød ₂ mm	Weight kg
200	203	40	55	198	109	170	158	0,8
250	253	50	75	248	139	210	198	1,3
315	318	60	95	313	169	260	248	2,0
400	403	70	115	398	199	321	313	2,8

Free area for GTI nozzle – see pages *Nozzle calculations*.

Nozzle diffuser

Technical data

Capacity

Volume flow q_v [l/s] and [m³/h], total pressure Δp_t [Pa], throw $l_{0,3}$ and sound level L_{WA} [dB(A)] can be seen in the diagrams.

Throw $l_{0,3}$

Throw $l_{0,3}$ can be seen in the diagrams for isothermal air at a terminal velocity of 0.3 m/s

Resulting sound effect level

The sound effect level from the nozzles must be added logarithmically to the sound effect level from the flow noise in the duct. See sample calculation, pages *Nozzle calculations*.

Frequency-related sound effect level

The sound effect level in the frequency band is defined as $L_{wok} = L_{WA} + K_{ok}$. K_{ok} values can be seen in the table below.

Table 1 - diffused supply air

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
200	15	0	-5	-6	-2	-10	-22	-32
250	13	-3	-6	-6	-1	-14	-14	-33
315	16	-1	-6	-2	-3	-15	-26	-35
400	14	-1	-3	0	-5	-16	-27	-32

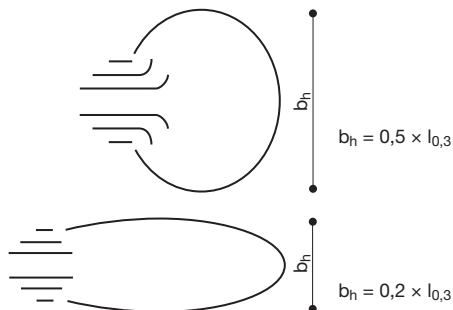
Table 2 - concentrated supply air

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
200	14	0	-3	-4	-2	-13	-27	-37
250	16	-3	-6	-4	-2	-16	-25	-28
315	18	-1	-5	-2	-3	-16	-29	-40
400	15	-4	-6	-4	-2	-21	-34	-38

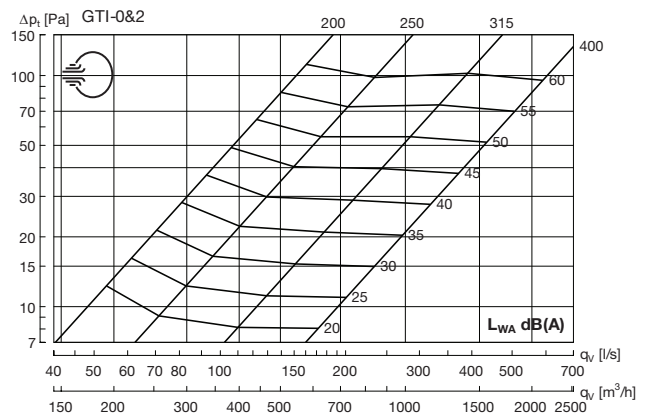
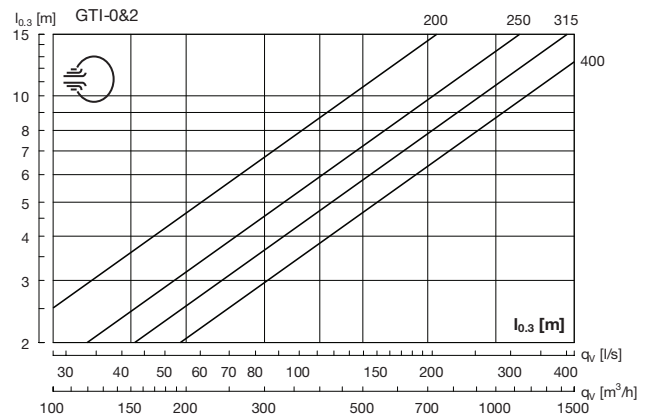
Air jet width b_h

Diffuse

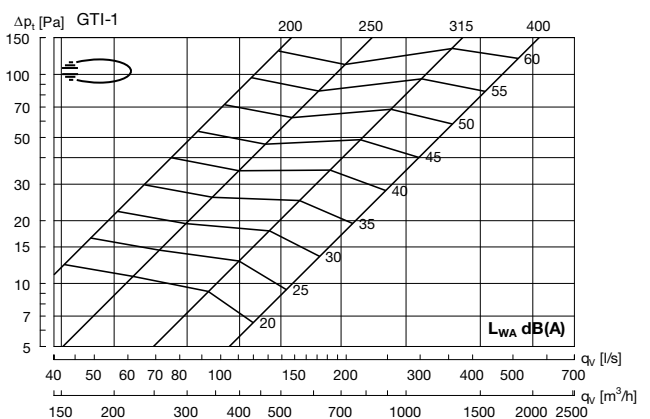
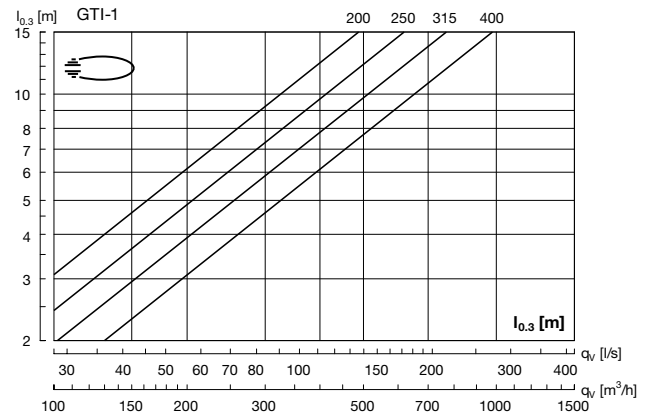
Concentrated



Diffuse supply



Concentrated supply



Supply air nozzle

Calculation

Resulting sound effect level

To calculate the resulting sound effect level from the nozzles, add the sound effect level from the nozzles (L_{WA} nozzle) and the sound effect level from the flow noise in the duct (L_{WA} duct) logarithmically.

Diagram 1, sound effect duct, L_{WA} duct.

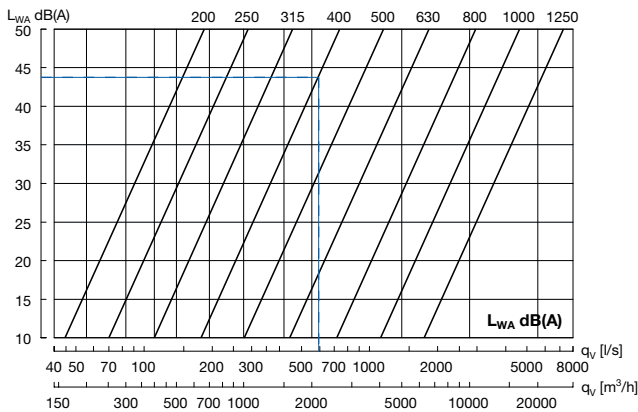
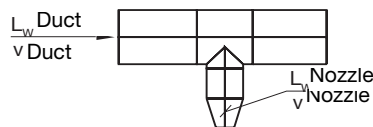
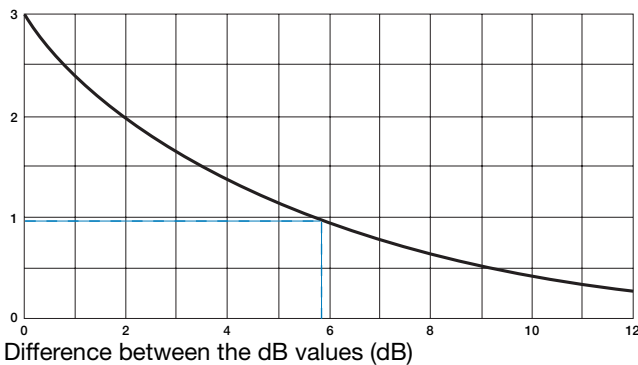


Diagram 2, addition of sound levels.

Difference to be added to the highest dB value (dB)



Sample calculation:

LAD-200 $q = 100$ l/s
 ΔP_t nozzle 90 Pa

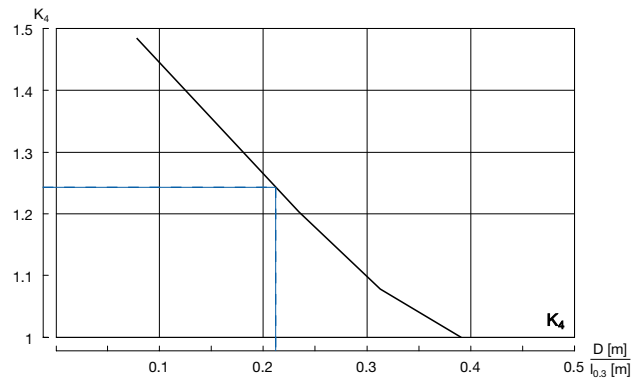
Duct size:

In order to achieve a sensible distribution of the air out to the nozzles without using a damper, it is recommended that the pressure loss in the nozzle be 3 times higher than the dynamic pressure in the duct system.

Selected duct dimension $\varnothing 400$
 Number of nozzles at joint 6
 Volume of air in the duct $6 \times 100 = 600$ l/s
 L_{WA} duct (can be seen in diagram 1) 43 dB(A)
 L_{WA} nozzle (can be seen in product diagram) 37 dB(A)
 Difference between db values 6 dB(A)
 Value to be added to the highest dB value (diagram 2) 1 dB(A)
Resulting sound effect level: $43 + 1 = 44$ dB(A)

Extension of throw for two nozzles, positioned side by side:

If two nozzles are positioned next to each other, the air jets will be amplified, thereby extending the throw. To calculate this, use the diagram below, in which the distance between the nozzles is designated D. The calculation factor K_4 must be multiplied by the throw $l_{0.3}$. The throw is not extended further with more nozzles.



Sample calculation:

LAD-125. Distance D = 1.5 metres.

Volume of air: $q = 15$ l/s

Diagram throw under selected nozzle

Specified throw: $l_{0.3} = 7$ m
 $D [m] / l_{0.3} [m]$ $1.5 / 7 = 0.21$

K_4 calculation factor

Can be seen in the diagram $K_4 = 1.25$

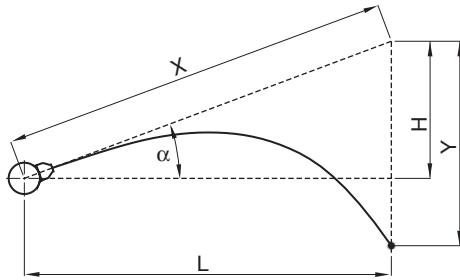
Resulting throw

$K_4 \times l_{0.3} = 1.25 \times 7 \text{ m} = 8.75 \text{ m}$

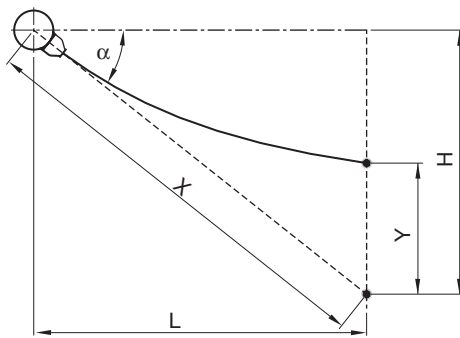
Supply air nozzle

Calculation

Supply air with cooled air



Supply air with heated air



$$X = \frac{L}{\cos \alpha} = \frac{H}{\sin \alpha}$$

$$H = L \times \tan \alpha$$

Terminal velocity V_x :

$$v_x = K_1 \times \frac{q}{X}$$

Deflection Y:

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t$$

Sample calculation: Cooled air

LAD-200: $q = 400 \text{ m}^3/\text{h}$
 $\Delta t = 6\text{K}$ $\alpha = 30^\circ$
 Final velocity $v_x = 0,3 \text{ m/s}$

$$v_x = K_1 \times \frac{q}{X}$$

$$X = K_1 \times \frac{q}{v_x} = 0,020 \times \frac{400}{0,3} = 27 \text{ m}$$

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t = 24 \times \frac{27^3}{400^2} \times 6 = 17,7 \text{ m}$$

$$H = X \times \sin \alpha = 27 \times 0,5 = 13,5 \text{ m}$$

$$L = X \times \cos \alpha = 27 \times 0,87 = 23,4 \text{ m}$$

Sample calculation: Heated air

LAD-200: $q = 400 \text{ m}^3/\text{h}$
 $\Delta t = 6\text{K}$ $\alpha = 60^\circ$
 Final velocity $v_x = 0,3 \text{ m/s}$

$$X = K_1 \times \frac{q}{v_x} = 0,020 \times \frac{400}{0,3} = 27 \text{ m}$$

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t = 24 \times \frac{27^3}{400^2} \times 6 = 17,7 \text{ m}$$

$$H = X \times \sin \alpha = 27 \times 0,87 = 23,4 \text{ m}$$

$$L = X \times \cos \alpha = 27 \times 0,5 = 13,5 \text{ m}$$

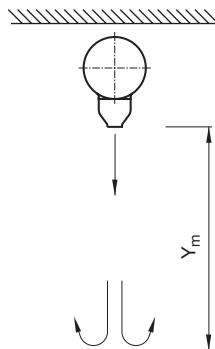
Supply air nozzle

Calculation

Calculation factors:

Size	Free area A m ²	K ₁		K ₂		K ₃	
		m ³ /h	l/s	m ³ /h	l/s	m ³ /h	l/s
LAD							
125	0.0029	0.037	0.133	3.9	0.30	0.24	0.86
160	0.0071	0.023	0.083	15.6	1.20	0.122	0.44
200	0.0095	0.020	0.072	24.0	1.85	0.097	0.35
250	0.0165	0.0153	0.055	54.4	4.2	0.064	0.230
315	0.0254	0.0122	0.044	104	8.0	0.046	0.166
400	0.0398	0.0097	0.035	206	15.9	0.033	0.119
DAD							
160	0.0056	0.026	0.094	10.7	0.83	0.145	0.52
200	0.0095	0.020	0.072	24.0	1.85	0.097	0.35
250	0.0154	0.0157	0.057	49.0	3.78	0.068	0.24
315	0.0240	0.0127	0.046	96.0	7.41	0.048	0.17
GD							
	0.0027	0.038	0.137	3.5	0.27	0.26	0.92
GTI-1							
200	0.0200	0.0090	0.032	114	8.8	0.048	0.173
250	0.0310	0.0073	0.026	219	16.9	0.034	0.122
315	0.0490	0.0058	0.021	435	34	0.024	0.086
400	0.0780	0.0046	0.017	875	68	0.017	0.062

Vertical supply air with heated air



$$Y_m = K_3 \times \frac{q}{\sqrt{\Delta t}} \text{ (m)}$$

Sample calculation:

LAD-160 q = 200 m³/h
 Δt = 10 K

The distance to the turning point of the air jet:

$$Y_m = K_3 \times \frac{q}{\sqrt{\Delta t}} \text{ (m)}$$

$$Y_m = 0,122 \times \frac{200}{\sqrt{10}} \text{ (m)}$$

$$Y_m = 7,7 \text{ m}$$

Supply air nozzle

DAD



Description

DAD is an adjustable supply air nozzle suitable for ventilation of large areas where long throws are required. The nozzle can be freely rotated 30 degrees in any direction in relation to the central line of the nozzle. The nozzle can be used for both heated and cooled air. The nozzle can be installed directly into a circular duct, fitting, wall or duct side. Supplied with screw holes through flange (DAD-0).

- Flexible adjustable nozzle
- Long throws
- Simple installation

Maintenance

The visible parts of the diffuser can be wiped with a damp cloth.

Materials and finish

Material: Aluminium
 Standard finish: Powder-coated
 Standard colour: RAL 9010, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

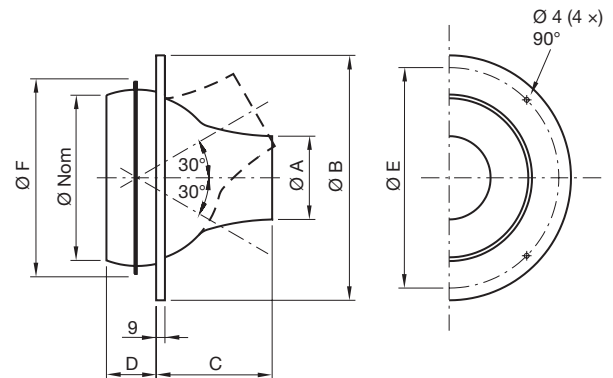
Ordering example

Product	DAD	a	bbb
Type			
with flange	0		
for circular ducts	1		
Size			

Dimensions

DAD-0

With flange for mounting on a wall or duct side.

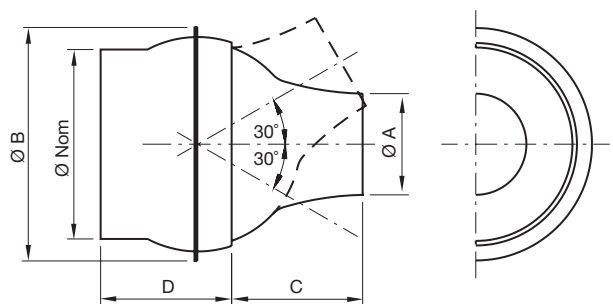


ØF = min. hole dimension

Ø nom Size	ØA [mm]	ØB [mm]	C [mm]	D [mm]	ØE [mm]	ØF [mm]	Weight [kg]
160	85	248	120	51	225	200	0.60
200	110	298	150	66	270	245	0.90
250	140	363	190	81	320	295	1.40
315	175	448	255	90	390	360	2.40

DAD-1

Installation in circular duct.



ØNom includes male connection measure

Ø nom Size	ØA [mm]	ØB [mm]	C [mm]	D [mm]	Weight [kg]
160	85	196	110	110	0.50
200	110	238	140	125	0.90
250	140	288	180	140	1.40
315	175	355	245	165	2.40

Free area for DAD nozzle – see section *Nozzle calculations*.

Supply air nozzle

DAD

Technical data

Capacity

Volume flow q_v [l/s] and [m³/h], total pressure Δp_t [Pa], throw $l_{0,3}$ and sound level L_{WA} [dB(A)] can be seen in the diagrams.

Throw $l_{0,3}$

Throw $l_{0,3}$ can be seen in the diagrams for isothermal air at a terminal velocity of 0.3 m/s

Resulting sound effect level

The sound effect level from the nozzles must be added logarithmically to the sound effect level from the flow noise in the duct. See sample calculation, section *Nozzle calculations*.

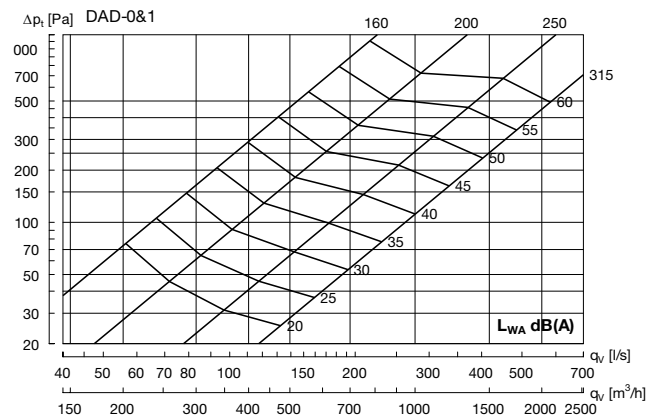
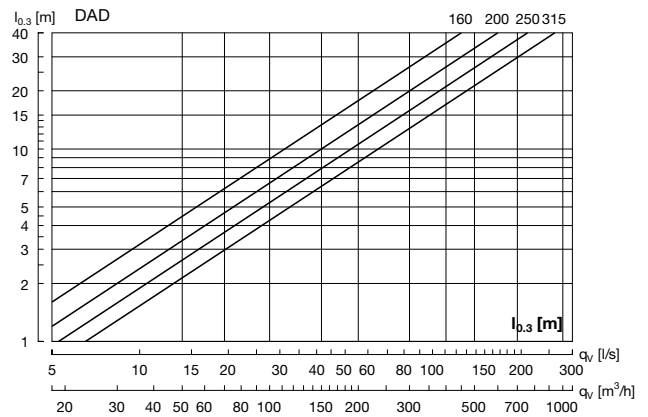
Frequency-related sound effect level

The sound effect level in the frequency band is defined as $L_{wok} = L_{WA} + K_{ok}$. K_{ok} values can be seen in the table below.

Table

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
160	10	-1	-5	-5	-5	-8	-9	-10
200	11	1	1	-4	-4	-10	-16	-23
250	17	0	0	-4	-4	-13	-21	-29
315	16	1	-1	-2	-4	-13	-21	-32

Supply air



Supply air nozzle

Calculation

Resulting sound effect level

To calculate the resulting sound effect level from the nozzles, add the sound effect level from the nozzles (L_{WA} nozzle) and the sound effect level from the flow noise in the duct (L_{WA} duct) logarithmically.

Diagram 1, sound effect duct, L_{WA} duct.

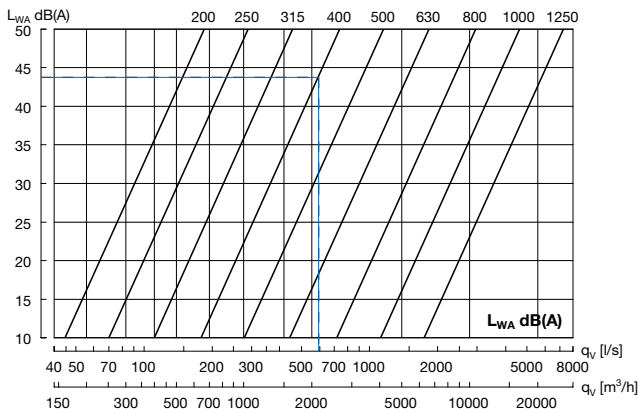
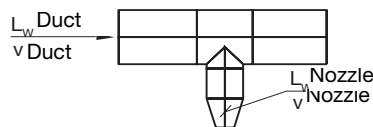
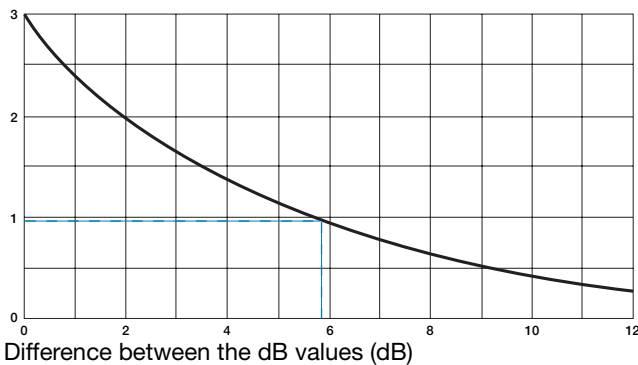


Diagram 2, addition of sound levels.

Difference to be added to the highest dB value (dB)



Sample calculation:

LAD-200 $q = 100$ l/s
 ΔP_t nozzle 90 Pa

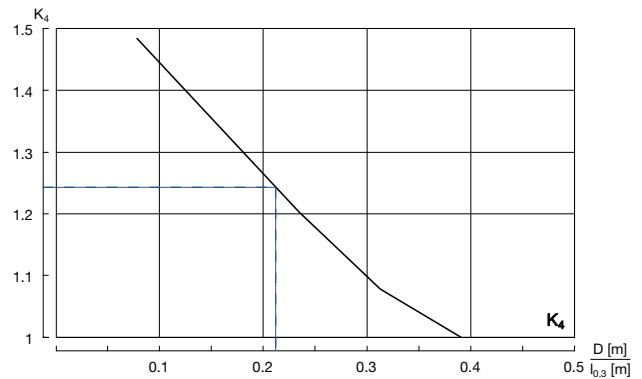
Duct size:

In order to achieve a sensible distribution of the air out to the nozzles without using a damper, it is recommended that the pressure loss in the nozzle be 3 times higher than the dynamic pressure in the duct system.

Selected duct dimension $\varnothing 400$
 Number of nozzles at joint 6
 Volume of air in the duct $6 \times 100 = 600$ l/s
 L_{WA} duct (can be seen in diagram 1) 43 dB(A)
 L_{WA} nozzle (can be seen in product diagram) 37 dB(A)
 Difference between db values 6 dB(A)
 Value to be added to the highest dB value (diagram 2) 1 dB(A)
Resulting sound effect level: $43 + 1 = 44$ dB(A)

Extension of throw for two nozzles, positioned side by side:

If two nozzles are positioned next to each other, the air jets will be amplified, thereby extending the throw. To calculate this, use the diagram below, in which the distance between the nozzles is designated D. The calculation factor K_4 must be multiplied by the throw $l_{0.3}$. The throw is not extended further with more nozzles.



Sample calculation:

LAD-125. Distance D = 1.5 metres.

Volume of air: $q = 15$ l/s

Diagram throw under selected nozzle

Specified throw: $l_{0.3} = 7$ m
 $D [m] / l_{0.3} [m]$ $1.5 / 7 = 0.21$

K_4 calculation factor

Can be seen in the diagram $K_4 = 1.25$

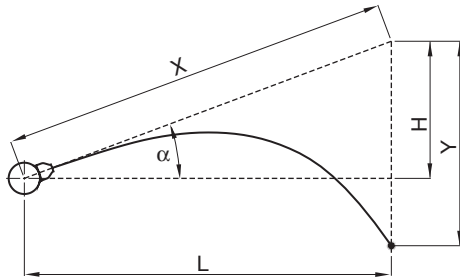
Resulting throw

$K_4 \times l_{0.3} = 1.25 \times 7 \text{ m} = 8.75 \text{ m}$

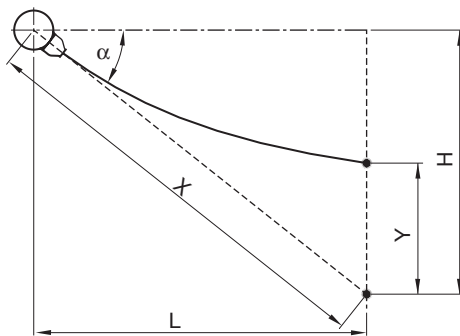
Supply air nozzle

Calculation

Supply air with cooled air



Supply air with heated air



$$X = \frac{L}{\cos \alpha} = \frac{H}{\sin \alpha}$$

$$H = L \times \tan \alpha$$

Terminal velocity V_x :

$$v_x = K_1 \times \frac{q}{X}$$

Deflection Y:

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t$$

Sample calculation: Cooled air

LAD-200: $q = 400 \text{ m}^3/\text{h}$
 $\Delta t = 6\text{K}$ $\alpha = 30^\circ$
 Final velocity $v_x = 0,3 \text{ m/s}$

$$v_x = K_1 \times \frac{q}{X}$$

$$X = K_1 \times \frac{q}{v_x} = 0,020 \times \frac{400}{0,3} = 27 \text{ m}$$

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t = 24 \times \frac{27^3}{400^2} \times 6 = 17,7 \text{ m}$$

$$H = X \times \sin \alpha = 27 \times 0,5 = 13,5 \text{ m}$$

$$L = X \times \cos \alpha = 27 \times 0,87 = 23,4 \text{ m}$$

Sample calculation: Heated air

LAD-200: $q = 400 \text{ m}^3/\text{h}$
 $\Delta t = 6\text{K}$ $\alpha = 60^\circ$
 Final velocity $v_x = 0,3 \text{ m/s}$

$$X = K_1 \times \frac{q}{v_x} = 0,020 \times \frac{400}{0,3} = 27 \text{ m}$$

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t = 24 \times \frac{27^3}{400^2} \times 6 = 17,7 \text{ m}$$

$$H = X \times \sin \alpha = 27 \times 0,87 = 23,4 \text{ m}$$

$$L = X \times \cos \alpha = 27 \times 0,5 = 13,5 \text{ m}$$

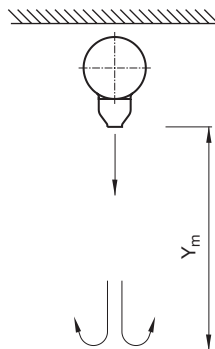
Supply air nozzle

Calculation

Calculation factors:

Size	Free area A m ²	K ₁		K ₂		K ₃	
		m ³ /h	l/s	m ³ /h	l/s	m ³ /h	l/s
LAD							
125	0.0029	0.037	0.133	3.9	0.30	0.24	0.86
160	0.0071	0.023	0.083	15.6	1.20	0.122	0.44
200	0.0095	0.020	0.072	24.0	1.85	0.097	0.35
250	0.0165	0.0153	0.055	54.4	4.2	0.064	0.230
315	0.0254	0.0122	0.044	104	8.0	0.046	0.166
400	0.0398	0.0097	0.035	206	15.9	0.033	0.119
DAD							
160	0.0056	0.026	0.094	10.7	0.83	0.145	0.52
200	0.0095	0.020	0.072	24.0	1.85	0.097	0.35
250	0.0154	0.0157	0.057	49.0	3.78	0.068	0.24
315	0.0240	0.0127	0.046	96.0	7.41	0.048	0.17
GD							
	0.0027	0.038	0.137	3.5	0.27	0.26	0.92
GTI-1							
200	0.0200	0.0090	0.032	114	8.8	0.048	0.173
250	0.0310	0.0073	0.026	219	16.9	0.034	0.122
315	0.0490	0.0058	0.021	435	34	0.024	0.086
400	0.0780	0.0046	0.017	875	68	0.017	0.062

Vertical supply air with heated air



$$Y_m = K_3 \times \frac{q}{\sqrt{\Delta t}} \text{ (m)}$$

Sample calculation:

LAD-160 q = 200 m³/h
 Δt = 10 K

The distance to the turning point of the air jet:

$$Y_m = K_3 \times \frac{q}{\sqrt{\Delta t}} \text{ (m)}$$

$$Y_m = 0,122 \times \frac{200}{\sqrt{10}} \text{ (m)}$$

$$Y_m = 7,7 \text{ m}$$

Perforated diffuser - circular

CCA



Description

Comdif CCA is a circular perforated displacement diffuser for freestanding installation. Behind the perforated front plate, CCA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a circular duct connection (MF measure), so the diffuser can be connected at the top or bottom. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for the supply of large volumes of air.
- The geometry of the near zone can be adjusted using adjustable nozzles.
- Plinths can be supplied as accessories.

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

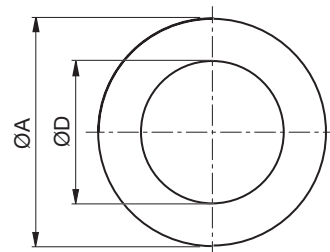
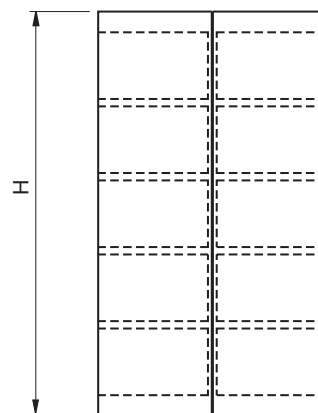
Order code

Product	CCA	aaaa
Type		
Size		

Order - accessories

Plinth: CCAZ - 2 - size

Dimensions



Size	ØA mm	ØD mm	H mm	Weight kg
1207	250	125	710	5,00
1607	300	160	710	7,50
2010	360	200	970	13,0
2510	400	250	970	18,0
3115	520	315	1490	35,0
4020	630	400	2010	58,0
5020	730	500	2010	78,0
6320	830	630	2010	106

Accessories

Can be supplied with plinth.

Materials and finish

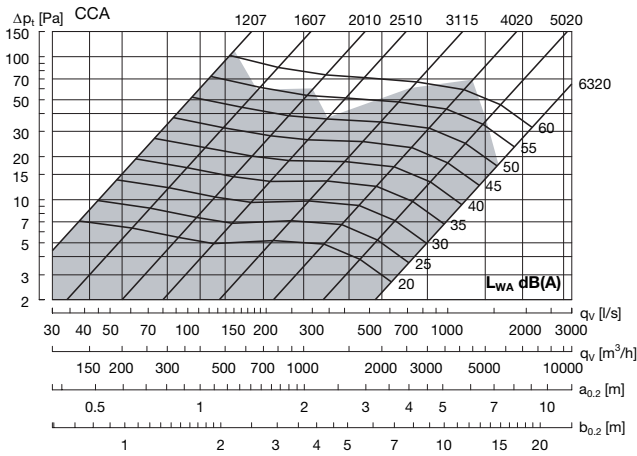
Diffuser:	Galvanised steel
Nozzles:	Black plastic
Front plate:	1 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 9010 - white

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Perforated diffuser - circular

CCA

Technical data



Recommended maximum volume flow

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{Ok}$

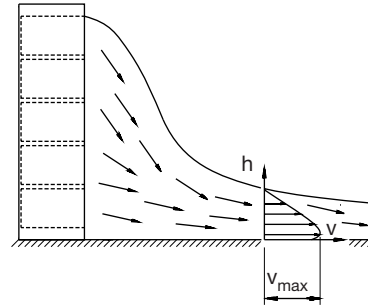
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
1207	8	-1	1	1	-9	-17	-28	-40
1607	10	-1	1	1	-8	-17	-29	-33
2010	10	-1	3	0	-9	-17	-27	-40
2510	7	-1	3	0	-7	-18	-28	-41
3115	13	2	3	-1	-8	-17	-29	-27
4020	13	2	3	-1	-7	-16	-28	-43
5020	7	3	2	0	-6	-16	-19	-17
6320	7	3	2	0	-8	-16	-20	-17

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
1207	19	14	5	3	2	1	2	1
1607	16	12	4	1	2	1	2	2
2010	12	8	4	2	3	2	2	2
2510	12	8	5	2	1	1	1	1
3115	11	8	3	2	1	1	2	2
4020	9	6	1	1	1	1	1	1
5020	6	4	1	1	1	1	1	1
6320	5	3	1	1	0	0	0	1

Nearzone



Oval diffusion

Circular diffusion (factory setting)

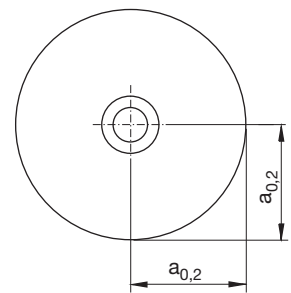
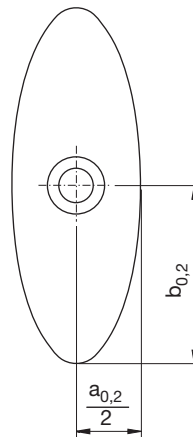
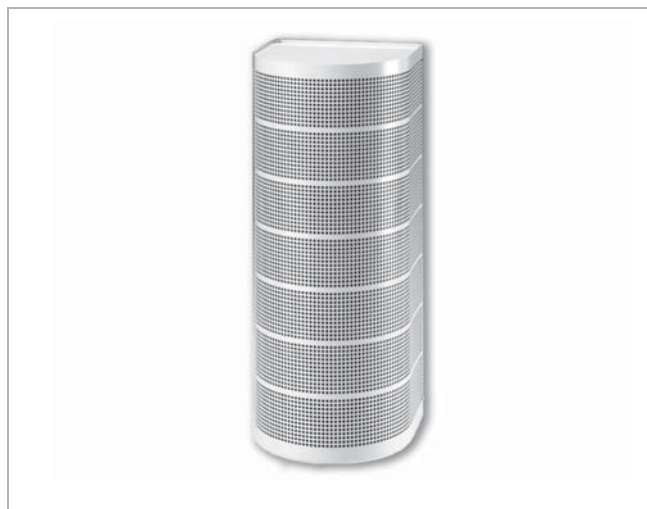


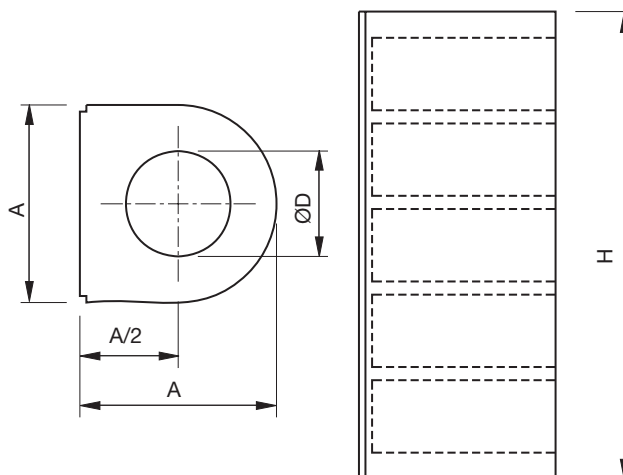
Table 1
Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

Under-temperature $T_f - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - semicircular CHA



Dimensions



Description

Comdif CHA is a semicircular perforated displacement diffuser for installation against a wall or column. Behind the perforated front plate, CHA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a circular duct connection (MF measure), so the diffuser can be connected at the top or bottom. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for the supply of large volumes of air.
- The geometry of the near zone can be adjusted using adjustable nozzles
- Duct covers, plinths and wall brackets can be supplied as accessories

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

Order code

Product	CHA	aaaa
Type		
Size		

Order - accessories

Cover:	CHAZ - 0 - size
Plinth:	CHAZ - 2 - size
Wall bracket:	CHAZ - 3 - size

Size	A mm	ØD mm	H mm	Weight kg
1207	250	125	710	6,50
1607	300	160	710	7,50
2010	330	200	970	13,0
2510	400	250	970	18,0
3115	520	315	1490	35,0
4020	630	400	2010	58,0
5020	730	500	2010	78,0
6320	830	630	2010	106

Accessories

Can be supplied with duct cover, plinth and bracket for wall mounting.

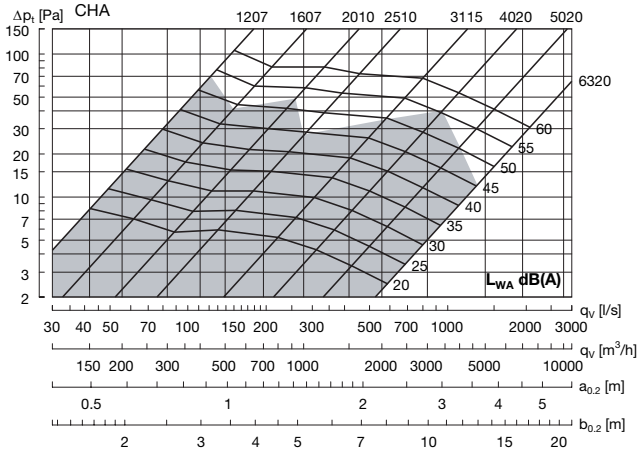
Materials and finish

Diffuser:	Galvanised steel
Nozzles:	Black plastic
Front plate:	1 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Perforated diffuser - semicircular CHA

Technical data



Recommended maximum volume flow

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table 1, correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{ok}$

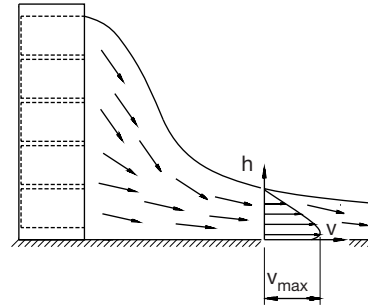
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
1207	11	-4	1	1	-9	-16	-28	-34
1607	9	-2	2	0	-8	-16	-28	-34
2010	10	-2	3	0	-7	-16	-28	-39
2510	11	0	4	-2	-7	-15	-27	-37
3115	13	1	3	-1	-7	-17	-29	-42
4020	7	3	2	-1	-5	-14	-19	-14
5020	7	3	2	0	-6	-16	-19	-17
6320	7	3	2	0	-6	-16	-29	-17

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

Size	Centre frequency Hz								
	63	125	250	500	1K	2K	4K	8K	
1207	19	14	5	3	2	1	2	1	
1607	16	12	4	1	2	1	2	2	
2010	12	8	4	2	3	2	2	2	
2510	12	8	5	2	1	1	1	1	
3115	11	8	3	2	1	1	2	2	
4020	9	6	1	1	1	1	1	1	
5020	7	5	0	1	1	1	1	2	
6320	5	3	1	1	0	0	0	0	

Nearzone



Large diffusion (factory setting)

Small diffusion

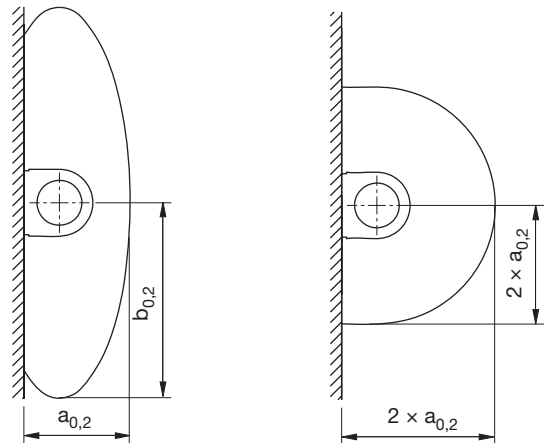


Table 1 Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

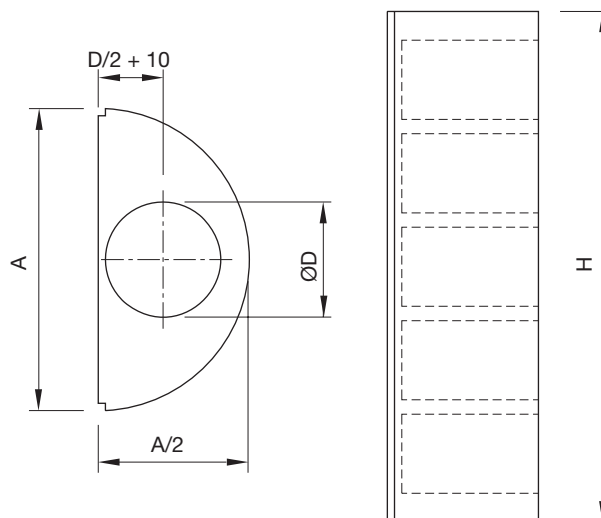
Under-temperature $T_r - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - semicircular

CBA



Dimensions



Description

Comdif CBA is a semicircular perforated displacement diffuser for installation against/on a wall or column.

Behind the perforated front plate, CBA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a circular duct connection (MF measure), so the diffuser can be connected at the top or bottom. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for the supply of large volumes of air.
- The geometry of the near zone can be adjusted using adjustable nozzles.
- Duct covers, plinths and wall brackets can be supplied as accessories

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

Order code

Product	CBA	aaaa
Type		
Size		

Order - accessories

Cover:	CBAZ - 0 - size
Plinth:	CBAZ - 2 - size
Wall bracket:	CBAZ - 3 - size

Size	A mm	ØD mm	H mm	Weight kg
1207	350	125	710	6,50
1607	420	160	710	7,50
2010	500	200	970	13,0
2510	600	250	970	18,0
3115	730	315	1490	35,0
4020	900	400	2010	58,0
5020	1100	500	2010	78,0

Accessories

Can be supplied with duct cover, plinth and bracket for wall mounting.

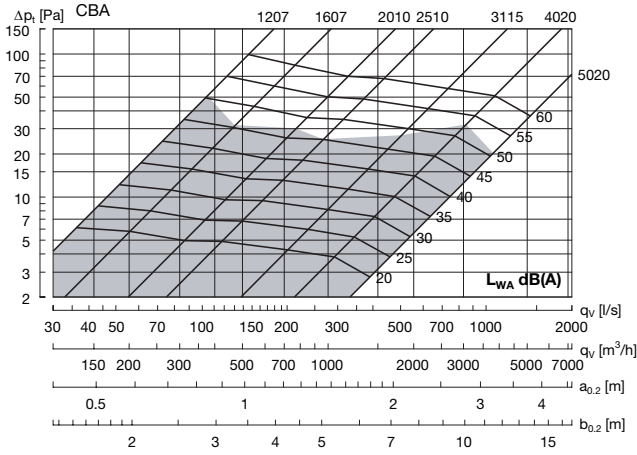
Materials and finish

Diffuser:	Galvanised steel
Nozzles:	Black plastic
Front plate:	1 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Perforated diffuser - semicircular CBA

Technical data



Recommended maximum volume flow

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table 1, correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{ok}$

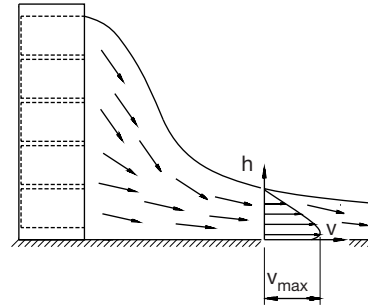
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
1207	8	-3	0	1	-8	-15	-27	-38
1607	10	-3	3	0	-8	-18	-30	-33
2010	15	-2	3	0	-9	-16	-30	-37
2510	10	-1	4	-1	-9	-16	-29	-41
3115	11	1	4	-1	-8	-17	-30	-42
4020	13	3	4	-1	-9	-17	-30	-43
5020	7	2	2	0	-6	-16	-19	-17

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
1207	19	14	5	3	2	1	2	1
1607	16	12	4	1	2	1	2	2
2010	12	8	4	2	3	2	2	2
2510	12	8	5	2	1	1	1	1
3115	11	8	3	2	1	1	2	2
4020	9	6	1	1	1	1	1	1
5020	7	5	0	1	1	1	1	2

Nearzone



Large diffusion (factory setting)

Small diffusion

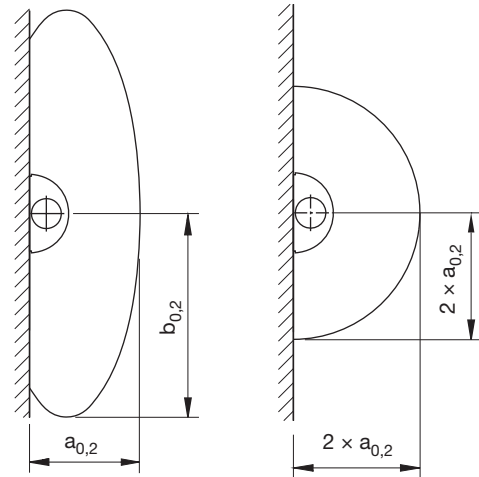


Table 1 Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

Under-temperature $T_r - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - corner

CQA



Description

Comdif CQA is a semicircular perforated displacement diffuser for corner installation. Behind the perforated front plate, CQA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a circular duct connection (MF measure), so the diffuser can be connected at the top or bottom. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for the supply of large volumes of air.
- The geometry of the near zone can be adjusted using adjustable nozzles
- Duct covers, plinths and wall brackets can be supplied as accessories

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

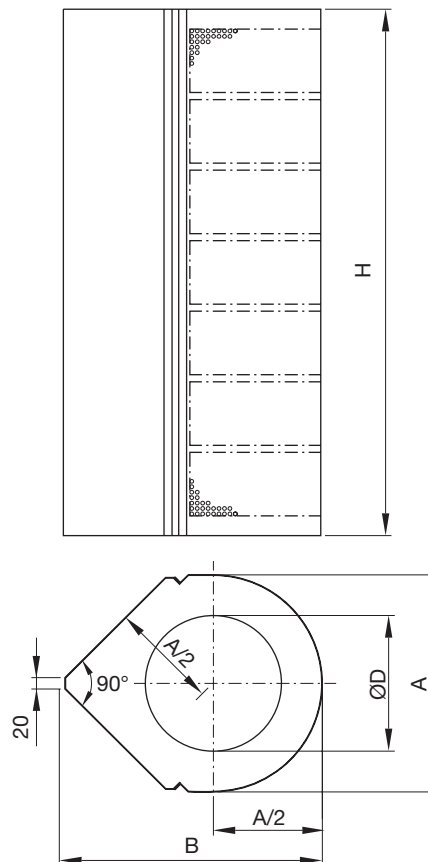
Order code

Product	CQA	aaaa
Type		
Size		

Order - accessories

Cover:	CQAZ - 0 - size
Plinth:	CQAZ - 2 - size
Wall bracket:	CQAZ - 3 - size

Dimensions



Size	A mm	B mm	ØD mm	H mm	Weight kg
1207	250	302	125	710	8,00
1607	300	362	160	710	9,00
2010	330	398	200	970	14,0
2510	400	483	250	970	20,0
3115	520	628	315	1490	40,0
4020	630	760	400	2010	64,0

Accessories

Can be supplied with duct cover, plinth and bracket for wall mounting.

Materials and finish

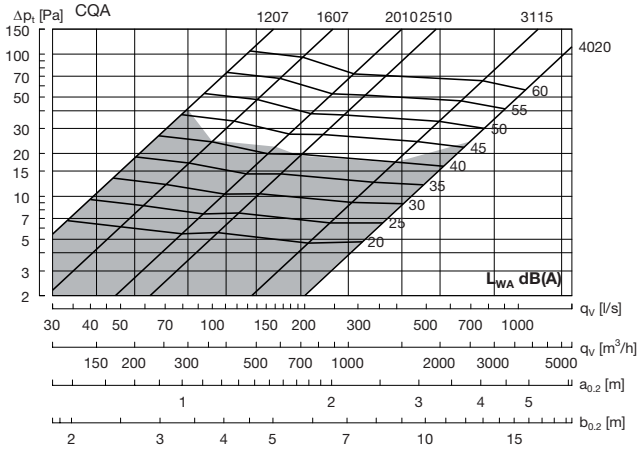
Diffuser:	Galvanised steel
Nozzles:	Black plastic
Front plate:	1 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Perforated diffuser - corner

CQA

Technical data



Recommended maximum volume flow.

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table 1, correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{ok}$

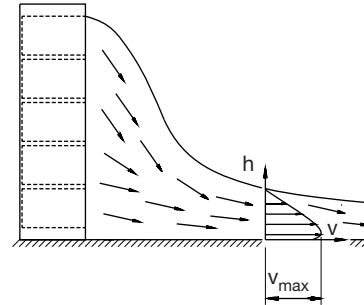
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
1207	8	-3	3	0	-7	-15	-27	-35
1607	11	-1	5	-2	-8	-16	-28	-34
2010	11	0	5	-2	-7	-16	-28	-40
2510	11	2	5	-2	-7	-15	-29	-39
3115	11	3	5	-2	-8	-17	-29	-38
4020	12	4	2	0	-8	-16	-30	-41

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
1207	18	13	5	3	3	2	2	2
1607	15	11	3	1	2	2	2	2
2010	11	7	3	8	5	5	7	7
2510	10	6	5	7	5	4	4	5
3115	9	6	5	4	4	5	5	7
4020	8	5	2	3	2	3	3	3

Nearzone



Large diffusion (factory setting)

Small diffusion

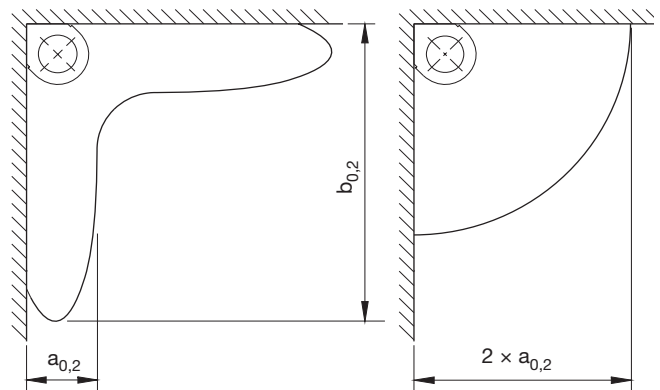


Table 1 Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

Under-temperature $T_f - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - rectangular

CRA



Description

Comdif CRA is a rectangular perforated displacement diffuser for installation against a wall or column. CRA has a rectangular connection and therefore has a limited depth, making it ideal for installation in premises where a discrete appearance is required. Behind the perforated front plate, CRA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a rectangular duct connection, so the diffuser can be connected at the top or bottom. The connection duct CRAZ with a circular connection is available as an accessory. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for the supply of large volumes of air.
- The geometry of the near zone can be adjusted using adjustable nozzles
- Duct connections and plinths can be supplied as accessories

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

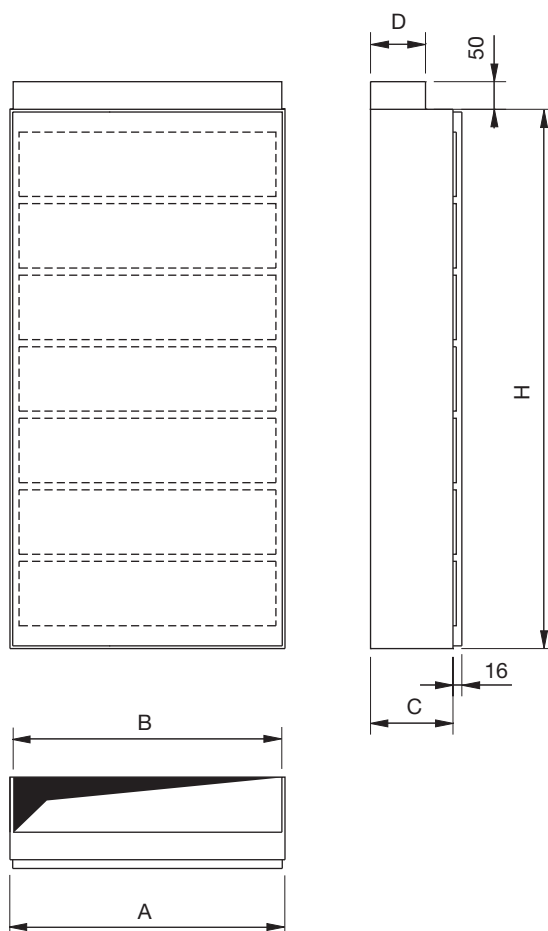
Order code

Product	CRA	aaaa
Type		
Size		

Order - accessories

Connection duct: CRAZ - 1 - size
 Plinth: CRAZ - 2 - size

Dimensions



Size	A mm	B mm	C mm	D mm	H mm	Weight kg
3010	300	278	150	98	980	10,0
5010	500	478	150	98	980	17,0
8010	800	778	150	98	980	27,0
8020	800	778	250	198	2020	32,0

Accessories

Can be supplied with duct connection and plinth.

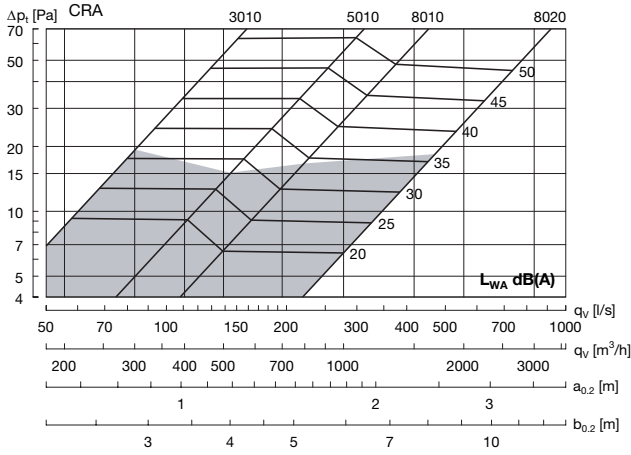
Materials and finish

Diffuser: Galvanised steel
 Nozzles: Black plastic
 Front plate: 1,5 mm galvanised steel
 Standard finish: Powder-coated
 Standard colour: RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Perforated diffuser - rectangular CRA

Technical data



Recommended maximum volume flow

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table 1, correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{ok}$

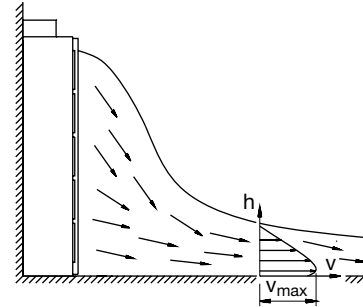
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
3010	9	-1	5	-1	-11	-17	-30	-41
5010	7	1	4	0	-11	-19	-32	-42
8010	15	0	4	0	-12	-20	-31	-43
8020	10	4	6	-2	-11	-21	-33	-39

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
3010	11	7	6	4	2	2	1	2
5010	10	6	6	4	2	2	1	2
8010	10	6	4	3	2	1	1	1
8020	7	4	3	2	1	1	1	1

Nearzone



Large diffusion (factory setting)

Small diffusion

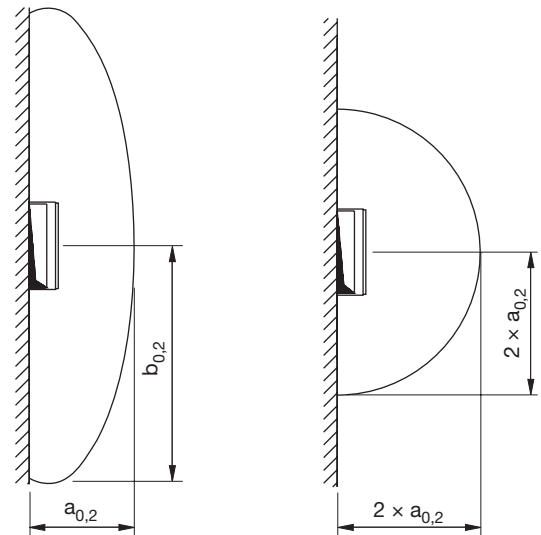


Table 1 Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

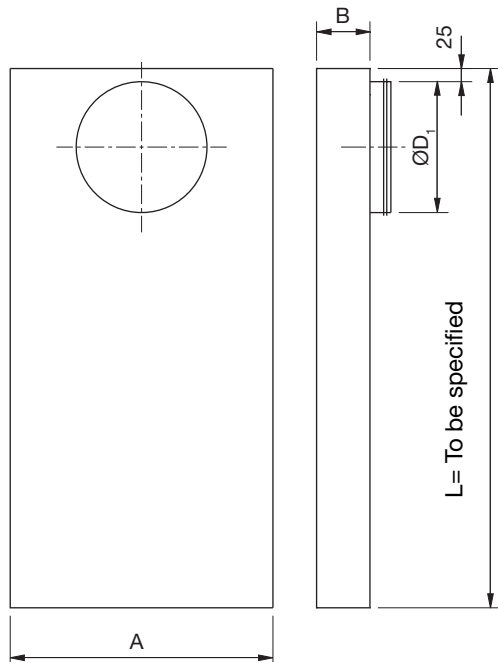
Under-temperature $T_f - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - rectangular

CRA

Accessories

Connection duct CRAZ-1



Size	A mm	B mm	ØD ₁ mm	Weight kg/m
3010	280	100	200	5,0
5010	480	100	250	7,0
8010	780	100	315	9,0
8020	780	200	400	11,0

Order code

Connection duct	CRAZ-1	aaaa	bbbb	c
Type				
Size				
Length	According to dimensions in mm L=max. 2,000 mm			
Connection	Front Back (Standard)	0 1		

Perforated diffuser - rectangular

CEA



Description

Comdif CEA is a rectangular perforated displacement diffuser for installation against a wall or column. Behind the perforated front plate, CEA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a circular duct connection (MF measure), so the diffuser can be connected at the top or bottom. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for the supply of large volumes of air.
- The geometry of the near zone can be adjusted using adjustable nozzles.
- Plinths be supplied as accessories.

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

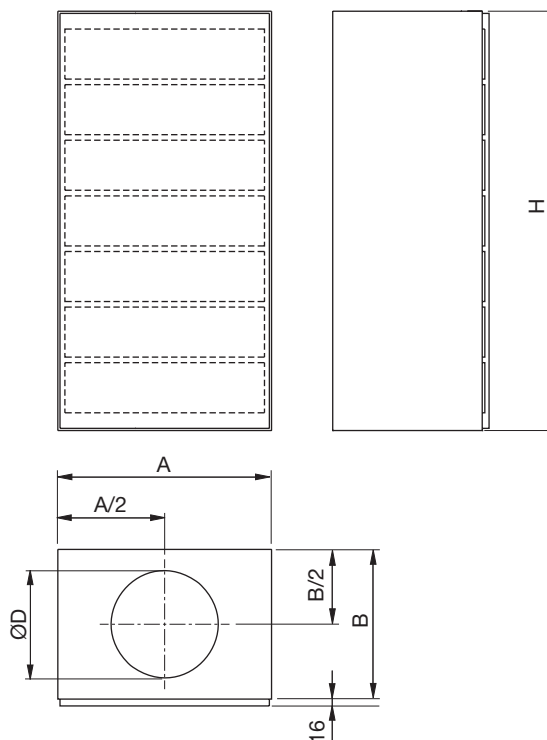
Order code

Product	CEA	aaaa
Type		
Size		

Order - accessories

Plinth: CEAZ - 2 - size

Dimensions



Size	A mm	B mm	ØD mm	H mm	Weight kg
200	300	300	200	980	12,0
250	500	350	250	980	24,0
315	800	500	315	1500	80,0
400	800	600	400	1500	96,0

Accessories

Can be supplied with plinth.

Materials and finish

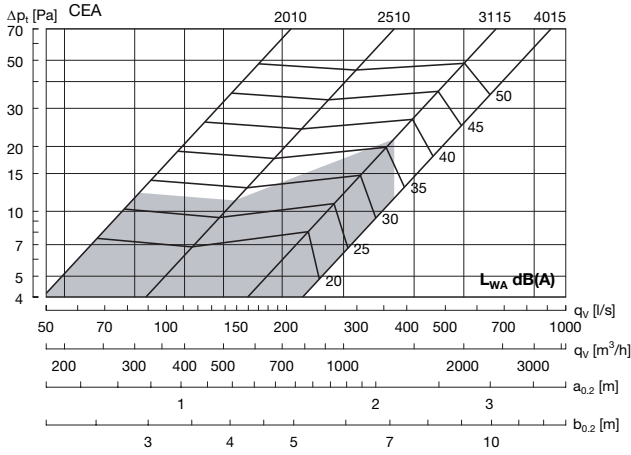
Diffuser:	Galvanised steel
Nozzles:	Black plastic
Front plate:	1,5 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Perforated diffuser - rectangular

CEA

Technical data



Recommended maximum volume flow.

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table 1, correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{ok}$

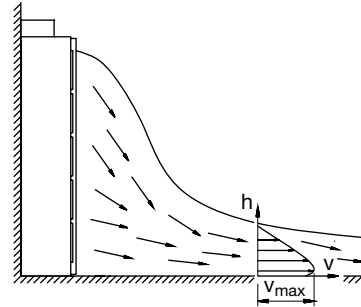
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
2010	11	4	4	-1	-8	-14	-25	-37
2510	8	4	2	0	-6	-16	-27	-40
3115	14	6	3	-1	-8	-17	-29	-25
4015	11	3	2	1	-10	-18	-30	-37

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

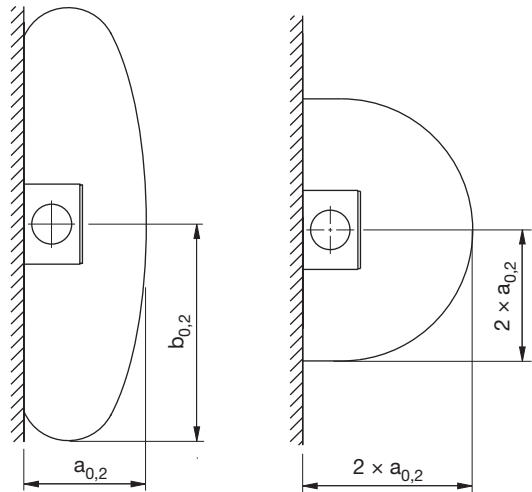
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
2010	10	6	1	4	5	3	4	4
2510	10	6	6	4	2	2	4	3
3115	9	6	5	3	3	4	4	5
4015	8	5	3	3	2	3	4	4

Nearzone



Large diffusion (factory setting)

Small diffusion



Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

Under-temperature $T_f - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - square

CKA



Description

Comdif CKA is a square perforated displacement diffuser for installation against a wall or column. Behind the perforated front plate, CKA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a circular duct connection (MF measure), so the diffuser can be connected at the top or bottom. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for the supply of large volumes of air
- The geometry of the near zone can be adjusted using adjustable nozzles
- Plinths can be supplied as accessories

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

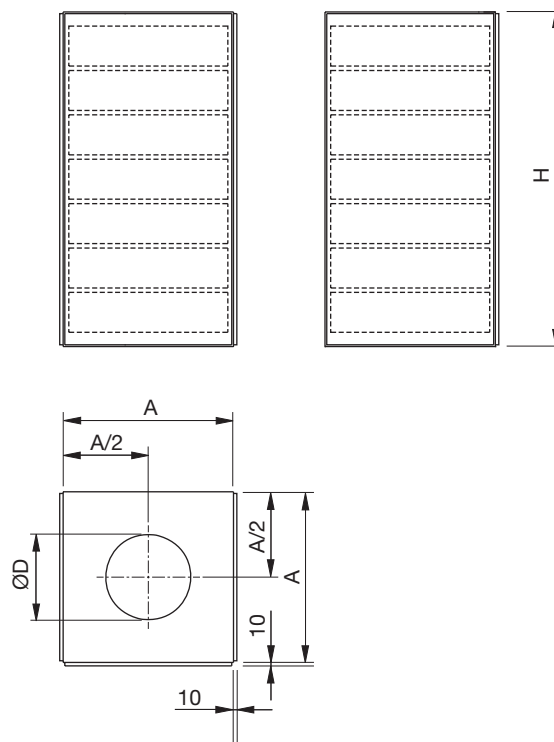
Order code

Product	CKA	aaaa
Type		
Size		

Order - accessories

Plinth: CKAZ - 2 - size

Dimensions



Size	A mm	ØD mm	H mm	Weight kg
200	300	200	980	11,0
250	400	250	980	20,0
315	500	315	980	30,0
400	500	400	1500	45,0
500	800	500	2020	150
630	800	630	2020	150

Accessories

Can be supplied with plinth.

Materials and finish

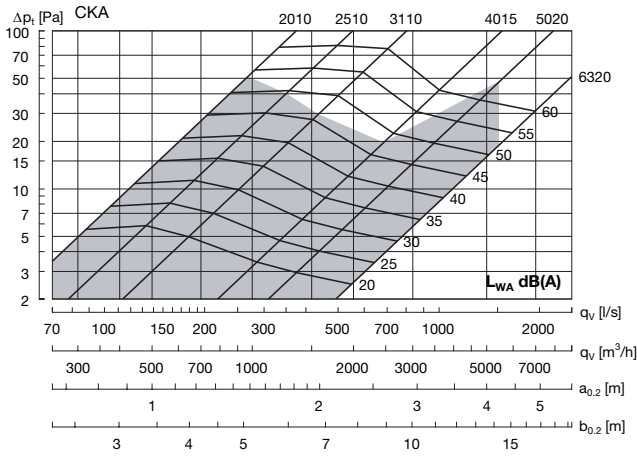
Diffuser:	Galvanised steel
Nozzles:	Black plastic
Front plate:	1,5 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Perforated diffuser - square

CKA

Technical data



Recommended maximum volume flow.

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{ok}$

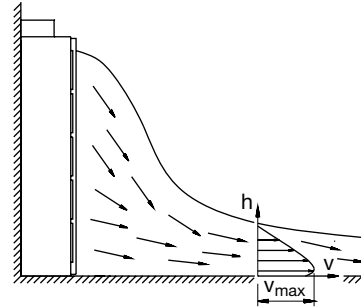
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
2010	10	0	4	0	-8	-18	-29	-43
2510	11	1	4	-1	-8	-19	-30	-42
3110	14	3	4	-1	-10	-18	-30	-32
4015	10	1	2	0	-8	-17	-27	-42
5020	7	3	2	0	-6	-16	-19	-17
6320	7	3	2	0	-6	-16	-19	-17

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

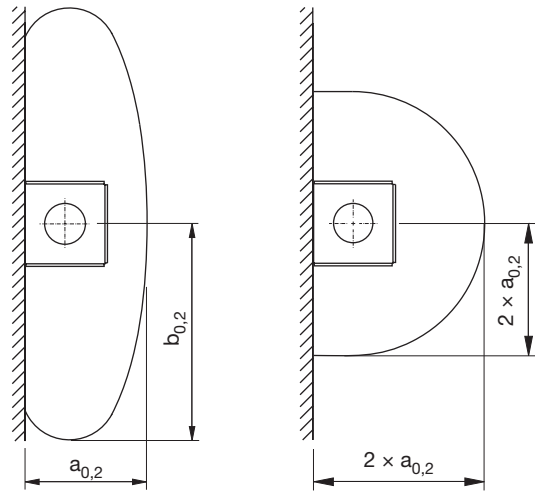
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
2010	12	8	4	2	1	1	1	1
2510	10	6	6	4	2	2	4	3
3110	10	7	3	1	2	1	2	1
4015	9	6	1	1	1	1	1	1
5020	6	4	1	1	1	1	1	1
6320	5	3	1	0	0	0	0	0

Nearzone



Large diffusion (factory setting)

Small diffusion

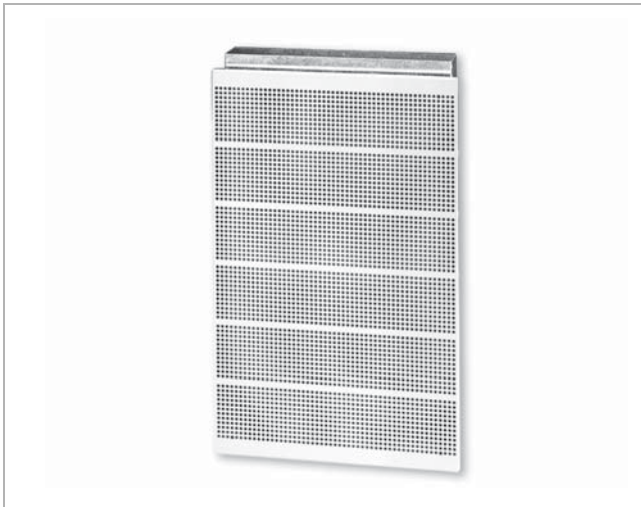


Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

Under-temperature $T_i - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - installation

CVA



Description

Comdif CVA is a rectangular perforated displacement diffuser for installation in walls or similar structures. CVA has a rectangular connection. Behind the perforated front plate, CVA is equipped with individually adjustable nozzles, making it possible to alter the geometry of the near zone. The diffuser can be turned and has a rectangular duct connection, so the diffuser can be connected at the top or bottom. A wall duct with circular connection is supplied as an accessory. The diffuser is suitable for the supply of large volumes of moderately cooled air.

- The diffuser is suitable for installation in walls.
- The geometry of the near zone can be adjusted using adjustable nozzles.
- A wall duct can be supplied as an accessory.

Maintenance

The front plate can be removed from the diffuser, making it possible to clean the nozzles. The visible parts of the diffuser can be wiped with a damp cloth.

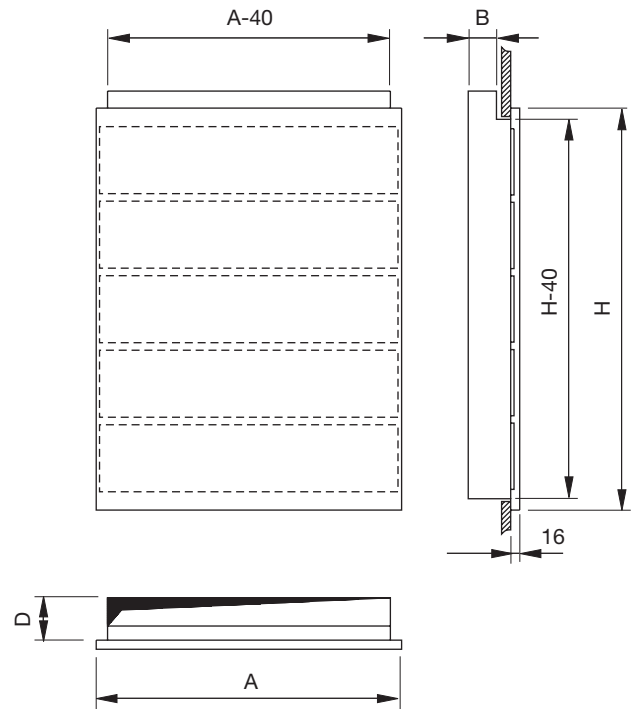
Order code

Product	CVA	aaaa
Type		
Size		

Order - accessories

Wall duct: CVAZ -1 - size

Dimensions



Size	A mm	B mm	D mm	H mm	m kg
3005	540	50	75	320	4,40
5005	540	50	75	450	5,80
6005	540	50	75	580	8,70
6008	540	80	105	580	9,00
8008	540	80	105	840	12,0

Cutting dimension: A - 30 x H - 30

Accessories

Can be supplied with wall duct.

Materials and finish

Diffuser:	Galvanised steel
Nozzles:	Black plastic
Front plate:	1,5 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 9010 - white, gloss 30

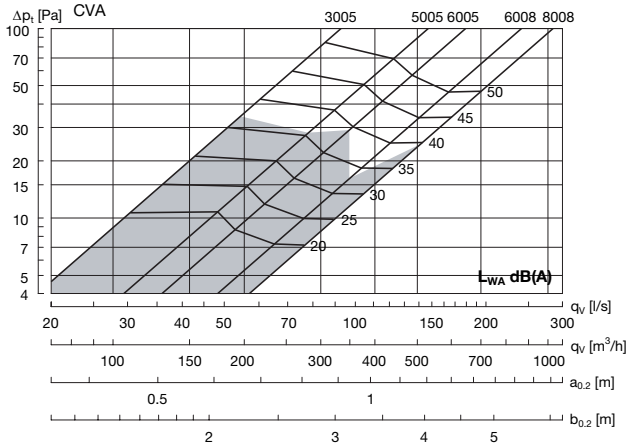
The diffuser is available in other colours. Please contact Lindab's sales department for further information.



Perforated diffuser - installation

CVA

Technical data



Recommended maximum volume flow

The near zone is given at an under-temperature of -3 K to a maximum terminal velocity of 0.20 m/s.

Conversion to other terminal velocities - see table 1, correction of the near zone for -3 K and -6 K respectively.

Sound effect level

Sound effect level L_W [dB] = $L_{WA} + K_{Ok}$

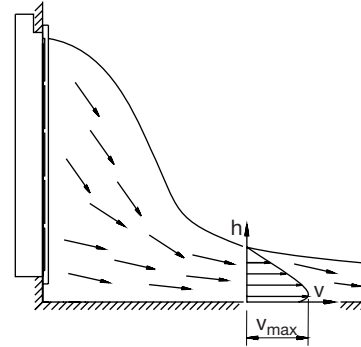
Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
3005	7	-2	-2	1	-8	-17	-27	-38
5005	7	-3	-1	1	-7	-17	-29	-36
6005	11	-4	-1	1	-7	-17	-29	-37
6008	12	-4	2	1	-9	-20	-31	-31
8008	10	-4	2	1	-9	-19	-30	-43

Sound attenuation

Sound attenuation ΔL [dB] including end reflection.

Size	Centre frequency Hz							
	63	125	250	500	1K	2K	4K	8K
3005	18	13	9	4	1	0	0	1
5005	15	11	8	2	2	1	0	0
6005	15	10	4	2	0	0	0	1
6008	12	8	3	2	0	0	0	0
8008	12	8	3	1	0	0	0	0

Nearzone



Large diffusion (factory setting)

Small diffusion

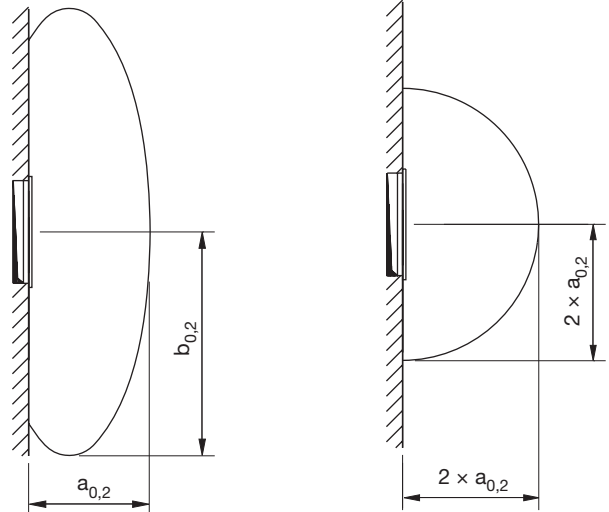


Table 1
Correction of the near zone ($a_{0,2}$, $b_{0,2}$)

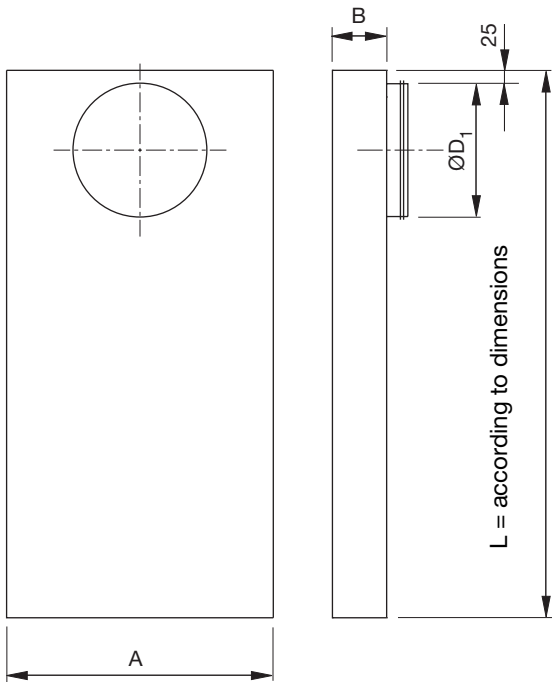
Under-temperature $T_f - T_r$	Maximum velocity m/s	Mean velocity m/s	Correction factor
-3K	0.20	0.10	1.00
	0.25	0.12	0.80
	0.30	0.15	0.70
	0.35	0.17	0.60
	0.40	0.20	0.50
-6K	0.20	0.10	1.20
	0.25	0.12	1.00
	0.30	0.15	0.80
	0.35	0.17	0.70
	0.40	0.20	0.60

Perforated diffuser - installation

CVA

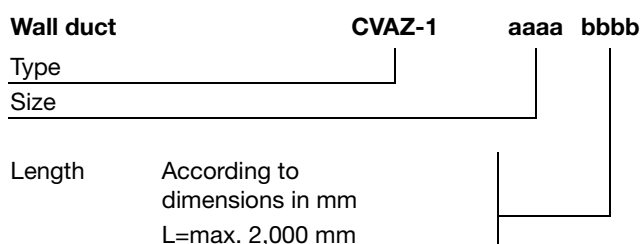
Accessories

Wall duct CVAZ-1



Size	A mm	B mm	ØD ₁ mm	Weight kg/m
3005	502	52	125	6,0
5005	502	52	160	6,0
6005	502	52	200	6,0
6008	502	82	250	6,5
8008	502	82	315	6,5

Order code



- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

Theatre diffuser

CRP



Description

CRP is a rectangular displacement diffuser for installation under seats in theatres, auditoriums, etc. It is suitable for installation in a pressure chamber and has a fixed resistance that ensures even distribution of the air. The diffuser can be adapted to the correct air volume and pressure, specified according to the actual conditions.

- It has built-in resistance that ensures even distribution over the diffusers
- The diffuser can be supplied with a specified pressure setting
- The diffuser is available in other dimensions

Maintenance

The front plate of the diffuser can be removed to enable cleaning of the internal components. The visible parts of the diffuser can be wiped with a damp cloth.

Materials and finish

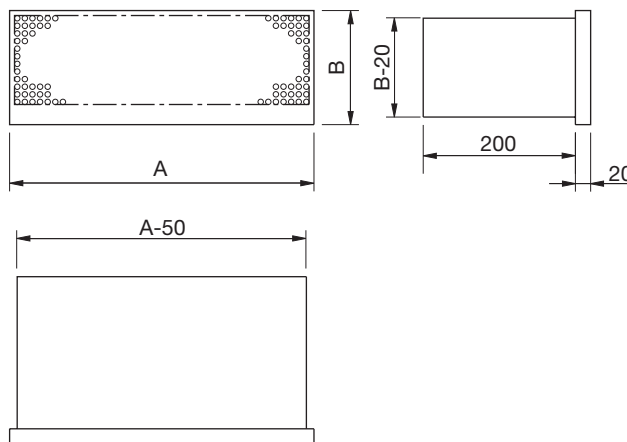
Diffuser:	Galvanised steel
Front plate:	1 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 7040 - grey, gloss 30 RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Order code

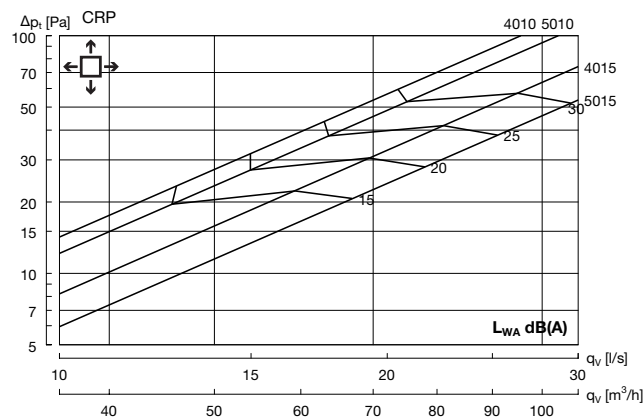
Product	CRP	a	bbbb
Type			
Colour	RAL 7040 - grey	0	
	RAL 9010 - white	1	
	Special colour	2	
Size			

Dimensions



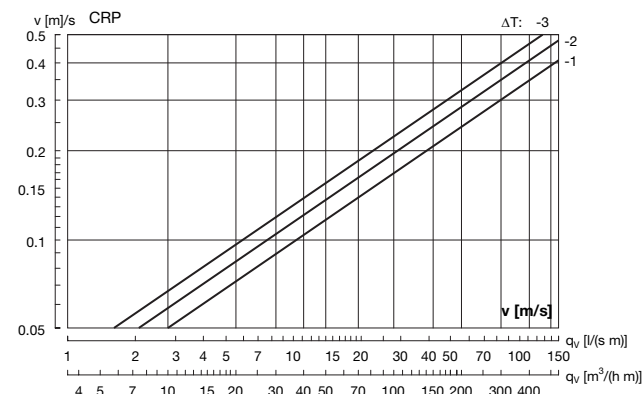
Size	A mm	B mm	Weight kg
4010	400	100	1,60
4015	400	150	2,20
5010	500	100	2,00
5015	500	150	2,70

Pressure, sound level



Size	63	125	250	500	1K	2K	4K	8K
4010	5	-6	-5	-2	-4	-9	-17	-26
4015	0	-4	-1	0	-6	-10	-18	-27
5010	7	-4	-3	0	-6	-12	-18	-29
5015	5	-3	-1	0	-6	-11	-19	-30

Near zone



The speed is measured 0.5 m from the diffuser.

Theatre diffuser

CRU



Description

CRU is a rectangular displacement diffuser for installation under seats in theatres, auditoriums, etc. The diffuser is supplied with a circular connection. The diffuser can be supplied with a fixed resistance adapted to the correct air volume and pressure, specified according to the actual conditions.

- Circular connection with Lindab Safe.
- The diffuser can be supplied with a fixed resistance at a specified pressure setting
- The diffuser is available in other dimensions.

Maintenance

The front plate can be removed from the diffuser for cleaning of the internal components. The visible parts of the diffuser can be wiped with a damp cloth.

Materials and finish

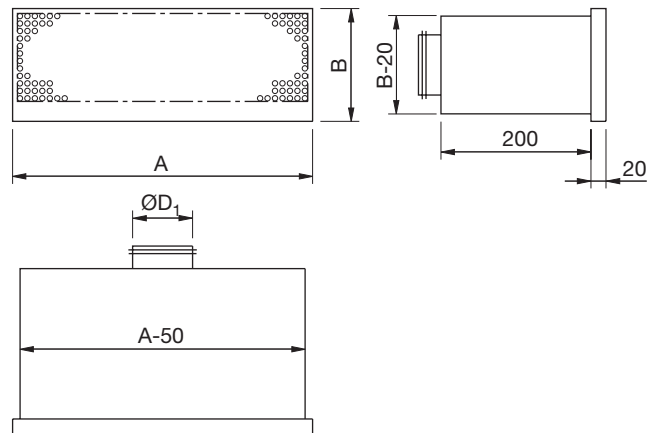
Diffuser:	Galvanised steel
Front plate:	1 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 7040 - grey, gloss 30 RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Order code

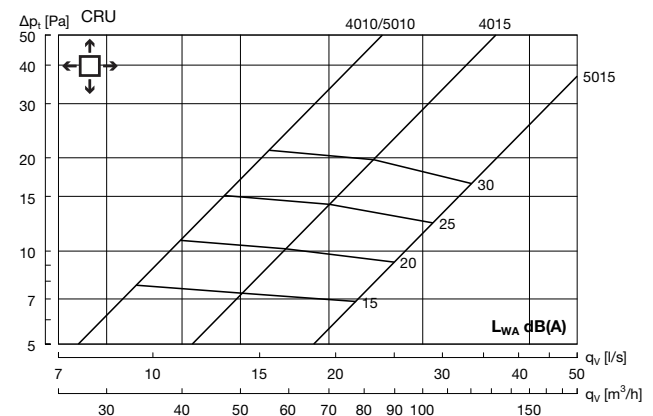
Product	CRU	aaaa	bbbb
Type			
Colour	RAL 7040 - grey	0	
	RAL 9010 - white	1	
	Special colour	2	
Size			

Dimensions



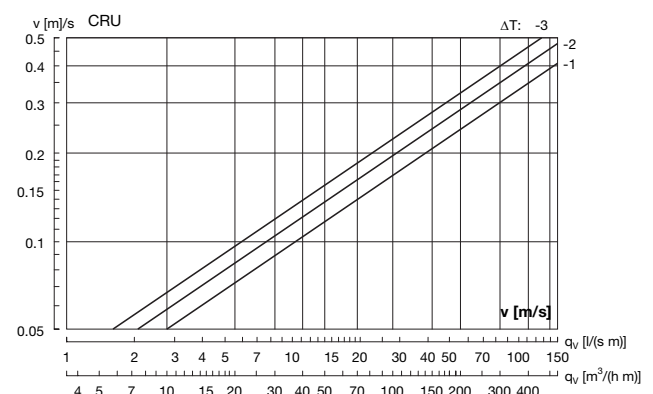
Size	A mm	B mm	ØD ₁ mm	Weight kg
4010	400	100	80	1,40
4015	400	150	100	2,00
5010	500	100	80	1,70
5015	500	150	125	2,50

Pressure, sound level



Size	63	125	250	500	1K	2K	4K	8K
4010	5	-4	-2	2	-9	-18	-30	-42
4015	9	-2	-2	2	-10	-17	-30	-37
5010	5	-4	-2	2	-9	-18	-30	-42
5015	7	-6	-2	2	-11	-21	-33	-28

Near zone



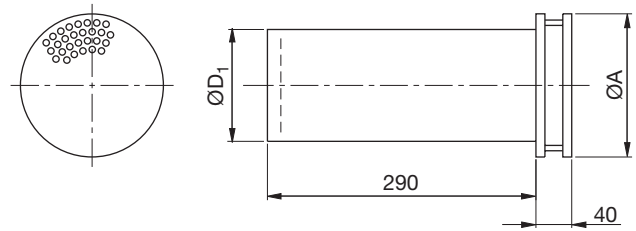
The speed is measured 0.5 m from the diffuser.

Theatre diffuser

CCP



Dimensions



Size	ØA mm	ØD1 mm	Weight kg
100	140	100	0,70
125	160	125	0,90

Description

CCP is a circular displacement diffuser for installation under seats in theatres, auditoriums, etc. This diffuser is suitable for installation in a pressure chamber. It has a fixed resistance that ensures even distribution of the air. The diffuser can be adapted to the correct air volume and pressure, specified according to the actual conditions.

- It has built-in resistance that ensures even distribution over the diffuser
- The diffuser can be supplied with a specified pressure setting
- The diffuser is available in other dimensions

Maintenance

The front plate of the diffuser can be removed to enable cleaning of the internal components. The visible parts of the diffuser can be wiped with a damp cloth.

Materials and finish

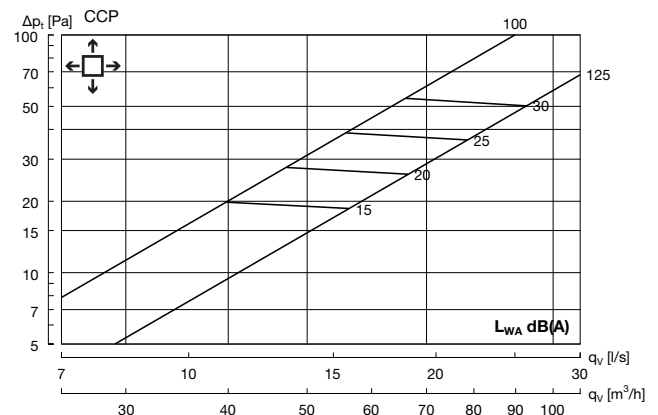
Diffuser: Galvanised steel
 Front plate: 1 mm galvanised steel
 Standard finish: Powder-coated
 Standard colour: RAL 7040 - grey, gloss 30
 RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Order code

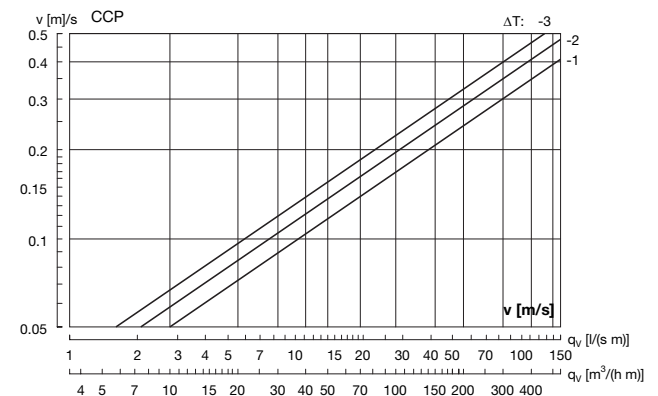
Product	CCP	a	bbb
Type			
Colour	RAL 7040 - grey	0	
	RAL 9010 - white	1	
	Special colour	2	
Size			

Pressure, sound level



Size	63	125	250	500	1K	2K	4K	8K
100	10	-7	-6	-1	-5	-8	-13	-24
125	3	-7	-5	0	-5	-10	-15	-27

Near zone



The speed is measured 0.5 m from the diffuser.

Theatre diffuser

CCU



Description

CCU is a circular displacement diffuser for installation under seats in theatres, auditoriums, etc. The diffuser is supplied with a circular connection. The diffuser can be supplied with a fixed resistance, adapted to the correct air volume and pressure, specified according to the actual conditions.

- Circular connection with Lindab Safe.
- The diffuser can be supplied with a fixed resistance at a specified pressure setting.
- The diffuser is available in other dimensions.

Maintenance

The front plate of the diffuser can be removed to enable cleaning of the internal components. The visible parts of the diffuser can be wiped with a damp cloth.

Materials and finish

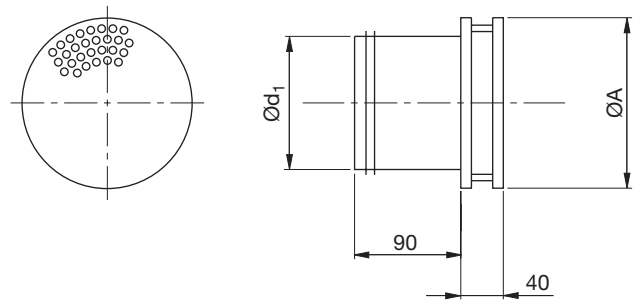
Diffuser:	Galvanised steel
Front plate:	1 mm galvanised steel
Standard finish:	Powder-coated
Standard colour:	RAL 7040 - grey, gloss 30 RAL 9010 - white, gloss 30

The diffuser is available in other colours. Please contact Lindab's sales department for further information.

Order code

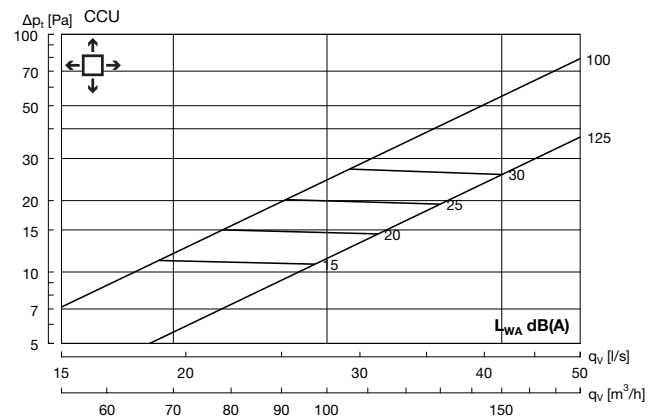
Product	CCU	a	bbb
Type			
Colour	RAL 7040 - grey	0	
	RAL 9010 - white	1	
	Special colour	2	
Size			

Dimensions



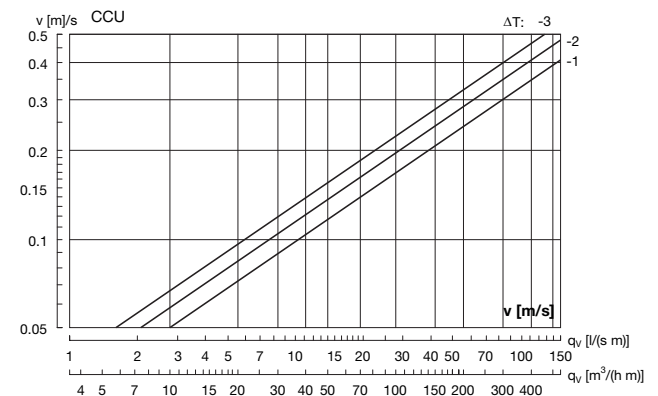
Size	ØA mm	ØD ₁ mm	Weight kg
100	140	100	0,40
125	160	125	0,50

Pressure, sound level



Size	63	125	250	500	1K	2K	4K	8K
100	10	1	-2	-3	-3	-11	-19	-29
125	9	-1	-2	-3	-3	-12	-20	-19

Near zone



The speed is measured 0.5 m from the diffuser.

Variable flow systems

VAV theory



LKPV, IBM, Aarhus.

Optimized usage

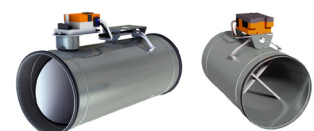
Ventilation makes up considerable part of energy costs in the daily usage of the building. At the same time authorities have several requirements concerning how much energy is to be spent on ventilation. In pretty much all types of systems, it consequently makes good sense to use some sort of VAV, making it possible to reduce the air volume depending on the need in each individual room. The reduction of air volume in connection with transport of the air, in addition to the energy needed to cool/heat the outer air, will reduce costs.

Besides saving money on the energy, it also makes it possible to maintain a desired temperature in the individual room at varying loads. Through documented research and testing, it has turned out that there is a specific connection between the operative temperature in the room and the people's productivity. If the temperature in the room is not right, the productivity will fall, which in many instances will mean an economical loss to the individual users of the construction.

With these parameters taken into consideration, there is no doubt that VAV, despite the more expensive one-off investment, will pay for itself in the long run.

Complete programme

Lindab's series of VAV products include several types of supply air diffusers with motorized dampers, in order to reduce the air volume from 100% to 0%. At the same time a constant air throw is ensured, in order to maintain the Coanda effect and avoid the risk of the air dropping in the occupied zone. Likewise, air flow regulators are available to regulate zones, in addition to motorized dampers for pressure regulation in the distribution ducts. Furthermore room regulator REGULA Combi and pressure regulator PR are available as well.



VRU / FRU

Variable flow systems

VAV theory

General information on VAV

VAV is short for "Variable Air Volume". VAV is a demand-controlled ventilation, to be used when the loads in a building vary. In rooms with changing numbers of people, a more satisfactory air quality can be ensured by regulating the air flow in relation to CO₂ concentration, which is a good indicator of air quality. It is however often the heat load, such as people, computers and sun, that is dimensioning the ventilation need in a room. These heat loads will almost always vary throughout the day and the night. By maintaining a constant supply air temperature, lower than the room temperature and instead regulate the air flow in ratio to the desired room temperature, the demand-controlled ventilation will cancel out the heat load.

The variations in airflow are brought about by a duct-damper or by motorized supply air diffusers with a damper function.

VAV-units can be produced for both with displacement ventilation and mixed ventilation.

Description of regulation types

In VAV-units, it is a pre-requisite that the fans can be speed-controlled.

Furthermore the VAV-unit must be divided into zones, typically one zone for each distribution air duct. These zones can be identified from two different principles. The airflow regulation or pressure regulation.

Airflow regulation

With airflow regulation, it is the airflow / air volume in the distribution air duct which is measured and regulated. The airflow is set to be able to vary between a pre-programmed minimum and maximum airflow. An electronic signal from a sensor (temperature, CO₂, movement) or BMS regulates the airflow within the set minimum and maximum airflow limits.

In airflow regulation, the right airflow will be achieved even when the pressure conditions in the air duct are changing, since the airflow regulator is independent of the pressure (and only requires a minimum pre-pressure).

This type of regulation is usually used for zone-regulation in connection with diffusers without dampers in mixed- or displacement systems. If mixed ventilation units without dampers are used, and the temperature difference is high. ($\Delta T = -8$ to 10 K) between supply air and room air, the attention should turn to the risk of cold-drops from the supply air diffusers.

Since the airflow should be measured, there is a minimum limit on the airflow regulator. The minimum airflow must not be set lower than the measurement limit for the velocity of approx. 0.7 m/s. Airflow regulation can be used in the distribution air duct both for supply air and exhaust, either with a parallel signal from a sensor or BMS or with a Master/Slave function. If for example an over- or under pressure in a room is desired, with respect to the surroundings, a Master/Slave function is advisable.

Pressure regulation

Normally it is the distribution air duct on the supply air side which is regulated for pressure. A pressure regulation entails that a constant static pressure is maintained in the air duct. The static pressure is measured by a probe mounted inside the air duct. The probe is connected by a pipe to an electronic unit (pressure regulator) which registers the static pressure in the air duct with a membrane sensor unit.

For units with motorized supply air diffusers there should be a pressure regulation in the distribution air duct, since the diffusers are set and calibrated for a certain airflow variation at a given pressure. Furthermore the pressure regulation ensures that the correct pressure loss over the diffusers is reached, and consequently unwanted diffuser noise is avoided at a minimum airflow.

If instead, un-motorized diffusers are used, and airflow variations are made from motorized dampers in the air duct, a pressure regulation in the distribution air duct will ensure stable pressure conditions in the zone, and therefore good conditions for controlling these air duct dampers.

No matter the unit type however, the pressure loss in the zones distribution air duct has to be taken into consideration, in order to obtain a similar if not identical pressure at all branches to the connection ducts. As a general rule, the pressure loss in the distribution air duct from the first branch to the last branch should not exceed approx. 40% of the static pressure.

In principle it is possible to obtain an airflow variation from $0-100\%$ using air pressure regulation. The variation is solely dependent on which dampers or VAV-units are being used.

Pressure regulation of a distribution air duct using the supply air diffuser can be combined with an airflow regulation of the exhaust air. Using the Master/Slave principle and measuring the airflow /air volume, in the supply air, the signal for the measured airflow can be used as a signal to the airflow regulator on the exhaust air. That way it is definite that the same volume of air will be removed from a VAV-zone as the volume supplied.

A more simple, but less precise method to secure the same volume of air in and out of the VAV-zone, is to use a mechanical slave-control of the exhaust-damper, which takes the same position as the supply air-damper. Regulation of the exhaust-damper happens by a simple electronic adjustment, when the turning angle has been determined.

Variable flow systems

VAV theory

Choice of regulation type

In smaller zones, with a clear pressure conditions (not too long supply air ducts) both in supply air and exhaust air, a VAV-system with a pressure regulation of the distribution air ducts is preferable. If motorized VAV-diffusers are required, a pressure regulation of the zone is necessary.

For units with widely varying pressure conditions, we instead recommend an airflow regulation of each zone.

In zones with longer distribution air ducts, eg. big office spaces, where not much variety happens in the thermal loads, airflow regulation will be preferable.

Airflow regulation

- + full control over airflow
- + measuring of actual airflow
- + signal to BMS about airflow
- + no airflow variations at pressure variations in the air duct system
- minimum airflow limited to 0,7 m/s
- demands special equipment to change settings (compact model)

Pressure regulation

- + very low minimum airflow
- + can be set without the help of tools
- + levels pressure variations from the system in the VAV-zone
- + ensures a low noise level for diffuser and dampers
- + possibility of combination with CAV
- no airflow control
- small pressure loss in distribution air duct is important

Choice of diffuser

Mixed ventilation

1) Motorized supply air diffusers

Advantages:

Built-in damper function, and no extra dampers necessary. Constant air throw despite varying airflow, resulting in good mix even at minimum airflow. Also suitable for supply air at cooling temperature.

Limitations:

Owing to sound generation in the diffuser, the duct pressure must be maintained at a constant (relatively low) level.

2) Non-motorized supply air diffusers

Advantages:

Simple diffusers without moveable parts.
Low sound level particularly at reduced air flow.

Existing systems can be changed to VAV without change of diffuser.

No electrical installations needed for diffusers.

More diffusers can be controlled by one motor damper.

Shut-off is possible with duct damper or airflow regulator.

Limitations:

Minimum airflow should not be chosen less than 50% for perforated or unperforated diffusers, and 40% for swirl diffusers, if cooling supply air is used at a temperature difference of ($\Delta T = -8$ to -10 K) between supply air and room air.

Displacement ventilation

All displacement units are suitable for VAV-systems. The units should be dimensioned for the maximum airflow, where the biggest near-zones and the highest sound levels arise. When the airflow is reduced, so is the near-zone and the sound level. Consequently there is no lower limit to the size of minimum airflow, which is why an airflow variation from 0-100% is possible.

Possible consequences should be evaluated in each case.

Variable flow systems

VAV theory

Component qualities

SUPPLY AIR		Airflow control	Pressure control	
		VRU	VAV-unit	Damper
Measurement of airflow - airflow signal to CTS		yes	no	no
Linear functions		yes	no	no
Reliability of airflow		yes	dependent on pressure variation	dependent on pressure variation
Limitation of airflow	max:	yes (standard up to 7 m/s)	pressure dependent	pressure dependent
	min:	yes (standard of 0,7 m/s)	approx. 20% of max. (standard)	damper angle
Shut-off possible		yes	no	yes
Constant airtrow (only mixed ventilation)		no	yes	no
Balancing		not necessary (diffusers are controlled)	by setting of static pressure or damper-position	by setting of static pressure or damper-position

EXHAUST AIR		Airflow control	Mechanical slave control
		VRU	Dampers
Requirements for supply air		VRU/FRU	motor for slave control
Measurement airflow (exhaust) - air flow signal to CTS		yes	no
Reliability of airflow		yes	highly pressure dependent, therefore inaccurate
Control of over pressure, under pressure or pressure balance in room		yes	no
Balancing		not necessary (diffuser controls)	by setting of static pressure or damper-position

Volume flow regulator - circular

VRU



Description

VRU is a circular volume flow regulator for VAV regulation in duct systems and consists of a measuring unit and a damper. VRU is used for volume flow regulation in circular ducts controlled from e.g. a room controller or BMS. VRU is as standard supplied with MF actuator without communication, but can on request be delivered for Belimo MP, LON, KNX or ModBus communication. Further documentation on the actuator can be requested from Lindab.

VRU is equipped with LindabSafe for connection to the duct and is prepared for insulation up to 50 mm.

VRU can be installed in any position without adjustment required. To avoid contamination of the measuring cross, VRU should only be used for clean air.

- Requires minimal initial pressure (Less than 20 Pa at V_{nom})
- Simple adjustment of settings with ZTH or PC tool
- Damper tightness class 4 according to EN 1751
- Tightness class C according to EN 1751
- Standard delivered with 2-10 V control signal
- Standard delivered with 2-10 V damper position feedback signal *
- Can be supplied with attenuation shield on request
- Can be supplied with actuator for several BUS systems
- Standard MF actuator is used in Pascal systems

Order code

Product	VRU	bbb	cccc
Type	VRU		
Dimension	∅d 100 - 630		
Motor type	MF, MP, LON, MOD, KNX, SPR, MF-D, MP-D, LON-D, MOD-D, KNX-D		

Example: VRU - 250 - MF

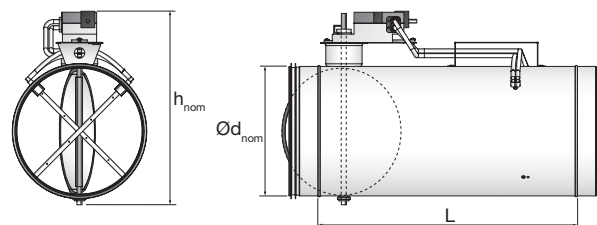
Factory settings

	Standard	On request
Min. air flow	0	Other min. flow
Max. air flow	V_{nom} (7m/s)	Other max. flow
Control signal	2-10 V	0-10 V
Feedback signal	Damper position *	Air flow

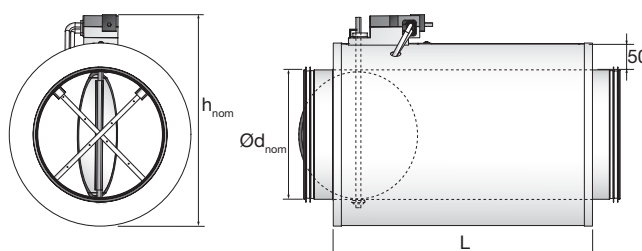
* Valid for MF and MP. SPR only available with air flow feedback signal.

Dimensions

VRU (MF, MP, LON, MOD, KNX)



VRU (MF-D, MP-D, LON-D, MOD-D, KNX-D)



∅d nom mm	L mm	h_{nom}		
		MF / MP / LON / MOD / KNX	MF-D / MP-D / LON-D / MOD-D / KNX-D	SPR
100	400	225	262	241
125	400	250	287	266
160	400	285	322	301
200	400	325	358	341
250	500	375	407	391
315	500	440	471	455
400	510	526	557	560
500	610	626	657	660
630	660	756	787	790

Motor type table

Motor		
Type	∅d 100 - 315	∅d 400 - 630
MF (Standard)	LMV-D3-MF-F	NMV-D3-MF-F
MP	LMV-D3-MP-F	NMV-D3-MP-F
LON	LMV-D3-LON-F	NMV-D3-LON-F
MOD	LMV-D3-MOD-F	NMV-D3-MOD-F
KNX	LMV-D3-KNX-F	NMV-D3-KNX-F
SPR	VRD3+LF24-MFT	VRD3-NF24A-V-F
MF-D *	LMV-D3-MF-F	NMV-D3-MF-F
MP-D *	LMV-D3-MP-F	NMV-D3-MP-F
LON-D *	LMV-D3-LON-F	NMV-D3-LON-F
MOD-D *	LMV-D3-MOD-F	NMV-D3-MOD-F
KNX-D *	LMV-D3-KNX-D-F	NMV-D3-KNX-D-F

* VRU with attenuation shield.

Volume flow regulator - circular

VRU

Technical data

Settings

V_{nom} indicates the measuring range for the actuator. A standard VRU is calibrated to a V_{nom} of 7 m/s according to the table below.

In special cases the VRU can be set to a higher V_{nom} , e.g. 10 m/s.

For VRU, V_{max} and V_{min} indicate the limits for the actuators working range.

There is linearity between V_{min} to V_{max} and the input signal. V_{max} can be set in the range 20-100% of V_{nom} , V_{min} in the range of 0-100% of V_{nom} ; however, there is no regulation between 0,7 m/s and closed position..

Air flow measurement

The accuracy of air flow measurement depends on the flow conditions in front of the measuring cross. It is preferable to have a long straight duct section in front of the measuring point, according to the table below.

If these recommendations are not followed, it will cause an unstable flow measurement and therefore higher inaccuracy in the regulation of the required air flow.

Components	Recommended straight duct before unit
Bend	3 x Ød
Tee-piece	2 x Ød
Damper	6 x Ød

With recommended straight duct in front of the unit, the air flow accuracy will be according to the table below.

Duct velocity	Air flow accuracy
> 3 m/s	+/- 5%
1,2 - 3 m/s	+/- 10%
0,7 - 1,2 m/s	+/- 25%

VRU nominal air flow (V_{nom}) and measuring limit

Size Ød mm	Measuring limit (0,7 m/s) *		(Standard) V_{nom} (7m/s)		V_{nom} (10m/s)	
	m ³ /h	l/s	m ³ /h	l/s	m ³ /h	l/s
100	20	6	198	55	283	79
125	31	9	309	86	442	123
160	51	14	506	141	723	201
200	79	22	791	220	1130	314
250	124	34	1236	343	1766	491
315	196	54	1963	545	2804	779
400	317	88	3165	879	4522	1256
500	495	138	4946	1374	7065	1963
630	785	218	7851	2181	11216	3116

* VRU-SPR with regulator VRD3 has a measuring limit of 2 Pa, which corresponds to a velocity of approximately 1,2 m/s.

Volume flow regulator - circular

VRU

Technical data

Pressure loss diagram and sound data for dimensioning.

The solid curves indicate the total pressure loss Δp_t over the damper as a function of the air flow q_v and the blade angle α .

The broken curves indicate the A-weighted sound power level L_{WA} , in dB to the duct.

Example:

Dimension $\varnothing d$: 100 mm
 Air flow q_v : 60 l/s
 Total pressure loss Δp_t : 200 Pa

The following can be obtained from the diagram:

Blade angle α : 32°
 Sound power level L_{WA} : 63 dB(A)

Measuring method for sound:

Sound data has been measured by the Swedish National Testing and Research Institute (SP) with reference to ISO 5135 and EN/ISO 3741.

Blade angle α :

0° = open damper.
 90° = closed damper.

Dimensioning

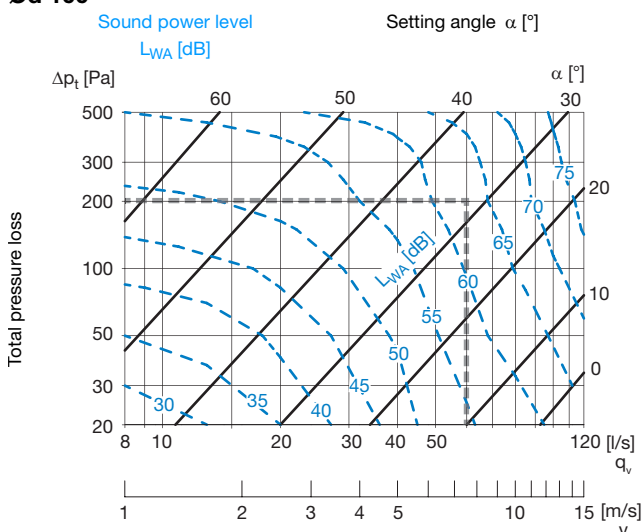
When dimensioning the dampers inherent noise from the dampers and their regulating properties (damper characteristics) must be taken into consideration.

If excessively large dampers are used, the working area (angle of rotation) at given V_{min} and V_{max} may be so limited that regulation does not function satisfactorily.

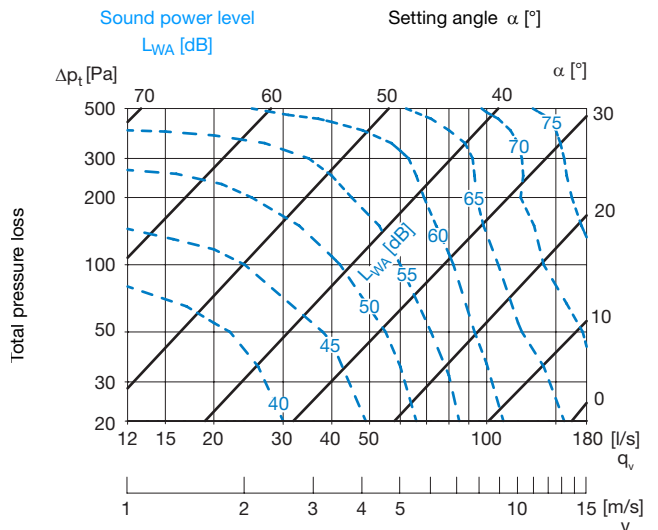
Efforts must be made to use damper dimensions that result in the largest possible working areas (angles of rotation).

Due to regulation accuracy, working areas with damper angles $< 15^\circ$ should be avoided.

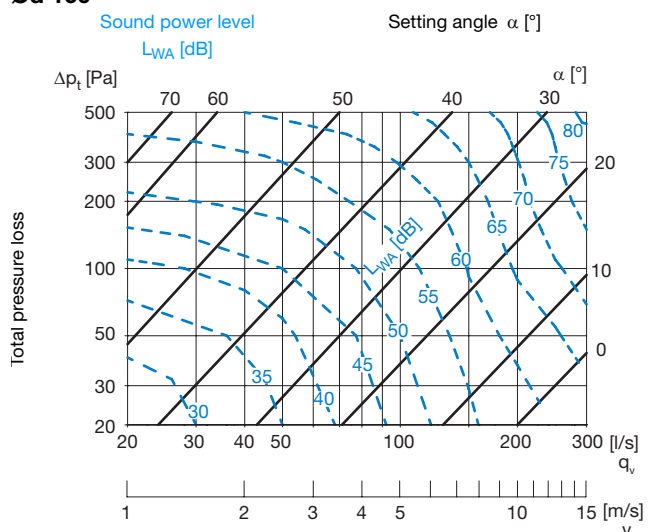
Ød 100



Ød 125



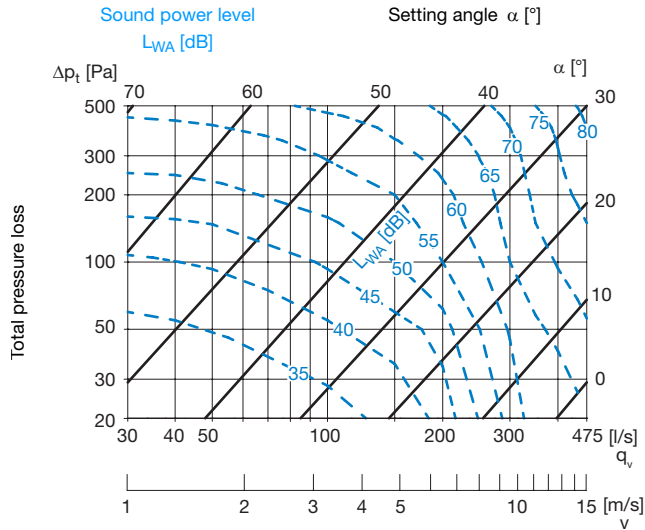
Ød 160



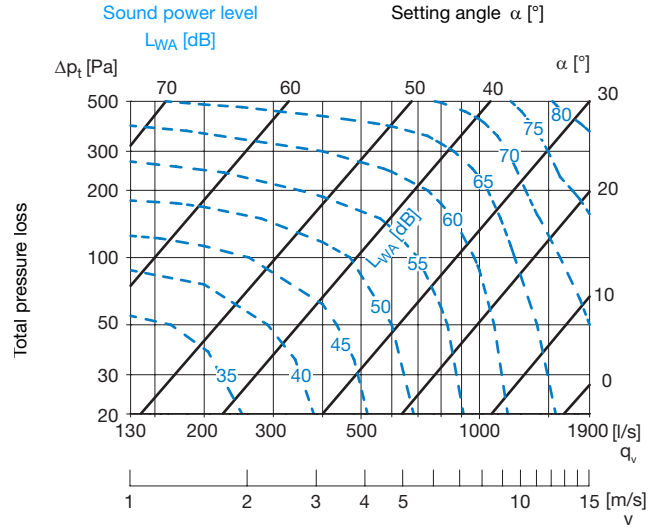
Volume flow regulator - circular VRU

Technical data

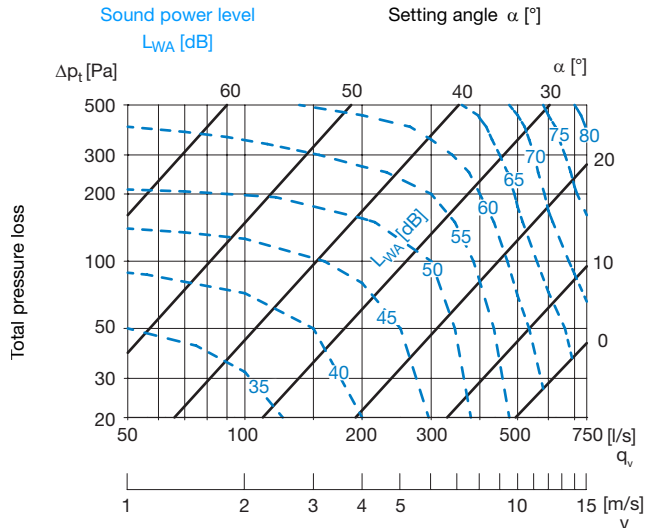
Ød 200



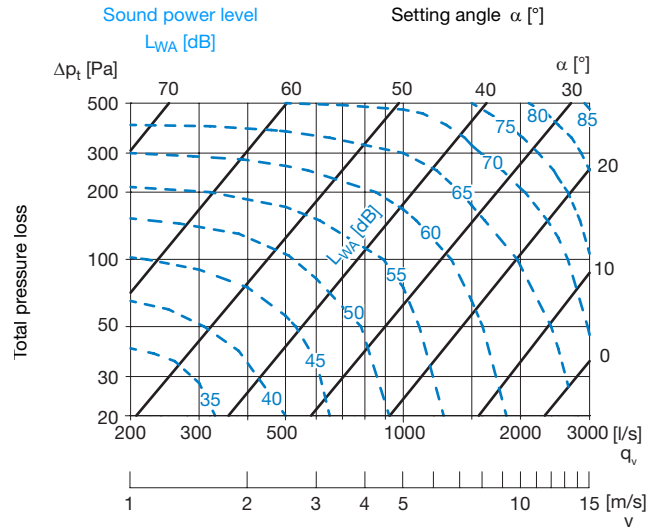
Ød 400



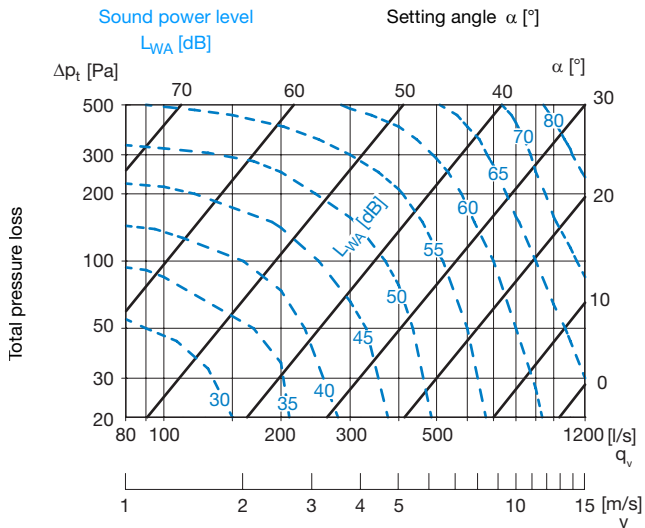
Ød 250



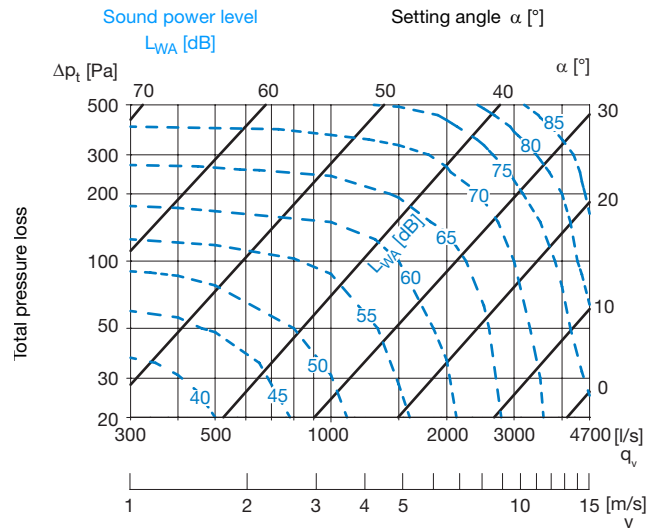
Ød 500



Ød 315



Ød 630



The Safe system

The Safe-system

- Safe is a quickly assembled system for round ventilation ducts.
- Safe is type approved to class D by SITAC, no. 1358/88.
- The complete programme has dimensions according to Eurovent 2/3 and Swedish Standard SS-EN 1506.
- The system is based on a double-lipped, factory-installed seal made from EPDM rubber. The moulding, which can withstand rough handling, and is almost insensitive to temperature changes, gives a very airtight seal.

Advantages of the Safe-system

- Quick assembly.
- Factory fitted seal with no loose fittings.
- Can be twisted and adjusted with tightness unaffected.
- Installation without sealant or solvents.
- Can be used in all climates.
- Seal moulding remains tight from 5 000 Pa negative pressure to 3 000 Pa positive pressure. Duct resistance to collapse differs from these pressures, and is noted on page 49.
- Type approved to sealing class D.

Click function

The Click function exists in principle on all Safe-products. The exceptions are stated under each product.

The Click function exists on the dimensions Ø 80–315.

The Click function means;

- that an end with male measure has an open turned-over end and
- that an end with female measure has a number of notches.

Type approval

Approval no 1358/88 means that the Safe-system complies with the requirements for tightness class D without any demand for pressure testing after installation.

The approval is only valid on condition that all fittings are marked by us in accordance with the example and are installed in accordance with the accompanying installation instruction.

Marking

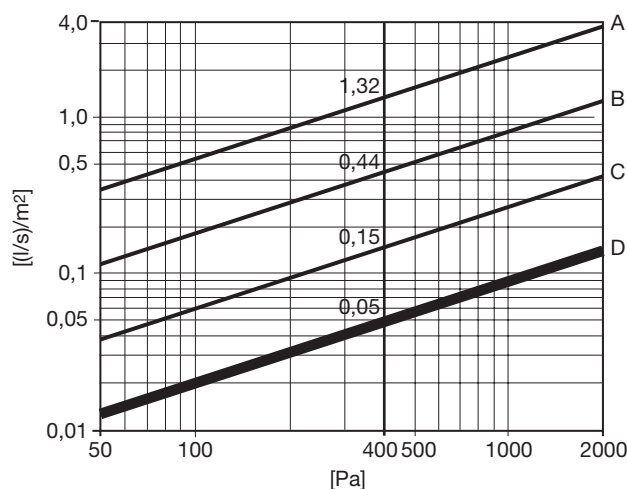
Each individual product is marked with a special label or stamped in the metal.



Tightness

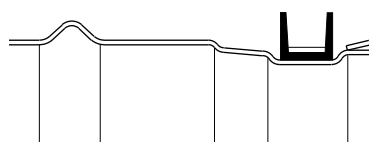
A duct system will never be “completely tight”. The system will normally have some leaks at joints between ducts and fittings. The leakage will also increase as the pressure difference between the in- and outside of the duct sides increases.

The leakage factor in (l/s)/m² is always specified in relation to the pressure difference in Pa. (The unit (l/s)/m² denotes the leakage flow in l/s in or out of the system in relation to its duct area in m².) The graph below shows the leakage factor for the sealing classes A–D as a function of the pressure difference.



The graph shows that sealing class D is 3 times better than class C, which in turn is 3 times better than class B etc. Class D thus entails demands on not only the seal moulding but also the fittings and how well the system is installed.

This is one reason why we have given all fittings a turned-over edge and have given still more fittings a stop bead. This gives us stable products which are better suited to withstand handling on site at the same time as the risk of skewed assembly falls.



Turned-over edge design

The Safe system

1

Economy – Tightness

Present-day stringent demands for interior climate entail expensive air treatment. Leakage leads to uneconomical operation, adjustment difficulties and over-dimensioned equipment. For this reason, it is important that ventilation systems are very well sealed, to keep overall costs down. This is why official requirements for sealing vary with the size and use of systems.

2

3

Inspection/Testing

In order to make Safe comply with the requirements of sealing class D, we have constant inspection procedures where we do daily sampling. Inspection is done on goods received from sub-contractors and our own production of ducts and fittings.

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Goods reception inspection complies with Swedish Standard for testing methods and batch acceptance levels. The inspection points include:

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1. Inspection of seal moulding inner diameter. This is particularly important for ageing resistance of the rubber. The greater the load on the rubber, either stretching or pressure, the faster the rubber ages, causing brittleness and cracking.
2. The seal moulding profile is measured in a profile projector, where the dimensions of the seal moulding are checked against agreed tolerances.
3. The seal moulding material is tested by accelerated ageing in heat oven.

8

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Manufacturing inspection is logged. The inspection includes a diameter check of ducts and fittings, a check of the groove where the seal moulding has been fixed, and a check of its fixing. Pressure testing is done in our air laboratory, to check the leakage flow from our products. This does not give the whole picture, however, so the best inspection of the Safe system is the pressure testing that The Swedish National and Testing Institute undertakes on randomly sampled products. In all these pressure tests, the Safe system has always exceeded the relevant sealing requirements.

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Fittings

Products under the Safe insert and fittings with Safe seals under the Silencers, Dampers and measure units, and Isol inserts are included in the type approval for sealing class D. In addition, some fittings, under the Other circular products insert, are included.

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A handful of fittings with the Safe seal can only manage up to tightness class C. This is marked on each of these products.

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Fittings in this catalogue with a “U” in their designations have Safe seals, with only a few exceptions.

18

Degreased

Fittings can be supplied degreased on the inside, to order.

Dimensions

Almost all products in the Safe-programme can also be delivered in intermediate dimensions. For further information see page 13.

Negative pressure

At big negative pressure there is a risk for a ventilation system to collapse. This risk is greater the bigger dimensions you have.

In order to increase the strength of *the ducts* you can e.g. increase their sheet metal thickness. This is a simple way but the effect is rather small. It exists other ways with higher result. For bigger dimensions then the ducts may be stronger than the fittings.

In order to increase the strength of *the fittings* other ways than thicker sheet metal thickness are more suitable.

Lindab has experience and knowledge about this and is willing to offer help at special cases. We can, as special, deliver duct systems that can withstand at least 5 000 Pa negative pressure.

The Safe system

Design

Our Safe seal system is based on a U-shaped profile of solid rubber. The seal moulding rests in a groove at the end of the fitting and is fixed with a steel strap.

As standard are Safe-fittings always supplied with an EPDM (ethylene-propylene rubber) seal moulding. The material has been chosen due to its long service life and the best possible resistance to ozone and UV radiation. It is also highly tolerant to temperature variations. Under normal conditions, the moulding can withstand:

-30 °C to +100 °C continuous
-50 °C to +120 °C intermittent

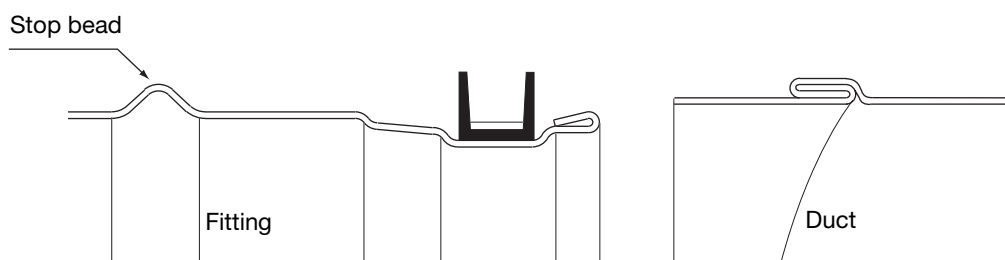
As special for installations which demand high temperature tolerance and somewhat higher oil resistance, Safe fittings can be supplied with a special silicone rubber moulding. This moulding is recognized by its blue colour. Mastic sealed fittings for higher temperatures are also produced with a more temperature resistant mastic. Temperature tolerance:

-70 °C to +150 °C continuous
-90 °C to +200 °C intermittent

When fittings are installed in ducts, the seal moulding lips will be bent backwards. This means that the seal will be better at withstanding negative pressure than positive pressure, since the negative pressure will tend to press the lips harder against the duct walls. The following pressure differences must not be exceeded, to cope with tightness class D.

Positive pressure in duct 3000 Pa
Negative pressure in duct 5000 Pa

Both Swedish and European standards allow a greater tolerance range between the duct and matching fittings as the diameter increases. In order to achieve maximum sealing for all dimensions, we have chosen to use successively bigger seal mouldings as duct dimensions increase.



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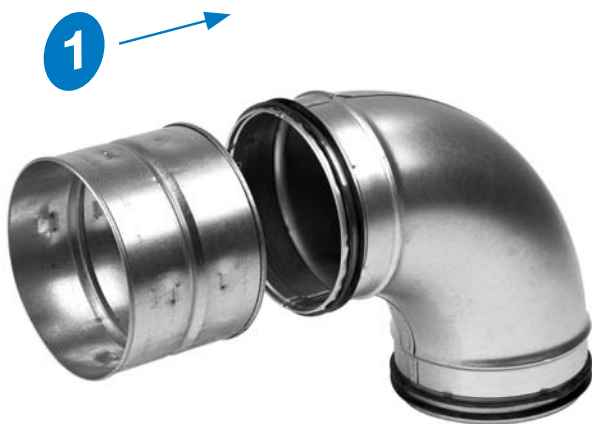
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Lindab Safe® Click Assemble easy and fast

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2 "CLICK"



The new, innovative duct system from Lindab is based on a principle well known to you. A simple click is all it takes to assemble ducts and fittings. Save time and create a perfect ventilation solution.

The new system is installed quickly and improves working conditions especially where space is limited. Lindab Safe Click is based on our well-known, tested and documented Safe system. We just added simplicity. One click and the job is done.

Advantages during installation

- Quick assembly
- Minimised use of screws or rivets
- Easy to install, especially where space is limited
- Better ergonomics
- Assembling and adjusting is made easier

Advantages during use

- Fewer holes from screws or rivets in the duct system and thereby a tighter system
- Fewer sharp parts from screws or rivets in the duct
- The ducts are easier to clean and the risk of bacteria growth is reduced
- Based on our well-known, tested and well-documented Lindab Safe system
- Compatible with other systems



Assembly Instruction

Lindab Safe and Lindab Safe Click

The Lindab Safe and the Lindab Safe Click duct system are type-approved, as per certificate no. 1358/88 issued by SITAC and are subject to continuous production checks.

This means that the requirements for air tightness class D are met if ducts and fittings of the systems are used and if assembly is performed as per these instructions.

The products covered by the type approval are either specified on the delivery note or are supplied with the following labelling. Labelling can comprise a sticker or an embossing on the sheet metal



NOTE! The assembly methods described herein only cope with the forces from the “Static pressure limits” defined in EN 12237. Forces from other sources, e.g. gravity or wind, have to be dealt with using other means, e.g. suspensions or supports.

NOTE! If the system shall be tested for air tightness, this shall be done before integration and insulation so that there is an opportunity for inspection and taking action. Any complaints regarding air tightness will only be dealt with provided the system is fully accessible for inspection.

Joining systems (general characteristics)

Lindab Safe	Lindab Safe Click
Is joined with screws or blind rivets.	Is joined with snapping heels, below called notches. Is based on Lindab Safe.
Spans all dimensions.	Spans only a restricted number of dimensions. See table 2. For the other dimensions use Lindab Safe.
	<p>Lindab Safe Click can be complementary joined with screws or blind rivets.</p> <p>This may be done in order to:</p> <ul style="list-style-type: none"> • achieve a stronger joint • prevent a joint from twisting • join a Click product with a non-Click product • join a Click product with a non-Click product to create an openable joint.

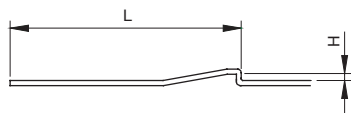
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Preparations for assembly

- Check that ducts and fittings to be used in the system are labelled as shown above.
- Store ducts and fittings in a well-ordered and weatherproof storage area to minimize the risk of damage. Do not use ducts or fittings that have been damaged in such a way that they jeopardise the air tightness or structural strength of the system.

Lindab Safe	Lindab Safe Click
<ul style="list-style-type: none"> • Cut ducts at right angles. Carefully remove any burrs from cut edges. Installation is easier and the risk of damaging the gasket is reduced if there are no burrs. Also cut away the two needles created from the fold. 	<ul style="list-style-type: none"> • Cut ducts at right angles. This is an uncompromisable demand for Lindab Safe Click. Carefully remove any burrs from cut edges. Installation is easier and the risk of damaging the gasket is reduced if there are no burrs. Also cut away the two needles created from the fold.
	<ul style="list-style-type: none"> • If a duct is cut – make notches around its circumference. See table 1 and 2.
<ul style="list-style-type: none"> • Carefully seal any holes left by measurements, removed screws, blind rivets, etc. 	<ul style="list-style-type: none"> • Carefully seal any holes left by measurements etc.

Table 1. Size and location of notches



Ø [mm]	Click Pliers		L [mm]
	40.1	60.1	
80–224	H _{min} [mm] 2,0	H _{min} [mm] –	30,5–32,5
250–315	H _{min} [mm] –	H _{min} [mm] 2,5	50,5–52,5

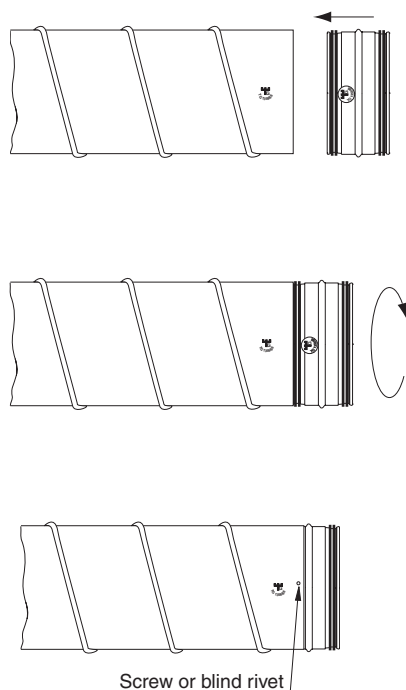
Table 2. Number of fasteners and notches

Ø [mm]	Lindab Safe	Lindab Safe Click	
		Click Pliers	
		40.1	60.1
	Minimum number of fasteners required to achieve sufficient strength.	Recommended number of notches required to achieve sufficient strength.	
63	2	–	–
80–112	2	2	–
125–160	3	4	–
180–224	3	4	–
250–315	4	–	4
355–630	4	–	–
710–1250	6	–	–
	Depending on the means of suspension, a larger number of fasteners than this may be required to achieve sufficient structural strength of a duct system.	Depending on the means of suspension, a larger number of notches than this may be required to achieve sufficient structural strength of a duct system. A greater number of notches makes it harder to assemble the parts.	

Assembly

Lindab Safe	Lindab Safe Click
1. Start by inserting the turned-over edge of the fitting into the duct.	1. Insert the fitting's turned-over edge into the duct.
2. Check that the first lip of the gasket is in contact with the edge of the duct all the way around and sticks straight out so that the lip is not twisted in one direction or the other.	2. Check that the gasket's first lip is in contact with the duct's edge all the way around and points straight out so that the lip is not twisted in any direction.
3. Push the end of the fitting into the duct. Twisting the fitting slightly aids insertion.	3. Push the first part of the fitting into the duct to just before the notches. Twisting the fitting slightly aids insertion.
4. Secure the fitting in the duct using self-tapping screws or airtight blind rivets. NOTE! Use only the types allowed by Lindab when going for tightness class C or D. See table 3.	4. Push the rest of the fitting into the duct and over the notches. Bend the fitting or duct back and forward slightly in order not to pass all notches at the same time aids insertion.
5. Fasteners should be positioned 10–15 mm from the end of the duct to prevent damage to the gasket.	5. The fitting is secured to the duct when the fitting's end has snapped behind all the notches.
6. Always position fasteners at the present largest radial gap between fitting and duct. Be sure to achieve an even distribution around the circumference.	6. After assembly it's possible to rotate the fitting.

Lindab Safe



Lindab Safe Click

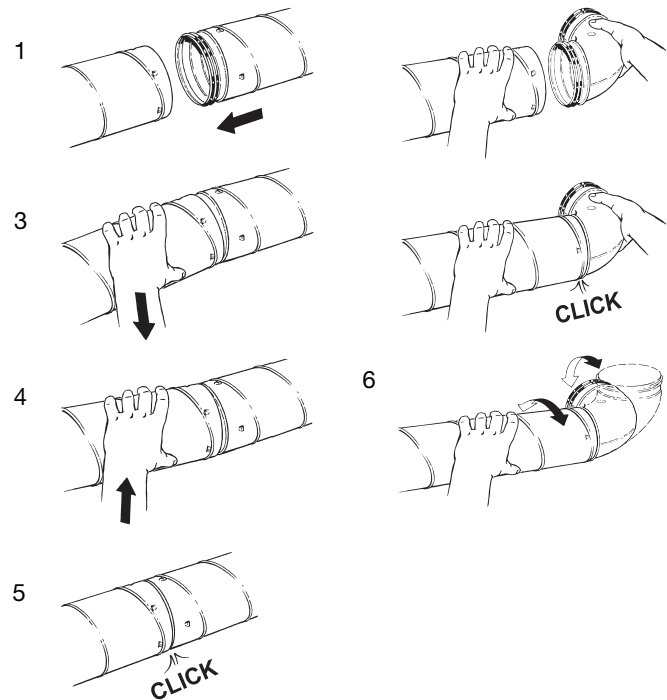
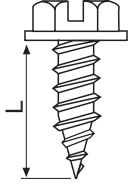
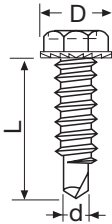
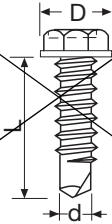




Table 3. Allowed and banned screws and blind rivets

	<p>Screw with sharp tip</p> <ul style="list-style-type: none"> • Very tight • Strong since it forms a collar in the thin sheet metal 	<p>Allowed by Lindab</p>
	<p>Screw with reduced drill tip</p> <ul style="list-style-type: none"> • Very tight • Strong since it only drills off a small part of the thin sheet metal 	<p>Allowed by Lindab</p>
	<p>Screw with drill tip</p> <ul style="list-style-type: none"> • Not tight • Weak since it drills off a big part of the thin sheet metal 	<p>Banned by Lindab</p>
	<p>Pressure-tight blind rivet</p> <ul style="list-style-type: none"> • Very tight • Strong • Very laborious to install 	<p>Allowed by Lindab</p>
	<p>Blind rivet</p> <ul style="list-style-type: none"> • Not tight if the inner splint falls out • Strong • Laborious to install 	<p>Banned by Lindab</p>

Hints!

Turning and bending the fitting slightly as you insert it into the duct aids assembly and removal.

If ducts and fittings are round, assembly is much easier. Lindab has placed high demands on roundness during the design and production stages, but large heavy fittings in particular have a tendency to be slightly oval because of their weight. These often become round when suspended, which is why you should use the brackets to make the components round and in this way simplify assembly.

Carefully tapping the surface of the duct with your hand normally makes assembly a lot easier, as it reduces the friction between duct and fitting, and the fitting tries to move to the right side if there are burrs and irregularities.

When cutting, be sure to remove burrs properly. Also cut away the two needles created from the fold.

For larger dimensions, Lindab has moved the gasket away from the edge, which makes assembly much easier.

If you have to reinstall a product, take care to seal old holes from screws or blind rivets which can cause leaks and noise.

Products with special seals

Some fittings, such as the collar saddle PSU, T-pieces TSTCU, TSTU and take-offs ILRU, ILU, ILF, have one more connection than Lindab Safe or Lindab Safe Click. This connection must be sealed so that they definitely meet the requirements for air-tightness class C or D. Sealing material used must be durable and permanently elastic.

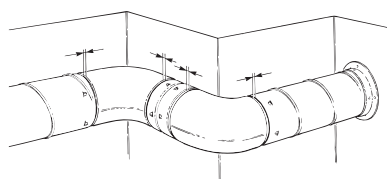
Products without Click

Some fittings, such as the slide-in female coupling SMFU, the end caps EPF and ESU and of course the cleaning covers EPFH, ESHU, KCU and KCIVU, do not have any Click function in order to make them easier to remove.

Use of products other than Lindab Safe or Lindab Safe Click

Products that do not formally fulfil the requirements for air tightness class C or D may only be used to a small extent. If such items are used, they must be carefully checked with regard to seal design and strength. They must be sealed so that they definitely meet the requirements for air-tightness class C or D. Sealing material used must be durable and permanently elastic.

To join parts temporarily to check if length of duct or system run is all right.	
Lindab Safe	Lindab Safe Click
Solution: 1 Join together to check. 2 Then take apart – and cut if necessary the duct length. 3 Join together with screws or blind rivets.	Solution 1: 1 Use a duct without notches in the end/ends. 2 Join together to check. 3 Then take apart – and cut if necessary the duct length. 4 Make notches in the duct. 5 Click-join together. Solution 2: 1 Use a duct with notches in the end/ends. 2 Join together to check – but don't join the parts completely so they click together. 3 Then take apart – and cut if necessary the duct length and make new notches. 4 Click-join together.

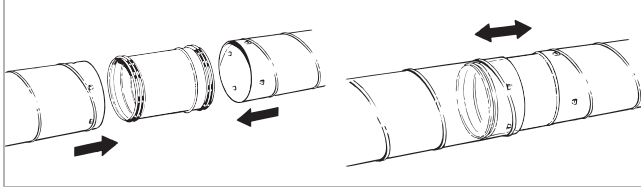


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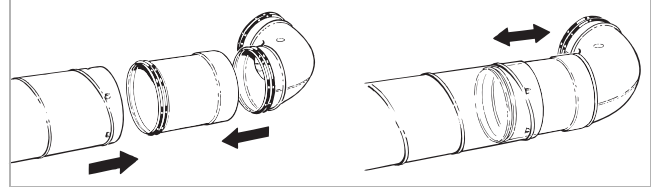
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To lengthwise adjust joined products instead of cutting the duct.	
Lindab Safe	Lindab Safe Click
<p>Solution:</p> <ol style="list-style-type: none"> 1 Use products with sliding property. E.g. slide-in coupling SNPU or slide-in female coupling SMFU. 2 Join together with screws or blind rivets. 	<p>Solution:</p> <ol style="list-style-type: none"> 1 Use products with sliding property. E.g. slide-in coupling SNPU or slide-in female coupling SMFU. 2 Join together with screws or blind rivets.

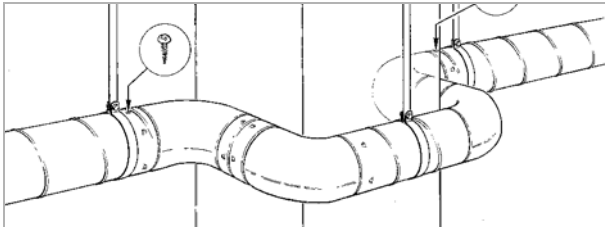
Slide-in coupling



Slide-in female coupling

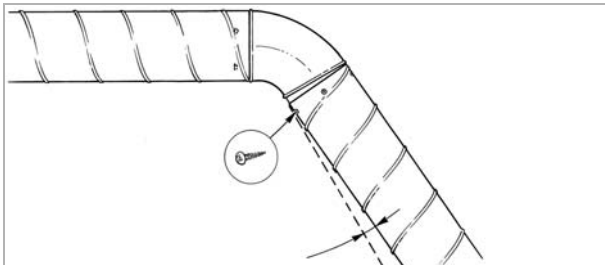


The joint must be locked



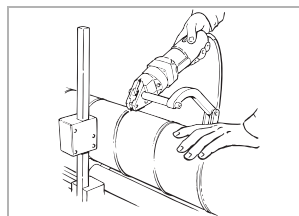
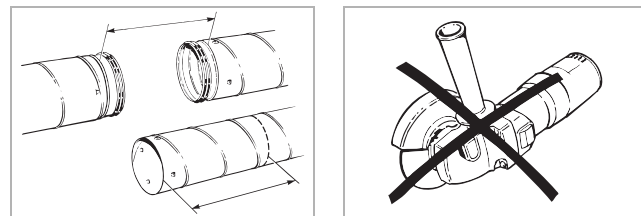
In situations where the mounting must be locked, e.g. when a bend is mounted to a duct and it twists downwards the floor. Mount the first hanger and mount the bend, then lock the joint with a screw or blind rivet.

Corners out of angle and curved walls

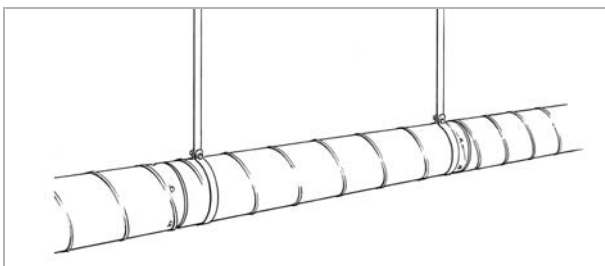


Mount the next piece of duct at an angle, but make sure that the rubber sealant is not visible. Put screws or blind rivets where the notches have not clicked in position.

Cutting duct with the SR Cutter



Suspension

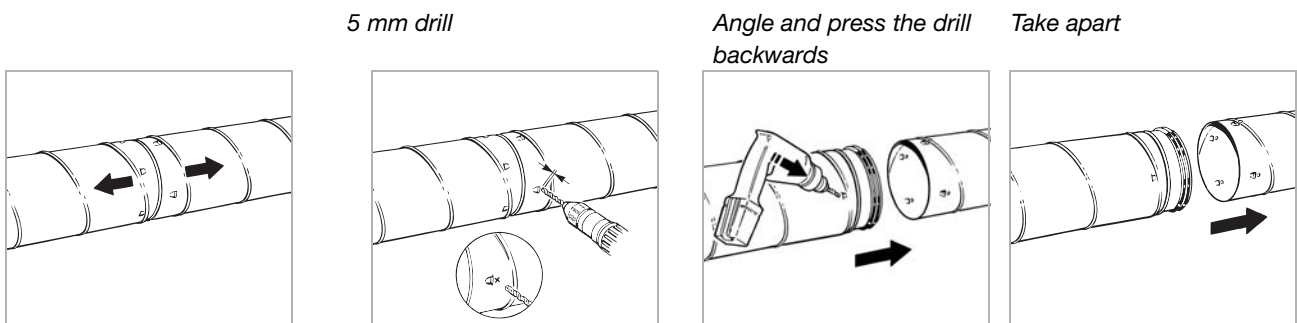


Mount the hangers in a straight line and as close to every joint as possible. Fix with an extra screw when needed for extra stability.

Dismantling

To separate joined products.	
Lindab Safe	Lindab Safe Click
<p>Solution:</p> <ol style="list-style-type: none"> 1 Unscrew the screws or drill away the blind rivets. 2 Twist the product loose. 3 The fitting will now have leaking holes but can be reused if these holes are carefully sealed off with mastic or tape. 	<p>Solution:</p> <ol style="list-style-type: none"> 1 Drill a 5 mm hole in the duct 4 mm behind the notch with the drill angled backward and 2 turn in the same moment the drill back so the fitting and duct are separated somewhat from each other. With the right technique the fitting remains undamaged and can be reused. 3 Repeat if necessary at more notches. 4 Twist the product loose. 5 Cut away the drilled through duct end.

Lindab Safe Click

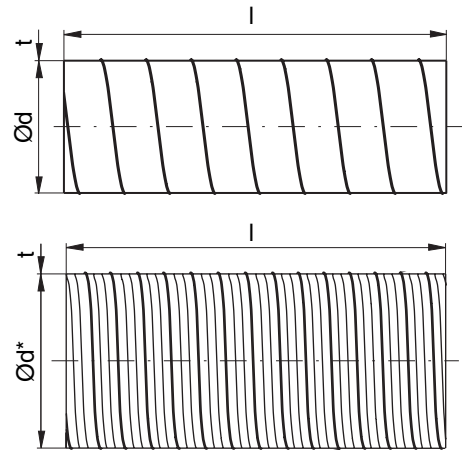


Circular duct

SR



Dimensions



Description

Circular duct.

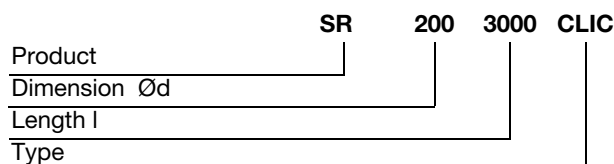
Ducts are always produced locally and can therefore have different thicknesses and other specifications per country.

The ducts can be produced both with and without click function (notches).

Please specify when ordering.

Ød std nom	O πd m	A πd ² /4 m ²	t std mm	l std mm	ml std kg/m
63	0,198	0,003	0,5	3000	0,89
80	0,251	0,005	0,45	3000	0,91
100	0,314	0,008	0,45	3000	1,14
112	0,352	0,010	0,5	3000	1,42
125	0,393	0,012	0,45	3000	1,41
140	0,440	0,015	0,5	3000	1,76
150	0,471	0,018	0,5	3000	1,89
160	0,503	0,020	0,5	3000	2,02
180	0,565	0,025	0,5	3000	2,26
200	0,628	0,031	0,5	3000	2,56
224	0,704	0,039	0,6	3000	3,42
250 *	0,785	0,049	0,5	3000	3,18
280	0,880	0,062	0,55	3000	3,92
300 *	0,942	0,071	0,55	3000	4,20
315 *	0,990	0,078	0,55	3000	4,41
355 *	1,115	0,099	0,55	3000	4,96
400 *	1,257	0,126	0,55	3000	6,01
450 *	1,414	0,159	0,7	3000	8,60
500 *	1,571	0,196	0,7	3000	9,54
560 *	1,759	0,246	0,8	3000	12,2
600 *	1,885	0,283	0,7	3000	13,1
630 *	1,979	0,312	0,7	3000	12,0
710 *	2,231	0,396	0,8	3000	15,5
800 *	2,513	0,503	0,8	3000	17,4
900 *	2,827	0,636	0,9	3000	21,7
1000 *	3,142	0,785	0,9	3000	24,1
1120 *	3,519	0,985	0,9	3000	27,0
1250 *	3,927	1,227	0,9	3000	30,2
1400 *	4,398	1,539	1,25	2400	48,0
1500 *	4,712	1,767	1,25	2400	51,4
1600 *	5,027	2,011	1,25	2400	54,8

Ordering example

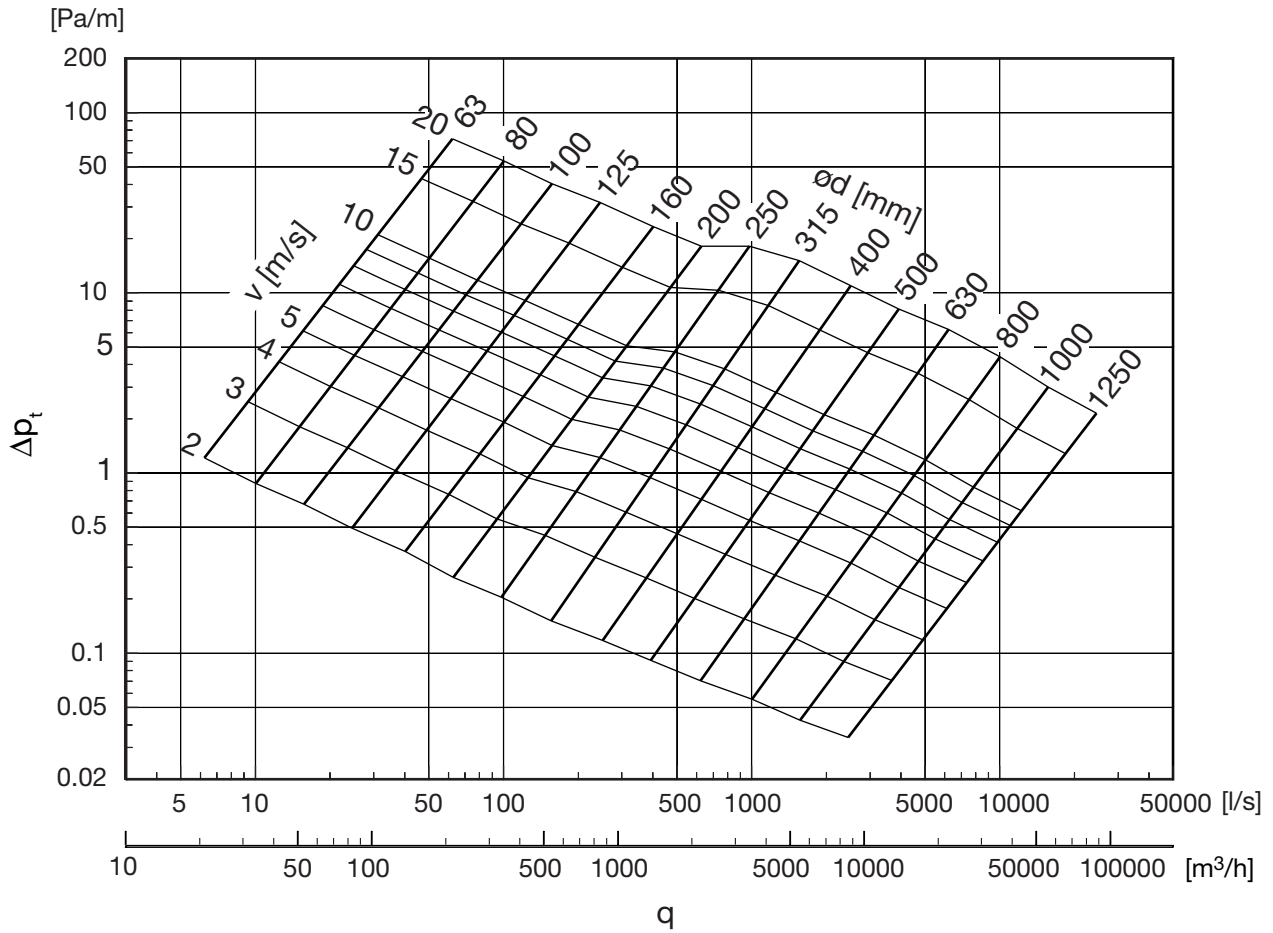


* With outturned stiffening corrugation.

Circular duct

SR

Technical data



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Circular duct

SR

Technical data

Special versions

We can supply ducts with the following special designs:

- In intermediate dimensions, see page 15.
- Extra tight, with nitrile rubber seal in the lock seam
- In other sheet metal thicknesses

Extra tight, with seam seal

When extremely good sealing is required in the spiral seam, the ducts can also be supplied with a special rubber seal in the seam.

This seal is very effective at stopping leakage of vegetable oils and greases, and most petroleum products including white spirit.

Other sheet metal thicknesses

If extra stability is needed in ducts, because of high negative pressure etc., they can be supplied with thicker sheet metal than standard. Remember that the thickness increase always reduces the inner diameter. Fittings for such special ducts must be specified separately and sometimes have to be made specially.

Reinforcement corrugations

Ducts of Ø250 mm and above are normally given stiffening corrugations to increase radial stiffness.

Strength

Positive pressure

In case of high positive pressure, the seal moulding lips will first start to whistle. At considerably higher pressure, the joints between the ducts will be forced apart. If you manage to fix the connections very well, the ducts will burst at their seams at even higher pressure. The high pressures needed for this to happen are not relevant to ventilation installations.

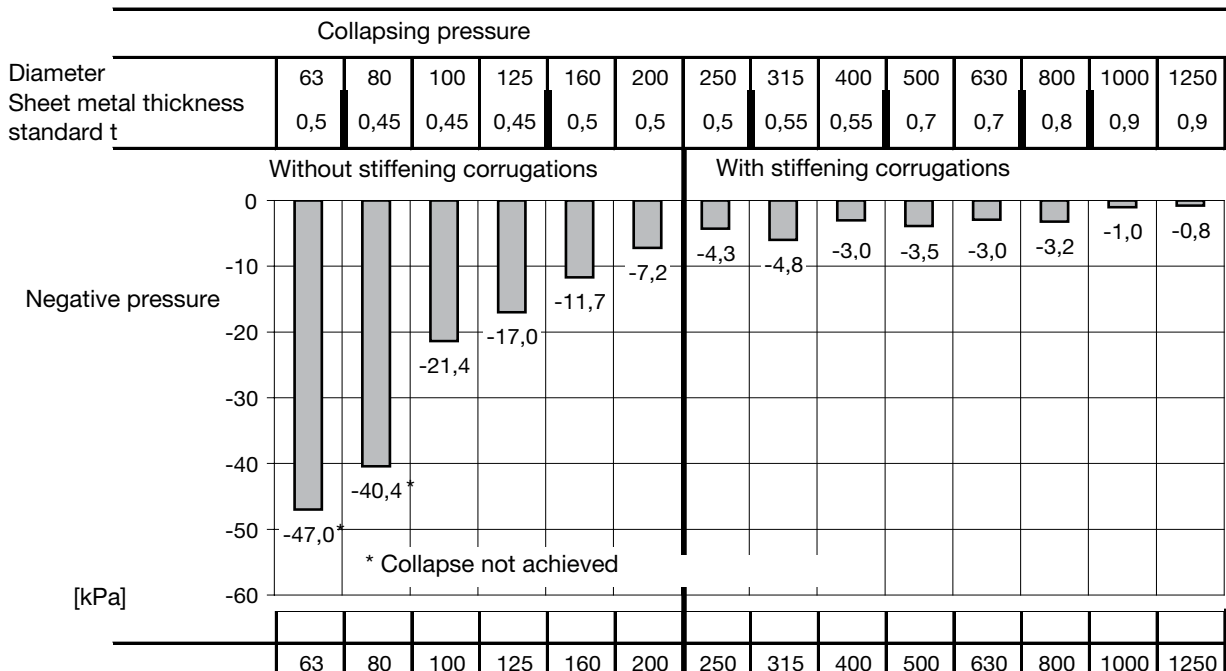
Negative pressure

In installations with high negative pressure, there is a risk that the ducts could collapse.

This phenomenon is referred to as buckling, and can suddenly happen at the weakest point in the system. Buckling wanders along the duct, which can be completely flattened. The weakest point is frequently a "transport dent" on a duct. For this reason, only use undamaged ducts in systems which are close to the critical pressure!

Sealing

The ability of the seal moulding to seal is different from these pressures, and is noted on page 45.

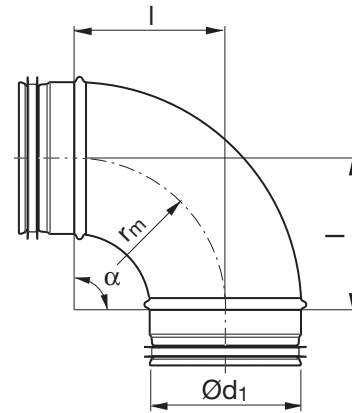


Bend

BU 90°



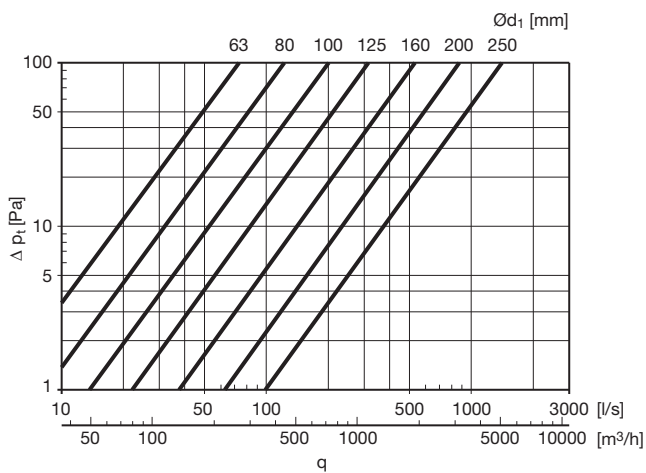
Dimensions



$$r_m \approx 1 \cdot d_1$$

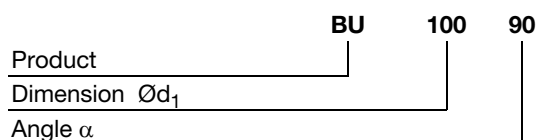
Description

Pressed and seam welded bend.



$\text{Ø}d_1$ nom	l mm	m kg
63	110	0,20
80	105	0,26
100	100	0,31
112	120	0,39
125	125	0,48
140	135	0,66
150	150	0,66
160	160	0,62
180	180	1,02
200	200	1,12
224	225	1,33
250	242	1,77

Ordering example

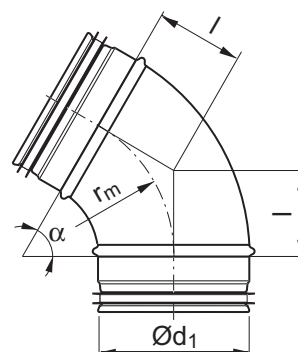


Bend

BU 60°



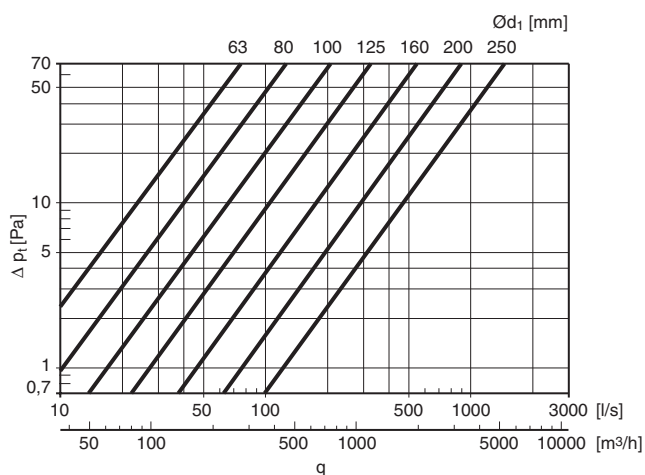
Dimensions



$$r_m \approx 1 \cdot d_1$$

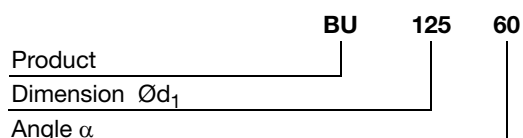
Description

Pressed and seam welded bend.



Ød ₁ nom	l mm	m kg
63	64	0,30
80	58	0,32
100	58	0,33
112	69	0,37
125	72	0,33
140	78	0,51
150	87	0,50
160	92	0,56
180	104	0,79
200	115	0,82
224	130	0,95
250	144	1,12

Ordering example



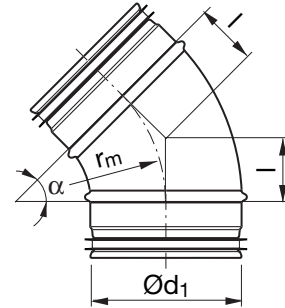
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Bend

BU 45°



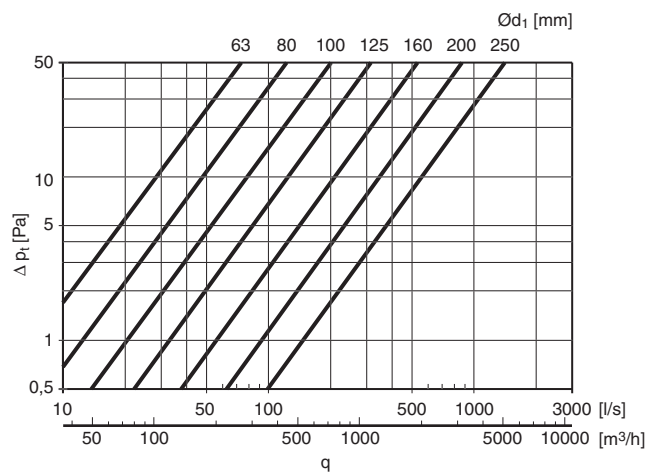
Dimensions



$$r_m \approx 1 \cdot d_1$$

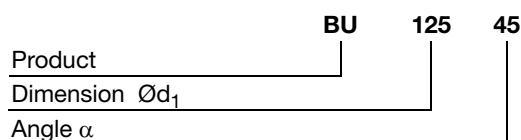
Description

Pressed and seam welded bend.



$\text{Ø}d_1$ nom	l mm	m kg
63	46	0,16
80	41	0,17
100	41	0,21
112	81	0,24
125	52	0,29
140	56	0,43
150	62	0,42
160	66	0,48
180	76	0,65
200	83	0,80
224	93	0,82
250	103	1,05

Ordering example

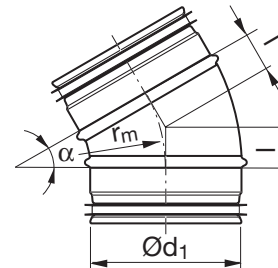


Bend

BU 30°



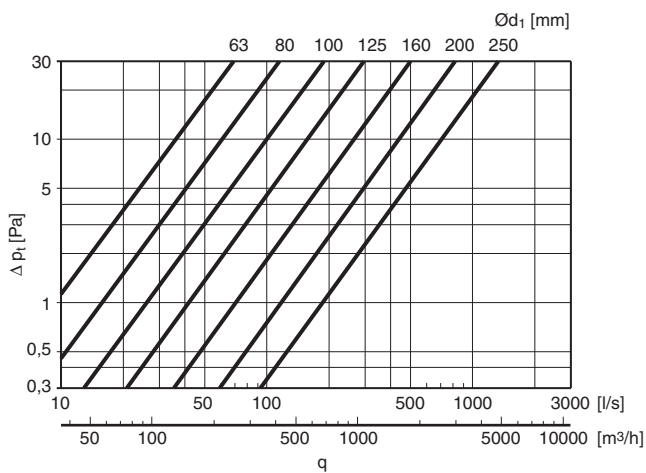
Dimensions



$$r_m \approx 1 \cdot d_1$$

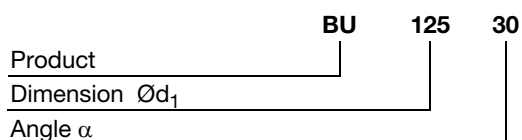
Description

Pressed and seam welded bend.



$\text{O}d_1$ nom	l mm	m kg
63	29	0,13
80	27	0,15
100	27	0,18
112	30	0,21
125	33	0,20
140	36	0,36
150	40	0,35
160	43	0,32
180	48	0,51
200	54	0,62
224	60	0,72
250	67	0,91

Ordering example



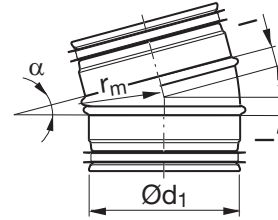
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Bend

BU 15°



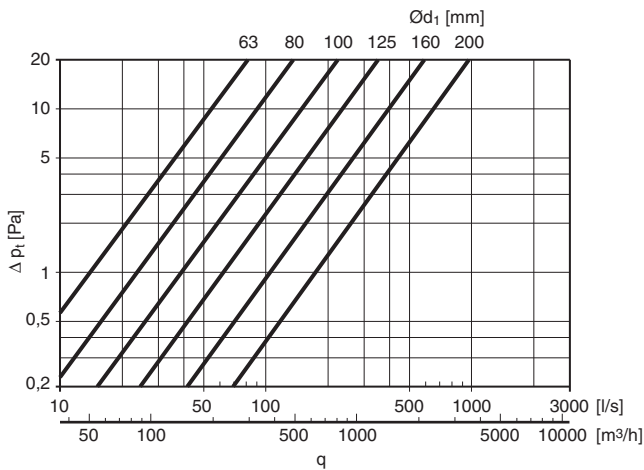
Dimensions



$$r_m \approx 1 \cdot d_1$$

Description

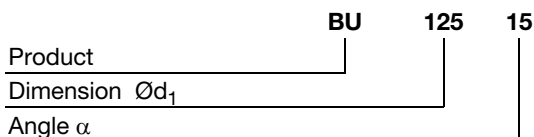
Pressed and seam welded bend.



$\text{Ø}d_1$ nom	l mm	m kg
63 *	14	0,09
80 *	13	0,11
100	13	0,15
112 *	25	0,29
125	16	0,18
140 *	18	0,29
150 *	20	0,27
160	21	0,24
180 *	24	0,37
200	26	0,35
224 *	30	0,56

* Segmented and lockseamed

Ordering example

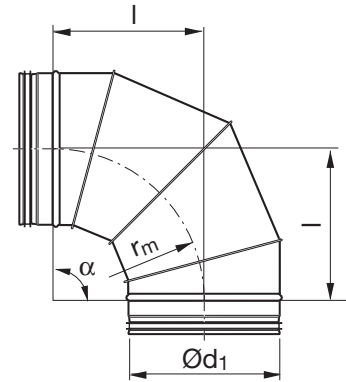


Bend – lockseamed

BFU 90°



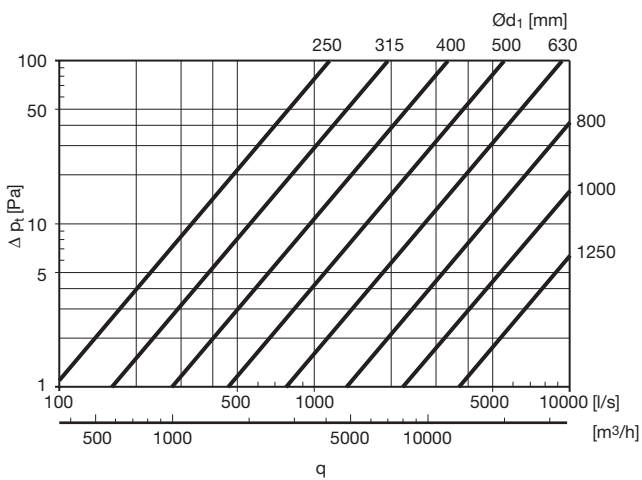
Dimensions



$$r_m \approx 1 \cdot d_1$$

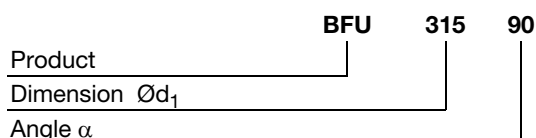
Description

Segmented and lockseamed bend.



$\text{Ø}d_1$ nom	l mm	m kg	Number of segments
250	250	2,20	4
280	280	2,50	4
300	300	2,7	4
315	315	3,00	4
355	355	3,75	4
400	400	5,64	4
450	450	7,00	4
500	500	8,20	4
560	560	10,1	4
600	600	11,7	4
630	630	12,9	4
710	710	19,8	4
800	800	26,0	4
900	900	33,6	4
1000	1000	42,0	5
1120	1120	52,6	5
1250	1250	64,0	5

Ordering example



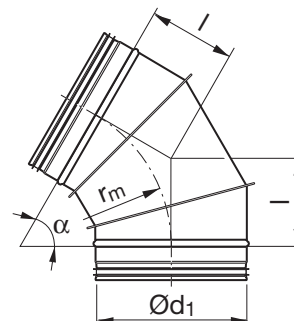
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Bend – lockseamed

BFU 60°



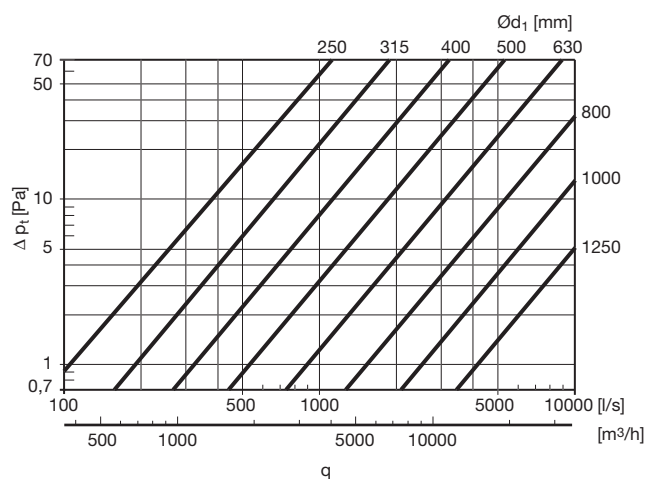
Dimensions



$$r_m \approx 1 \cdot d_1$$

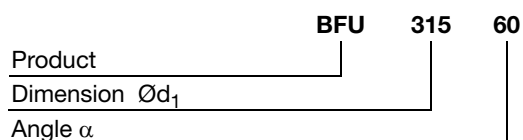
Description

Segmented and lockseamed bend.



$\text{Ø}d_1$ nom	l mm	m kg
250	144	1,48
280	162	1,80
300	173	2,00
315	182	2,20
355	205	2,80
400	231	3,47
450	260	4,70
500	289	6,00
560	323	7,40
600	346	8,60
630	364	9,20
710	410	11,3
800	462	14,8
900	520	19,3
1000	577	24,2
1120	647	30,1
1250	722	36,6

Ordering example

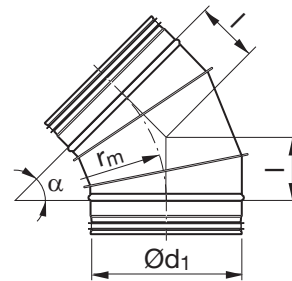


Bend – lockseamed

BFU 45°



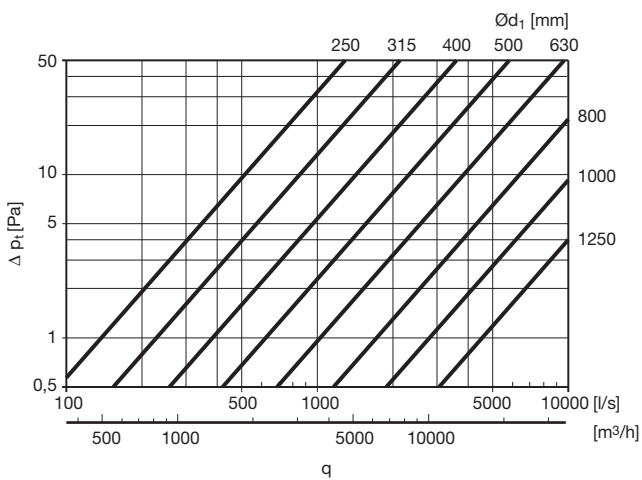
Dimensions



$$r_m = 1 \cdot d_1$$

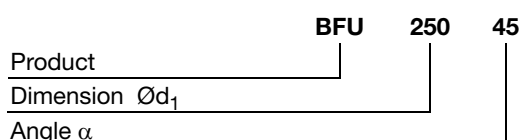
Description

Segmented and lockseamed bend.



$\text{O} d_1$ nom	l mm	m kg
250	104	1,26
280	116	1,54
300	124	1,77
315	130	1,90
355	147	2,26
400	166	2,96
450	186	4,00
500	207	4,90
560	232	6,10
600	249	6,80
630	261	7,49
710	294	11,3
800	331	15,0
900	373	16,8
1000	414	19,5
1120	464	28,5
1250	518	38,0

Ordering example

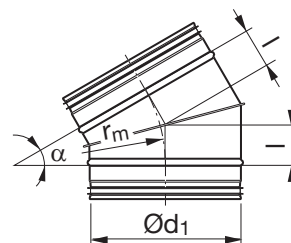


Bend – lockseamed

BFU 30°



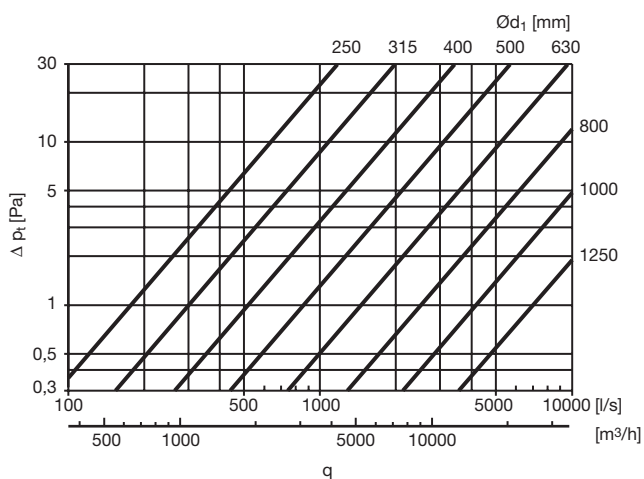
Dimensions



$$r_m = 1 \cdot d_1$$

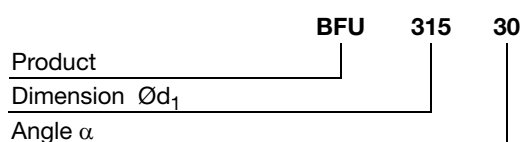
Description

Segmented and lockseamed bend.



$\text{Ø}d_1$ nom	l mm	m kg
250	67	1,00
280	75	1,10
300	80	1,30
315	84	1,42
355	95	1,70
400	107	2,27
450	121	3,00
500	134	3,70
560	150	4,60
600	161	5,10
630	169	5,60
710	190	8,60
800	214	11,0
900	241	10,9
1000	268	13,4
1120	300	16,1
1250	335	19,0

Ordering example

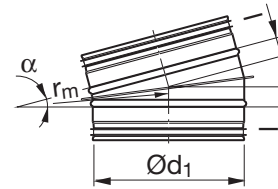


Bend – lockseamed

BFU 15°



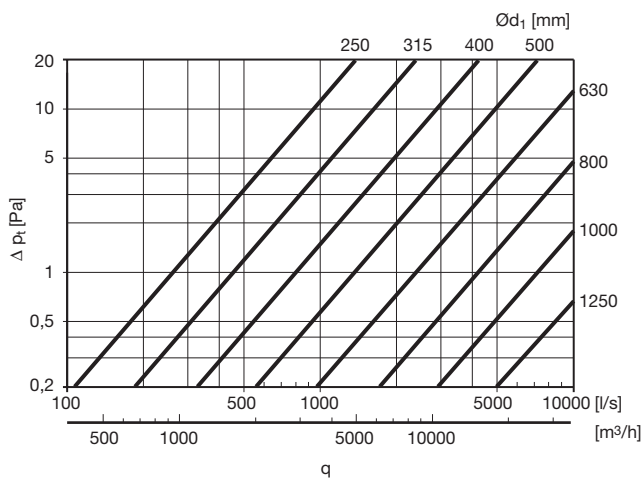
Dimensions



$$r_m = 1 \cdot d_1$$

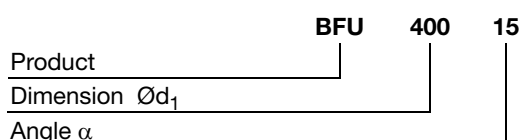
Description

Segmented and lockseamed bend.



$\text{Ø}d_1$ nom	l mm	m kg
250	33	0,65
280	37	0,77
300	39	0,85
315	41	0,91
355	47	1,41
400	53	1,70
450	59	2,20
500	66	2,65
560	74	3,30
600	79	3,70
630	83	4,00
710	93	5,80
800	105	7,00
900	118	8,50
1000	132	10,4
1120	147	12,5
1250	165	14,5

Ordering example



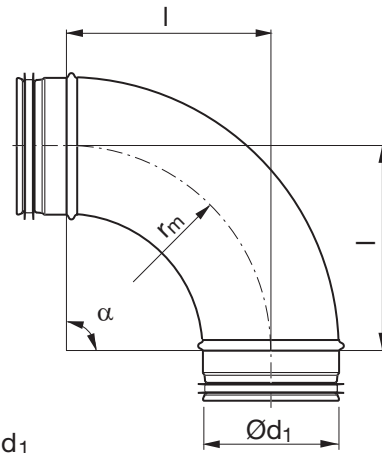
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Bend – long

BSU 90°



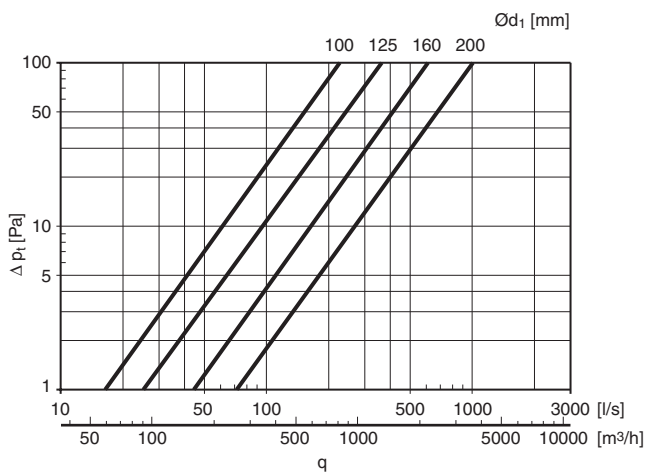
Dimensions



$r_m \approx 1,5 \cdot d_1$

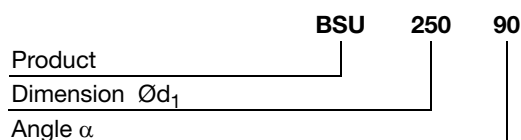
Description

Pressed and seam welded bend.



$\text{Ø}d_1$ nom	l mm	m kg
100	150	0,50
125	190	0,79
150	225	0,95
160	240	1,14
180	270	1,50
200	300	1,55

Ordering example

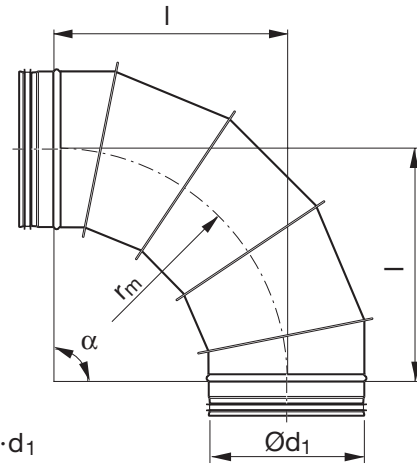


Bend – long, lockseamed

BSFU 90°



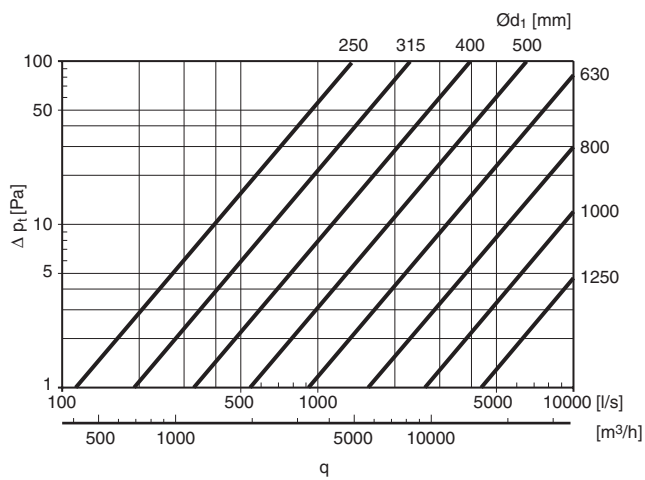
Dimensions



$r_m \approx 1,5 \cdot d_1$

Description

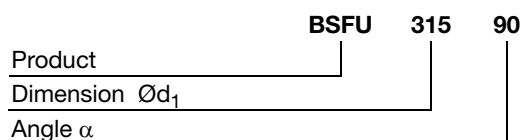
Segmented and lockseamed bend.



O_{d_1} nom	l mm	m kg
250	375	2,70
280	420	3,33
300	450	3,60
315	473	4,20
355	533	4,60
400	600	8,30
450	675	10,2
500	750	11,9
560	840	15,2
600	900	17,0
630	945	18,8
710	1065	22,7
800	1200	26,9
900	1350	39,3
1000	1500	47,7
1120	1680	63,0
1250	1875	78,5

...

Ordering example

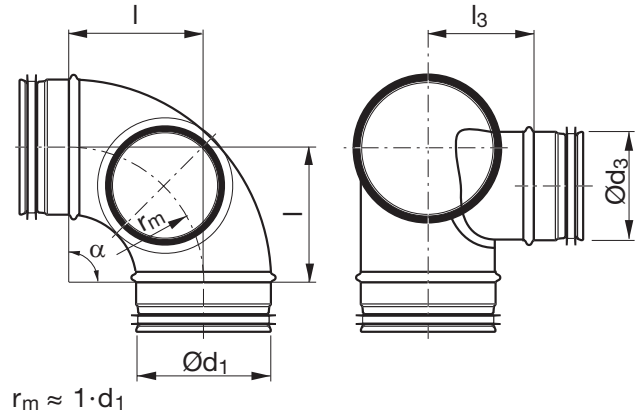


Cleaning bend

BKCU 90°

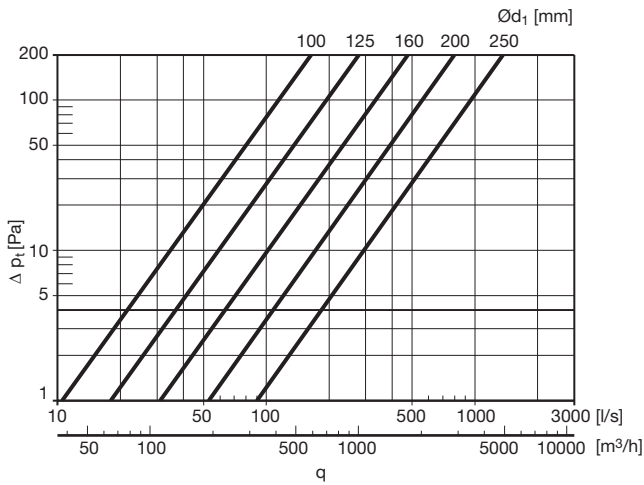


Dimensions



Description

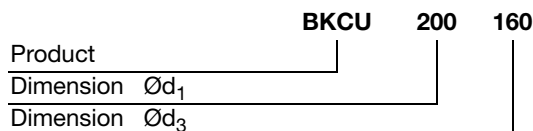
Pressed and seam welded bend with separate branch for cleaning. The stud is fitted with a Safe take-off and fits an inspection cap. The design gives a lower pressure drop than the equivalent design using a T-piece. The stud can also be used as the connection for an SR duct.



The graph applies to a cleaning bend with cleaning cap. Pressure drop is independent of take-off dimension ($\text{O}d_3 \leq \text{O}d_1$).

$\text{O}d_1$ nom	$\text{O}d_3$ nom	l mm	l ₃ mm	m kg
100	100	100	75	0,41
112	100	120	85	0,50
125	100	125	90	0,59
125	125	125	90	0,66
140	125	135	100	0,75
150	125	150	105	0,78
160	125	160	110	0,97
160	160	160	110	0,97
180	160	180	120	1,18
200	160	200	130	1,24
200	200	200	130	1,28
224	200	225	140	1,57
250	200	250	155	1,93
250	250	250	150	2,01

Ordering example

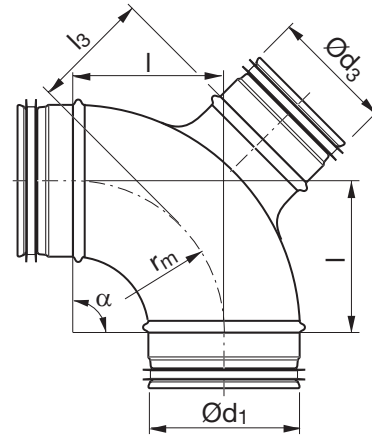


Cleaning bend

BBKCU 90°



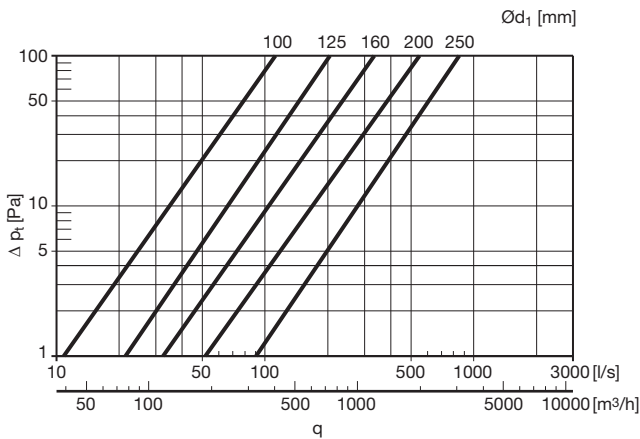
Dimensions



$$r_m \approx 1 \cdot d_1$$

Description

Pressed and seam welded bend with separate branch for cleaning. The stud is fitted with a Safe take-off and fits an inspection cap.



The graph applies to a cleaning bend with cleaning cap EPFH and with the same dimension of take-off and main duct ($\text{Ø}d_3 = \text{Ø}d_1$).

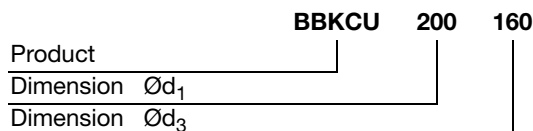
The pressure drop is about 30% lower for cleaning cap KCU and $\text{Ø}d_3 = \text{Ø}d_1$.

The pressure drop is about 30% lower for cleaning cap EPFH and one step smaller take-off dimension ($\text{Ø}d_3 < \text{Ø}d_1$).

The pressure drop is about 50% lower for cleaning cap KCU and one step smaller take-off dimension ($\text{Ø}d_3 < \text{Ø}d_1$).

$\text{Ø}d_1$ nom	$\text{Ø}d_3$ nom	l mm	l ₃ mm	m kg
100	100	100	75	0,42
112	100	120	78	0,51
125	100	125	78	0,58
125	125	125	83	0,58
140	125	135	90	0,75
150	125	150	90	0,77
160	125	160	100	0,97
160	160	160	105	0,96
180	160	180	108	1,20
200	160	200	125	1,24
200	200	200	125	1,29
224	200	225	128	1,67
250	200	250	150	2,02
250	250	250	150	2,12

Ordering example



Measuring bend

MBFU



Description

Applications

The measuring bend is suitable both for balancing and for continuous flow measurement. It is intended for permanent installation and must therefore be specified at the design stage. The measuring bend is a good choice, since bends are normally used in all installations.

There is a separate assembly, measuring, balancing and maintenance instruction for this product.

Design

The measuring bend consists of a segmented and lock-seamed 90° Safe bend with measuring nozzles on the inner and outer radii. The nozzles are asymmetrically located on the centreline, for manufacturing reasons. Each nozzle has a removable plastic plug which prevents dirt from entering. It also eliminates air leakage when measurement is not done.

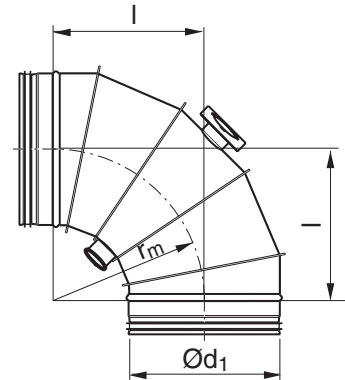
The unit allows insulation of up to 50 mm thickness to be installed without concealing the measurement nozzle or the label plate. The plate can be rotated for best legibility, irrespective of the way the unit is installed and can easily be removed, to be located away from the unit. If thicker insulation is needed, add the insulation cup IK to the standard cup.

Thanks to the robust design of the standard cup, the measurement nozzles are securely protected both before and after installation.

Ordering example

	MBFU	500	90
Product			
Dimension Ød ₁			
Angle α			

Dimensions



$$r_m \approx 0,9 \cdot d_1$$

Ød ₁ nom	l mm	m kg
315	300	3,18
400	360	5,82
500	454	8,38
630	566	13,1

Advantages

- Has a double function – both as a bend and as a meter.
- Does not increase pressure drop, compared with a standard Safe bend.
- Does not cause any noise, due to projecting components in the duct.
- Does not obstruct duct cleaning.

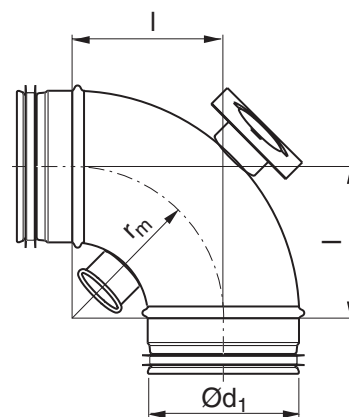
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Measuring bend

MBU



Dimensions



$$r_m \approx 1 \cdot d_1$$

Ød ₁ nom	l mm	m kg
100	100	0,40
125	125	0,60
160	160	1,02
200	200	1,23
250	250	1,74

Description

Applications

The measuring bend is suitable both for balancing and for continuous flow measurement. It is intended for permanent installation and must therefore be specified at the design stage. The measuring bend is a good choice, since bends are normally used in all installations.

There is a separate assembly, measuring, balancing and maintenance instruction for this product.

Design

The measuring bend consists of a pressed and seam welded 90° Safe bend with measurement nozzles on the inner and outer radii. The nozzles are asymmetrically located on the centreline, for manufacturing reasons. Each nozzle has a removable plastic plug which prevents dirt from entering. It also eliminates air leakage when measurement is not done.

The unit allows insulation of up to 50 mm thickness to be installed without concealing the measurement nozzle or the label plate. The plate can be rotated for best legibility, irrespective of the way the unit is installed and can easily be removed, to be located away from the unit. If thicker insulation is needed, add the insulation cup IK to the standard cup.

Thanks to the robust design of the standard cup, the measurement nozzles are securely protected both before and after installation.

Advantages

- Has a double function – both as bend and as flow meter.
- Does not increase pressure drop, compared with a standard Safe bend.
- Does not cause any noise, due to projecting components in the duct.
- Does not obstruct duct cleaning.

Ordering example

	MBU	250	90
Product			
Dimension Ød ₁			
Angle α			

Measuring bend

MBFU



Description

Applications

The measuring bend is suitable both for balancing and for continuous flow measurement. It is intended for permanent installation and must therefore be specified at the design stage. The measuring bend is a good choice, since bends are normally used in all installations.

There is a separate assembly, measuring, balancing and maintenance instruction for this product.

Design

The measuring bend consists of a segmented and lock-seamed 90° Safe bend with measuring nozzles on the inner and outer radii. The nozzles are asymmetrically located on the centreline, for manufacturing reasons. Each nozzle has a removable plastic plug which prevents dirt from entering. It also eliminates air leakage when measurement is not done.

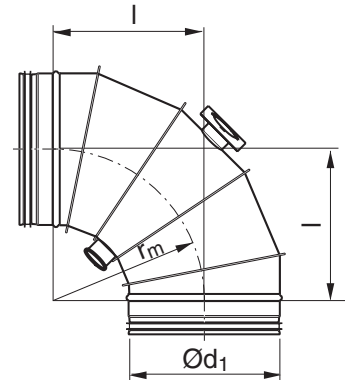
The unit allows insulation of up to 50 mm thickness to be installed without concealing the measurement nozzle or the label plate. The plate can be rotated for best legibility, irrespective of the way the unit is installed and can easily be removed, to be located away from the unit. If thicker insulation is needed, add the insulation cup IK to the standard cup.

Thanks to the robust design of the standard cup, the measurement nozzles are securely protected both before and after installation.

Ordering example

	MBFU	500	90
Product			
Dimension $\varnothing d_1$			
Angle α			

Dimensions



$$r_m \approx 0,9 \cdot d_1$$

$\varnothing d_1$ nom	l mm	m kg
315	300	3,18
400	360	5,82
500	454	8,38
630	566	13,1

Advantages

- Has a double function – both as a bend and as a meter.
- Does not increase pressure drop, compared with a standard Safe bend.
- Does not cause any noise, due to projecting components in the duct.
- Does not obstruct duct cleaning.

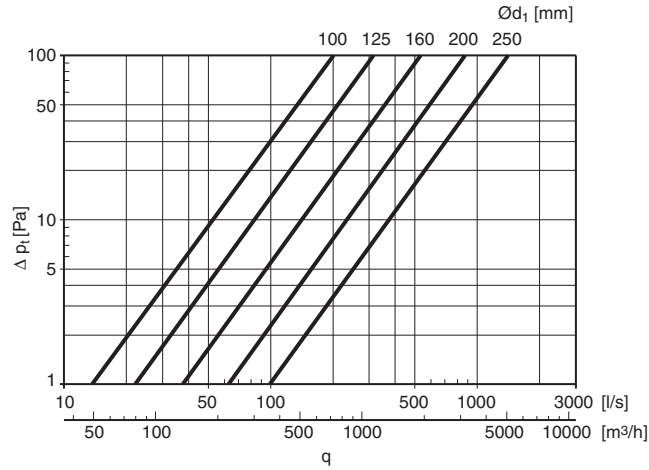
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Measuring bends

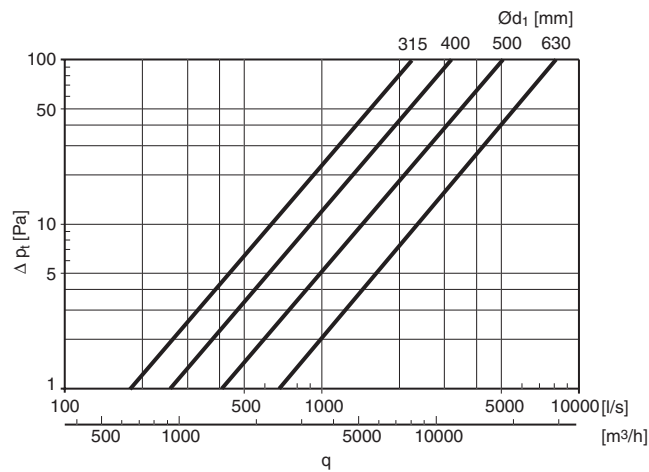
MBU, MBFU

Technical data

Pressure drop graph for dimensioning of MBU

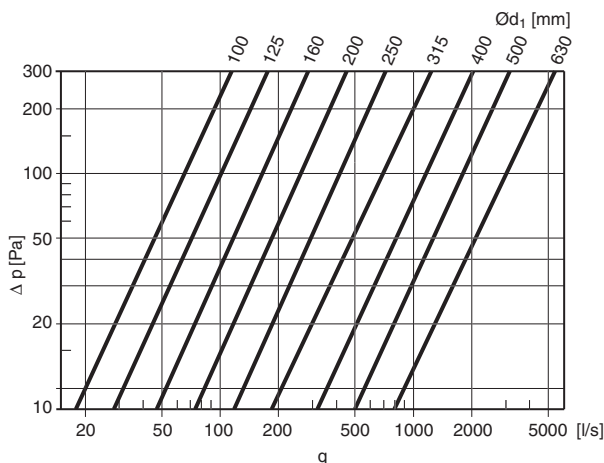


Pressure drop graph for dimensioning of MBFU



Flow graph for balancing

The curves show the flow, q , as a function of the pressure difference in the measurement nipples. Flow data for dimensioning differ from this graph



Measurement function

By measuring the pressure difference, Δp , between the inner and outer bend radii, you can derive the flow in the duct by means of the equation on the units plate.

Measurement accuracy

If the velocity profile is asymmetric, the measurement values can differ from the ideal values. For this reason, the measuring bend should never be located right up to any flow disturbance. The method error, as shown in the table below will differ, depending on the distance to the flow disturbance.

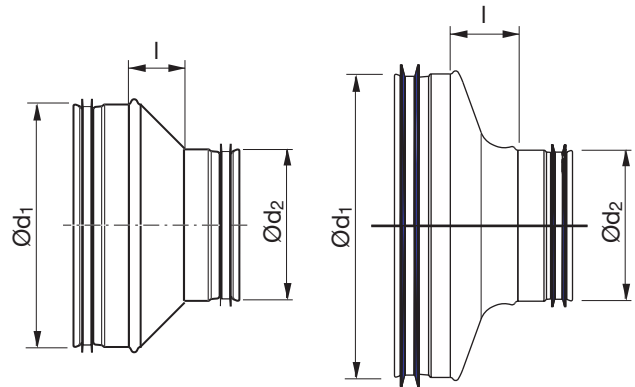
l_1 = straight distance before measuring bends. Type of disturbance	Method error m_2	
	5%	10%
<p>A 90° bend</p>	8,5· d_1	4,5· d_1
<p>A rotary damper (45°). Shaft in line with the measurement nozzles</p>	9,0· d_1	6,0· d_1
l_2 = straight distance after measuring bend	2· d_1	2· d_1

Reducer

RCU



Dimensions



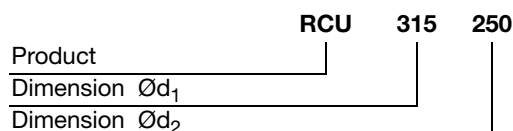
Description

Pressed, concentric reducer to meet demands for short installation length with low pressure drop and low internal noise generation.

Pressure drop, see graphs on page 90.

Ød ₁ nom	Ød ₂ nom	l mm	m kg
80	63	18	0,12
100	63	30	0,17
100 *	80	26	0,18
125 *	80	36	0,16
125 *	100	27	0,21
150	100	36	0,17
150 *	125	31	0,15
160	80	55	0,31
160 *	100	46	0,17
160 *	125	35	0,22
160	150	22	0,26
180	100	55	0,24
180	125	40	0,37
180	150	27	0,29
180	160	20	0,26
200 *	100	46	0,22
200 *	125	55	0,30
200	150	37	0,37
200 *	160	39	0,29
200	180	26	0,35
224	150	48	0,53
224	160	44	0,53
224	180	34	0,48
224	200	24	0,45
250	125	70	0,62
250	150	62	0,60
250 *	160	60	0,46
250	180	47	0,59
250 *	200	42	0,46
250	224	29	0,57
300 *	200	59	0,64
300	250	34	0,71
315	160	91	0,86

Ordering example



Reducer

$\varnothing d_1$ nom	$\varnothing d_2$ nom	l mm	m kg
315 *	200	74	0,72
315 *	250	50	0,65
355	250	69	1,08
355	315	33	0,99
400	200	118	1,37
400	250	94	1,38
400	315	54	1,29
500 **	250	128	2,30
500	315	95	1,90
500	400	68	1,76
630 **	315	160	3,37
630 **	400	118	3,17
630 **	500	68	2,89

* With stream-lined transition

** Hand made

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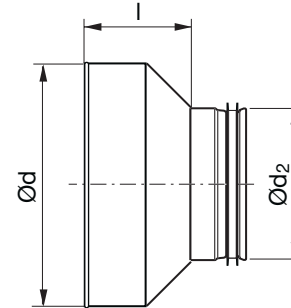
18

Reducer

RCFU



Dimensions



Description

Pressed, concentric reducer with female coupling, with a 45° angle to meet demands for short installation length with low pressure drop and low internal noise generation. Ød fits outside another fitting.

Pressure drop, see graphs on page 90.

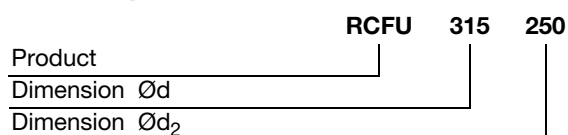
Has Click function at the Safe end – has an open turned-over end.

Has normally not any Click function at the female end – hasn't any notches.

Ø 80–315 can upon order be delivered with click function at the female end as well – i.e. with notches.

Ød nom	Ød ₂ nom	l mm	m kg
80	63	57	0,11
100	63	70	0,14
100 *1	80	61	0,16
125 *1	80	73	0,16
125 *1	100	64	0,14
150	100	78	0,16
150 1	125	66	0,17
160 *	80	92	0,24
160 *1	100	83	0,16
160 *1	125	71	0,20
160	150	59	0,25
180	100	98	0,24
180	125	85	0,31
180	150	68	0,24
180	160	66	0,27
200 *1	100	84	0,23
200 *1	125	90	0,27
200	150	75	0,34
200 *1	160	73	0,26
200	180	63	0,32
224	150	92	0,45
224	160	87	0,49
224	180	76	0,46
224	200	66	0,45
250 *	125	133	0,57
250	150	122	0,56
250 *1	160	117	0,40
250	180	107	0,55
250 *1	200	103	0,42
250	224	89	0,53
300	200	119	0,68
300	250	94	0,66
315 *	160	153	0,82

Ordering example



Reducer

RCFU

Ød nom	Ød ₂ nom	l mm	m kg
315 * ¹	200	134	0,77
315 * ¹	250	108	0,65
355	250	136	1,04
355	315	97	0,89
400 *	200	196	1,31
400 *	250	174	1,37
400 *	315	133	1,20
500 **	250	208	2,12
500 **	315	185	2,09
500 **	400	150	1,95
630 **	315	240	2,76
630 **	400	198	2,72
630 **	500	148	2,69

* With turned-over edge

** Hand made

¹ With stream-lined transition

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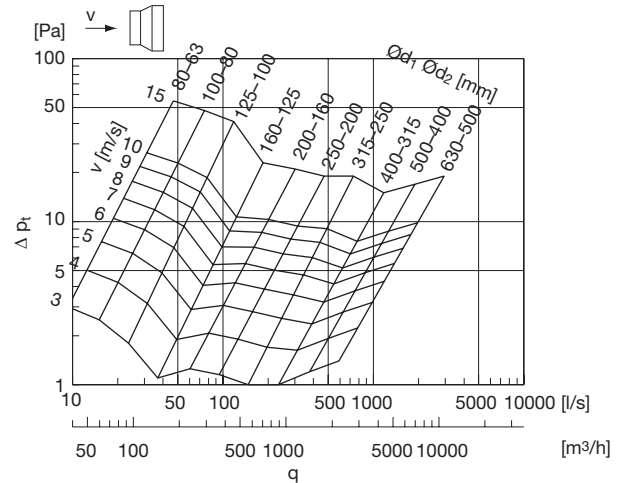
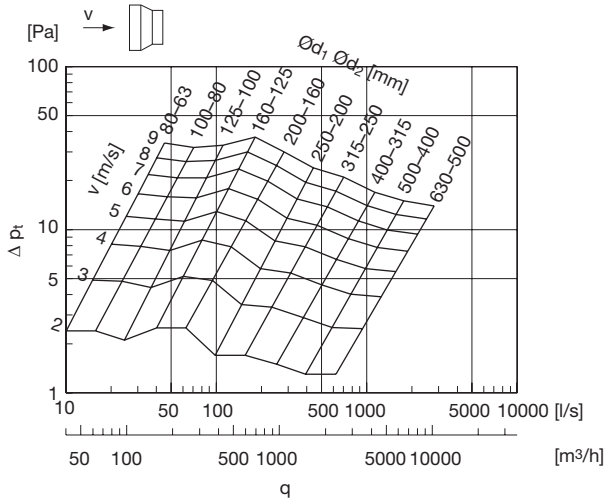
18

Reducers

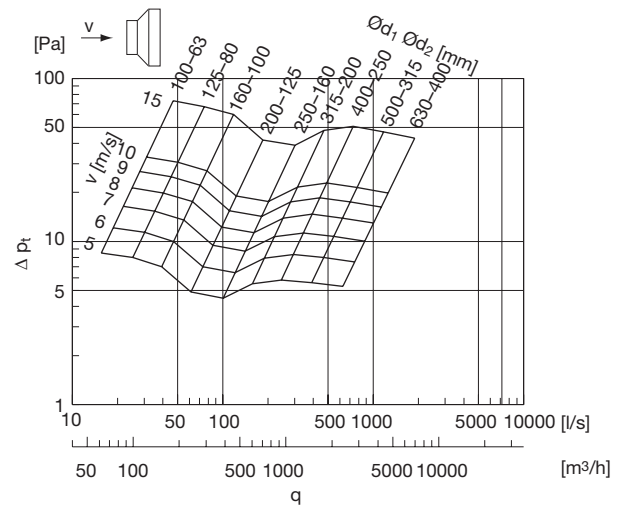
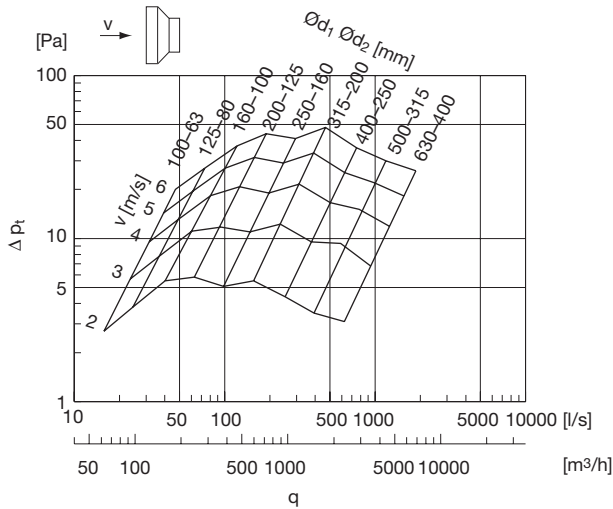
RCU, RCFU

Technical data

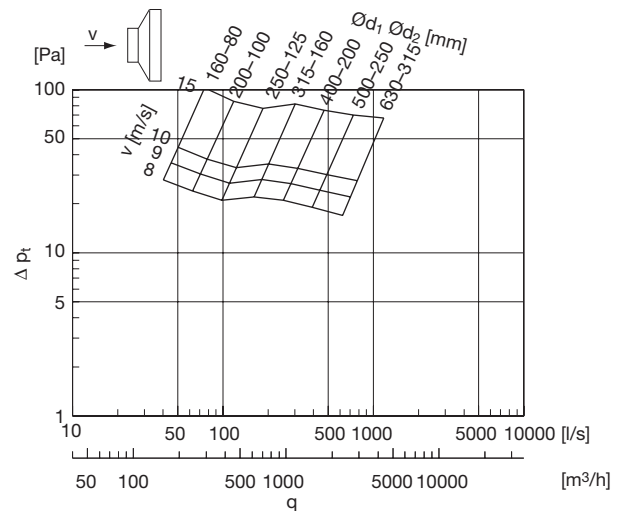
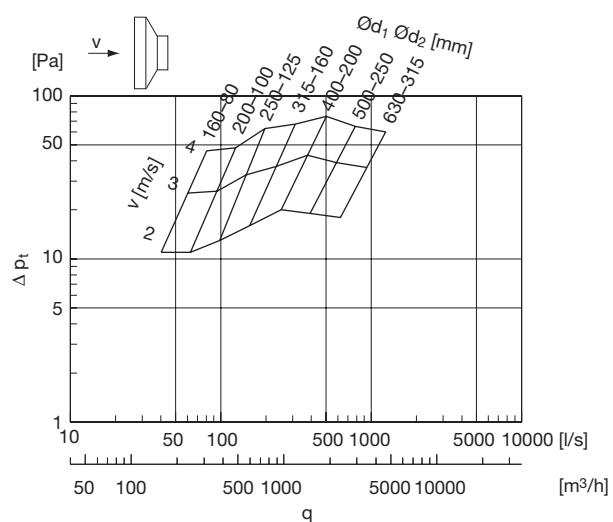
1 dimension step



2 dimension steps



3 dimension steps



Reducer

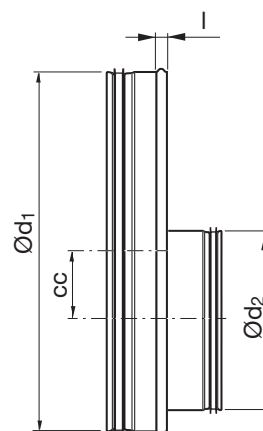
RU



Description

Short, eccentric reducer to achieve extremely short installation length.

Dimensions



Ød ₁ nom	Ød ₂ nom	cc mm	l mm	m kg
400	200	90	12	1,42
400	224	78	12	1,48
400	250	65	12	1,54
400	280	50	12	1,53
400	300	40	12	1,52
400	315	33	12	1,51
400	355	13	12	1,13
450	250	90	4	1,76
450	280	75	4	1,75
450	300	65	4	1,74
450	315	58	4	1,73
450	355	38	4	1,64
450	400	15	4	1,31
500	250	115	12	1,98
500	280	100	12	1,97
500	300	90	12	1,96
500	315	83	12	1,95
500	355	63	12	1,87
500	400	40	12	1,92
500	450	15	12	1,46
560	315	113	4	2,29
560	355	93	4	2,21
560	400	70	4	2,26
560	450	45	4	1,80
560	500	20	4	1,70
600	315	133	4	2,63
600	355	113	4	2,54
600	400	90	4	2,60
600	450	65	4	2,14
600	500	40	4	2,56
600	560	10	4	1,87
630	315	148	4	2,85
630	355	128	4	2,77

Ordering example

	RU	400	315
Product			
Dimension Ød ₁			
Dimension Ød ₂			

Reducer

RU

$\varnothing d_1$ nom	$\varnothing d_2$ nom	cc mm	l mm	m kg
630	400	105	4	2,82
630	450	80	4	2,36
630	500	55	4	2,78
630	560	25	4	2,09
630	600	5	4	1,90
710	400	145	4	3,43
710	450	120	4	2,97
710	500	95	4	3,39
710	560	65	4	2,70
710	600	45	4	2,51
710	630	30	4	2,48
800	400	190	4	4,06
800	450	165	4	3,60
800	500	140	4	4,02
800	560	110	4	3,33
800	600	90	4	3,14
800	630	75	4	3,75
800	710	35	4	3,06
900	500	190	4	5,30
900	560	160	4	4,58
900	600	140	4	4,36
900	630	125	4	4,95
900	710	85	4	4,20
900	800	40	4	4,01
1000	500	240	4	6,52
1000	560	210	4	5,80
1000	600	190	4	5,58
1000	630	175	4	6,17
1000	710	135	4	5,42
1000	800	90	4	5,23
1000	900	40	4	4,94
1120	630	235	4	7,59
1120	710	195	4	6,48
1120	800	150	4	6,64
1120	900	100	4	6,36
1120	1000	50	4	5,46
1250	630	300	4	9,69
1250	710	260	4	8,94
1250	800	215	4	8,74
1250	900	165	4	8,46
1250	1000	115	4	7,56
1250	1120	55	4	7,53

Reducer

RFU

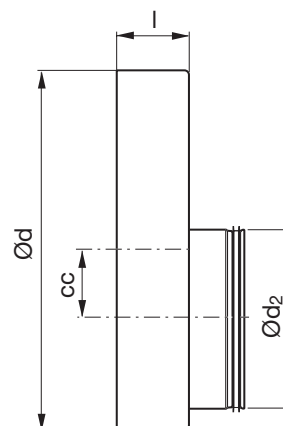


Description

Short, eccentric reducer with female end to achieve extremely short installation length.

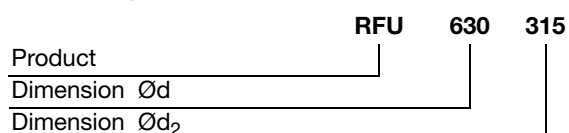
Ød fits outside another fitting.

Dimensions



Ød nom	Ød ₂ nom	cc mm	l mm	m kg
400 *	200	90	80	1,33
400	224	78	80	1,39
400 *	250	65	80	1,44
400	280	50	80	1,43
400	300	40	80	1,43
400 *	315	33	80	1,42
400	355	13	80	0,99
450	250	90	80	1,76
450	280	75	80	1,75
450	300	65	80	1,74
450	315	58	80	1,73
450	355	38	80	1,69
450	400	15	80	1,31
500	250	115	80	2,09
500	280	100	80	2,08
500	300	95	80	2,07
500	315	83	80	2,06
500	355	63	80	1,98
500	400	40	80	2,03
500	450	15	80	1,57
560	315	113	80	2,39
560	355	93	80	2,32
560	400	70	80	2,36
560	450	45	80	1,90
560	500	20	80	1,80
600	315	133	80	2,62
600	355	113	80	2,54
600	400	90	80	2,59
600	450	65	80	2,53
600	500	40	80	2,54
600	560	10	80	1,86
630	315	148	80	2,79
630	355	128	80	2,71

Ordering example



Reducer

RFU

Ød nom	Ød ₂ nom	cc mm	l mm	m kg
630	400	105	80	2,76
630	450	80	80	2,30
630	500	55	80	2,72
630	560	25	80	2,03
630	600	5	80	1,84
710	400	145	100	3,72
710	450	120	100	2,76
710	500	95	100	3,18
710	560	65	100	2,49
710	600	45	100	2,30
710	630	30	100	2,44
800	400	190	100	3,76
800	450	165	100	3,30
800	500	140	100	3,72
800	560	110	100	3,03
800	600	90	100	2,84
800	630	75	100	3,44
800	710	35	100	2,76
900	500	190	100	6,14
900	560	160	100	5,42
900	600	140	100	5,20
900	630	125	100	5,74
900	710	85	100	5,04
900	800	40	100	4,84
1000	500	240	100	7,34
1000	560	210	100	6,42
1000	600	190	100	6,40
1000	630	175	100	6,99
1000	710	135	100	6,24
1000	800	90	100	6,04
1000	900	40	100	5,76
1120	630	235	120	9,09
1120	710	195	120	8,34
1120	800	150	120	8,14
1120	900	100	120	7,86
1120	1000	50	120	6,96
1250	630	300	120	11,0
1250	710	260	120	10,3
1250	800	215	120	10,0
1250	900	165	120	9,76
1250	1000	115	120	8,86
1250	1120	55	120	8,83

* With turned-over edge

Reducer

RFLU



Description

Long, tangential, hand made reducer with a female end and with approx. 35° angle.

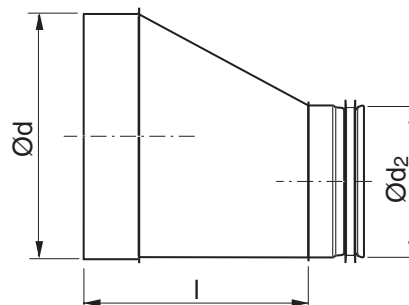
Dimensions are otherwise adapted to DIN 24147 section 4.

Has Click function at the Safe end – has an open turned-over end.

Has normally not any Click function at the female end – hasn't any notches.

Ø 80–315 can upon order be delivered with click function at the female end as well – i.e. with notches.

Dimensions



Ød nom	Ød ₂ nom	l mm	m kg
80	63	98	0,14
100	63	126	0,20
100	80	103	0,18
112	63	142	0,23
112	80	119	0,22
112	100	92	0,20
125	63	159	0,28
125	80	137	0,26
125	100	109	0,24
125	112	93	0,23
140	63	181	0,33
140	80	157	0,32
140	100	130	0,30
140	112	114	0,28
140	125	96	0,27
150	63	195	0,37
150	80	171	0,36
150	100	144	0,34
150	112	127	0,32
150	125	109	0,30
150	140	99	0,28
160	63	207	0,43
160	80	185	0,42
160	100	157	0,40
160	112	141	0,38
160	125	123	0,36
160	140	102	0,34
160	150	99	0,32
180	80	212	0,51
180	100	185	0,49
180	112	168	0,47
180	125	151	0,46
180	140	130	0,43

Ordering example

Product	RFLU	250	160
Dimension Ød			
Dimension Ød ₂			

Reducer

RFLU

Ød nom	Ød ₂ nom	l mm	m kg
180	150	116	0,41
180	160	103	0,41
200	80	240	0,61
200	100	213	0,59
200	112	196	0,57
200	125	178	0,55
200	140	157	0,53
200	150	144	0,51
200	160	130	0,50
200	180	103	0,46
224	100	215	0,72
224	112	229	0,70
224	125	211	0,68
224	140	190	0,65
224	150	177	0,64
224	160	163	0,63
224	180	135	0,58
224	200	107	0,53
250	100	301	0,94
250	112	285	0,92
250	125	267	0,90
250	140	246	0,89
250	150	232	0,87
250	160	219	0,87
250	180	191	0,80
250	200	164	0,75
250	224	131	0,67
280	125	308	1,10
280	140	287	1,08
280	150	274	1,06
280	160	260	1,05
280	180	232	1,00
280	200	205	0,95
280	224	172	0,87
280	250	136	0,84
300	125	335	1,25
300	140	315	1,22
300	150	301	1,20
300	160	287	1,20
300	180	260	1,15
300	200	262	1,09
300	224	200	1,02
300	250	164	0,98
300	280	123	0,86
315	125	356	1,36
315	140	335	1,33
315	150	322	1,32
315	160	308	1,31

Ød nom	Ød ₂ nom	l mm	m kg
315	180	281	1,26
315	200	253	1,21
315	224	220	1,13
315	250	184	1,09
315	280	143	0,97
315	300	116	0,88
355	160	363	1,84
355	180	335	1,77
355	200	308	1,71
355	224	275	1,61
355	250	239	1,56
355	280	198	1,41
355	300	171	1,30
355	315	150	1,21
400	160	450	2,44
400	180	422	2,38
400	200	395	2,31
400	224	362	2,23
400	250	326	2,20
400	280	285	2,01
400	300	257	1,90
400	315	237	1,86
400	355	182	1,55
450	200	463	2,99
450	224	431	2,90
450	250	395	2,85
450	280	354	2,70
450	300	326	2,59
450	315	306	2,50
450	355	251	2,24
450	400	194	2,64
500	200	532	3,66
500	224	499	3,56
500	250	463	3,51
500	280	422	3,36
500	300	395	3,25
500	315	374	3,16
500	355	319	2,89
500	400	262	2,69
500	450	194	2,37
560	250	546	4,47
560	280	505	4,32
560	300	477	4,21
560	315	456	4,11
560	355	402	3,85
560	400	345	3,66
560	450	276	2,70
560	500	207	2,86

Reducer

RFLU

Ød nom	Ød ₂ nom	l mm	m kg
600	250	601	5,10
600	280	560	4,96
600	300	532	4,84
600	315	512	4,76
600	355	457	4,49
600	400	400	4,29
600	450	331	3,96
600	500	262	3,49
600	560	180	2,94
630	250	642	5,60
630	280	601	5,46
630	300	573	5,34
630	315	553	5,25
630	355	498	4,99
630	400	441	4,79
630	450	372	4,46
630	500	304	4,00
630	560	221	3,43
630	600	166	2,97
710	355	633	7,11
710	400	576	6,92
710	450	507	6,60
710	500	438	6,12
710	560	356	5,57
710	600	301	5,10
710	630	260	4,72
800	400	699	8,81
800	450	631	8,49
800	500	562	8,02
800	560	480	7,46
800	600	425	6,99
800	630	384	6,62
800	710	279	6,21
900	450	768	10,8
900	500	699	10,3
900	560	617	9,78
900	600	562	9,31
900	630	521	8,94
900	710	416	8,53
900	800	292	7,18
1000	560	774	12,5
1000	600	719	12,0
1000	630	678	11,7
1000	710	573	11,2
1000	800	450	9,91
1000	900	312	8,17
1120	560	939	16,4
1120	600	884	15,9

Ød nom	Ød ₂ nom	l mm	m kg
1120	630	843	15,5
1120	710	738	15,1
1120	800	615	13,8
1120	900	477	12,1
1120	1000	656	16,2
1250	600	340	10,3
1250	630	1063	20,1
1250	710	1022	19,7
1250	800	917	19,3
1250	900	793	17,9
1250	1000	518	14,4
1250	1120	354	12,2

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Reducer

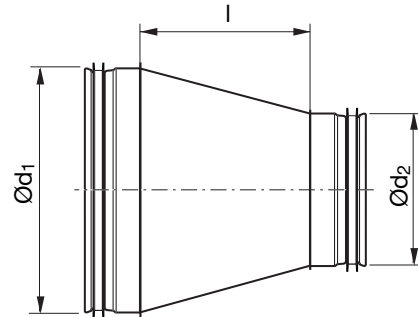
RCLU



Description

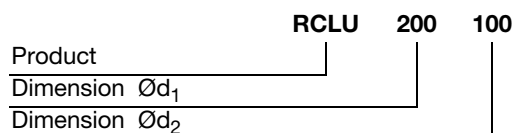
Long, concentric, hand made reducer with approx. 18° angle.

Dimensions



Ød ₁ nom	Ød ₂ nom	l mm	m kg
112	63	97	0,23
112	80	74	0,22
112	100	47	0,20
125	63	115	0,28
125	112	48	0,23
140	63	136	0,33
140	80	112	0,32
140	100	85	0,30
140	112	69	0,28
140	125	51	0,27
150	63	150	0,37
150	80	126	0,36
150	112	82	0,32
150	140	44	0,28
160	63	163	0,43
160	112	96	0,38
160	140	57	0,34
180	80	167	0,51
180	112	123	0,47
180	140	85	0,43
200	80	195	0,61
200	112	151	0,57
200	140	112	0,53
224	100	200	0,72
224	112	184	0,70
224	125	166	0,68
224	140	145	0,65
250	100	236	0,94
250	112	220	0,92
250	140	181	0,89
280	125	243	1,10
280	140	222	1,08

Ordering example



Reducer

RCLU

Ød ₁ nom	Ød ₂ nom	l mm	m kg
280	150	209	1,06
280	160	195	1,05
280	180	167	1,00
280	200	140	0,95
280	224	107	0,87
280	250	71	0,84
300	125	270	1,25
300	140	250	1,22
300	150	236	1,20
300	160	222	1,20
300	180	195	1,15
300	224	135	1,02
300	280	58	0,86
315	125	291	1,36
315	140	270	1,33
315	150	257	1,32
315	180	216	1,26
315	224	155	1,13
315	280	78	0,97
315	300	51	0,88
355	160	298	1,84
355	180	270	1,77
355	200	243	1,71
355	224	210	1,61
355	280	133	1,41
355	300	106	1,30
400	160	365	2,44
400	180	337	2,38
400	224	277	2,23
400	280	200	2,01
400	300	172	1,90
400	355	97	1,55
450	200	378	2,99
450	224	346	2,90
450	250	310	2,85
450	280	269	2,70
450	300	241	2,59
450	315	221	2,50
450	355	166	2,24
450	400	109	2,64
500	200	447	3,66
500	224	414	3,56
500	280	337	3,36
500	300	310	3,25
500	355	234	2,89
500	450	109	2,37
560	250	461	4,47
560	280	420	4,32

Ød ₁ nom	Ød ₂ nom	l mm	m kg
560	300	392	4,21
560	315	371	4,11
560	355	317	3,85
560	400	260	3,66
560	450	191	2,70
560	500	122	2,86
600	250	516	5,10
600	280	475	4,96
600	300	447	4,84
600	315	427	4,76
600	355	372	4,49
600	400	315	4,29
600	450	246	3,96
600	500	177	3,49
600	560	95	2,94
630	250	557	5,60
630	280	516	5,46
630	300	488	5,34
630	355	413	4,99
630	450	287	4,46
630	560	136	3,43
630	600	81	2,97
710	355	528	7,11
710	400	471	6,92
710	450	402	6,60
710	500	333	6,12
710	560	251	5,57
710	600	196	5,10
710	630	155	4,72
800	400	594	8,81
800	450	526	8,49
800	500	457	8,02
800	560	375	7,46
800	600	320	6,99
800	630	279	6,62
800	710	174	6,21
900	450	663	10,8
900	500	594	10,3
900	560	512	9,78
900	600	457	9,31
900	630	416	8,94
900	710	311	8,53
900	800	187	7,18
1000	500	732	13,1
1000	560	649	12,5
1000	600	594	12,0
1000	630	553	11,7
1000	710	448	11,2

Reducer

RCLU

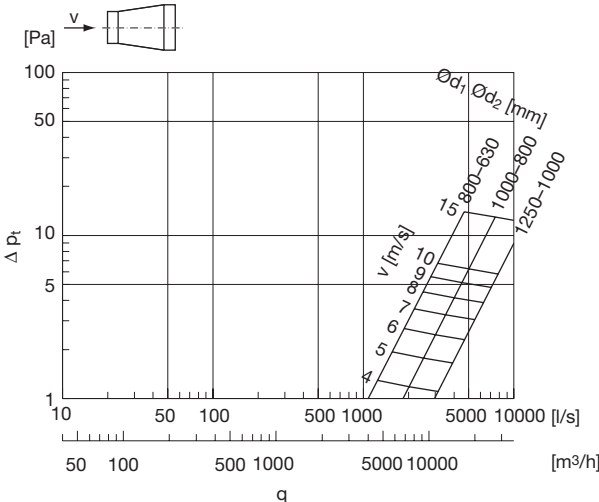
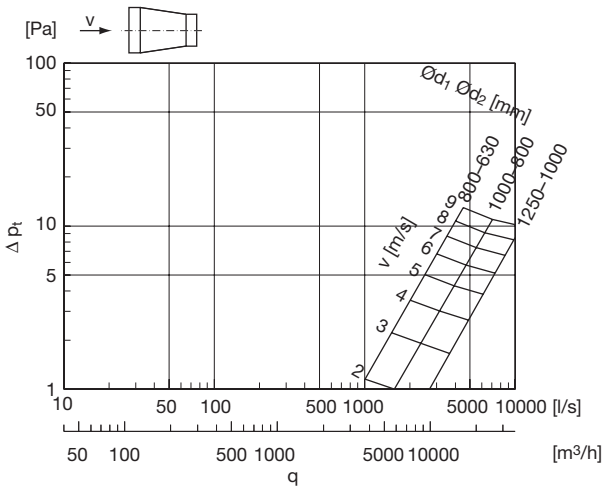
$\varnothing d_1$ nom	$\varnothing d_2$ nom	l mm	m kg
1000	800	325	9,91
1000	900	187	8,17
1120	560	814	16,4
1120	600	759	15,9
1120	630	718	15,5
1120	710	613	15,1
1120	800	490	13,8
1120	900	352	12,1
1120	1000	215	10,3
1250	600	938	20,1
1250	630	897	19,7
1250	710	792	19,3
1250	800	668	17,9
1250	900	531	16,2
1250	1000	393	14,4
1250	1120	229	12,2

Reducer

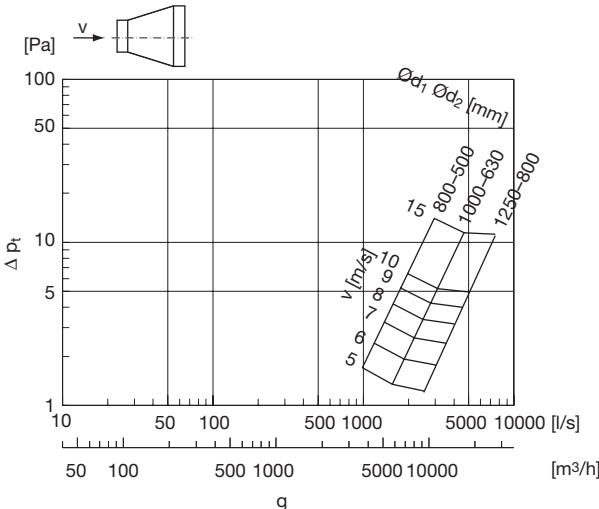
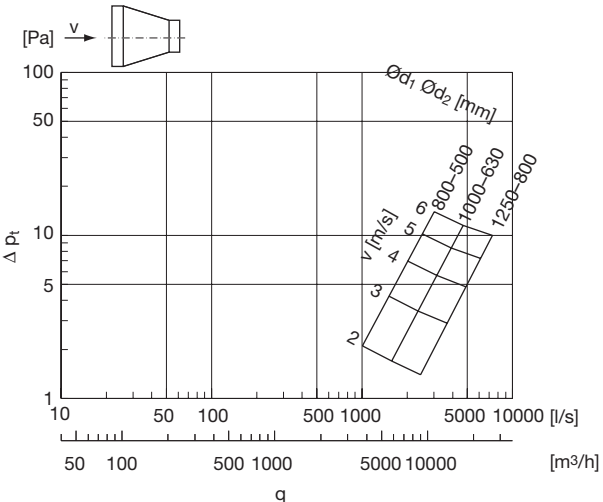
RCLU

Technical data

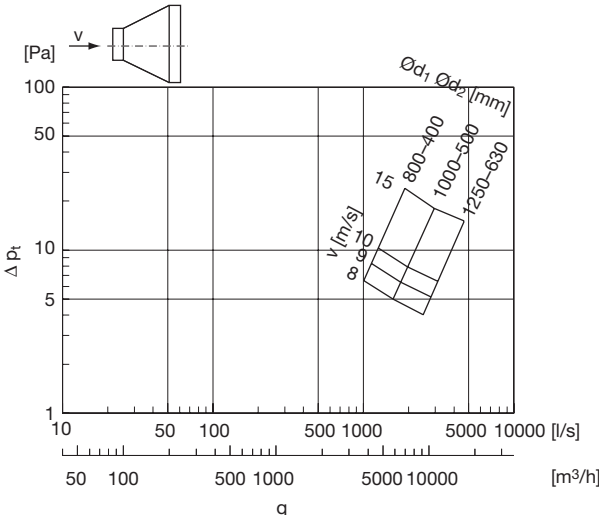
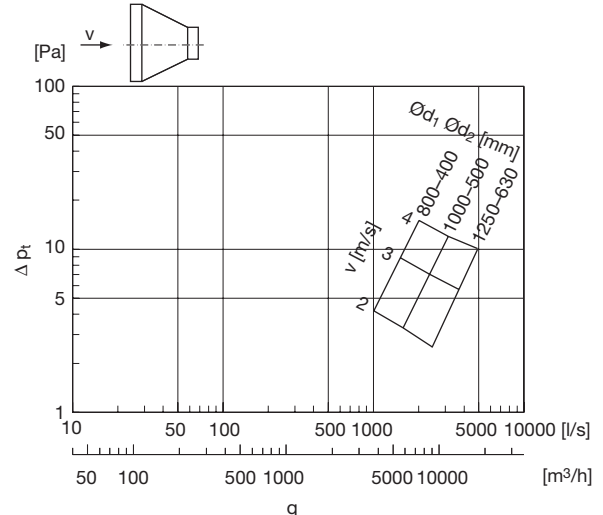
1 dimension step



2 dimension steps



3 dimension steps



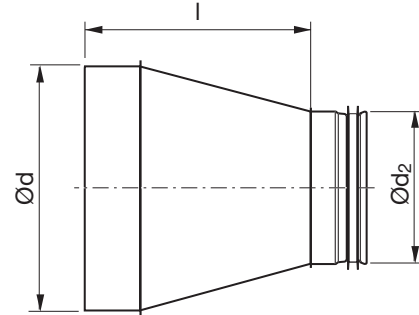
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Reducer

RCFLU



Dimensions



Description

Long, concentric, hand made reducer with a female end and with approx. 18° angle.

Has Click function at the Safe end – has an open turned-over end.

Has normally not any Click function at the female end – hasn't any notches.

Ø 80–315 can upon order be delivered with click function at the female end as well – i.e. with notches.

Ød nom	Ød ₂ nom	l mm	m kg
80	63	98	0,14
100	63	126	0,20
100	80	103	0,18
112	63	142	0,23
112	80	119	0,22
112	100	92	0,20
125	63	159	0,28
125	100	109	0,24
125	112	93	0,23
140	63	137	0,26
140	80	181	0,33
140	112	130	0,30
140	125	114	0,28
140	140	96	0,27
150	63	157	0,32
150	80	195	0,37
150	100	144	0,34
150	112	127	0,32
150	125	109	0,30
150	140	99	0,28
160	63	171	0,36
160	80	207	0,43
160	100	157	0,40
160	112	141	0,38
160	125	123	0,36
160	140	102	0,34
160	150	99	0,32
180	80	185	0,42
180	100	185	0,49
180	112	168	0,47
180	125	151	0,46
180	140	130	0,43
180	150	116	0,41

Ordering example



Reducer

RCFLU

Ød nom	Ød ₂ nom	l mm	m kg
180	160	103	0,41
200	80	212	0,51
200	100	213	0,59
200	112	196	0,57
200	125	178	0,55
200	140	157	0,53
200	150	144	0,51
200	160	130	0,50
200	180	103	0,46
224	100	215	0,72
224	112	229	0,70
224	125	211	0,68
224	140	190	0,65
224	150	177	0,64
224	160	163	0,63
224	180	135	0,58
224	200	107	0,53
250	100	301	0,94
250	112	285	0,92
250	125	267	0,90
250	140	246	0,89
250	150	232	0,87
250	160	219	0,87
250	180	191	0,80
250	200	164	0,75
250	224	131	0,67
280	125	308	1,10
280	140	287	1,08
280	150	274	1,06
280	160	260	1,05
280	180	232	1,00
280	200	205	0,95
280	224	172	0,87
280	250	136	0,84
300	125	335	1,25
300	140	315	1,22
300	150	301	1,20
300	160	287	1,20
300	180	260	1,15
300	200	262	1,09
300	224	200	1,02
300	250	164	0,98
300	280	123	0,86
315	125	356	1,36
315	140	335	1,33
315	150	322	1,32
315	160	308	1,31
315	180	281	1,26

Ød nom	Ød ₂ nom	l mm	m kg
315	200	253	1,21
315	224	220	1,13
315	250	184	1,09
315	280	143	0,97
315	300	116	0,88
355	160	363	1,84
355	180	335	1,77
355	200	308	1,71
355	224	275	1,61
355	250	239	1,56
355	280	198	1,41
355	300	171	1,30
355	315	150	1,21
400	160	450	2,44
400	180	422	2,38
400	200	395	2,31
400	224	362	2,23
400	250	326	2,20
400	280	285	2,01
400	300	257	1,90
400	315	237	1,86
400	355	182	1,55
450	200	463	2,99
450	224	431	2,90
450	250	395	2,85
450	280	354	2,70
450	300	326	2,59
450	315	306	2,50
450	355	251	2,24
450	400	194	2,64
500	200	532	3,66
500	224	499	3,56
500	250	463	3,51
500	280	422	3,36
500	300	395	3,25
500	315	374	3,16
500	355	319	2,89
500	400	262	2,69
500	450	194	2,37
560	250	546	4,47
560	280	505	4,32
560	300	477	4,21
560	315	456	4,11
560	355	402	3,85
560	400	345	3,66
560	450	276	2,70
560	500	207	2,86
600	250	601	5,10

Reducer

RCFLU

Ød nom	Ød ₂ nom	l mm	m kg
600	280	560	4,96
600	300	532	4,84
600	315	512	4,76
600	355	457	4,49
600	400	400	4,29
600	450	331	3,96
600	500	262	3,49
600	560	180	2,94
630	250	642	5,60
630	280	601	5,46
630	300	573	5,34
630	315	553	5,25
630	355	498	4,99
630	400	441	4,79
630	450	372	4,46
630	500	304	4,00
630	560	221	3,43
630	600	166	2,97
710	355	633	7,11
710	400	576	6,92
710	450	507	6,60
710	500	438	6,12
710	560	356	5,57
710	600	301	5,10
710	630	260	4,72
800	400	699	8,81
800	450	631	8,49
800	500	562	8,02
800	560	480	7,46
800	600	425	6,99
800	630	384	6,62
800	710	279	6,21
900	450	768	10,8
900	500	699	10,3
900	560	617	9,78
900	600	562	9,31
900	630	521	8,94
900	710	416	8,53
900	800	292	7,18
1000	500	857	13,1
1000	560	774	12,5
1000	600	719	12,0
1000	630	678	11,7
1000	710	573	11,2
1000	800	450	9,91
1000	900	312	8,17
1120	560	939	16,4
1120	600	884	15,9

Ød nom	Ød ₂ nom	l mm	m kg
1120	630	843	15,5
1120	710	738	15,1
1120	800	615	13,8
1120	900	477	12,1
1120	1000	656	16,2
1250	600	340	10,3
1250	630	1063	20,1
1250	710	1022	19,7
1250	800	917	19,3
1250	900	793	17,9
1250	1000	518	14,4
1250	1120	354	12,2

Reducer

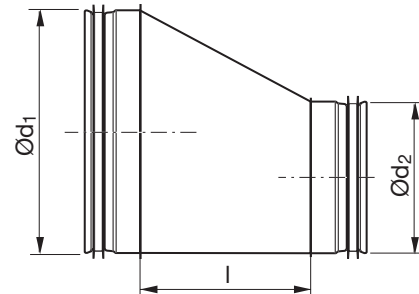
RLU



Description

Long, tangential, hand made reducer with approx. 35° angle.

Dimensions



Ød ₁ nom	Ød ₂ nom	l mm	m kg
80	63	53	0,14
100	63	81	0,20
100	80	58	0,18
112	63	97	0,23
112	80	74	0,22
112	100	47	0,20
125	63	115	0,28
125	80	92	0,26
125	100	64	0,24
125	112	48	0,23
140	63	136	0,33
140	80	112	0,32
140	100	85	0,30
140	112	69	0,28
140	125	51	0,27
150	63	150	0,37
150	80	126	0,36
150	100	99	0,34
150	112	82	0,32
150	125	64	0,30
150	140	44	0,28
160	63	163	0,43
160	80	140	0,42
160	100	112	0,40
160	112	96	0,38
160	125	78	0,36
160	140	57	0,34
160	150	44	0,32
180	80	167	0,51
180	100	140	0,49
180	112	123	0,47
180	125	106	0,46
180	140	85	0,43

Ordering example

	RLU	200	160
Product	----- ----- -----		
Dimension Ød ₁	----- ----- -----		
Dimension Ød ₂	----- ----- -----		

Reducer

RLU

Ød ₁ nom	Ød ₂ nom	l mm	m kg
180	150	71	0,41
180	160	58	0,41
200	80	195	0,61
200	100	167	0,59
200	112	151	0,57
200	125	133	0,55
200	140	112	0,53
200	150	99	0,51
200	160	85	0,50
200	180	58	0,46
224	100	200	0,72
224	112	184	0,70
224	125	166	0,68
224	140	145	0,65
224	150	132	0,64
224	160	118	0,63
224	180	90	0,58
224	200	63	0,53
250	100	236	0,94
250	112	220	0,92
250	125	202	0,90
250	140	181	0,89
250	150	167	0,87
250	160	154	0,87
250	180	126	0,80
250	200	99	0,75
250	224	66	0,67
280	125	243	1,10
280	140	222	1,08
280	150	209	1,06
280	160	195	1,05
280	180	167	1,00
280	200	140	0,95
280	224	107	0,87
280	250	71	0,84
300	125	270	1,25
300	140	250	1,22
300	150	236	1,20
300	160	222	1,20
300	180	195	1,15
300	200	167	1,09
300	224	135	1,02
300	250	99	0,98
300	280	58	0,86
315	125	291	1,36
315	140	270	1,33
315	150	257	1,32
315	160	243	1,31

Ød ₁ nom	Ød ₂ nom	l mm	m kg
315	180	216	1,26
315	200	188	1,21
315	224	155	1,13
315	250	119	1,09
315	280	78	0,97
315	300	51	0,88
355	160	298	1,84
355	180	270	1,77
355	200	243	1,71
355	224	210	1,61
355	250	174	1,56
355	280	133	1,41
355	300	106	1,30
355	315	85	1,21
400	160	365	2,44
400	180	337	2,38
400	200	310	2,31
400	224	277	2,23
400	250	241	2,20
400	280	200	2,01
400	300	172	1,90
400	315	152	1,86
400	355	97	1,55
450	200	378	2,99
450	224	346	2,90
450	250	310	2,85
450	280	269	2,70
450	300	241	2,59
450	315	221	2,50
450	355	166	2,24
450	400	109	2,64
500	200	447	3,66
500	224	414	3,56
500	250	378	3,51
500	280	337	3,36
500	300	310	3,25
500	315	289	3,16
500	355	234	2,89
500	400	177	2,69
500	450	109	2,37
560	250	461	4,47
560	280	420	4,32
560	300	392	4,21
560	315	371	4,11
560	355	317	3,85
560	400	260	3,66
560	450	191	2,70
560	500	122	2,86

Reducer

RLU

Ød ₁ nom	Ød ₂ nom	l mm	m kg
600	250	516	5,10
600	280	475	4,96
600	300	447	4,84
600	315	427	4,76
600	355	372	4,49
600	400	315	4,29
600	450	246	3,96
600	500	177	3,49
600	560	95	2,94
630	250	557	5,60
630	280	516	5,46
630	300	488	5,34
630	315	468	5,25
630	355	413	4,99
630	400	356	4,79
630	450	287	4,46
630	500	219	4,00
630	560	136	3,43
630	600	81	2,97
710	355	528	7,11
710	400	471	6,92
710	450	402	6,60
710	500	333	6,12
710	560	251	5,57
710	600	196	5,10
710	630	155	4,72
800	400	594	8,81
800	450	526	8,49
800	500	457	8,02
800	560	375	7,46
800	600	320	6,99
800	630	279	6,62
800	710	174	6,21
900	450	663	10,8
900	500	594	10,3
900	560	512	9,78
900	600	457	9,31
900	630	416	8,94
900	710	311	8,53
900	800	187	7,18
1000	500	732	13,1
1000	560	649	12,5
1000	600	594	12,0
1000	630	553	11,7
1000	710	448	11,2
1000	800	325	9,91
1000	900	187	8,17
1120	560	814	16,4

Ød ₁ nom	Ød ₂ nom	l mm	m kg
1120	600	759	15,9
1120	630	718	15,5
1120	710	613	15,1
1120	800	490	13,8
1120	900	352	12,1
1120	1000	215	10,3
1250	600	938	20,1
1250	630	897	19,7
1250	710	792	19,3
1250	800	668	17,9
1250	900	531	16,2
1250	1000	393	14,4
1250	1120	229	12,2

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Saddle

PSU

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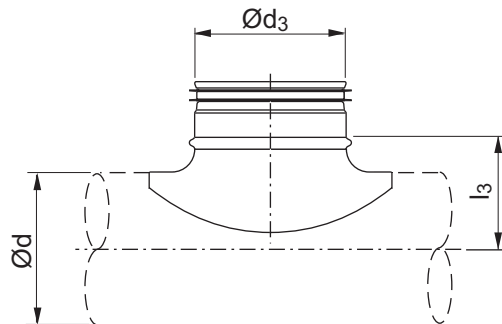


Description

Pressed saddle with aerodynamic flow radius facing the branch.

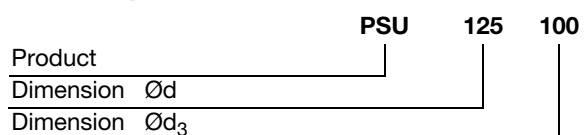
Some PSUs are pressed with one and the same tool, and fit several dimensions of main pipe.

Dimensions



Ød nom	Ød ₃ nom	l ₃ mm	m kg
63	63	42	0,09
80	63	50	0,09
80	80	52	0,13
100	63	60	0,09
100	80	60	0,14
100	100	65	0,18
112	63	66	0,09
112	80	68	0,13
112	100	71	0,18
112 *	112	81	0,21
125	63	73	0,08
125	80	75	0,13
125	100	78	0,18
125 *	112	88	0,21
125	125	83	0,25
140	80	82	0,13
140	100	85	0,18
140 *	112	95	0,21
140 *	125	95	0,22
140	140	90	0,25
150	80	87	0,10
150	100	90	0,18
150	125	95	0,18
150	140	95	0,25
150	150	95	0,25
160	80	92	0,10
160	100	95	0,18
160	125	100	0,18
160	140	100	0,25
160	150	100	0,32
160	160	105	0,26
180	80	102	0,09
180	100	105	0,19

Ordering example



Saddle

PSU

Ød nom	Ød ₃ nom	l ₃ mm	m kg
180	125	110	0,25
180	140	110	0,25
180	150	110	0,22
180	160	115	0,27
180	180	115	0,48
200	80	112	0,09
200	100	115	0,19
200	125	115	0,25
200	140	120	0,25
200	150	120	0,22
200	160	125	0,27
200	180	125	0,45
200	200	125	0,39
224	80	124	0,12
224	100	127	0,18
224	125	132	0,23
224	140	132	0,29
224	150	132	0,21
224	160	137	0,24
224	180	137	0,41
224 *	200	137	0,47
224	224	137	0,64
250	80	137	0,12
250	100	140	0,18
250	125	145	0,23
250	140	145	0,29
250	150	145	0,21
250	160	150	0,24
250	180	150	0,41
250	200	150	0,34
250	224	150	0,63
250	250	150	0,80
280	80	155	0,12
280	100	155	0,12
280	125	160	0,23
280	140	160	0,27
280	150	160	0,21
280	160	165	0,24
280	180	165	0,40
280	200	165	0,46
280	224	165	0,58
280 *	250	165	0,77
280 *	280	165	0,59
300	80	162	0,12
300	100	165	0,12
300	125	170	0,23
300	140	170	0,27
300	150	170	0,21

Ød nom	Ød ₃ nom	l ₃ mm	m kg
300	160	175	0,24
300	180	175	0,40
300	200	175	0,46
300	224	175	0,58
300	250	175	0,71
300 *	280	175	0,59
300	300	175	1,13
315	80	170	0,12
315	100	173	0,12
315	125	178	0,23
315	140	178	0,27
315	150	178	0,21
315	160	182	0,24
315	180	182	0,40
315	200	182	0,34
315	224	182	0,58
315	250	182	0,71
315 *	280	182	0,95
315	300	182	1,10
315	315	182	1,22
355	100	193	0,12
355	125	198	0,23
355	140	198	0,27
355	150	198	0,21
355	160	203	0,24
355	180	203	0,40
355	200	203	0,44
355	224	203	0,58
355	250	203	0,65
355 *	280	203	0,89
355	300	203	0,94
355 *	315	203	1,12
355 *	355	203	0,90
400	100	215	0,12
400	125	220	0,23
400	150	220	0,24
400	160	225	0,24
400	200	225	0,44
400	224	225	0,54
400	250	225	0,65
400 *	280	225	0,83
400	300	250	0,94
400	315	225	1,03
400 *	355	225	1,42
400	400	225	1,87
450	100	240	0,12
450	125	245	0,23
450	150	245	0,24

Saddle

PSU

Ød nom	Ød ₃ nom	l ₃ mm	m kg
450	160	250	0,25
450	200	250	0,42
450	224	250	0,54
450	250	250	0,67
450 *	280	250	0,77
450	300	250	0,83
450	315	250	0,94
450 *	355	250	1,01
450	400	250	1,81
450 *	450	250	1,58
500	100	265	0,12
500	125	270	0,23
500	150	270	0,24
500	160	275	0,25
500	200	275	0,42
500	224	275	0,54
500	250	275	0,67
500	300	275	0,83
500	315	275	0,93
500 *	355	275	1,01
500	400	275	1,75
500 *	450	275	1,45
500 *	500	290	1,87
560	100	295	0,12
560	125	300	0,23
560	160	305	0,25
560	200	305	0,42
560	224	305	0,54
560	250	305	0,67
560	300	305	0,83
560	315	305	0,93
560 *	355	305	1,06
560	400	305	1,75
560 *	450	305	1,37
560 *	500	320	1,75
560 *	560	320	2,24
600	100	315	0,12
600	125	320	0,23
600	160	325	0,31
600	200	325	0,40
600	224	325	0,54
600	250	325	0,65
600	300	325	0,83
600	315	325	0,93
600 *	355	325	0,94
600	400	325	1,49
600 *	450	325	1,34
600 *	500	340	1,60

Ød nom	Ød ₃ nom	l ₃ mm	m kg
600 *	560	340	2,09
600 *	600	340	2,47
630	100	330	0,12
630	125	335	0,23
630	160	340	0,31
630	200	340	0,40
630	224	340	0,54
630	250	340	0,83
630	300	340	0,55
630	315	340	0,93
630 *	355	340	0,80
630	400	340	1,49
630 *	450	340	1,82
630 *	500	355	1,53
630 *	560	355	2,09
630 *	600	355	2,35
630 *	630	355	2,53

* Hand made without radius.

Saddle

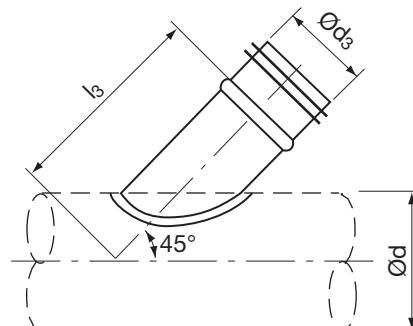
PSVU45°



Description

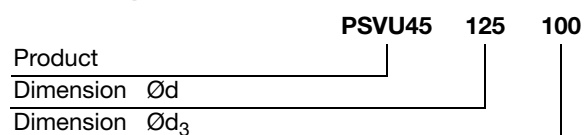
As standard the angle is 45°.
Different angle available to order.

Dimensions



Ød nom	Ød ₃ nom	l ₃ mm	m kg
80	80	165	0,20
100	80	180	0,20
100	100	190	0,30
125	80	200	0,20
125	100	210	0,30
125	112	215	0,30
125	125	220	0,40
140	80	210	0,20
140	100	220	0,30
140	112	225	0,30
140	125	230	0,40
140	140	250	0,50
150	80	215	0,20
150	100	225	0,30
150	112	235	0,30
150	125	240	0,40
150	140	260	0,50
150	150	265	0,50
160	80	220	0,20
160	100	230	0,30
160	112	240	0,30
160	125	245	0,40
160	140	265	0,50
160	150	270	0,50
160	160	275	0,60
180	80	235	0,20
180	100	245	0,30
180	112	250	0,30
180	125	260	0,40
180	140	280	0,50
180	150	285	0,50
180	160	290	0,60
180	180	300	0,90

Ordering example



Saddle

PSVU45°

Ød nom	Ød ₃ nom	l ₃ mm	m kg
200	80	250	0,20
200	100	260	0,30
200	112	265	0,30
200	125	270	0,40
200	140	295	0,50
200	150	300	0,50
200	160	305	0,60
200	180	315	0,90
200	200	325	1,00
224	100	275	0,30
224	112	285	0,30
224	125	290	0,40
224	140	310	0,50
224	150	315	0,50
224	160	320	0,60
224	180	330	0,90
224	200	340	1,00
224	224	350	1,20
250	80	287	0,20
250	100	295	0,30
250	112	300	0,30
250	125	310	0,40
250	140	330	0,50
250	150	335	0,50
250	160	340	0,60
250	180	350	0,90
250	200	360	1,00
250	224	370	1,20
250	250	385	1,60
280	112	320	0,30
280	125	330	0,40
280	140	350	0,50
280	150	355	0,50
280	160	360	0,60
280	180	370	0,90
280	200	380	1,00
280	224	390	1,20
280	250	405	1,60
280	280	435	1,80
300	125	350	0,40
300	140	365	0,50
300	150	370	0,50
300	160	375	0,60
300	180	385	0,90
300	200	395	1,00
300	224	405	1,20
300	250	420	1,60
300	280	450	2,00

Ød nom	Ød ₃ nom	l ₃ mm	m kg
300	300	460	2,20
315	80	333	0,20
315	100	343	0,30
315	125	360	0,40
315	140	375	0,50
315	150	380	0,50
315	160	385	0,60
315	180	395	0,90
315	200	405	1,00
315	224	415	1,20
315	250	430	1,60
315	280	460	1,90
315	300	470	2,20
315	315	480	2,40
355	80	361	0,20
355	100	371	0,30
355	125	388	0,40
355	150	410	0,50
355	160	415	0,60
355	180	425	0,90
355	200	435	1,00
355	224	445	1,20
355	250	460	1,60
355	280	490	2,00
355	300	500	2,20
355	315	505	2,30
355	355	525	2,80
400	80	393	0,20
400	100	403	0,30
400	125	420	0,40
400	160	445	0,60
400	180	455	0,90
400	200	465	1,00
400	224	475	1,20
400	250	490	1,60
400	280	520	1,90
400	300	530	2,20
400	315	535	2,30
400	355	555	2,80
400	400	580	4,30
450	180	490	0,90
450	200	500	1,00
450	224	510	1,20
450	250	525	1,60
450	280	555	1,90
450	300	565	2,20
450	315	570	2,30
450	355	590	2,80

Saddle

Ød nom	Ød ₃ nom	l ₃ mm	m kg
450	400	615	4,30
450	450	640	5,20
500	80	464	0,20
500	100	474	0,30
500	125	491	0,40
500	160	518	0,60
500	200	535	1,00
500	224	550	1,20
500	250	560	1,60
500	280	590	1,80
500	300	600	2,20
500	315	610	2,40
500	355	630	2,90
500	400	650	4,30
500	450	675	5,20
500	500	700	6,30
560	160	560	0,60
560	224	590	1,20
560	250	605	1,60
560	280	630	1,90
560	300	640	2,20
560	315	650	2,30
560	355	670	2,80
560	400	690	4,30
560	450	715	5,20
560	500	740	6,30
560	560	800	7,80
600	250	630	1,60
600	280	655	1,90
600	300	665	2,20
600	315	675	2,40
600	355	695	2,80
600	400	715	4,30
600	450	740	5,20
600	500	765	6,20
600	560	825	7,80
600	600	850	8,80
630	315	700	2,30
630	355	720	2,80
630	400	740	4,30
630	450	765	5,20
630	500	790	6,30
630	560	850	7,80
630	600	870	8,80
630	630	885	9,50
710	300	745	2,20
710	315	755	2,30
710	355	775	2,80

Ød nom	Ød ₃ nom	l ₃ mm	m kg
710	400	800	4,20
710	450	825	5,10
710	500	850	6,10
710	560	905	7,60
710	600	925	8,60
710	630	940	9,30
710	710	980	15,5
800	315	820	2,30
800	355	840	2,80
800	400	860	4,30
800	450	885	5,20
800	500	910	6,30
800	560	970	7,80
800	600	990	8,80
800	630	1005	9,50
800	710	1045	15,6
800	800	1090	19,0
900	355	910	2,80
900	400	935	4,30
900	450	960	5,20
900	500	980	6,30
900	560	1040	7,80
900	600	1060	8,80
900	630	1075	9,50
900	710	1115	15,6
900	800	1160	19,0
900	900	1210	23,3
1000	400	1005	4,30
1000	450	1030	5,20
1000	500	1055	6,40
1000	560	1110	7,80
1000	600	1130	8,80
1000	630	1145	9,50
1000	710	1185	15,5
1000	800	1230	19,0
1000	900	1280	23,0
1000	1000	1330	28,5
1120	500	1140	6,30
1120	560	1195	7,80
1120	600	1215	8,80
1120	630	1230	9,50
1120	710	1270	15,5
1120	800	1315	19,0
1120	900	1365	23,3
1120	1000	1415	28,5
1120	1120	1505	36,0
1250	500	1230	6,30
1250	560	1290	7,80

Saddle

PSVU45°

Ød nom	Ød ₃ nom	l ₃ mm	m kg
1250	600	1310	8,80
1250	630	1325	9,50
1250	710	1365	15,6
1250	800	1410	19,1
1250	900	1460	23,0
1250	1000	1510	28,6
1250	1120	1595	35,9
1250	1250	1660	43,4

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T-piece

TCPU

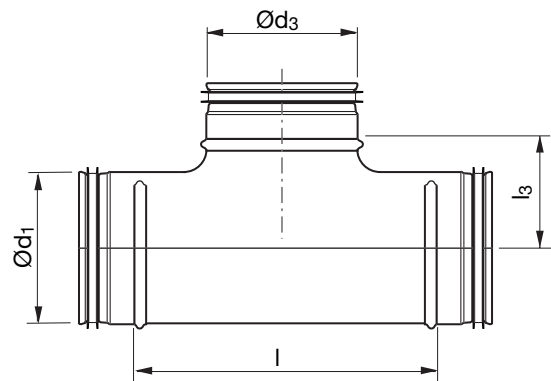
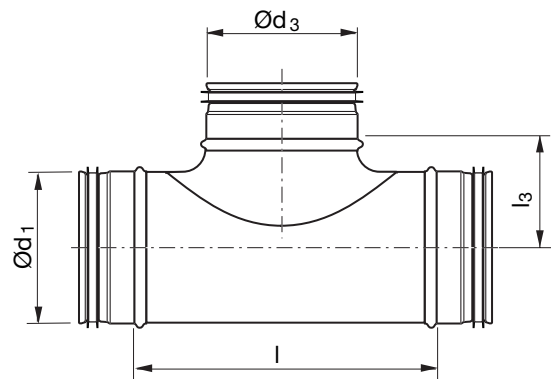


Description

T-piece built with PSU saddle or a fully pressed top section.

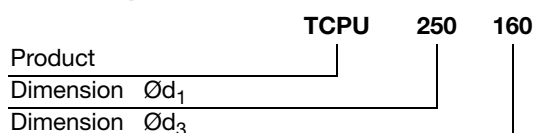
Pressure drop, see graphs on page 118.

Dimensions



Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
63	63	125	42	0,26
80	63	125	50	0,31
80	80	140	52	0,36
100	63	125	60	0,35
100	80	97	60	0,23
100	100	130	65	0,32
112	63	125	66	0,41
112	80	140	68	0,47
112	100	175	71	0,55
112	112 *	140	81	0,57
125	63	125	73	0,44
125	80	97	72	0,34
125	100	130	78	0,37
125	112	175	78	0,61
125	125	165	83	0,44
140	80	140	82	0,56
140	100	175	85	0,65
140	112	175	85	0,67
140	125 *	215	70	0,76
140	140	230	90	0,78
150	80	140	87	0,58
150	100	175	90	0,69
150	125	215	95	0,76
150	140	230	95	0,82

Ordering example



T-piece

TCPU

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
150	150	260	95	0,94
160	80	140	92	0,59
160	100	130	95	0,46
160	125	166	100	0,53
160	140	230	100	0,87
160	150	260	100	0,99
160	160	209	105	0,63
180	80	140	102	0,92
180	100	175	105	0,80
180	125	215	110	0,91
180	140	230	110	0,96
180	150	260	110	1,08
180	160	260	115	1,06
180	180	285	115	1,44
200	80	140	112	0,77
200	100	175	115	0,88
200	125	215	115	1,02
200	140	230	120	1,07
200	150	260	120	1,19
200	160	209	125	0,67
200	180	285	125	1,35
200	200	249	125	1,21
224	80	140	124	0,85
224	100	175	127	1,01
224	125	215	132	1,14
224	140	230	132	1,20
224	150	260	132	1,29
224	160	260	137	1,28
224	180	285	137	1,46
224	200	346	137	1,69
250	80	156	137	1,13
250	100	175	140	1,22
250	125	220	145	1,48
250	140	230	145	1,48
250	150	255	145	1,55
250	160	256	150	1,58
250	180	306	150	1,79
250	200	306	150	1,78
250	224	350	150	2,09
250	250	296	150	1,65
280	80	156	155	1,25
280	100	175	155	1,37
280	125	220	160	1,56
280	140	230	160	1,63
280	150	255	160	1,72
280	160	256	165	1,75
280	180	306	165	1,97
280	200	306	165	2,01

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
280	224	350	165	2,27
280	250 *	350	140	2,44
280	280 *	390	140	2,67
300	80	156	162	1,36
300	100	175	165	1,47
300	125	220	170	1,68
300	140	230	170	1,74
300	150	255	170	1,86
300	160	256	175	1,87
300	180	306	175	2,12
300	200	306	175	2,15
300	224	350	175	2,41
300	250	350	175	2,50
300	280 *	390	150	2,53
300	300	430	175	3,55
315	80	156	170	1,43
315	100	175	173	1,50
315	125	220	178	1,76
315	140	230	178	1,82
315	150	355	178	2,38
315	160	256	182	1,96
315	180	306	182	2,21
315	200	306	182	2,14
315	224	350	182	2,51
315	250	350	182	2,59
315	280	390	182	3,00
315	300	430	182	3,21
315	315	363	182	2,20
355	100	175	193	1,73
355	125	220	198	1,96
355	140	230	198	2,03
355	150	255	198	2,46
355	160	256	203	2,45
355	180	306	203	2,81
355	200	306	203	2,82
355	224	350	203	3,13
355	250	350	203	3,18
355	280 *	390	178	3,63
355	300	430	203	3,87
355	315	455	203	4,06
355	355 *	470	203	5,14
400	100	175	215	2,27
400	125	225	220	2,81
400	160	266	225	3,02
400	200	300	225	3,37
400	224	350	225	3,74
400	250	350	225	3,79
400	280 *	390	200	4,23

T-piece

TCPUR

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
400	300	430	225	4,47
400	315	415	225	4,42
400	355 *	470	225	5,04
400	400	510	225	6,20
450	100	175	240	2,76
450	125	225	245	3,15
450	160	266	250	3,38
450	200	300	250	3,75
450	224	350	250	4,16
450	250	350	250	4,23
450	280 *	390	225	4,64
450	300	430	250	4,89
450	315	415	250	4,82
450	355	470	250	5,16
450	400	510	250	5,81
450	450 *	550	225	6,99
500	100	175	265	3,06
500	125	225	270	3,35
500	160	266	275	3,77
500	200	300	275	4,14
500	250	350	275	4,68
500	300	430	275	5,36
500	315	415	275	5,30
500	355	470	275	5,70
500	400	510	275	6,34
500	450 *	550	250	6,56
500	500 *	552	290	8,27
560	100	175	295	3,59
560	125	225	300	3,92
560	160	266	305	4,41
560	200	300	305	4,78
560	250	350	305	5,38
560	300	430	280	5,86
560	315	415	305	6,06
560	355	470	305	6,57
560	400	510	305	7,08
560	450 *	550	280	7,38
560	500 *	552	280	7,57
560	560 *	610	280	9,69
600	100	175	315	3,83
600	125	225	320	4,19
600	160	266	325	4,73
600	200	300	325	5,10
600	250	350	325	5,73
600	300 *	430	300	6,36
600	315	415	325	6,46
600	355 *	470	300	6,98
600	400	510	325	7,43

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
600	450 *	550	300	7,84
600	500 *	552	300	7,91
600	560 *	610	300	8,76
600	600 *	650	300	10,8
630	100	175	330	4,03
630	125	225	335	4,41
630	160	266	340	4,99
630	200	300	340	5,35
630	250	350	340	6,00
630	300 *	450	315	7,23
630	315	415	340	6,77
630	355 *	470	315	7,18
630	400	510	340	7,69
630	450 *	555	315	8,24
630	500 *	552	340	8,44
630	560 *	610	315	9,11
630	600 *	650	315	9,58
630	630 *	680	340	11,3

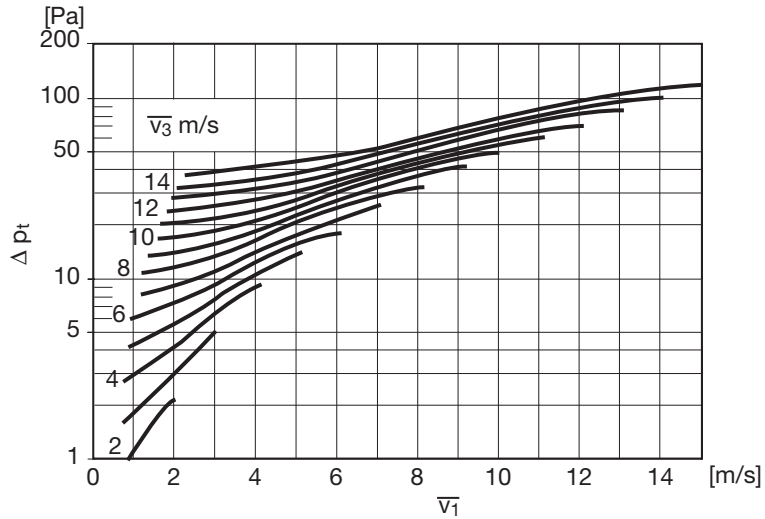
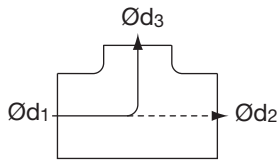
* Hand made with saddle without radius.

T-piece and saddle

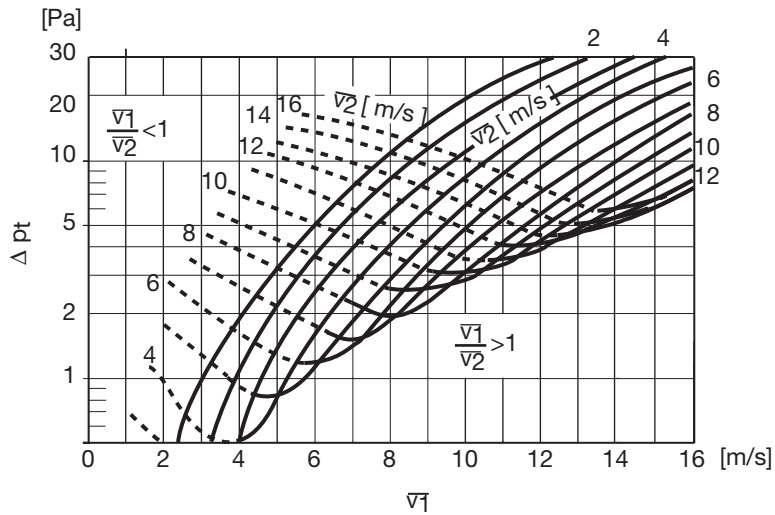
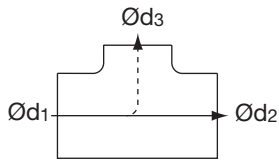
T-CPU, PSU

Supply air

Diverging flow

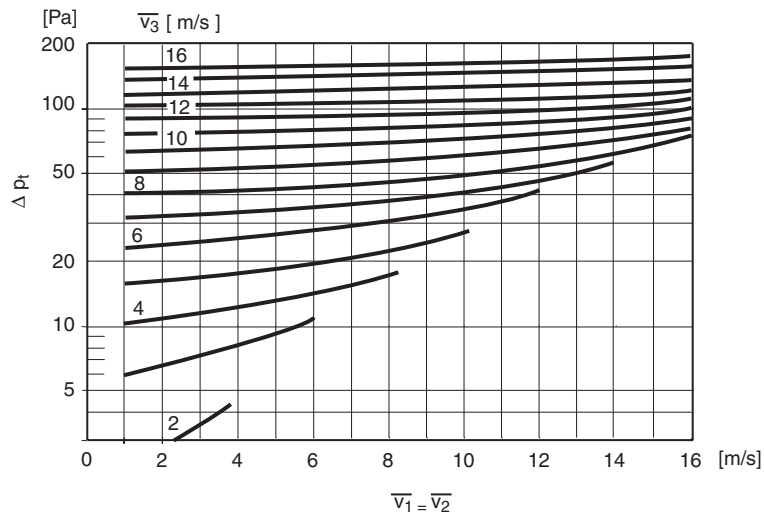
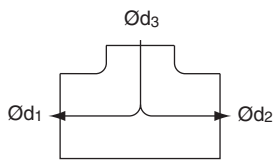


Diverging flow



The diagram is also applicable to reduction in Ød_2 .

Diverging flow

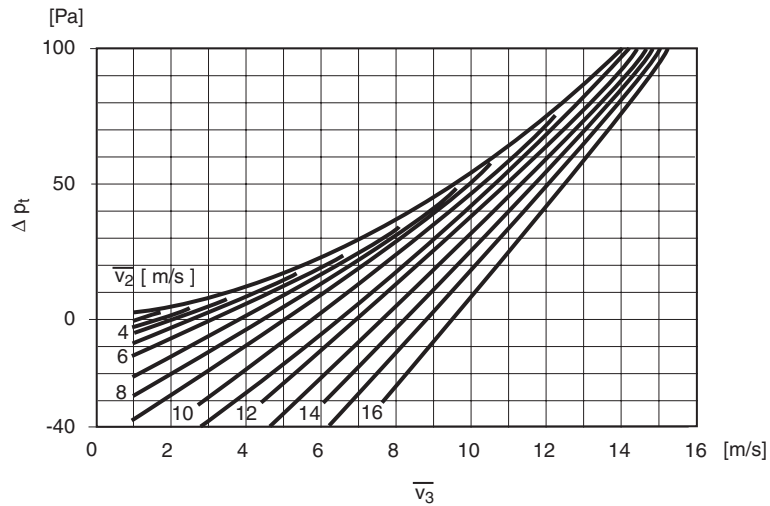
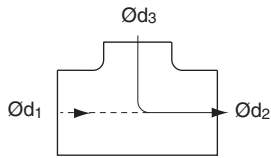


T-piece and saddle

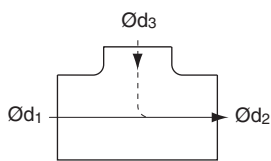
T-CPU, PSU

Exhaust air

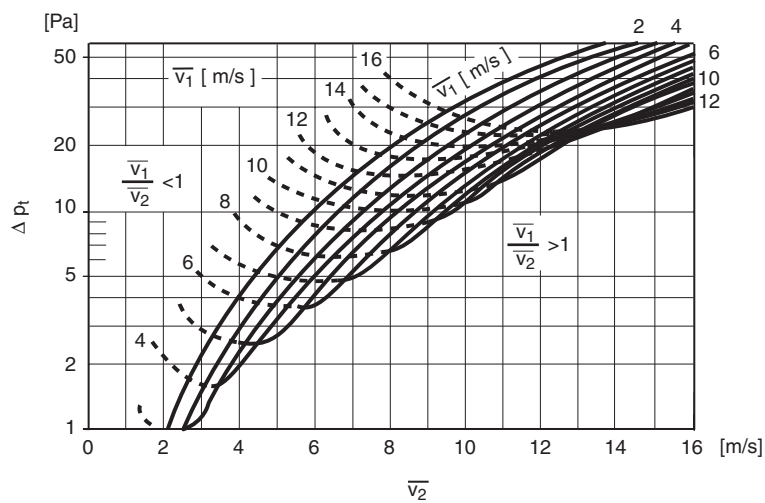
Converging flow



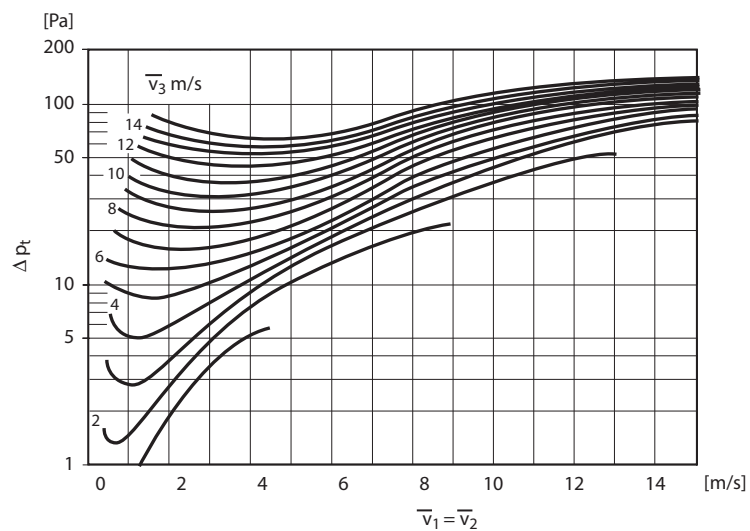
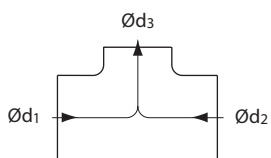
Converging flow



The diagram is also applicable to reduction in Ød_1 .



Converging flow



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T-piece

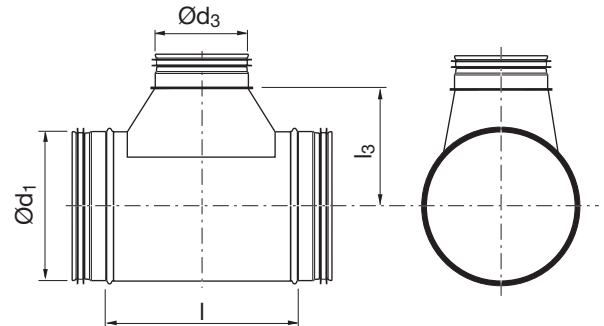
TCU



Description

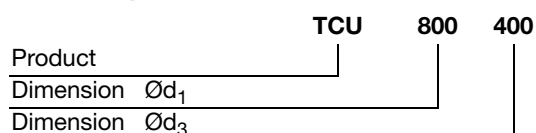
Centric T-piece with hand made T-piece TSTCU.

Dimensions



Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
63	80	195	77	0,33
63	100	215	77	0,38
80	112	225	85	0,48
80	125	240	85	0,53
100	112	225	95	0,52
100	125	240	95	0,56
100	140	260	100	0,63
100	150	270	100	0,63
100	160	280	100	0,68
112	112	225	100	0,60
112	140	260	105	0,71
112	150	270	105	0,74
112	160	280	105	0,77
112	180	300	105	0,83
125	140	260	115	0,72
125	150	270	115	0,75
125	160	280	115	0,77
125	180	300	115	0,85
125	200	335	130	1,01
140	63	178	115	0,60
140	125	240	115	0,75
140	150	270	120	0,85
140	160	280	120	0,88
140	180	300	120	0,95
140	200	335	135	1,09
140	224	360	135	1,19
150	63	178	120	0,59
150	112	225	120	0,75
150	180	300	125	0,99
150	200	335	140	1,17
150	224	360	140	1,24
150	250	385	140	1,40
160	63	178	125	0,58

Ordering example



T-piece

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
160	200	335	145	1,21
160	224	360	145	1,30
160	250	385	145	1,52
180	63	178	135	0,69
180	112	225	135	0,87
180	200	335	155	1,32
180	224	360	155	1,41
180	250	385	155	1,58
180	280	425	165	1,98
200	63	178	145	0,74
200	112	225	145	0,92
200	224	360	165	1,50
200	250	385	165	1,68
200	280	425	175	2,06
200	300	445	175	2,19
200	315	460	175	2,11
224	63	178	160	0,83
224	112	225	160	1,02
224	250	385	180	1,94
224	280	425	190	2,21
224	300	445	190	2,33
224	315	460	190	2,42
224	355	510	200	2,80
250	63	178	170	1,05
250	112	225	170	1,12
250	280	425	200	2,36
250	300	445	200	2,49
250	315	460	200	2,55
250	355	510	210	2,97
250	400	555	210	3,56
280	112	225	185	1,24
280	250	385	205	2,27
280	280	425	215	2,51
280	300	445	215	2,65
280	315	460	215	2,75
280	355	510	225	3,13
280	400	555	225	3,74
280	450	605	225	4,14
300	112	225	195	1,34
300	280	425	225	2,64
300	315	460	225	2,87
300	355	510	235	3,28
300	400	555	235	3,81
300	450	605	235	4,29
315	112	235	205	1,38
315	355	520	245	3,44
315	400	565	245	3,99
315	450	615	245	4,31

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
315	500	670	250	4,68
355	112	235	225	1,76
355	280	435	245	3,78
355	355	520	265	4,44
355	400	565	265	5,07
355	450	615	265	5,50
355	500	670	270	5,99
355	560	730	270	6,51
400	112	235	245	1,97
400	140	270	250	2,31
400	150	280	250	2,40
400	180	310	250	2,68
400	280	435	275	4,16
400	355	520	285	4,85
400	450	615	285	5,99
400	500	670	290	6,59
400	560	730	290	7,11
400	600	770	290	7,47
400	630	800	290	7,73
450	140	270	275	2,52
450	150	280	275	2,62
450	180	310	275	2,94
450	280	435	300	4,72
450	450	615	310	6,44
450	500	670	315	7,16
450	560	730	315	7,78
450	600	770	315	8,19
450	630	800	315	8,50
450	710	880	315	9,85
500	140	270	300	2,79
500	150	280	300	2,90
500	180	310	300	3,18
500	224	370	315	3,87
500	280	435	325	4,99
500	450	615	335	7,15
500	500	670	340	7,81
500	560	730	340	8,60
500	600	770	340	9,19
500	630	800	340	9,41
500	710	880	340	11,5
500	800	970	340	11,8
560	224	370	345	4,33
560	280	435	355	5,56
560	450	615	365	8,01
560	500	670	370	8,56
560	560	730	370	9,21
560	600	770	370	9,80
560	630	800	370	10,3

T-piece

TCU

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
560	710	880	370	12,1
560	800	970	370	13,7
560	900	1090	370	15,6
600	224	370	365	4,62
600	280	435	375	5,93
600	300	455	375	6,15
600	355	520	385	6,99
600	450	615	385	8,55
600	500	670	390	9,16
600	560	730	390	9,63
600	600	770	390	10,5
600	630	800	390	10,7
600	710	880	390	12,6
600	800	970	390	14,1
600	900	1090	390	16,1
630	224	380	380	4,84
630	280	445	390	6,21
630	300	465	390	6,44
630	355	530	400	7,23
630	450	625	400	8,95
630	500	680	405	9,72
630	560	740	405	10,2
630	600	780	405	10,4
630	630	810	405	10,8
630	710	890	405	12,9
630	800	980	405	14,4
630	900	1100	405	16,4
630	1000	1200	405	18,3
710	250	455	420	6,34
710	280	495	420	7,00
710	300	515	430	7,26
710	315	530	430	7,46
710	355	580	440	8,24
710	400	625	440	9,49
710	450	675	440	10,1
710	500	730	445	10,9
710	560	790	445	11,6
710	600	830	445	12,1
710	630	860	445	12,3
710	710	940	445	14,1
710	800	1030	445	15,7
710	900	1150	445	17,8
710	1000	1250	445	19,8
710	1120	1370	445	23,2
800	250	455	465	8,49
800	280	495	475	9,46
800	300	515	475	9,80
800	315	530	475	9,99

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
800	355	580	485	11,1
800	400	625	485	12,6
800	450	675	485	13,4
800	500	730	490	14,6
800	560	790	490	15,3
800	600	830	490	15,8
800	630	860	490	16,5
800	710	940	490	18,0
800	800	1030	490	19,5
800	900	1150	490	21,5
800	1000	1250	490	22,6
800	1120	1370	490	27,6
800	1250	1500	490	30,8
900	315	530	525	11,5
900	355	580	535	12,8
900	400	625	535	15,0
900	450	675	535	15,7
900	500	730	540	16,9
900	560	790	540	18,2
900	600	830	540	19,0
900	630	860	540	19,6
900	710	940	540	22,2
900	800	1030	540	23,8
900	900	1150	540	26,1
900	1000	1250	540	29,1
900	1120	1370	540	34,1
900	1250	1500	540	38,5
1000	315	530	575	12,7
1000	355	580	585	14,1
1000	400	625	585	16,1
1000	450	675	585	17,3
1000	500	730	590	18,4
1000	560	790	590	20,1
1000	600	830	590	21,0
1000	630	860	590	22,0
1000	710	940	590	24,7
1000	800	1030	590	26,8
1000	900	1150	590	29,1
1000	1000	1250	590	31,8
1000	1120	1370	590	37,4
1000	1250	1500	590	42,5
1120	500	730	650	20,5
1120	560	790	650	22,3
1120	600	830	650	23,3
1120	630	860	650	24,1
1120	710	940	650	27,5
1120	800	1030	650	29,9
1120	900	1150	650	32,9

T-piece

$\varnothing d_1$ nom	$\varnothing d_3$ nom	l mm	l_3 mm	m kg
1120	1000	1250	650	35,0
1120	1120	1370	650	40,0
1120	1250	1500	650	45,3
1250	500	730	715	22,9
1250	560	790	715	24,6
1250	600	830	715	25,8
1250	630	860	715	26,7
1250	710	940	715	30,4
1250	800	1030	715	33,1
1250	900	1150	715	36,5
1250	1000	1250	715	39,2
1250	1120	1370	715	43,9
1250	1250	1500	715	48,4

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T-piece

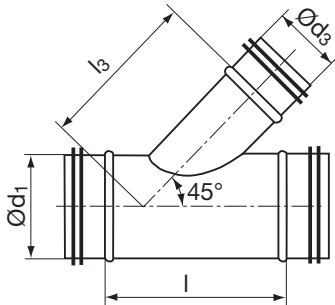
TVU45°



Description

As standard the angle is 45°.
Different angle available to order.

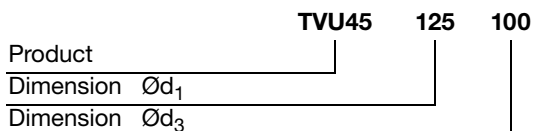
Dimensions



Dimensions

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
80	80	250	165	0,70
100	80	250	180	0,80
100	100	280	190	1,10
125	80	250	200	0,90
125	100	280	210	1,10
125	112	300	215	1,20
125	125	315	220	1,30
140	80	280	210	1,00
140	100	305	220	1,20
140	112	320	225	1,30
140	125	340	230	1,40
140	140	365	250	1,60
150	80	280	215	1,10
150	100	305	225	1,30
150	112	320	235	1,40
150	125	340	240	1,50
150	140	365	260	1,70
150	150	380	265	1,80
160	80	280	220	1,10
160	100	305	230	1,30
160	112	320	240	1,40
160	125	340	245	1,50
160	140	365	265	1,70
160	150	380	270	1,80
160	160	390	275	1,90
180	80	280	235	1,20
180	100	305	245	1,40
180	112	320	250	1,50
180	125	340	260	1,60
180	140	365	280	1,90
180	150	380	285	2,00
180	160	390	290	2,10
180	180	420	300	2,30
200	80	280	250	1,30
200	100	305	260	1,50
200	112	320	265	1,60
200	125	340	270	1,80
200	140	365	295	2,00
200	150	380	300	2,10
200	160	390	305	2,20
200	180	420	315	2,50
200	200	450	325	2,80
224	100	305	275	1,70
224	112	320	285	1,80
224	125	340	290	1,90
224	140	365	310	2,20
224	150	380	315	2,30
224	160	390	320	2,40

Ordering example



T-piece

TVU45°

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
224	180	420	330	2,70
224	200	450	340	3,00
224	224	480	350	3,20
250	100	305	295	2,10
250	112	320	300	2,20
250	125	340	310	2,30
250	140	365	330	2,60
250	150	380	335	2,80
250	160	390	340	2,80
250	180	420	350	3,00
250	200	450	360	3,40
250	224	480	370	3,60
250	250	520	385	4,10
280	112	320	320	2,50
280	125	340	330	2,70
280	140	365	350	2,90
280	150	380	355	3,00
280	160	390	360	3,10
280	180	445	370	3,40
280	200	475	380	3,80
280	224	510	390	4,00
280	250	545	405	4,50
280	280	590	435	5,10
300	125	340	350	3,10
300	140	365	365	3,40
300	150	380	370	3,60
300	160	390	375	3,70
300	180	445	385	4,00
300	200	475	395	4,40
300	224	510	405	4,70
300	250	545	420	5,20
300	280	590	450	5,90
300	300	615	460	6,70
315	100	280	343	3,50
315	125	340	360	3,60
315	140	365	375	3,80
315	150	380	380	4,00
315	160	395	385	4,10
315	180	445	395	4,40
315	200	475	405	4,90
315	224	510	415	5,20
315	250	545	430	5,80
315	280	590	460	6,50
315	300	615	470	7,00
315	315	640	480	7,30
355	100	280	371	4,00
355	125	340	388	5,90
355	150	380	410	4,40
355	160	395	415	4,50
355	180	445	425	4,80
355	200	475	435	5,40

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
355	224	510	445	5,60
355	250	545	460	6,30
355	280	590	490	7,10
355	300	615	500	7,50
355	315	640	505	7,80
355	355	695	525	8,80
400	100	280	403	5,90
400	125	340	420	6,10
400	160	395	445	5,30
400	180	445	455	5,60
400	200	475	465	6,20
400	224	510	475	6,50
400	250	545	490	7,10
400	280	590	520	8,00
400	300	615	530	8,50
400	315	640	535	8,80
400	355	695	555	9,80
400	400	760	580	11,2
450	180	445	490	6,30
450	200	475	500	6,90
450	224	510	510	7,20
450	250	545	525	7,90
450	280	590	555	8,70
450	300	615	565	9,20
450	315	640	570	9,60
450	355	695	590	10,6
450	400	760	615	12,1
450	450	830	640	13,5
500	200	475	535	7,50
500	224	510	550	7,80
500	250	545	560	8,60
500	280	590	560	9,50
500	300	615	600	10,0
500	315	640	610	10,4
500	355	695	630	11,5
500	400	760	650	13,0
500	450	830	675	14,5
500	500	900	700	16,1
560	224	510	590	9,20
560	250	600	605	10,0
560	280	640	630	10,8
560	300	665	640	11,4
560	315	690	650	11,8
560	355	750	670	13,0
560	400	810	690	14,5
560	450	880	715	16,1
560	500	950	740	17,8
560	560	1040	800	20,4
600	250	600	630	11,5
600	280	640	655	12,5
600	300	665	665	13,1

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T-piece

TVU45°

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
600	315	690	675	13,6
600	355	750	695	15,1
600	400	810	715	16,7
600	450	880	740	18,4
600	500	950	765	20,5
600	560	1040	825	23,4
600	600	1090	850	25,8
630	280	640	680	14,0
630	300	665	690	14,6
630	315	690	700	15,1
630	355	750	720	16,8
630	400	810	740	18,7
630	450	880	765	20,6
630	500	950	790	22,7
630	560	1040	850	25,8
630	600	1090	870	27,8
630	630	1140	885	29,2
710	300	665	745	16,9
710	315	690	755	17,4
710	355	750	775	19,1
710	400	810	800	21,0
710	450	880	825	23,2
710	500	950	850	25,4
710	560	1040	905	28,6
710	600	1090	925	30,6
710	630	1140	940	32,2
710	710	1250	980	36,7
800	315	690	820	19,2
800	355	750	840	21,0
800	400	810	860	23,1
800	450	880	885	25,4
800	500	950	910	27,7
800	560	1040	970	31,2
800	600	1090	990	33,9
800	630	1140	1005	34,9
800	710	1250	1045	39,6
800	800	1380	1090	45,0
900	355	750	910	26,2
900	400	810	935	28,8
900	450	880	960	31,5
900	500	950	985	34,4
900	560	1040	1040	38,6
900	600	1090	1060	41,1
900	630	1140	1075	43,1
900	710	1250	1115	48,7
900	800	1380	1160	55,2
900	900	1520	1210	62,7
1000	400	810	1005	31,5
1000	450	880	1030	34,4
1000	500	950	1055	37,5
1000	560	1040	1110	41,8

Ød ₁ nom	Ød ₃ nom	l mm	l ₃ mm	m kg
1000	600	1090	1130	44,5
1000	630	1140	1145	46,5
1000	710	1250	1185	52,5
1000	800	1380	1230	59,3
1000	900	1520	1280	67,2
1000	1000	1660	1330	75,5
1120	500	1005	1140	49,0
1120	560	1090	1195	54,3
1120	600	1140	1215	57,4
1120	630	1190	1230	60,0
1120	710	1305	1270	67,1
1120	800	1430	1315	75,2
1120	900	1570	1365	84,6
1120	1000	1710	1415	94,7
1120	1120	1880	1505	109
1250	500	1005	1230	53,6
1250	560	1090	1290	59,3
1250	600	1140	1310	62,8
1250	630	1190	1325	65,4
1250	710	1305	1365	73,0
1250	800	1430	1410	81,5
1250	900	1570	1460	91,5
1250	1000	1710	1510	101
1250	1120	1880	1595	117
1250	1250	2065	1660	132

X-piece

XCPU

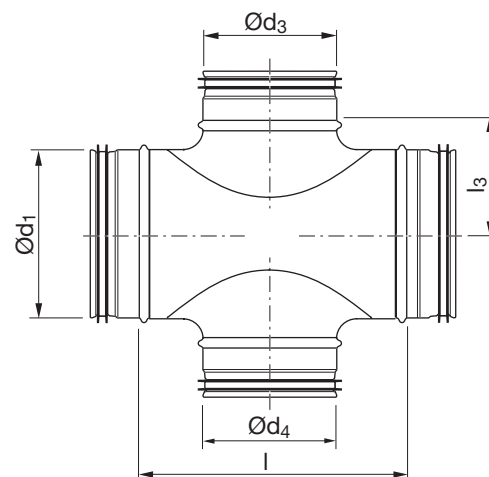


Description

Centric –

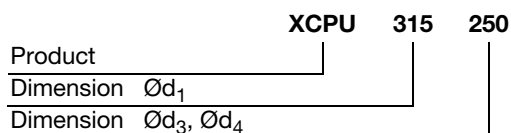
- fully pressed or
- with saddle PSU.

Dimensions



Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ mm	m kg
63	63	125	42	0,38
80	63	125	50	0,31
80	80	140	52	0,36
100	63	125	60	0,35
100	80	126	65	0,43
100	100	130	65	0,37
112	63	125	66	0,68
112	80	140	68	0,73
112	100	175	71	0,77
125	63	125	73	0,44
125	80	146	75	0,51
125	100	175	78	0,45
125	125	165	83	0,57
140	80	140	82	0,79
140	100	175	85	0,86
140	140	230	90	0,99
150	80	140	87	0,77
150	100	175	90	0,86
150	125	215	95	0,96
150	140	230	95	1,03
150	150	260	95	1,08
160	80	140	92	0,59
160	100	175	95	0,91
160	125	215	100	0,91
160	140	230	100	1,05
160	150	260	100	1,08
160	160	209	105	0,67
180	80	140	102	0,88
180	100	175	105	0,97
180	125	215	110	1,08
180	140	230	110	1,18
180	150	260	110	1,21
180	160	260	115	1,26

Ordering example



X-piece

XCPU

$\varnothing d_1$ nom	$\varnothing d_3/\varnothing d_4$ nom	l mm	l_3 mm	m kg
180	180	285	115	1,33
200	80	140	112	0,77
200	100	175	115	0,88
200	125	215	115	1,02
200	140	230	120	1,22
200	150	260	120	1,26
200	160	260	125	0,77
200	180	285	125	1,36
200	200	249	125	1,70
224	80	140	124	0,99
224	100	175	127	1,09
224	125	215	132	1,22
224	140	230	132	1,33
224	150	260	132	1,38
224	160	260	137	1,42
224	180	285	137	1,50
224	200	346	137	1,81
224	224	346	137	1,83
250	80	156	137	1,13
250	100	175	140	1,22
250	125	220	145	1,48
250	140	230	145	1,45
250	150	255	145	1,50
250	160	256	150	1,58
250	180	306	150	1,65
250	200	306	150	1,78
250	224	350	150	1,98
250	250	296	150	1,78
280	80	156	137	1,20
280	100	175	140	1,31
280	125	220	145	1,46
280	140	230	145	1,59
280	150	255	145	1,65
280	160	256	150	1,71
280	180	306	150	1,81
280	200	306	150	2,08
280	224	350	150	2,19
300	80	156	162	1,29
300	100	175	165	1,38
300	125	220	170	1,53
300	140	230	170	1,66
300	150	255	170	1,76
300	160	256	175	1,82
300	180	306	175	1,93
300	200	306	175	2,27
300	224	350	175	2,34
300	250	350	175	2,75
300	300	445	225	3,12

$\varnothing d_1$ nom	$\varnothing d_3/\varnothing d_4$ nom	l mm	l_3 mm	m kg
315	80	156	170	1,43
315	100	175	173	1,50
315	125	220	178	1,76
315	140	230	178	1,81
315	150	255	178	1,90
315	160	256	182	1,96
315	180	306	182	2,13
315	200	306	182	2,14
315	224	350	182	2,61
315	250	350	182	2,59
315	300	430	182	3,26
315	315	363	182	3,73
355	100	175	193	1,74
355	125	220	198	2,03
355	140	230	198	2,29
355	150	255	198	2,40
355	160	256	203	2,50
355	180	306	203	2,71
355	200	306	203	3,15
355	224	350	203	3,37
355	250	350	203	3,96
355	300	430	203	4,43
400	100	175	215	2,27
400	125	225	220	2,81
400	150	255	220	2,47
400	160	266	225	3,02
400	200	300	225	3,37
400	224	350	225	3,71
400	250	350	225	3,79
400	300	430	225	4,97
400	315	415	225	4,42
400	400	510	225	6,20
450	125	225	245	2,30
450	150	255	245	2,76
450	160	266	250	2,90
450	200	300	250	3,75
450	224	350	250	4,06
450	250	350	250	4,79
450	300	430	250	5,54
450	315	415	250	5,68
450	400	510	250	6,96
500	125	225	270	3,35
500	150	255	270	3,35
500	160	266	275	3,77
500	200	300	275	4,14
500	224	350	275	4,12
500	250	350	275	4,68
500	300	430	275	5,64

X-piece

XCPU

$\varnothing d_1$ nom	$\varnothing d_3/\varnothing d_4$ nom	l mm	l_3 mm	m kg
500	315	415	275	5,30
500	400	510	275	6,34
560	200	300	305	4,30
560	224	350	305	4,59
560	250	350	305	5,41
560	300	430	305	6,25
560	315	415	305	6,43
560	400	510	305	8,28
600	200	300	325	4,59
600	224	350	325	4,98
600	250	350	325	5,75
600	300	350	325	6,64
600	315	415	325	6,83
600	400	510	325	8,78
630	200	300	340	5,35
630	224	350	340	5,12
630	250	350	340	6,00
630	300	430	340	6,93
630	315	415	340	6,77
630	400	510	340	7,69

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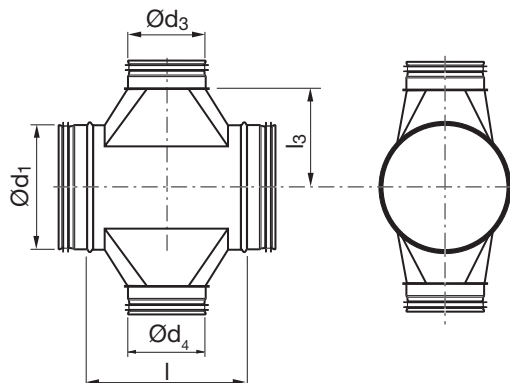
18

X-piece

XCU



Dimensions

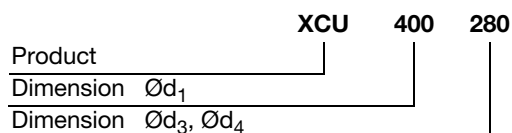


Description

Centric – with hand made T-piece TSTCU.

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ mm	m kg
112	112	225	100	0,80
125	112	225	110	0,77
140	63	178	115	0,79
140	112	225	115	0,88
140	125	240	115	0,92
150	63	178	120	0,67
150	112	225	120	0,90
160	63	178	125	0,62
160	112	225	125	0,89
180	63	178	135	0,79
180	112	225	135	1,01
200	63	178	145	0,83
200	112	225	145	1,05
224	63	178	160	0,91
224	112	225	160	1,14
250	63	178	170	0,99
250	112	225	170	1,24
280	112	225	185	1,37
280	250	385	205	2,57
280	280	425	215	2,86
300	112	225	195	1,47
300	280	425	225	2,95
315	112	225	205	1,49
315	280	435	235	3,26
355	112	235	225	1,85
355	280	435	245	4,33
355	315	470	255	4,48
355	355	520	265	5,09
400	112	235	245	2,05
400	140	270	250	2,47
400	180	310	250	2,95
400	280	435	275	4,68
400	355	520	285	5,42

Ordering example



X-piece

XCU

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ mm	m kg
450	140	270	275	2,62
450	180	310	275	3,17
450	280	435	300	5,33
450	355	520	310	6,19
450	450	615	310	7,08
500	140	270	300	2,91
500	180	310	300	3,35
500	280	435	325	5,42
500	355	520	335	6,45
500	450	615	335	7,86
500	500	670	340	8,69
560	280	435	355	6,01
560	355	520	365	7,15
560	450	615	365	8,82
560	500	670	370	9,35
560	560	730	370	10,1
600	280	435	375	6,38
600	355	520	385	7,59
600	450	615	385	9,38
600	500	670	390	10,0
600	560	730	390	10,4
600	600	770	390	11,7
630	280	445	390	6,67
630	355	530	400	7,74
630	450	625	400	9,78
630	500	680	405	10,7
630	560	740	405	11,0
630	600	780	405	11,1
630	630	810	405	11,6
710	250	455	420	6,78
710	280	495	420	7,52
710	300	515	430	7,82
710	315	530	430	8,05
710	355	580	440	8,91
710	400	625	440	10,4
710	450	675	440	11,1
710	500	730	445	12,0
710	560	790	445	12,7
710	600	830	445	13,2
710	630	860	445	13,4
710	710	940	445	15,5
800	250	455	465	7,08
800	280	495	475	8,10
800	300	515	475	8,42
800	315	530	475	8,54
800	355	580	485	9,60
800	400	625	485	11,1
800	450	675	485	11,9

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ mm	m kg
800	500	730	490	13,3
800	560	790	490	13,7
800	600	830	490	14,2
800	630	860	490	15,2
800	710	940	490	16,3
800	800	1030	490	17,9
900	315	530	525	11,9
900	355	580	535	13,2
900	400	625	535	16,0
900	450	675	535	16,5
900	500	730	540	17,9
900	560	790	540	19,2
900	600	830	540	20,1
900	630	860	540	20,7
900	710	940	540	23,7
900	800	1030	540	25,1
900	900	1150	540	27,8
1000	315	530	575	13,0
1000	355	580	585	14,3
1000	400	625	585	16,6
1000	450	675	585	17,9
1000	500	730	590	19,0
1000	560	790	590	21,0
1000	600	830	590	22,1
1000	630	860	590	23,4
1000	710	940	590	26,4
1000	800	1030	590	28,5
1000	900	1150	590	31,0
1000	1000	1250	590	34,3
1120	500	730	650	21,4
1120	560	790	650	23,1
1120	600	830	650	24,3
1120	630	860	650	25,2
1120	710	940	650	29,1
1120	800	1030	650	31,7
1120	900	1150	650	35,4
1120	1000	1250	650	37,3
1120	1120	1370	650	43,5
1250	500	730	715	23,4
1250	560	790	715	25,3
1250	600	830	715	26,6
1250	630	860	715	27,6
1250	710	940	715	31,9
1250	800	1030	715	34,9
1250	900	1150	715	39,1
1250	1000	1250	715	41,9
1250	1120	1370	715	47,1
1250	1250	1500	715	52,6

X-piece

XU

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ mm	m kg
450	125	250	270	2,30
450	140	270	275	2,62
450	150	280	275	2,76
450	160	290	275	2,90
450	180	310	275	3,17
450	200	345	290	3,75
450	224	370	290	4,06
450	250	395	290	4,79
450	280	435	300	5,33
450	300	455	300	5,54
450	315	470	300	5,68
450	355	520	310	6,19
450	400	565	310	6,96
500	125	250	295	2,65
500	140	270	300	2,91
500	150	280	300	3,04
500	160	290	300	3,14
500	180	310	300	3,35
500	200	345	315	4,05
500	224	370	315	4,12
500	250	395	315	4,99
500	280	435	325	5,42
500	300	455	325	5,64
500	315	470	325	5,80
500	355	520	335	6,45
500	400	565	335	6,81
500	450	615	335	7,86
560	200	345	345	4,30
560	224	370	345	4,59
560	250	395	345	5,41
560	280	435	355	6,01
560	300	455	355	6,25
560	315	470	355	6,43
560	355	520	365	7,15
560	400	565	365	8,28
560	450	615	365	8,82
560	500	670	370	9,35
600	200	345	365	4,59
600	224	370	365	4,89
600	250	395	365	5,75
600	280	435	375	6,38
600	300	455	375	6,64
600	315	470	375	6,83
600	355	520	385	7,59
600	400	565	385	8,78
600	450	615	385	9,38
600	500	670	390	10,0
600	560	730	390	10,4

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ mm	m kg
630	200	355	380	4,81
630	224	380	380	5,12
630	250	405	380	6,01
630	280	445	390	6,67
630	300	465	390	6,93
630	315	480	390	7,13
630	355	530	400	7,74
630	400	575	400	9,36
630	450	625	400	9,78
630	500	680	405	10,7
630	560	740	405	11,0
630	600	780	405	11,1
710	250	455	420	6,78
710	280	495	420	7,52
710	300	515	430	7,82
710	315	530	430	8,05
710	355	580	440	8,91
710	400	625	440	10,4
710	450	675	440	11,1
710	500	730	445	12,0
710	560	790	445	12,7
710	600	830	445	13,2
710	630	860	445	13,4
800	250	455	465	7,08
800	280	495	475	8,10
800	300	515	475	8,42
800	315	530	475	8,54
800	355	580	485	9,60
800	400	625	485	11,1
800	450	675	485	11,9
800	500	730	490	13,3
800	560	790	490	13,7
800	600	830	490	14,2
800	630	860	490	15,2
800	710	940	490	16,3
900	315	530	525	11,9
900	355	580	535	13,2
900	400	625	535	16,0
900	450	675	535	16,5
900	500	730	540	17,9
900	560	790	540	19,2
900	600	830	540	20,1
900	630	860	540	20,7
900	710	940	540	23,7
900	800	1030	540	25,1
1000	315	530	575	13,0
1000	355	580	585	14,3
1000	400	625	585	16,6

X-piece

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ /l ₄ mm	m kg
200	80	280	250	1,40
200	100	305	260	1,70
200	112	320	265	1,80
200	125	340	270	2,00
200	140	365	295	2,30
200	150	380	300	2,40
200	160	390	305	2,50
200	180	420	315	2,90
200	200	450	325	3,30
224	100	305	275	1,90
224	112	320	285	2,00
224	125	340	290	2,10
224	140	365	310	2,50
224	150	380	315	2,60
224	160	390	320	2,70
224	180	420	330	3,10
224	200	450	340	3,50
224	224	480	350	3,80
250	100	305	295	2,30
250	112	320	300	2,40
250	125	340	310	2,50
250	140	365	330	2,90
250	150	380	335	3,10
250	160	390	340	3,20
250	180	420	350	3,40
250	200	450	360	3,90
250	224	480	370	4,20
250	250	520	385	4,80
280	112	320	320	2,70
280	125	340	330	2,90
280	140	365	350	3,20
280	150	380	355	3,30
280	160	390	360	3,40
280	180	445	370	3,80
280	200	475	380	4,30
280	224	510	390	4,60
280	250	545	405	5,20
280	280	590	435	5,90
300	125	340	350	3,30
300	140	365	365	3,70
300	150	380	370	3,90
300	160	390	375	4,00
300	180	445	385	4,40
300	200	475	395	4,90
300	224	510	405	5,30
300	250	545	420	5,90
300	280	590	450	6,70
300	300	615	460	7,60

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ /l ₄ mm	m kg
315	140	365	375	4,10
315	150	380	380	4,30
315	160	395	385	4,40
315	180	445	395	4,80
315	200	475	405	5,40
315	224	510	415	5,80
315	250	545	430	6,50
315	280	590	460	7,30
315	300	615	470	7,90
315	315	640	480	8,30
355	150	380	410	4,70
355	160	395	415	4,80
355	180	445	425	5,20
355	200	475	435	5,90
355	224	510	445	6,20
355	250	545	460	7,00
355	280	590	490	7,90
355	300	615	500	8,40
355	315	640	505	8,80
355	355	695	525	10,0
400	160	395	445	5,60
400	180	445	455	6,00
400	200	475	465	6,70
400	224	510	475	7,10
400	250	545	490	7,80
400	280	590	520	8,80
400	300	615	530	9,40
400	315	640	535	9,80
400	355	695	555	11,0
400	400	760	580	12,7
450	180	445	490	6,70
450	200	475	500	7,40
450	224	510	510	7,80
450	250	545	525	8,60
450	280	590	555	9,50
450	300	615	565	10,1
450	315	640	570	10,6
450	355	695	590	11,8
450	400	760	615	13,6
450	450	830	640	15,5
500	200	475	535	8,00
500	224	510	550	8,40
500	250	545	560	9,30
500	280	590	590	10,3
500	300	615	600	10,9
500	315	640	610	11,4
500	355	695	630	12,7
500	400	760	650	14,5

X-piece

XVU45°

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ /l ₄ mm	m kg
500	450	830	675	16,5
500	500	900	700	18,6
560	224	510	590	9,80
560	250	600	605	10,7
560	280	640	630	11,6
560	300	665	640	12,3
560	315	690	650	12,6
560	355	750	670	14,2
560	400	810	690	16,0
560	450	880	715	18,1
560	500	950	740	20,3
560	560	1040	800	23,4
600	250	600	630	12,2
600	280	640	655	13,3
600	300	665	665	14,0
600	315	690	675	14,6
600	355	750	695	16,3
600	400	810	715	18,2
600	450	880	740	20,4
600	500	950	765	23,0
600	560	1040	825	26,4
600	600	1090	850	29,3
630	280	640	680	14,8
630	300	665	690	15,6
630	315	690	700	16,1
630	355	750	720	18,0
630	400	810	740	20,2
630	450	880	765	22,6
630	500	950	790	25,2
630	560	1040	850	28,8
630	600	1090	870	31,3
630	630	1140	885	33,4
710	300	665	745	17,8
710	315	690	755	18,4
710	355	750	775	20,3
710	400	810	800	22,5
710	450	880	825	25,2
710	500	950	850	27,9
710	560	1040	905	31,6
710	600	1090	925	34,1
710	630	1140	940	36,4
710	710	1250	980	41,7
800	315	690	820	20,2
800	355	750	840	22,2
800	400	810	860	24,6
800	450	880	885	27,4
800	500	950	910	30,2
800	560	1040	970	34,2

Ød ₁ nom	Ød ₃ /Ød ₄ nom	l mm	l ₃ /l ₄ mm	m kg
800	600	1090	990	37,4
800	630	1140	1005	39,1
800	710	1250	1045	44,6
800	800	1380	1090	51,0
900	355	750	910	27,4
900	400	810	935	30,3
900	450	880	960	33,5
900	500	950	985	36,9
900	560	1040	1040	41,6
900	600	1090	1060	44,6
900	630	1140	1075	47,3
900	710	1250	1115	53,7
900	800	1380	1160	51,2
900	900	1520	1210	69,7
1000	400	810	1005	33,0
1000	450	880	1030	36,4
1000	500	950	1055	40,0
1000	560	1040	1110	44,8
1000	600	1090	1130	48,0
1000	630	1140	1145	50,7
1000	710	1250	1185	57,5
1000	800	1380	1230	65,3
1000	900	1520	1280	74,2
1000	1000	1660	1330	83,5
1120	500	1005	1140	51,0
1120	560	1090	1195	57,3
1120	600	1140	1215	60,9
1120	630	1190	1230	64,2
1120	710	1305	1270	72,1
1120	800	1430	1315	81,2
1120	900	1570	1365	91,6
1120	1000	1710	1415	102
1120	1120	1880	1505	118
1250	500	1005	1230	56,1
1250	560	1090	1290	62,3
1250	600	1140	1310	66,3
1250	630	1190	1325	69,6
1250	710	1305	1365	78,0
1250	800	1430	1410	87,5
1250	900	1570	1460	98,5
1250	1000	1710	1510	110
1250	1120	1880	1595	126
1250	1250	2065	1660	142

Y-piece

YVU45°

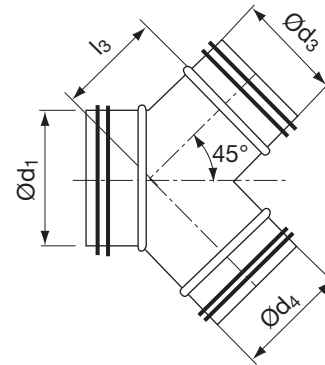


Description

As standard is $\text{Ød}_3 = \text{Ød}_4$ and the angle 45°. Different dimensions and angle available to order.

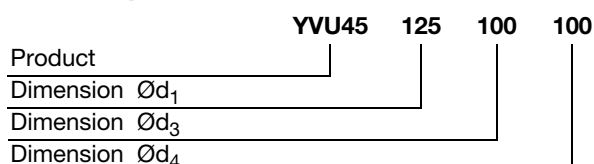
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Dimensions



Ød_1 nom	Ød_3 nom	Ød_4 nom	l_3 mm	m kg
80	80	80	120	0,90
100	80	80	140	1,00
100	100	100	140	1,00
112	80	80	160	1,00
125	100	100	170	1,30
125	125	125	170	1,30
140	100	100	185	1,40
150	100	100	190	1,50
150	150	150	190	1,50
160	112	112	205	1,60
160	160	160	205	1,80
180	125	125	215	1,80
180	180	180	215	1,80
200	140	140	230	2,10
200	200	200	230	2,10
224	160	160	250	3,50
224	224	224	250	2,70
250	180	180	280	3,50
250	200	200	280	3,50
250	250	250	280	3,50
280	200	200	310	3,60
280	280	280	310	3,50
300	200	200	320	4,20
300	300	300	320	4,20
315	224	224	335	4,40
315	315	315	335	4,80
355	250	250	365	5,00
355	355	355	365	6,40
400	280	280	410	6,80
400	300	300	410	7,00
400	400	400	410	9,10
450	300	300	440	8,50
450	315	315	440	8,50

Ordering example



Y-piece

YVU45°

Ød_1 nom	Ød_3 nom	Ød_4 nom	l_3 mm	m kg
500	355	355	490	9,80
560	400	400	550	12,1
600	400	400	580	13,2
630	450	450	610	15,6
630	630	630	610	20,6
710	500	500	670	18,7
710	710	710	670	24,4
800	560	560	740	22,7
800	800	800	740	28,9
900	630	630	825	24,8
1000	710	710	920	30,5
1120	800	800	1030	38,0
1250	900	900	1150	50,0

T-piece

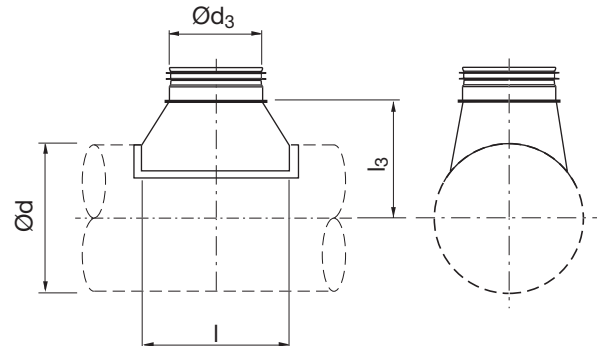
TSTCU



Description

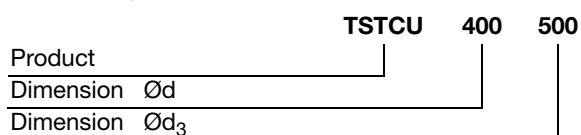
Hand made centric T-piece.

Dimensions



Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
63	80	145	77	0,15
63	100	165	77	0,20
80	100	165	85	0,21
80	112	175	85	0,24
80	125	190	85	0,29
100	112	175	95	0,22
100	125	190	95	0,25
100	140	210	100	0,30
100	150	220	100	0,30
100	160	230	100	0,36
112	112	175	100	0,27
112	125	190	100	0,30
112	140	210	105	0,34
112	150	220	105	0,37
112	160	230	105	0,39
112	180	250	105	0,43
125	112	175	110	0,23
125	140	210	115	0,31
125	150	220	115	0,33
125	160	230	115	0,35
125	180	250	115	0,41
125	200	285	130	0,50
140	80	145	115	0,22
140	112	175	115	0,28
140	150	220	120	0,38
140	160	230	120	0,40
140	180	250	120	0,45
140	200	285	135	0,53
140	224	310	135	0,59
150	80	145	120	0,19
150	112	175	120	0,27
150	160	230	125	0,43
150	180	250	125	0,47

Ordering example



T-piece

TSTCU

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
150	200	285	140	0,57
150	224	310	140	0,64
150	250	335	140	0,77
160	63	128	125	0,10
160	112	175	125	0,25
160	180	250	130	0,47
160	200	285	145	0,57
160	224	310	145	0,65
160	250	335	145	0,85
180	63	128	135	0,16
180	80	145	135	0,20
180	112	175	135	0,27
180	125	190	135	0,31
180	140	210	140	0,36
180	150	220	140	0,39
180	160	230	140	0,43
180	200	285	155	0,62
180	224	310	155	0,69
180	250	335	155	0,82
180	280	375	165	1,02
200	63	128	145	0,14
200	112	175	145	0,25
200	224	310	165	0,66
200	250	335	165	0,79
200	280	375	175	1,00
200	300	395	175	1,09
200	315	410	175	1,13
224	63	128	160	0,15
224	112	175	160	0,25
224	250	335	180	0,84
224	280	375	190	1,01
224	300	395	190	1,11
224	315	410	190	1,18
224	355	460	200	1,44
250	63	128	170	0,15
250	112	175	170	0,26
250	280	375	200	1,03
250	300	395	200	1,12
250	315	410	200	1,13
250	355	460	210	1,46
250	400	505	210	1,83
280	112	175	185	0,27
280	250	335	205	0,86
280	280	375	215	1,03
280	300	395	215	1,12
280	315	410	215	1,19
280	355	460	225	1,44
280	400	505	225	1,80

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
280	450	555	225	2,11
300	112	175	195	0,28
300	280	375	225	1,03
300	315	410	225	1,20
300	355	460	235	1,45
300	400	505	235	1,73
300	450	555	235	2,10
315	112	175	205	0,26
315	280	375	235	1,11
315	355	460	245	1,53
315	400	505	245	1,80
315	450	555	245	2,01
315	500	610	250	2,24
355	112	175	225	0,28
355	280	375	245	1,36
355	315	410	255	1,55
355	355	460	265	1,91
355	400	505	265	2,18
355	450	555	265	2,46
355	500	610	270	2,77
355	560	670	270	3,11
400	112	175	245	0,28
400	140	210	250	0,44
400	180	250	250	0,66
400	280	375	275	1,34
400	355	460	285	1,89
400	450	555	285	2,58
400	500	610	290	2,96
400	560	670	290	3,29
400	600	710	290	3,51
400	630	740	290	3,68
450	140	210	275	0,40
450	180	250	275	0,64
450	280	375	300	1,46
450	355	460	310	1,98
450	450	555	310	2,60
450	500	610	315	3,08
450	560	670	315	3,48
450	600	710	315	3,74
450	630	740	315	3,94
450	710	820	315	4,70
500	140	210	300	0,43
500	180	250	300	0,60
500	280	375	325	1,29
500	355	460	335	1,85
500	450	555	335	2,74
500	500	610	340	3,28
500	560	670	340	3,83

T-piece

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
500	600	710	340	4,25
500	630	740	340	4,35
500	710	820	340	5,74
500	800	910	340	6,91
560	280	375	355	1,34
560	355	460	365	1,98
560	450	555	365	2,78
560	500	610	370	3,27
560	560	670	370	3,85
560	600	710	370	4,26
560	630	740	370	4,58
560	710	820	370	5,71
560	800	910	370	6,34
560	900	1030	370	8,45
600	280	375	375	1,37
600	355	460	385	1,93
600	450	555	385	2,81
600	500	610	390	3,29
600	560	670	390	3,86
600	600	710	390	4,54
600	630	740	390	4,58
600	710	820	390	5,69
600	800	910	390	6,79
600	900	1030	390	8,36
630	280	375	390	1,39
630	355	460	400	1,86
630	450	555	400	2,83
630	500	610	405	3,42
630	560	670	405	3,87
630	600	710	405	4,27
630	630	740	405	4,45
630	710	820	405	5,68
630	800	910	405	6,76
630	900	1030	405	8,30
630	1000	1130	405	9,71
710	250	335	420	1,26
710	280	375	420	1,50
710	300	395	430	1,64
710	315	410	430	1,74
710	355	460	440	2,08
710	400	505	440	2,61
710	450	555	440	3,01
710	500	610	445	3,52
710	560	670	445	4,11
710	600	710	445	4,52
710	630	740	445	4,81
710	710	820	445	6,00
710	800	910	445	7,10

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
710	900	1030	445	8,69
710	1000	1130	445	10,2
710	1120	1250	445	12,4
800	250	335	465	1,08
800	280	375	475	1,44
800	300	395	475	1,57
800	315	410	475	1,61
800	355	460	485	2,00
800	400	505	485	2,50
800	450	555	485	2,88
800	500	610	490	3,59
800	560	670	490	3,93
800	600	710	490	4,32
800	630	740	490	4,94
800	710	820	490	5,73
800	800	910	490	6,99
800	900	1030	490	8,32
800	1000	1130	490	8,61
800	1120	1250	490	11,9
800	1250	1380	490	14,0
900	315	410	525	2,00
900	355	460	535	2,43
900	400	505	535	3,41
900	450	555	535	3,59
900	500	610	540	4,24
900	560	670	540	5,01
900	600	710	540	5,56
900	630	740	540	5,99
900	710	820	540	7,50
900	800	910	540	9,03
900	900	1030	540	11,2
900	1000	1130	540	13,3
900	1120	1250	540	16,4
900	1250	1380	540	19,7
1000	315	410	575	1,95
1000	355	460	585	2,36
1000	400	505	585	2,97
1000	450	555	585	3,54
1000	500	610	590	3,99
1000	560	670	590	5,02
1000	600	710	590	5,66
1000	630	740	590	6,34
1000	710	820	590	7,67
1000	800	910	590	9,31
1000	900	1030	590	11,8
1000	1000	1130	590	14,2
1000	1120	1250	590	17,7
1000	1250	1380	590	21,5

T-piece

TSTCU

Ød nom	Ød₃ nom	l mm	l₃ mm	m kg
1120	500	610	650	4,25
1120	560	670	650	5,07
1120	600	710	650	5,66
1120	630	740	650	6,12
1120	710	820	650	7,75
1120	800	910	650	9,45
1120	900	1030	650	12,2
1120	1000	1130	650	14,3
1120	1120	1250	650	17,9
1120	1250	1380	650	21,7
1250	500	610	715	4,28
1250	560	670	715	5,11
1250	600	710	715	5,71
1250	630	740	715	6,18
1250	710	820	715	7,83
1250	800	910	715	9,55
1250	900	1030	715	12,5
1250	1000	1130	715	14,5
1250	1120	1250	715	18,2
1250	1250	1380	715	22,0

T-piece

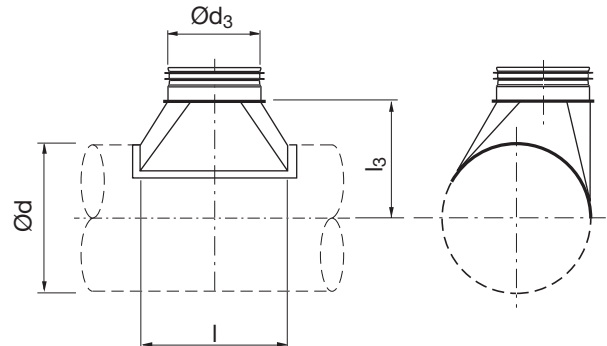
TSTU



Description

Hand made tangential T-piece.

Dimensions



Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
63	80	145	77	0,15
63	100	165	77	0,20
80	63	128	85	0,12
80	100	165	85	0,21
80	112	175	85	0,24
80	125	190	85	0,29
100	63	128	95	0,13
100	80	145	95	0,16
100	112	175	95	0,22
100	125	190	95	0,25
100	140	210	100	0,30
100	150	220	100	0,30
100	160	230	100	0,36
112	63	128	100	0,18
112	80	145	100	0,21
112	100	165	100	0,25
112	125	190	100	0,30
112	140	210	105	0,34
112	150	220	105	0,37
112	160	230	105	0,39
112	180	250	105	0,43
125	63	128	110	0,14
125	80	145	110	0,17
125	100	165	110	0,21
125	112	175	110	0,23
125	140	210	115	0,31
125	150	220	115	0,33
125	160	230	115	0,35
125	180	250	115	0,41
125	200	285	130	0,50
140	63	128	115	0,18
140	80	145	115	0,22
140	100	165	115	0,26

Ordering example



T-piece

TSTU

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
140	112	175	115	0,28
140	125	190	115	0,31
140	150	220	120	0,38
140	160	230	120	0,40
140	180	250	120	0,45
140	200	285	135	0,53
140	224	310	135	0,59
150	63	128	120	0,14
150	80	145	120	0,19
150	100	165	120	0,24
150	112	175	120	0,27
150	125	190	120	0,31
150	140	210	125	0,37
150	160	230	125	0,43
150	180	250	125	0,47
150	200	285	140	0,57
150	224	310	140	0,64
150	250	335	140	0,77
160	63	128	125	0,10
160	80	145	125	0,15
160	100	165	125	0,22
160	112	175	125	0,25
160	125	190	125	0,29
160	140	210	130	0,35
160	150	220	130	0,38
160	180	250	130	0,47
160	200	285	145	0,57
160	224	310	145	0,65
160	250	335	145	0,85
180	63	128	135	0,16
180	80	145	135	0,20
180	100	165	135	0,25
180	112	175	135	0,27
180	125	190	135	0,31
180	140	210	140	0,36
180	150	220	140	0,39
180	160	230	140	0,43
180	200	285	155	0,62
180	224	310	155	0,69
180	250	335	155	0,82
180	280	375	165	1,02
200	63	128	145	0,14
200	80	145	145	0,18
200	100	165	145	0,23
200	112	175	145	0,25
200	125	190	145	0,29
200	140	210	150	0,34
200	150	220	150	0,37

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
200	160	230	150	0,40
200	180	250	150	0,46
200	224	310	165	0,66
200	250	335	165	0,79
200	280	375	175	1,00
200	300	395	175	1,09
200	315	410	175	1,13
224	63	128	160	0,15
224	80	145	160	0,18
224	100	165	160	0,23
224	112	175	160	0,25
224	125	190	160	0,29
224	140	210	165	0,35
224	150	220	165	0,37
224	160	230	165	0,40
224	180	250	165	0,47
224	200	285	180	0,63
224	250	335	180	0,84
224	280	375	190	1,01
224	300	395	190	1,11
224	315	410	190	1,18
224	355	460	200	1,44
250	63	128	170	0,15
250	80	145	170	0,18
250	100	165	170	0,23
250	112	175	170	0,26
250	125	190	170	0,29
250	140	210	175	0,35
250	150	220	175	0,38
250	160	230	175	0,41
250	180	250	175	0,47
250	200	285	190	0,62
250	224	310	190	0,68
250	280	375	200	1,03
250	300	395	200	1,12
250	315	410	200	1,13
250	355	460	210	1,46
250	400	505	210	1,83
280	80	145	185	0,20
280	100	165	185	0,24
280	112	175	185	0,27
280	125	190	185	0,31
280	140	210	190	0,36
280	150	220	190	0,39
280	160	230	190	0,42
280	180	250	190	0,49
280	200	285	205	0,60
280	224	310	205	0,69

T-piece

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
280	250	335	205	0,86
280	300	395	215	1,12
280	315	410	215	1,19
280	355	460	225	1,44
280	400	505	225	1,80
280	450	555	225	2,11
300	80	145	195	0,20
300	100	165	195	0,24
300	112	175	195	0,28
300	125	190	195	0,30
300	140	210	200	0,35
300	150	220	200	0,40
300	160	230	200	0,43
300	180	250	200	0,49
300	200	285	215	0,63
300	224	310	215	0,70
300	250	335	215	0,86
300	280	375	225	1,03
300	315	410	225	1,20
300	355	460	235	1,45
300	400	505	235	1,73
300	450	555	235	2,10
315	80	145	205	0,19
315	100	165	205	0,24
315	112	175	205	0,26
315	125	190	205	0,31
315	140	210	210	0,40
315	150	220	210	0,44
315	160	230	210	0,45
315	180	250	210	0,56
315	200	285	225	0,63
315	224	310	225	0,79
315	250	335	225	0,92
315	280	375	235	1,11
315	300	395	235	1,19
315	355	460	245	1,53
315	400	505	245	1,80
315	450	555	245	2,01
315	500	610	250	2,24
355	100	165	225	0,23
355	112	175	225	0,28
355	125	195	225	0,36
355	140	210	230	0,45
355	150	220	230	0,50
355	160	230	230	0,55
355	180	250	230	0,65
355	200	285	245	0,82
355	224	310	245	0,95

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
355	250	335	245	1,16
355	280	375	245	1,36
355	300	395	255	1,47
355	315	410	255	1,55
355	400	505	265	2,18
355	450	555	265	2,46
355	500	610	270	2,77
355	560	670	270	3,11
400	100	165	245	0,26
400	112	175	245	0,28
400	125	195	245	0,36
400	140	210	250	0,44
400	150	220	250	0,50
400	160	230	250	0,55
400	180	250	250	0,66
400	200	285	265	0,78
400	224	310	265	0,97
400	250	335	265	1,19
400	280	375	275	1,34
400	300	395	275	1,52
400	315	410	275	1,56
400	355	460	285	1,89
400	450	555	285	2,58
400	500	610	290	2,96
400	560	670	290	3,29
400	600	710	290	3,51
400	630	740	290	3,68
450	125	190	270	0,28
450	140	210	275	0,40
450	150	220	275	0,46
450	160	230	275	0,52
450	180	250	275	0,64
450	200	285	290	0,84
450	224	310	290	0,98
450	250	335	290	1,22
450	280	375	300	1,46
450	300	395	300	1,58
450	315	410	300	1,68
450	355	460	310	1,98
450	400	505	310	2,39
450	500	610	315	3,08
450	560	670	315	3,48
450	600	710	315	3,74
450	630	740	315	3,94
450	710	820	315	4,70
500	125	190	295	0,35
500	140	210	300	0,43
500	150	220	300	0,48

T-piece

TSTU

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
500	160	230	300	0,52
500	180	250	300	0,60
500	200	285	315	0,84
500	224	310	315	0,86
500	250	335	315	1,13
500	280	375	325	1,29
500	300	395	325	1,42
500	315	410	325	1,52
500	355	460	335	1,85
500	400	505	335	2,26
500	450	555	335	2,74
500	560	670	340	3,83
500	600	710	340	4,25
500	630	740	340	4,35
500	710	820	340	5,74
500	800	910	340	6,91
560	200	285	345	0,78
560	224	310	345	0,90
560	250	335	345	1,12
560	280	375	355	1,34
560	300	395	355	1,47
560	315	410	355	1,57
560	355	460	365	1,98
560	400	505	365	2,38
560	450	555	365	2,78
560	500	610	370	3,27
560	600	710	370	4,26
560	630	740	370	4,58
560	710	820	370	5,71
560	800	910	370	6,34
560	900	1030	370	8,45
600	200	285	365	0,81
600	224	310	365	0,93
600	250	335	365	1,14
600	280	375	375	1,37
600	300	395	375	1,50
600	315	410	375	1,59
600	355	460	385	1,93
600	400	505	385	2,39
600	450	555	385	2,81
600	500	610	390	3,29
600	560	670	390	3,86
600	630	740	390	4,58
600	710	820	390	5,69
600	800	910	390	6,79
600	900	1030	390	8,36
630	200	285	380	0,83
630	224	310	380	0,95

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
630	250	335	380	1,16
630	280	375	390	1,39
630	300	395	390	1,52
630	315	410	390	1,62
630	355	460	400	1,86
630	400	505	400	2,51
630	450	555	400	2,83
630	500	610	405	3,42
630	560	670	405	3,87
630	600	710	405	4,27
630	710	820	405	5,68
630	800	910	405	6,76
630	900	1030	405	8,30
630	1000	1130	405	9,71
710	250	335	420	1,26
710	280	375	420	1,50
710	300	395	430	1,64
710	315	410	430	1,74
710	355	460	440	2,08
710	400	505	440	2,61
710	450	555	440	3,01
710	500	610	445	3,52
710	560	670	445	4,11
710	600	710	445	4,52
710	630	740	445	4,81
710	800	910	445	7,10
710	900	1030	445	8,69
710	1000	1130	445	10,2
710	1120	1250	445	12,4
800	250	335	465	1,08
800	280	375	475	1,44
800	300	395	475	1,57
800	315	410	475	1,61
800	355	460	485	2,00
800	400	505	485	2,50
800	450	555	485	2,88
800	500	610	490	3,59
800	560	670	490	3,93
800	600	710	490	4,32
800	630	740	490	4,94
800	710	820	490	5,73
800	900	1030	490	8,32
800	1000	1130	490	8,61
800	1120	1250	490	11,9
800	1250	1380	490	14,0
900	315	410	525	2,00
900	355	460	535	2,43
900	400	505	535	3,41

T-piece

Ød nom	Ød ₃ nom	l mm	l ₃ mm	m kg
900	450	555	535	3,59
900	500	610	540	4,24
900	560	670	540	5,01
900	600	710	540	5,56
900	630	740	540	5,99
900	710	820	540	7,50
900	800	910	540	9,03
900	1000	1130	540	13,3
900	1120	1250	540	16,4
900	1250	1380	540	19,7
1000	315	410	575	1,95
1000	355	460	585	2,36
1000	400	505	585	2,97
1000	450	555	585	3,54
1000	500	610	590	3,99
1000	560	670	590	5,02
1000	600	710	590	5,66
1000	630	740	590	6,34
1000	710	820	590	7,67
1000	800	910	590	9,31
1000	900	1030	590	11,8
1000	1120	1250	590	17,7
1000	1250	1380	590	21,5
1120	500	610	650	4,25
1120	560	670	650	5,07
1120	600	710	650	5,66
1120	630	740	650	6,12
1120	710	820	650	7,75
1120	800	910	650	9,45
1120	900	1030	650	12,2
1120	1000	1130	650	14,3
1120	1250	1380	650	21,7
1250	500	610	715	4,28
1250	560	670	715	5,11
1250	600	710	715	5,71
1250	630	740	715	6,18
1250	710	820	715	7,83
1250	800	910	715	9,55
1250	900	1030	715	12,5
1250	1000	1130	715	14,5
1250	1120	1250	715	18,2

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Take-off

ILRU

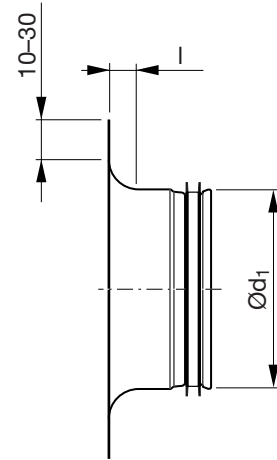
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Description

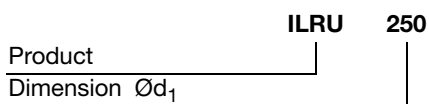
Take-off with radius.

Dimensions



Ød ₁ nom	l mm	m kg
63	10	0,07
80	12	0,10
100	15	0,11
125	20	0,14
140	20	0,22
150	20	0,24
160	25	0,19
180	25	0,30
200	25	0,26
224	25	0,46
250	25	0,57
300	25	0,68
315	25	0,72
355	25	0,53
400	25	0,97
500	25	1,35
630	25	1,77

Ordering example



Take-off

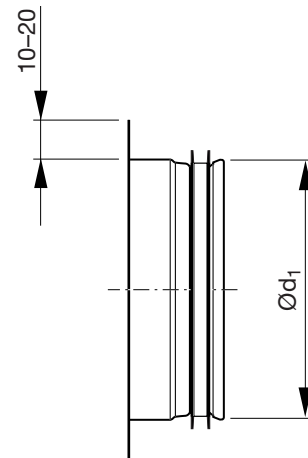
ILU



Description

Take-off without radius.

Dimensions



Ød ₁ nom	m kg
63	0,07
80	0,07
100	0,08
112	0,09
125	0,11
140	0,12
150	0,12
160	0,16
180	0,15
200	0,17
224	0,23
250	0,33
280	0,37
300	0,40
315	0,42
355	0,48
400	0,65
450	0,74
500	0,82
560	1,13
600	1,21
630	1,27
710	2,12
800	2,39
900	2,69
1000	3,57
1120	3,99
1250	4,46

Ordering example

Product **ILU**
 Dimension Ød₁ **250**

Coupling

NPU

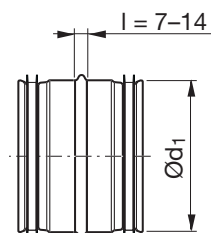
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Description

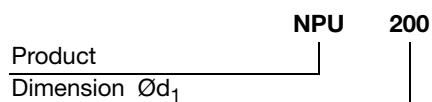
Coupling connector for joining circular ducts.

Dimensions



Ød ₁ nom	m kg
63	0,07
80	0,09
100	0,12
112	0,14
125	0,15
140	0,16
150	0,18
160	0,19
180	0,25
200	0,30
224	0,30
250	0,52
280	0,56
300	0,64
315	0,66
355	0,76
400	1,10
450	1,34
500	1,52
560	1,90
600	2,10
630	2,24
710	2,65
800	3,10
900	4,52
1000	5,30
1120	7,03
1250	7,70

Ordering example



Expanding coupling

NPEU

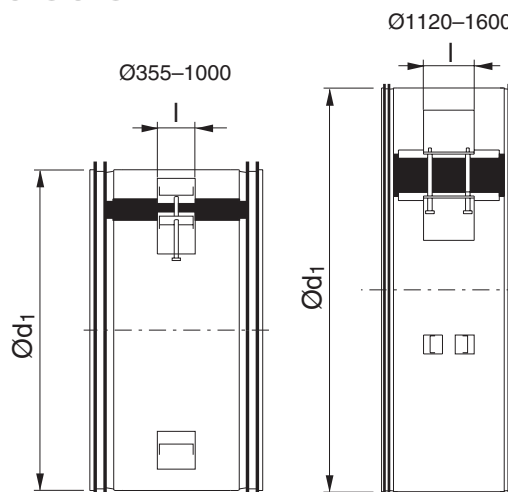


Description

Expanding coupling, intended for installation of ventilation ducts and components of larger dimensions. The coupling makes installation easier and can also be used between circular ducts and fittings without a rubber seal.

The coupling is expanded by means of a threaded bolt, socket no. 13. Can achieve maximum tightness class C.

Dimensions



Ød ₁ nom	l mm	m kg
355	45	1,24
400	45	1,64
450	45	1,83
500	45	2,50
560	45	2,95
600	45	3,15
630	45	3,30
710	45	4,30
800	45	4,81
900	45	5,40
1000	45	8,48
1120	120	15,3
1250	120	17,3
1400	120	15,2
1500	120	16,4
1600	120	17,5

Ordering example

Product	NPEU	500
Dimension Ød ₁		

Female coupling

MF



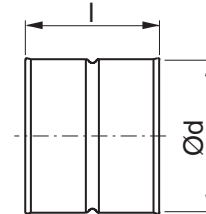
Description

Female coupling for joining fittings.

Has normally not any Click function – hasn't any notches.

Ø 80–315 can upon order be delivered with click function – i.e. with notches.

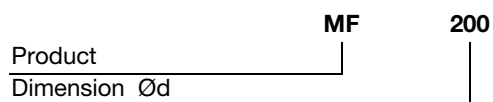
Dimensions



Ød nom	l mm	m kg
63 *	99	0,06
80 *	99	0,08
100 *	99	0,10
112	99	0,12
125 *	99	0,14
140	99	0,19
150 *	99	0,19
160 *	99	0,21
180	99	0,24
200 *	99	0,26
224	99	0,30
250 *	139	0,42
280	139	0,56
300	139	0,57
315 *	139	0,54
355	139	0,69
400 *	190	1,01
450	190	1,31
500 *	190	1,54
560	190	1,75
600	190	1,84
630	190	1,94
710	230	2,06
800	230	2,35
900	230	4,20
1000	275	5,49
1120	275	9,39
1250	275	11,0

* With turned-over edge

Ordering example

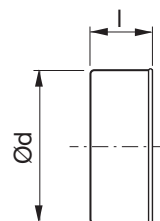


End cap

EPF



Dimensions



Description

End cap, which fits outside a Safe fitting.

No Click function – no notches.

Ød nom	l mm	m kg
63	40	0,04
80 *	48	0,07
100 *	48	0,11
112 **	48	0,10
125 *	48	0,14
140	48	0,16
150	48	0,14
160 *	48	0,17
180	48	0,24
200 *	46	0,21
224	46	0,35
250 *	68	0,50
280 **	60	0,61
300	60	0,63
315 *	60	0,67
355	60	0,84
400 *	91	1,17
450 **	80	1,48
500 **	80	1,81
560 **	80	2,14
600 **	80	2,37
630 **	80	2,54
710 **	100	3,00
800 **	100	3,54
900 **	100	6,10
1000 **	100	7,30
1120 **	120	9,40
1250 **	120	11,3

* With turned-over edge

** Hand made

Ordering example

Product	EPF	250
Dimension Ød		

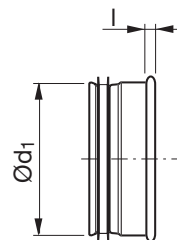
End cap

ESU

**Description**

End cap, which fits inside SR duct.

No Click function – has a closed turned-over end.

Dimensions

Ød₁ nom	l mm	m kg
63	4	0,08
80	10	0,08
100	10	0,12
112	4	0,13
125	10	0,14
140	10	0,14
150	10	0,17
160	10	0,24
180	10	0,28
200	10	0,32
224	10	0,40
250	10	0,37
280	4	0,62
300	10	0,70
315	10	0,80
355	12	0,91
400	12	1,26
450	4	1,48
500	12	2,00
560	4	2,04
600	4	2,38
630	4	2,90
710	4	3,21
800	4	5,00
900	4	5,26
1000	4	9,25
1120	4	7,92
1250	4	10,0

Ordering example

Product **ESU**
 Dimension Ød₁ **160**

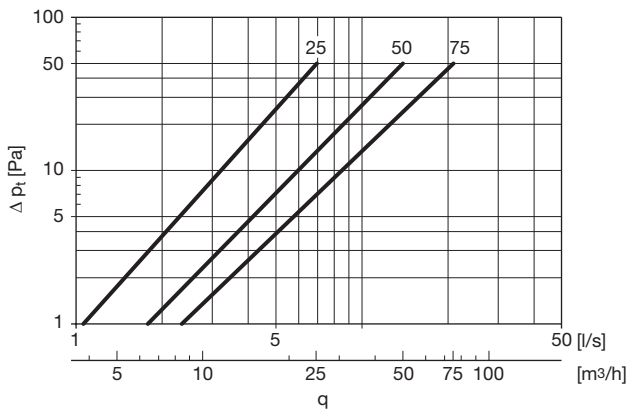
Air entry nozzle

IMSKU



Description

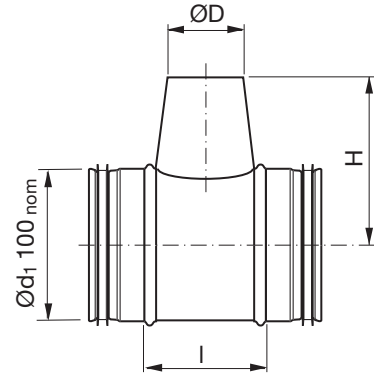
Used for ducting in bomb shelters, and is dimensioned for the air volumes specified by the Civil Defence Board regulations.



Ordering example

Product **IMSKU** **75**
 Type _____
 Size _____

Dimensions



Size nom	ØD mm	I mm	H mm	m kg
25	35	85	95	0,31
50	50	110	110	0,38
75	60	110	110	0,39

Size nom	q _{max} m³/h	Maximum no. of persons
25	25	10
50	50	20
75	75	30

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- 17
- 18

Access door

KCU



Description

Insulated access door which fits outside a Safe fitting.

KCU is tested with the whole Lindab smoke evacuation system according to EN 1366-9.

Ø100–315

The door is held in place by spring clips against the inside of the Safe fitting. The door is loosened by pulling it while turning it slightly, and is installed in the opposite manner. There are one or two handles to help in the process.

Ø400–630

The door is held in place by two eccentric locks and is loosened by unlocking the eccentric locks. Slightly turning and pulling the door will make it easier to get it loose.

Δp in the table gives the maximum positive pressure the access door can withstand when installed from beneath.

No Click function – no notches.

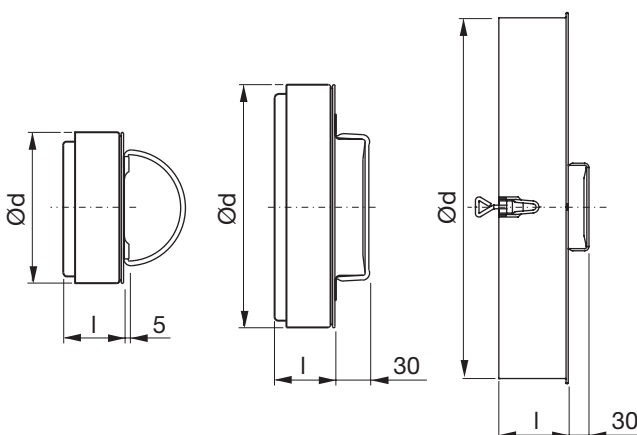
Can achieve maximum tightness class D.

Dimensions

Ø100 – 160

Ø200 – 315

Ø400 – 630



Dimensions

Ød nom	Δp Pa	l mm	m kg	Handle
100	3400	40	0,30	1 folding
125	3400	40	0,40	1 folding
160	3400	40	0,60	1 folding
200	3400	40	0,80	1 fixed
250	3400	60	1,28	2 fixed
315	2600	60	1,81	2 fixed
400	10000	90	2,82	2 fixed
500	10000	90	6,40	2 fixed
630	10000	90	10,1	2 fixed

Fire classification (Swedish type approval)

The access door has been tested and has a Swedish type approval for the following fire classification:

Ød nom	Fire classification
100–400	E 60
500–630	None

Alternative fire classification with safety distances, guidance for planning.

In order to use the access door's alternative fire classes:

- minimum safety distance according to table below must be ensured
- the surface of the access door must not be changed, e.g. by painting

Ød nom	Fire classification alternative	Safety distance at radiation intensity		
		3 kW/m ² (evacuating people) mm	10 kW/m ² (interior mtrl) (inflammable mtrl) mm	30 kW/m ² (building mtrl) (wood) mm
100	EI 60	50	10	10
125	EI 60	50	10	10
160	EI 60	50	10	10
200	EI 60	50	10	10
250	EI 60	50	10	10
315	EI 60	50	10	10
400	EI 60	50	10	10
500	None	-	-	-
630	None	-	-	-

Ordering example

Product code **KCU**
 Dimension Ød **250**



Duct filter

STR



Description

The duct filter fits in all fittings with a Safe-groove. To install the filter in a T-piece means a simple mounting and replacing.

The special tapered shape gives 4–5 times larger filter area than the equivalent duct cross section area, giving lower pressure drop and longer exchange intervals than the equivalent flat filter.

Standard filter class is G4, but class F5 is optionally available. The diagram shows the pressure drop across a clean filter, including T-piece. The filter can be used to twice this pressure drop. It is a good idea to dimension the system for the average value.

$$\Delta p_{t \text{ dim}} = 1,5 \cdot \Delta p_{t \text{ clean}}$$

Max temperature = 120 °C

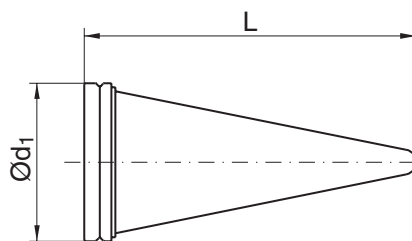
Highest recommended air speed in the duct.

Filter class	v_{max} (m/s)
G4	10
F5	4,5

Ordering example

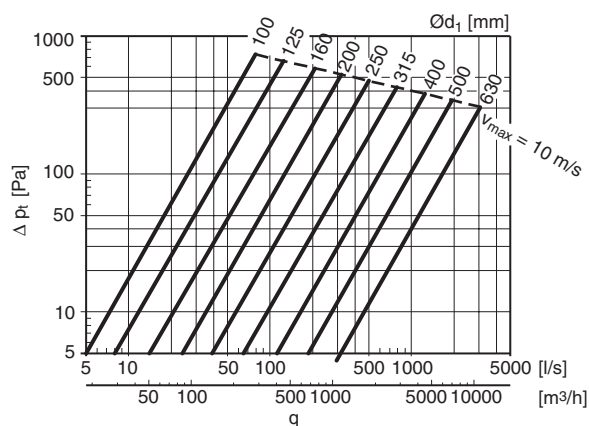
Product	STR	200	G4
Dimension $\varnothing d_1$			
Filter class			

Dimensions

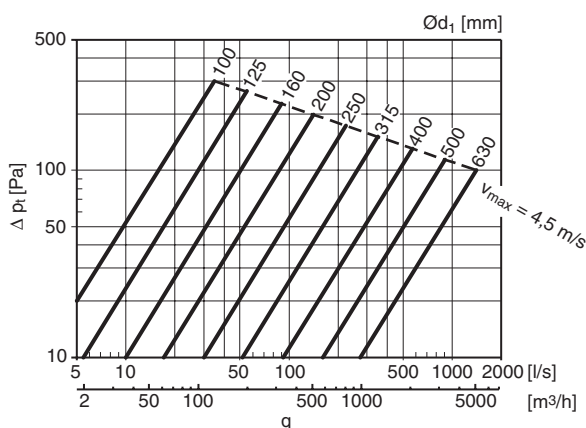


$\varnothing d_1$ Nm	L mm	tolerance mm	area m ²	m kg
100	220	± 20	0,04	0,04
125	260	± 20	0,05	0,08
160	340	± 20	0,09	0,12
200	420	± 25	0,14	0,16
250	540	± 30	0,22	0,23
315	670	± 30	0,34	0,36
400	860	± 35	0,55	0,59
500	1100	± 50	0,89	0,72
630	1350	± 50	1,37	0,91

Filter class G4



Filter class F5





Cleanable filter

IFU

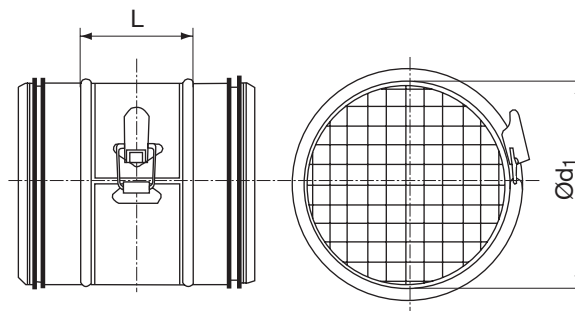


Description

Insertion filter type IFU is a simple, practical solution for small ventilation systems, where rough filtration is advisable. IFU is equipped with a G3-filter, placed in a cassette with a fine-meshed net (wire size 1 mm) on the one side and a 0,5" wire mesh on the other side.

The filter is easy to clean. Just open the clamp on the side, and take out the whole cassette for cleaning or replacement of the filter.

Dimensions



Ød ₁ nom	L mm	Filter class	m kg
100	70	G3	0,5
125	70	G3	0,5
160	70	G3	0,7
200	70	G3	0,9
250	70	G3	1,1
315	70	G3	1,3

Ordering example

Product	IFU	200
Dimension Ød ₁		

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- 2
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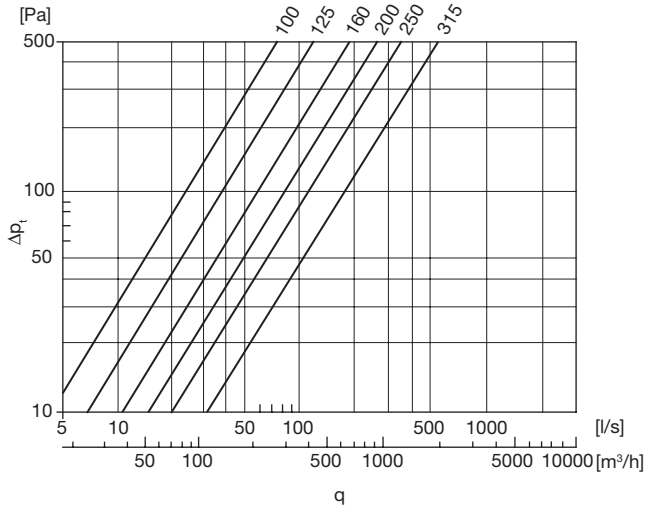


Cleanable filter

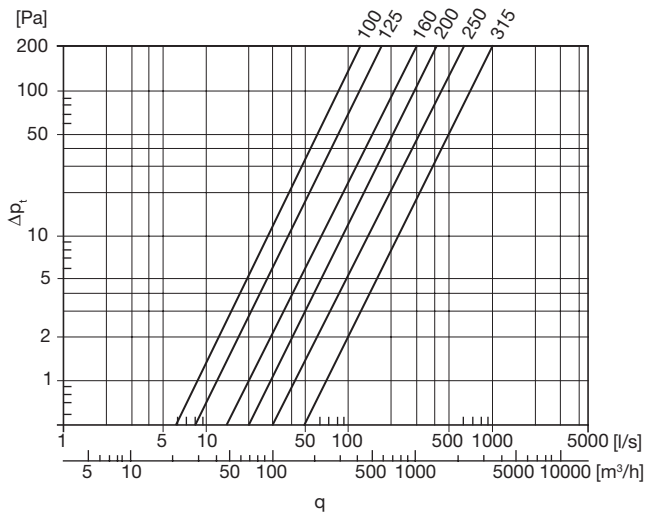
IFU

Technical data

Filter + net



Net



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Flat bar flange

FL

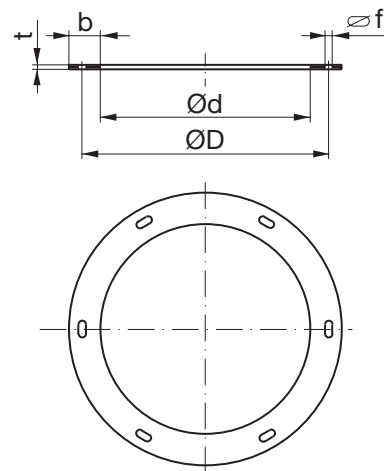


Description

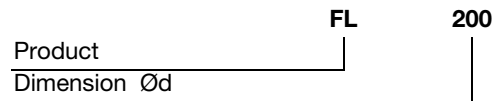
Heavy flange made from flat bar which then is hot dip galvanized. It suits both spirally swaged and lengthways swaged ducts. Oval bolt holes facilitate assembly.

Other dimensions and hole spacings can be provided for large orders.

Dimensions



Ordering example



Dimensions

Ød			ØD		f mm	Bolts to DIN 601			b x t mm	m kg						
nom mm	real mm	tolerance mm	real mm	tolerance mm		quantity pcs	dim	L mm								
80	82,5	+1,0 -0,0	108	±1,0	7,0 x 16	4	M6	16	25 x 3	0,18						
100	102		129							0,22						
112	114		141							0,25						
125	127		155							0,30						
140	142	+1,5 -0,0	176			±1,5				9,5 x 20	6	M8	20	30 x 4	0,49	
150	152		184												0,52	
160	162		194		0,55											
180	182		213		0,60											
200	203		235		0,70											
224	227		259		0,74											
250	253	286	0,81													
280	283	+2,0 -0,0	322		±1,5		11,5 x 24	8	M10	25	35 x 5	1,31				
300	303		341	1,40												
315	319,5		356	1,47												
355	359,5		395	1,63												
400	404,5	+2,0 -0,0	438	±1,5				11,5 x 24				12	M10	25	40 x 5	1,80
450	454,5		487			2,02										
500	505		541			2,35										
560	565,5	+2,0 -0,0	605			±1,5	11,5 x 24		16	M10	25	50 x 6				2,81
600	605,5		644													3,00
630	635,5		674													3,15
710	716		751					3,54								
800	806,5	+2,0 -0,0	850					±1,5	11,5 x 24				24	M10	25	50 x 6
900	907		951		4,39											
1000	1007,5		1052		4,89											
1120	1128		1174		8,36											
1250	1258	1311	9,32													
1400	1410	1465	10,4													
1600	1610	1665	11,8													

Description

Transfer – the duct system which is quick and easy to assemble and take apart

Transfer is the circular duct system with tension clips for quick assembly and disassembly. The system is supplied as standard with clips in dimensions Ø80 to Ø500 and with FL flanges in dimensions Ø560 to Ø900. Please refer to page 491.

Dust explosions

There is always a risk of dust explosion in installations where finely-divided material is transported.

A dust explosion occurs when a critical mixture of finely divided material and air is ignited and burns rapidly with consequent rapid expansion and pressure rise. A common cause of ignition is a spark from electrostatic discharge. Dust and sawdust extraction installations must be designed to minimise sources of fire and explosion.

Noise

In particle transport systems, where the pressure differs between in- and outside is big and where a little leakage may cause noise, the joints ought to be taped if low noise levels are required.

Applications

The duct system is suitable for

- Particle transportation from woodworking, such as saw mills, carpenters, furniture manufacturers and craft workshops.
- Comfort ventilation.
- Extraction systems for better working environment.
- Plasma cutters.
- Specially designed ventilation plants where you have extra demands for form, colour and appearance.

Please contact Lindab if you need other applications or to transport other materials, and if there are special operation circumstances.

Mountings

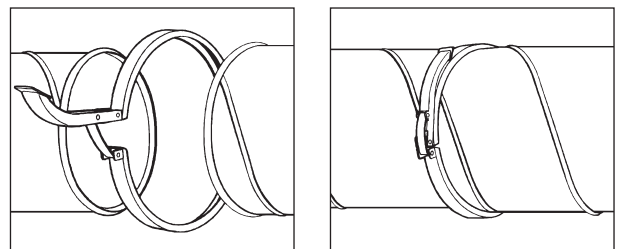
The types of mountings and their distances shall be chosen so that no sagging occurs in the system, and as justified for safe installation.

Maintenance

The duct system does not normally need any maintenance, but regular checks for wear should be made.

Advantages of the Transfer system

- Facilitates inspection and cleaning thanks to quick and simple disassembly.
- Facilitates environmental checking of the duct system.
- Rational joining, without screws or blind rivets.
- Has well-protected seal mouldings inside the clips.
- Can be twisted and adjusted after installation.
- Gives straight assembly.
- Does not have any sharp edges in the joints, since the bead is swaged directly on the fittings.
- Is highly suitable for transporting light material by means of air (chip extraction).
- Thanks to the bead, components are round and stiff.
- Does not require couplings.
- Transition pieces available for the Safe systems etc.
- Has lower pressure drop than the Safe system.
- Quick and easy to assemble and disassemble.



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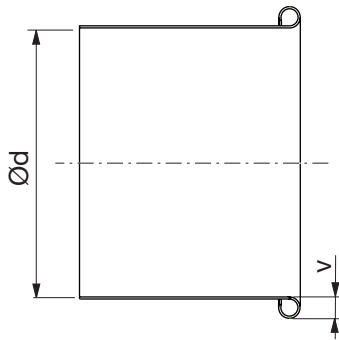
16

17

18

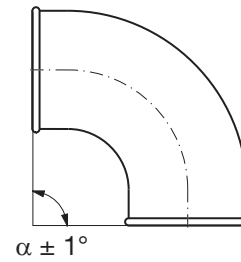
General

Dimensions of ducts and fittings



Ød nom	Ød mm	v mm
80	78	6
100	98	6
125	123	6
140	138	6
150	148	6
160	158	6
180	178	8
200	198	8
224	224	8
250	250	8
300	300	10
315	315	10
350	350	10
400	400	10
450	450	10
500	500	10
560–900 with flanges		

Angle tolerances

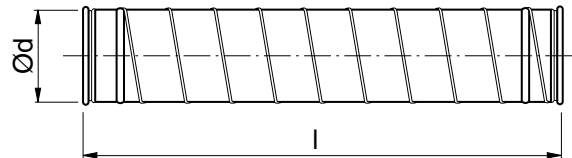


Spiral swaged duct

SRTR



Dimensions



Description

Circular spiral swaged duct with projecting seam.

The duct has end stubs swaged on, with Transfer beads at each end.

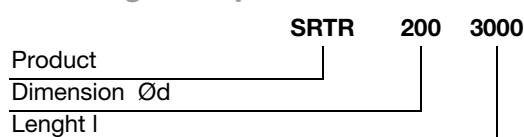
Please refer to page 56 for technical data about ducts.

Please refer to pages 56 for technical data about ducts.

Ød nom	t std mm	500 mm	1000 mm	1500 mm	2000 mm	3000 mm	6000 mm
Weight for standard lengths, kg							
80	0,45	0,55	1,10	1,65	2,20	3,30	6,60
100	0,45	0,74	1,37	2,11	2,74	4,11	8,22
125	0,45	0,82	1,64	2,46	3,28	4,92	9,84
140	0,5	1,00	2,00	3,00	4,00	6,00	12,0
150	0,5	1,10	2,20	3,30	4,40	6,60	13,2
160	0,5	1,20	2,30	3,50	4,60	6,90	13,8
180	0,5	1,30	2,60	3,90	5,20	7,80	15,6
200	0,5	1,40	2,90	4,30	5,80	8,70	17,4
224	0,6	1,90	3,80	5,80	7,70	11,5	23,0
250	0,5	1,80	3,60	5,40	7,20	10,8	21,6
300	0,6	2,60	5,20	7,80	10,4	15,6	31,2
315	0,6	2,80	5,50	8,30	11,0	16,5	33,0
350	0,6	3,10	6,20	9,30	12,4	18,6	37,2
400	0,6	3,50	7,00	10,5	14,0	21,0	42,0
450	0,6	3,90	7,80	11,7	15,6	23,4	46,8
500	0,7	5,10	10,2	15,2	20,3	30,5	60,9
560*	0,8	11,7	18,2	24,7	31,2	44,2	83,3
600*	0,8	12,5	19,5	26,5	33,4	47,4	89,2
630*	0,7	11,3	17,6	23,9	30,2	42,8	80,6
710*	0,8	14,8	23,0	31,2	39,4	55,9	105
800*	0,8	16,5	25,7	35,1	44,4	63,0	119
900*	0,8	17,8	28,3	38,8	49,2	70,2	133

* Supplied with flange FL

Ordering example



Lengthways swaged duct

LRTR



Dimensions



Description

Circular lengthways swaged duct with external seam.

Ød nom	t std mm	1000 mm Max permissible static negative pressure, kPa	2000 mm	3000 mm
80	0,6	36,0		
100	0,6	34,0	25,0	
125	0,6	32,0	24,0	
140	0,6	29,0	21,0	
150	0,6	25,0	18,0	
160	0,6	22,0	16,0	
180	0,7	21,0	15,5	
200	0,7	21,0	15,0	
224	0,7	20,0	14,5	
250	0,7	19,5	14,0	10,0
300	0,7	18,5	13,5	9,5
315	0,7	18,0	13,0	9,0
350	0,7	16,0	12,0	8,0
400	0,9	19,0	14,0	8,5
450	0,9	16,0	12,0	7,0
500	0,9	14,0	10,0	6,0
560	0,9			
600	0,9			
630	0,9			
650	0,9			
710	0,9			
750	0,9			
800	0,9			
900	0,9			

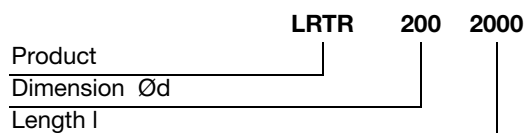
Ød nom	t std mm	500 mm	1000 mm	1500 mm	2000 mm	2960** mm
Weight for standard lengths, kg						
80	0,6	0,70	1,30			
100	0,6	0,80	1,68	2,50	3,40	
125	0,6	1,00	2,09	3,10	4,20	
140	0,6	1,10	2,29	3,40	4,60	
150	0,6	1,20	2,49	3,70	5,00	
160	0,6	1,30	2,69	4,00	5,40	
180	0,7	1,80	3,6	5,40	7,20	
200	0,7	1,90	3,89	5,80	7,80	
224	0,7	2,20	4,4	6,60	8,80	
250	0,7	2,40	4,88	7,30	9,80	14,6*
300	0,7	2,90	5,88	8,80	11,8	17,6**
315	0,7	3,10	6,2	9,30	12,4	18,6**
350	0,7	3,50	7	10,5	14,0	21,0**
400	0,9	4,70	9,4	14,1	18,8	28,2**
450	0,9	5,30	10,6	15,9	21,2	31,8**
500	0,9	5,90	11,8	17,7	23,6	35,4**
560***	0,9	11,8	18,4	25,0		
600***	0,9	12,6	19,7	26,7		
630***	0,9	13,2	20,7	27,1		
650***	0,9	13,6	21,3	28,9		
710***	0,9	14,9	23,3	31,6		
750***	0,9	15,7	24,6	33,4		
800***	0,9	16,6	26,1	35,5		
900***	0,9	18,8	29,4	40,0		

* t = 0,9; l = 2970

** t = 0,9

*** Supplied with flange FL

Ordering example



Slide-on stub

PTR



Description

Slide-on stub for installation in ducts of type LRTR.

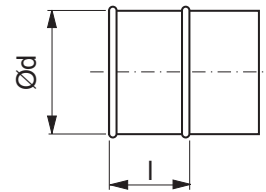
After the duct has been shortened/fitted the slide-on stub is inserted into the duct, after which the slide-on stub is sealed and fixed with putty or an sealing clamp such as MFK.

Turn the join during assembly, to face away from the direction of air flow.

Please refer to the shortening instruction on page 486.

Please refer to the shortening instruction on page 486.

Dimensions



Ød nom	t mm	l mm	m kg
80	0,5	58	0,20
100	0,5	58	0,20
125	0,5	58	0,30
140	0,5	58	0,30
150	0,5	58	0,40
160	0,6	58	0,40
180	0,6	53	0,40
200	0,6	53	0,40
224	0,6	53	0,40
250	0,6	53	0,30
300	0,6	49	0,60
315	0,6	49	0,40
350	0,6	49	0,80
400	0,7	49	1,20
450	0,7	49	1,30
500	0,7	49	1,50

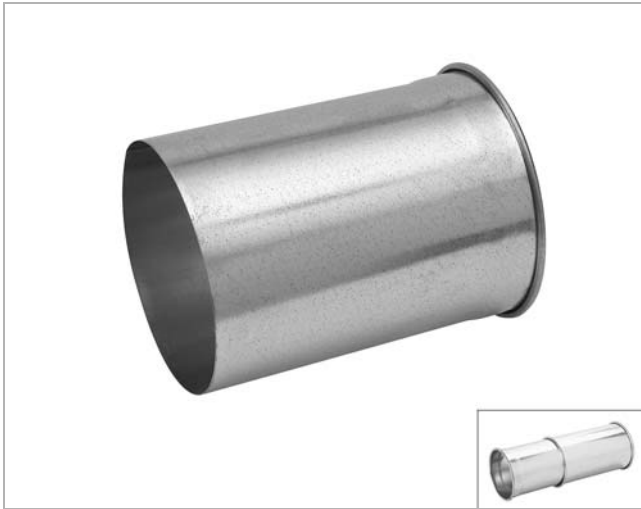
Folded design

Ordering example

Product	PTR	200
Dimension Ød		

Telescopic duct

TLTR1

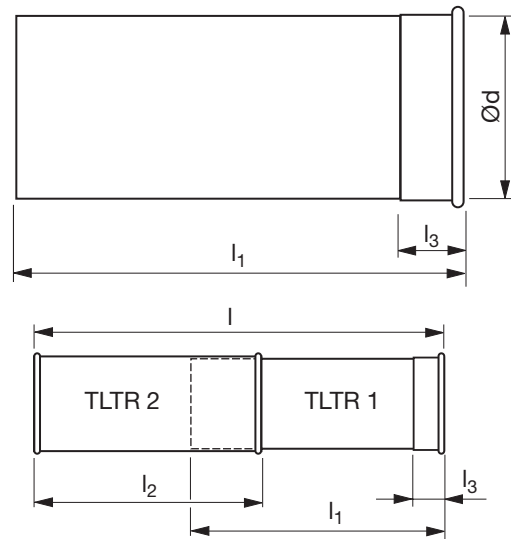


Description

Used together with telescopic duct TLTR 2 where it is necessary to adjust duct length when the standard lengths are not sufficient.

Fits also inside ducts of type SRTR Ø 80–200 and LRTR Ø 80–500.

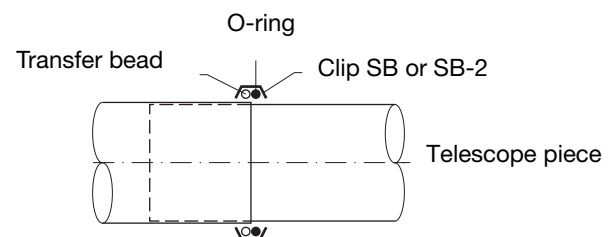
Dimensions



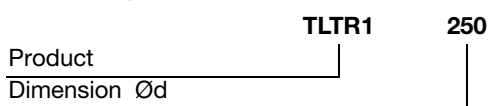
Ød nom	t mm	l ₁ , l ₂ mm	l ₃ mm	l _{min} mm	l _{max} mm	m kg
80	0,7	220	30	250	410	0,40
100	0,7	220	30	250	410	0,45
125	0,7	220	30	250	410	0,55
140	0,7	220	60	280	410	0,60
150	0,7	220	30	250	410	0,65
160	0,7	220	30	250	410	0,70
180	0,7	220	30	250	410	0,80
200	0,7	350	30	380	670	1,35
224	0,7	350	30	380	670	1,50
250	0,7	350	30	380	670	1,70
300	0,7	350	60	410	670	2,05
315	0,7	350	30	380	670	2,15
350	0,7	350	60	410	670	2,40
400	0,9	350	60	410	670	3,30
450	0,9	350	60	410	670	3,70
500	0,9	350	60	410	670	4,10

Seal the joint after assembly by using either:

- Mastic or tape
- O-ring ORINGTR + clip SB or SB-2



Ordering example



Telescopic duct

TLTR2

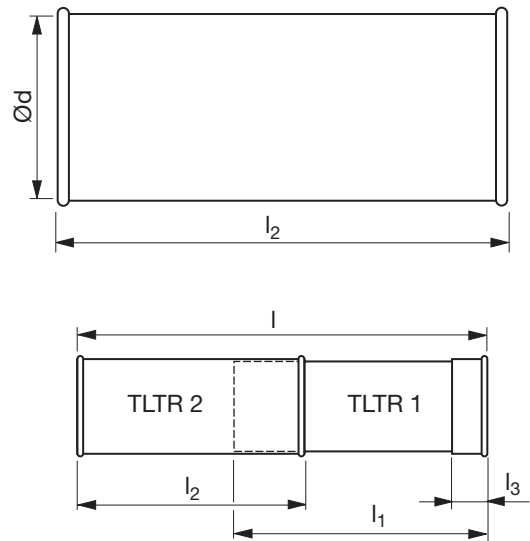


Description

Used together with telescopic duct TLTR 1 where it is necessary to adjust duct length when the standard lengths are not sufficient.

Can also be used as an ordinary duct.

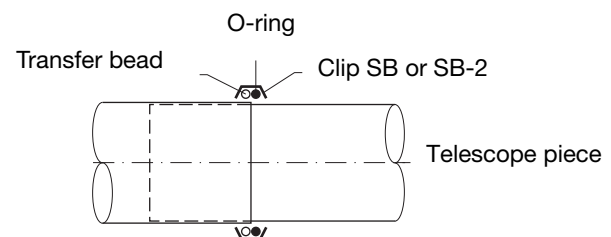
Dimensions



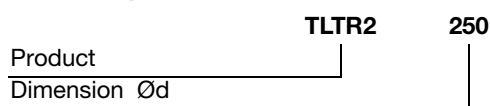
Ød nom	t mm	l ₁ , l ₂ mm	l ₃ mm	l _{min} mm	l _{max} mm	m kg
80	0,7	220	30	250	410	0,40
100	0,7	220	30	250	410	0,45
125	0,7	220	30	250	410	0,55
140	0,7	220	60	280	410	0,60
150	0,7	220	30	250	410	0,65
160	0,7	220	30	250	410	0,70
180	0,7	220	30	250	410	0,80
200	0,7	350	30	380	670	1,35
224	0,7	350	30	380	670	1,50
250	0,7	350	30	380	670	1,70
300	0,7	350	60	410	670	2,05
315	0,7	350	30	380	670	2,15
350	0,7	350	60	410	670	2,40
400	0,9	350	60	410	670	3,30
450	0,9	350	60	410	670	3,70
500	0,9	350	60	410	670	4,10

Seal the joint after assembly by using either:

- Mastic or tape
- O-ring ORINGTR + clip SB or SB-2



Ordering example

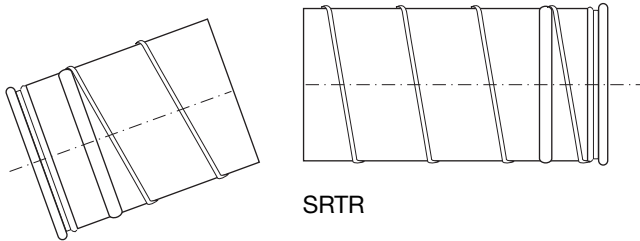


Instruction for shortening for length adaptation of Transfer ducts

1

Spiral swaged duct SRTR

Adaption with fixed length



SRTR

Shorten the duct to the desired length. Also consider the installation length of the slide-on stub.

2

3

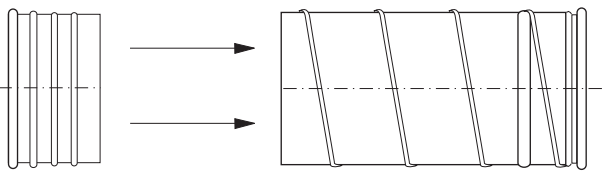
4

5

6

7

8

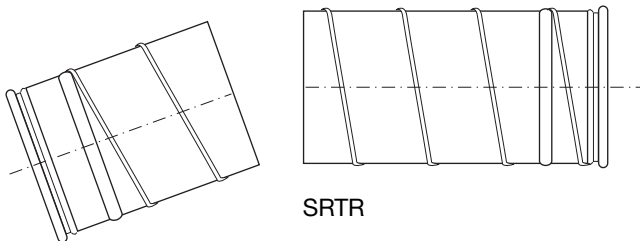


TSRTTR

SRTR

Install slide-on stub TSRTTR (please refer to page 480).

Adaption with flexible length



SRTR

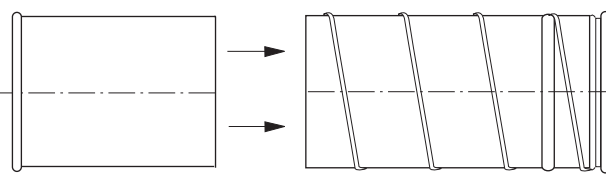
Shorten the duct to the desired length. Also consider the installation length of the slide-on stub.

11

12

13

14



TLTR 1/TLSR

SRTR

Install telescopic duct
For Ø80-200 use TLTR-1 (page 484)

Remember to

Turn the duct so that the joint does not point towards the direction of the air flow.

15

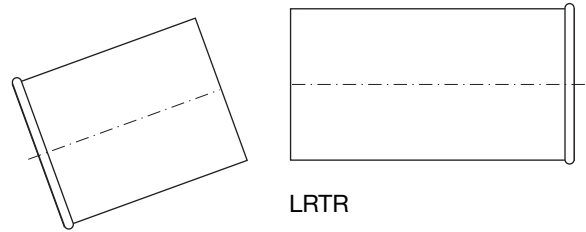
16

17

18

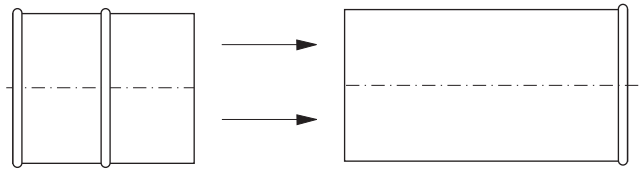
Lengthways swaged duct LRTR

Adaption with fixed length



LRTR

Shorten the duct to the desired length. Also consider the installation length of the slide-on stub.

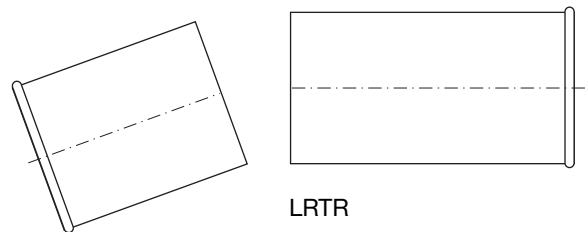


PTR

LRTR

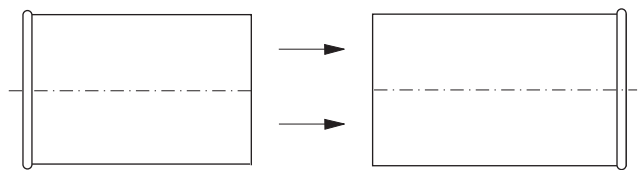
Install slide-on stub PTR (please refer to page 483).

Adaption with flexible length



LRTR

Shorten the duct to the desired length. Also consider the installation length of the slide-on stub.



TLTR 1

LRTR

Install telescopic duct
Use TLTR-1 (page 484)

Remember to

Turn the duct so that the joint does not point towards the direction of the air flow.

Bend

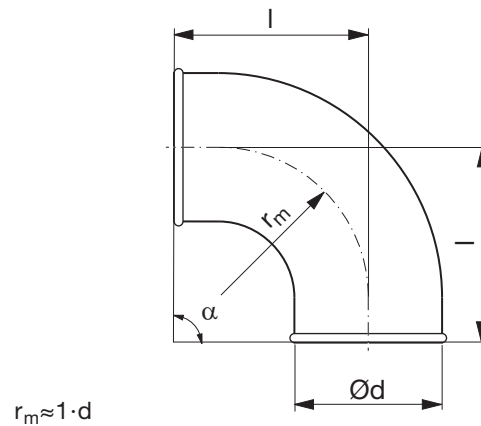
BTR 90°



Description

Pressed and seam welded bend.

Dimensions



Ød nom	t mm	r _m mm	l mm	m kg
80	0,5	100	135	0,31
100	0,5	100	130	0,30
125	0,5	125	155	0,50
140	0,7	135	165	0,70
150	0,7	150	180	0,80
160	0,6	160	190	0,65
180	0,7	180	205	1,00
200 **	0,7	200	252	1,20
224 **	0,7	225	277	1,37
250 **	0,7	250	302	1,71

** 2 swaged-on ends

Ordering example

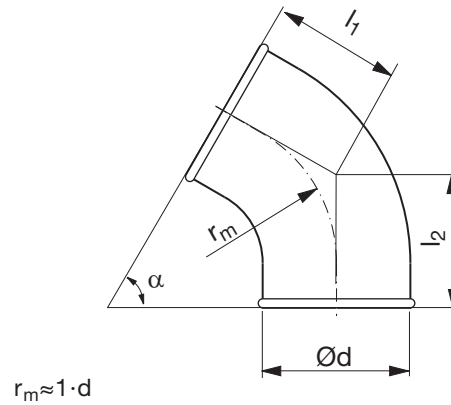
	BTR	125	90
Product			
Dimension Ød			
Angle α			

Bend

BTR 60°



Dimensions



Description

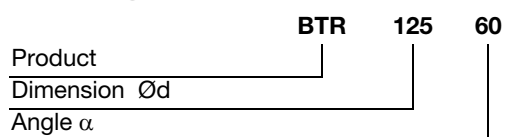
Pressed and seam welded bend.

Ød nom	t mm	r _m mm	l ₁ mm	l ₂ mm	m kg
80 *	0,5	100	88	114	0,20
100	0,5	100	108	108	0,20
125	0,6	125	122	122	0,25
140 *	0,7	135	108	134	0,50
150 *	0,7	150	117	143	0,51
160 *	0,6	160	122	148	0,51
180 *	0,7	180	129	156	0,80
200 **	0,7	200	167	167	0,86
224 **	0,7	225	182	182	1,03
250 **	0,7	250	196	196	1,20

* 1 swaged-on end

** 2 swaged-on ends

Ordering example



Bend

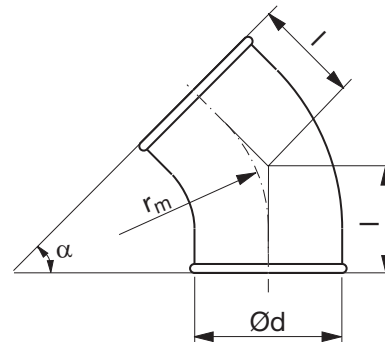
BTR 45°



Description

Pressed and seam welded bend.

Dimensions

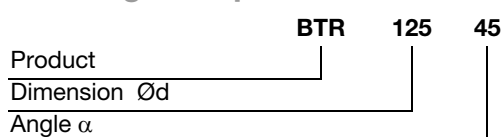


$$r_m \approx 1 \cdot d$$

Ød nom	t mm	r _m mm	l mm	m kg
80	0,5	100	71	0,20
100	0,5	100	71	0,30
125	0,5	125	82	0,30
140	0,7	135	86	0,40
150	0,7	150	92	0,43
160	0,6	160	96	0,43
180	0,7	180	110	0,68
200 **	0,6	200	135	0,80
224 **	0,7	225	145	0,86
250 **	0,7	250	156	0,86

** 2 swaged-on ends

Ordering example



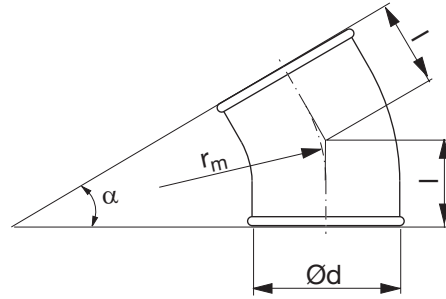
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

Bend

BTR 30°



Dimensions



$$r_m \approx 1 \cdot d$$

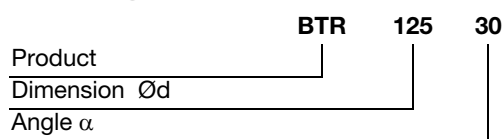
Description

Pressed and seam welded bend.

Ød nom	t mm	r _m mm	l mm	m kg
80	0,5	100	57	0,20
100	0,5	100	57	0,20
125	0,6	125	63	0,25
140	0,7	140	68	0,40
150	0,7	150	70	0,34
160	0,7	160	73	0,50
180	0,7	180	73	0,60
200 **	0,7	200	106	0,80
224 **	0,7	225	112	0,77
250 **	0,7	250	119	1,10

** 2 swaged-on ends

Ordering example



Bend

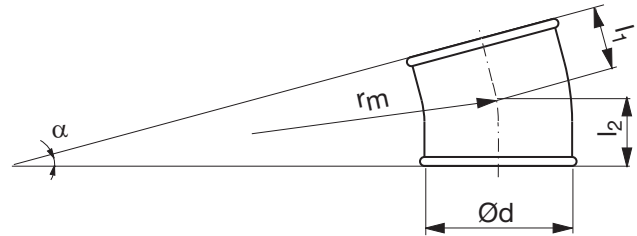
BTR 15°



Description

Pressed and seam welded bend.

Dimensions



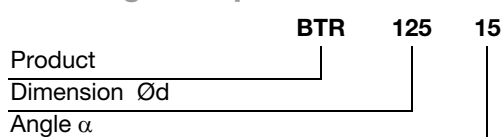
$$r_m \approx 1 \cdot d$$

Ød nom	t mm	r _m mm	l ₁ mm	l ₂ mm	m kg
80 *	0,5	100	43	69	0,10
100	0,5	100	43	43	0,20
125	0,5	125	46	46	0,14
140 **	0,7	140	74	74	0,30
150 **	0,6	150	76	76	0,26
160	0,5	160	51	51	0,14
180 **	0,7	180	76	76	0,40
200 **	0,7	200	78	78	0,43
224 **	0,7	225	81	81	0,60

* 1 swaged-on end

** 2 swaged-on ends

Ordering example



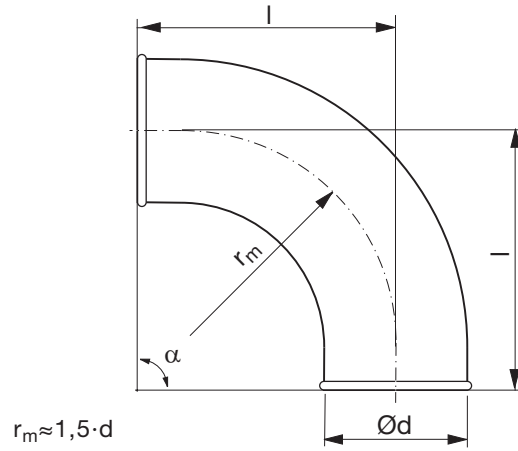
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

Bend

BSTR 90°



Dimensions



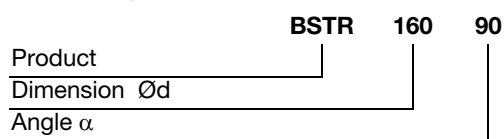
Description

Pressed and seam welded bend.

Ød nom	t mm	r_m mm	l mm	m kg
100	0,6	150	180	0,50
125	0,7	190	220	0,80
150	0,7	225	255	1,10
160	0,7	240	270	1,20
180	0,7	270	295	1,60
200 **	0,6	300	352	1,63

** 2 swaged-on ends

Ordering example



Bend

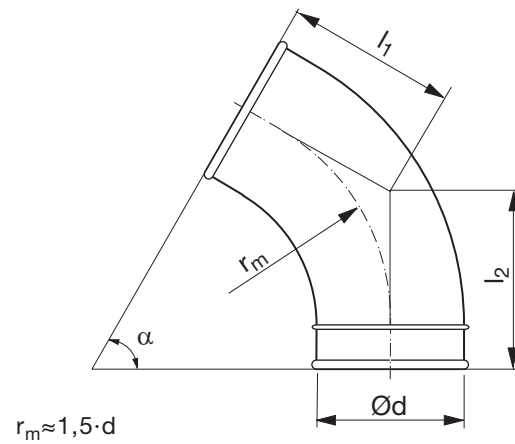
BSTR 60°



Description

Pressed and seam welded bend.

Dimensions



Ød nom	t mm	r _m mm	l ₁ mm	l ₂ mm	m kg
100 *	0,6	150	117	143	0,40
125 *	0,7	190	140	166	0,60
150 *	0,7	225	160	186	0,70
160 *	0,7	240	169	195	0,80
180 *	0,7	270	181	208	1,20
200 **	0,7	300	225	225	1,13

* 1 swaged-on end

** 2 swaged-on ends

Ordering example

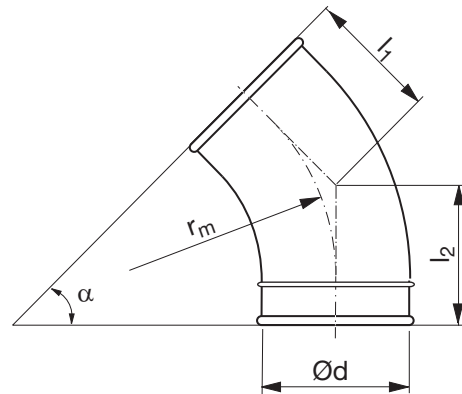
	BSTR	200	60
Product			
Dimension Ød			
Angle α			

Bend

BSTR 45°



Dimensions



$r_m \approx 1,5 \cdot d$

Description

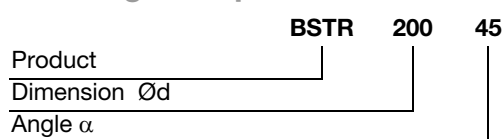
Pressed and seam welded bend.

Ød nom	t mm	r_m mm	l₁ mm	l₂ mm	m kg
100 *	0,6	150	92	118	0,30
125 *	0,7	190	109	135	0,40
150 *	0,7	225	123	149	0,50
160 *	0,7	240	129	155	0,60
180 *	0,7	270	137	164	0,90
200 **	0,6	300	176	176	0,88

* 1 swaged-on end

** 2 swaged-on ends

Ordering example



Bend

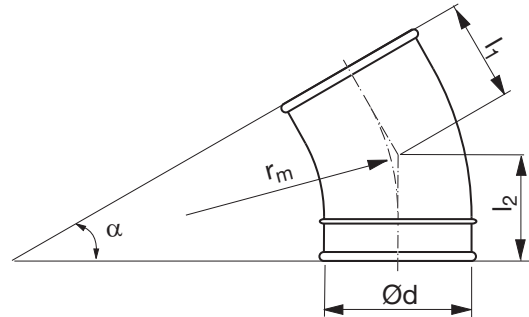
BSTR 30°



Description

Pressed and seam welded bend.

Dimensions



$$r_m \approx 1,5 \cdot d$$

Ød nom	t mm	r _m mm	l ₁ mm	l ₂ mm	m kg
100 *	0,6	150	70	96	0,30
125 *	0,7	190	81	107	0,30
150 *	0,7	225	90	116	0,50
160 *	0,7	240	94	120	0,50
180 *	0,7	270	97	124	0,70
200 **	0,7	300	132	132	0,79

* 1 swaged-on end

** 2 swaged-on ends

Ordering example

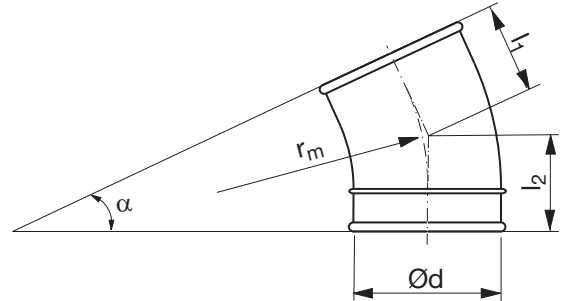
	BSTR	160	30
Product			
Dimension Ød			
Angle α			

Bend

BSTR 15°



Dimensions



$$r_m \approx 1,5 \cdot d$$

Description

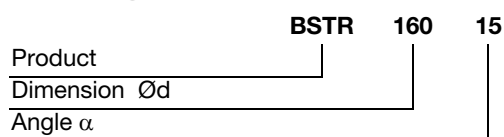
Pressed and seam welded bend.

Ød nom	t mm	r _m mm	l ₁ mm	l ₂ mm	m kg
100 *	0,6	150	50	76	0,20
125 *	0,7	190	55	81	0,40
150 *	0,7	225	60	86	0,40
160 *	0,7	240	62	88	0,40
180 *	0,7	270	61	88	0,50
200 **	0,7	300	91	91	0,62

* 1 swaged-on end

** 2 swaged-on ends

Ordering example



Bend

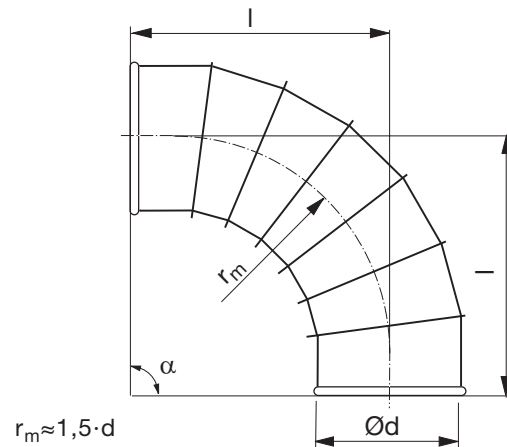
BSFTR 90°



Description

Segmented and swaged bend.

Dimensions



Ød nom	t mm	r _m mm	l mm	m kg
200	0,7	300	387	3,40
224	0,7	336	423	4,20
250	0,7	375	462	4,90
300	0,7	450	531	6,40
315	0,7	472	553	7,10
350	0,7	525	606	9,00
400	0,9	600	681	13,1
450	0,9	675	756	16,2
500	0,9	750	831	19,5
560 *	0,9	840	875	29,3
600 *	0,9	900	935	32,7
630 *	0,9	945	980	37,3
650 *	0,9	975	1010	41,4
710 *	0,9	1065	1100	47,0
750 *	0,9	1125	1160	51,1
800 *	0,9	1200	1235	54,5
900 *	0,9	1350	1385	74,8

* Supplied with flange FL

Ordering example

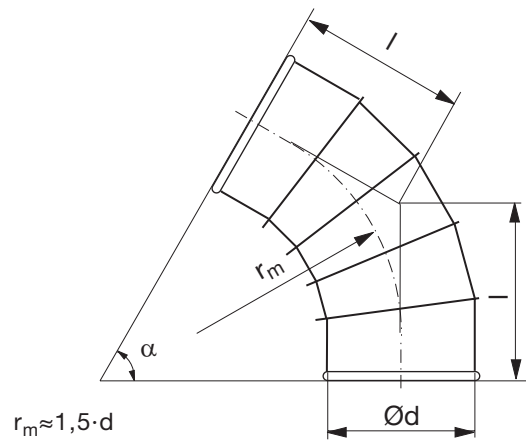
Product	BSFTR	250	90
Dimension Ød			
Angle α			

Bend

BSFTR 60°



Dimensions



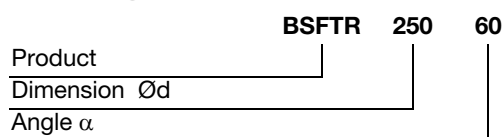
Description

Segmented and swaged bend.

Ød nom	t mm	r _m mm	l mm	m kg
200	0,7	300	260	2,30
224	0,7	336	281	2,70
250	0,7	375	304	3,10
300	0,7	450	341	4,20
315	0,7	472	354	4,60
350	0,7	525	384	5,60
400	0,9	600	427	8,10
450	0,9	675	471	10,1
500	0,9	750	514	12,1
560 *	0,9	840	520	20,8
600 *	0,9	900	555	23,5
630 *	0,9	945	581	24,6
650 *	0,9	975	598	27,2
710 *	0,9	1065	650	36,4
750 *	0,9	1125	685	40,4
800 *	0,9	1200	728	42,3
900 *	0,9	1350	814	45,1

* Supplied with flange FL

Ordering example



Bend

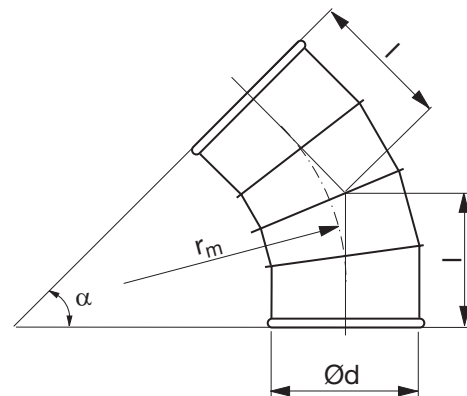
BSFTR 45°



Description

Segmented and swaged bend.

Dimensions



$$r_m \approx 1,5 \cdot d$$

Ød nom	t mm	r _m mm	l mm	m kg
200	0,7	300	211	1,90
224	0,7	336	226	2,20
250	0,7	375	242	2,50
300	0,7	450	267	3,40
315	0,7	472	277	3,70
350	0,7	525	298	4,50
400	0,9	600	330	6,50
450	0,9	675	361	7,90
500	0,9	750	392	9,40
560 *	0,9	840	383	16,7
600 *	0,9	900	408	18,5
630 *	0,9	945	426	20,1
650 *	0,9	975	439	22,3
710 *	0,9	1065	476	26,4
750 *	0,9	1125	501	28,6
800 *	0,9	1200	532	31,8
900 *	0,9	1350	594	34,9

* Supplied with flange FL

Ordering example

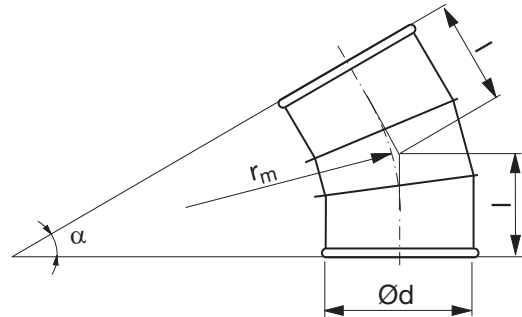
	BSFTR	250	45
Product			
Dimension Ød			
Angle α			

Bend

BSFTR 30°



Dimensions



$$r_m \approx 1,5 \cdot d$$

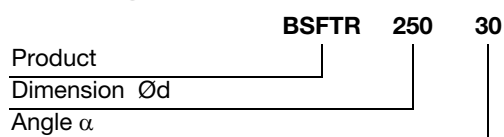
Description

Segmented and swaged bend.

Ød nom	t mm	r _m mm	l mm	m kg
200	0,7	300	167	1,50
224	0,7	336	177	1,70
250	0,7	375	187	1,90
300	0,7	450	202	2,50
315	0,7	472	208	2,80
350	0,7	525	222	3,40
400	0,9	600	242	4,90
450	0,9	675	262	5,80
500	0,9	750	282	6,80
560 *	0,9	840	260	12,7
600 *	0,9	900	276	14,5
630 *	0,9	945	288	15,7
650 *	0,9	975	296	18,4
710 *	0,9	1065	320	20,2
750 *	0,9	1125	336	21,5
800 *	0,9	1200	357	24,9
900 *	0,9	1350	397	29,6

* Supplied with flange FL

Ordering example



Bend

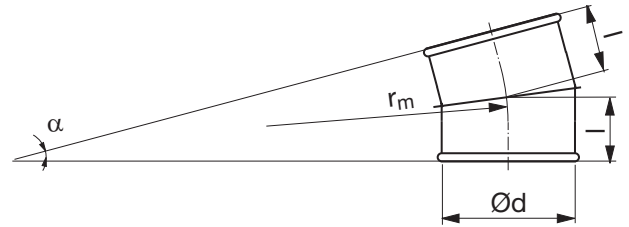
BSFTR 15°



Description

Segmented and swaged bend.

Dimensions



$$r_m \approx 1,5 \cdot d$$

Ød nom	t mm	r _m mm	l mm	m kg
200	0,7	300	126	1,10
224	0,7	336	131	1,30
250	0,7	375	136	1,50
300	0,7	450	140	2,00
315	0,7	472	143	2,40
350	0,7	525	150	2,90
400	0,9	600	160	4,50
450	0,9	675	170	5,40
500	0,9	750	180	6,20
560 *	0,9	840	146	11,8
600 *	0,9	900	153	13,4
630 *	0,9	945	159	15,6
650 *	0,9	975	163	16,4
710 *	0,9	1065	175	18,3
750 *	0,9	1125	183	19,6
800 *	0,9	1200	193	22,4
900 *	0,9	1350	213	26,3

* Supplied with flange FL

Ordering example

Product	BSFTR	250	15
Dimension Ød			
Angle α			

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

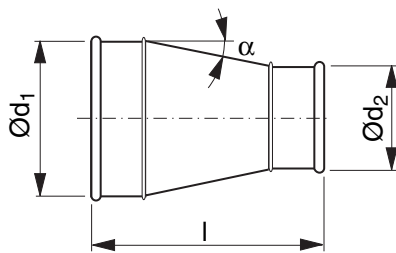
Reducer

RCLTR



Description

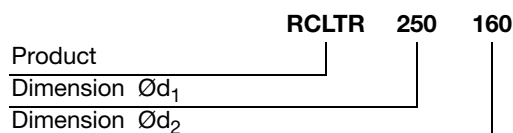
Long, concentric reducer with about 18° angle.



Dimensions

Ød ₁ nom	Ød ₂ nom	t mm	l mm	m kg
100	80	0,7	162	0,30
125	80	0,7	196	0,40
125	100	0,7	168	0,40
140	80	0,7	216	0,60
140	100	0,7	189	0,40
140	125	0,7	155	0,40
150	80	0,7	230	0,60
150	100	0,7	203	0,60
150	125	0,7	168	0,40
150	140	0,7	148	0,40
160	80	0,7	244	0,70
160	100	0,7	216	0,60
160	125	0,7	182	0,50
160	140	0,7	161	0,60
160	150	0,7	148	0,40
180	100	0,7	239	0,60
180	125	0,7	205	0,60
180	140	0,7	184	0,60
180	150	0,7	170	0,60
180	160	0,7	157	0,50
200	125	0,7	232	0,80
200	140	0,7	211	0,70
200	150	0,7	198	0,70
200	160	0,7	184	0,60
200	180	0,7	152	0,50
224	140	0,7	244	1,00
224	150	0,7	231	1,00
224	160	0,7	217	0,80
224	180	0,7	184	0,80
224	200	0,7	157	0,70
250	140	0,7	280	1,30
250	150	0,7	266	1,30
250	160	0,7	253	1,10
250	180	0,7	220	1,00
250	200	0,7	193	1,00
250	224	0,7	160	1,00
300	150	0,7	332	1,70
300	160	0,7	318	1,70
300	180	0,7	286	1,70
300	200	0,7	258	1,50
300	250	0,7	190	1,40
315	160	0,7	339	1,60
315	180	0,7	307	1,60
315	200	0,7	279	1,50
315	224	0,7	246	1,40

Ordering example



Reducer

RCLTR

Ød ₁ nom	Ød ₂ nom	t mm	l mm	m kg
315	250	0,7	210	1,40
315	300	0,7	139	1,30
350	180	0,7	361	2,00
350	200	0,7	334	2,00
350	224	0,7	301	2,10
350	250	0,7	265	1,90
350	300	0,7	194	1,70
350	315	0,7	173	1,40
400	180	0,7	428	2,80
400	200	0,7	401	2,80
400	224	0,7	368	3,00
400	250	0,7	332	2,60
400	300	0,7	260	2,70
400	315	0,7	240	2,30
400	350	0,7	185	2,00
450	200	0,7	469	3,50
450	224	0,7	437	3,80
450	250	0,7	401	3,30
450	300	0,7	329	3,40
450	315	0,7	309	2,90
450	350	0,7	254	2,60
450	400	0,9	197	2,80
500	224	0,7	505	4,30
500	250	0,7	469	4,00
500	300	0,7	398	4,00
500	315	0,7	377	3,80
500	350	0,7	322	3,40
500	400	0,9	265	3,60
500	450	0,9	197	3,20
560 *	250	0,7	578	8,20
560 *	300	0,9	506	8,00
560 *	315	0,7	485	7,80
560 *	350	0,7	431	7,60
560 *	400	0,9	374	7,40
560 *	450	0,9	305	7,00
560 *	500	0,9	236	6,50
600 *	300	0,9	561	8,60
600 *	315	0,7	541	8,60
600 *	350	0,7	486	8,20
600 *	400	0,9	429	8,20
600 *	450	0,9	360	7,70
600 *	500	0,9	291	7,20
600 *	560	0,9	235	6,40
630 *	315	0,7	582	8,60
630 *	350	0,7	527	8,00
630 *	400	0,9	470	7,90
630 *	450	0,9	401	7,40
630 *	500	0,9	333	7,00

Ød ₁ nom	Ød ₂ nom	t mm	l mm	m kg
630 *	560 *	0,9	276	9,30
630 *	600	0,9	221	8,80
650 *	350	0,9	547	8,40
650 *	400	0,9	490	8,30
650 *	450	0,9	421	7,80
650 *	500	0,9	353	7,40
650 *	560 *	0,9	296	9,70
650 *	600 *	0,9	241	9,20
650 *	630 *	0,9	221	9,00
710 *	400	0,9	605	9,60
710 *	450	0,9	536	9,20
710 *	500	0,9	467	8,70
710 *	560 *	0,9	411	11,1
710 *	600 *	0,9	356	10,6
710 *	630 *	0,9	315	10,2
750 *	450	0,9	566	9,60
750 *	500	0,9	497	9,10
750 *	560 *	0,9	441	11,5
750 *	600 *	0,9	386	11,0
750 *	630 *	0,9	345	10,6
750 *	650 *	0,9	325	10,4
750 *	710 *	0,9	290	10,0
800 *	500	0,9	591	11,0
800 *	560 *	0,9	535	13,4
800 *	600 *	0,9	480	12,9
800 *	630 *	0,9	439	12,5
800 *	650 *	0,9	419	12,1
800 *	710 *	0,9	354	11,6
800 *	750 *	0,9	325	11,2
900 *	560 *	0,9	697	17,7
900 *	600 *	0,9	642	17,0
900 *	630 *	0,9	601	16,5
900 *	650 *	0,9	570	16,1
900 *	710 *	0,9	516	15,3
900 *	750 *	0,9	450	14,9
900 *	800 *	0,9	392	13,8

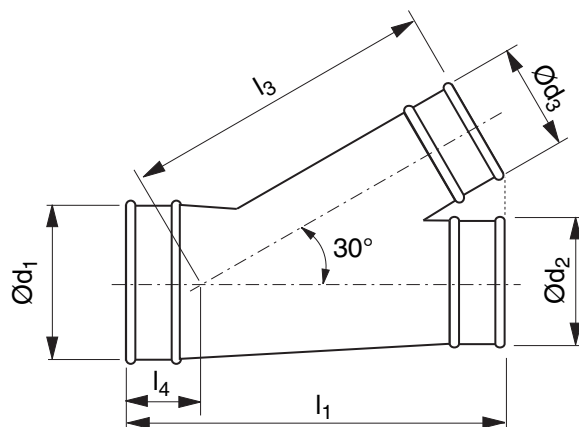
* Supplied with flange FL

T-piece

TVTR30



Dimensions



Description

T-piece.

NB

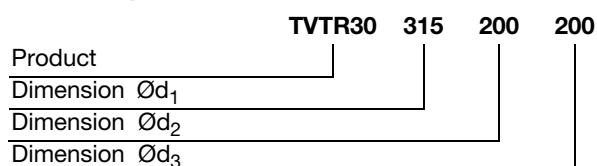
To save space, the adjacent table only contains a limited selection from our range the T-pieces where all dimensions d_1 , d_2 and d_3 are equal in size. Other dimensions are available to special order.

In all combinations, the installation length l_1 is only governed by the branch diameter d_3 . For example, all T-pieces with $d_3 = 200$ have installation length $l_1 = 589$ mm.

Ød ₁ nom	Ød ₂ nom	Ød ₃ nom	t mm	l ₁ mm	l ₃ mm	l ₄ mm	m kg
80	80	80	0,7	358	263	109	0,90
100	100	100	0,7	398	301	112	1,20
125	125	125	0,7	448	347	116	1,60
140	140	140	0,7	478	375	118	1,80
150	150	150	0,7	498	394	119	2,00
160	160	160	0,7	518	413	120	2,30
180	180	180	0,7	549	445	119	2,80
200	200	200	0,7	589	482	121	3,40
224	224	224	0,7	637	527	124	4,20
250	250	250	0,7	689	576	128	4,90
300	300	300	0,7	777	662	129	7,00
315	315	315	0,7	807	690	131	7,30
350	350	350	0,7	960	755	177	9,00
400	400	400	0,9	1060	848	184	14,0
450	450	450	0,9	1160	842	190	16,9
500	500	500	0,9	1260	1035	197	20,1
560*	560*	560*	0,9	1520	1245	275	26,0
600*	600*	600*	0,9	1600	1320	280	29,0
630*	630*	630*	0,9	1660	1376	284	31,0
650*	650*	650*	0,9	1700	1413	287	34,0
710*	710*	710*	0,9	1820	1525	295	41,0
750*	750*	750*	0,9	1900	1600	301	45,0
800*	800*	800*	0,9	2000	1693	307	51,0
900*	900*	900*	0,9	2200	1879	321	64,0

* Supplied with flange FL

Ordering example



X-piece

XVTR30



Description

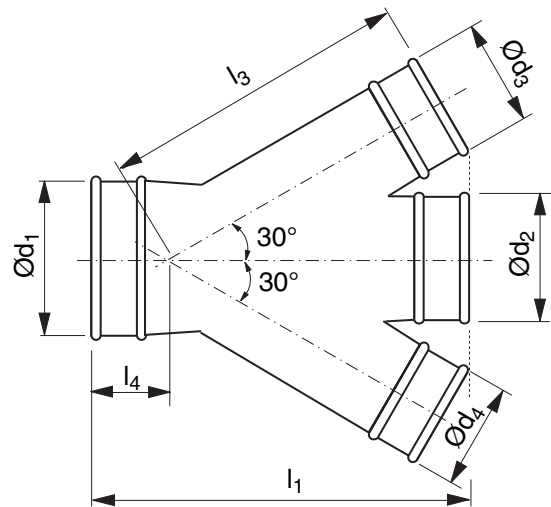
X-piece.

NB

To save space, the adjacent table only contains a limited selection from our range the X-pieces where all dimensions d_1 , d_2 and d_3/d_4 are equal in size. Other dimensions are available to special order.

In all combinations, the installation length l_1 is only governed by the larger branch diameter d_3/d_4 . For example, all X-pieces with $d_3 = 160$ and $d_4 = 200$ have installation length $l_1 = 589$ mm.

Dimensions



Ød ₁ nom	Ød ₂ nom	Ød ₃ Ød ₄ nom	t mm	l ₁ mm	l ₃ mm	l ₄ mm	m kg
80	80	80	0,7	358	263	109	1,10
100	100	100	0,7	398	301	112	1,40
125	125	125	0,7	448	347	116	1,80
140	140	140	0,7	478	375	118	2,10
150	150	150	0,7	498	394	119	2,30
160	160	160	0,7	518	413	120	2,60
180	180	180	0,7	549	445	119	3,20
200	200	200	0,7	589	482	121	4,00
224	224	224	0,7	637	527	124	4,90
250	250	250	0,7	689	576	128	5,80
300	300	300	0,7	777	662	129	8,80
315	315	315	0,7	807	690	131	9,30
350	350	350	0,7	960	755	177	11,2
400	400	400	0,9	1060	848	184	18,8
450	450	450	0,9	1160	842	190	22,2
500	500	500	0,9	1260	1035	197	26,8
560 *	560 *	560 *	0,9	1520	1245	275	34,0
600 *	600 *	600 *	0,9	1600	1320	280	39,0
630 *	630 *	630 *	0,9	1660	1376	284	41,0
650 *	650 *	650 *	0,9	1700	1413	295	46,0
710 *	710 *	710 *	0,9	1820	1525	295	54,0
750 *	750 *	750 *	0,9	1900	1600	301	60,0
800 *	800 *	800 *	0,9	2000	1693	307	68,0
900 *	900 *	900 *	0,9	2200	1879	321	85,0

* Supplied with flange FL

Ordering example

	XVTR30	400	200	160	160
Product					
Dimension Ød ₁					
Dimension Ød ₂					
Dimension Ød ₃					
Dimension Ød ₄					

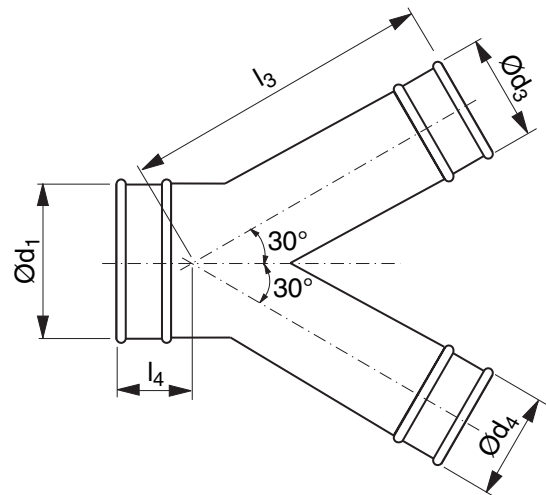


Y-piece

YVTR30



Dimensions



Description

Y-piece.

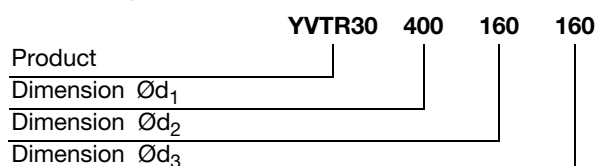
NB

To save space, the adjacent table only contains a limited selection from our range the Y-pieces where all dimensions d_1 , d_3 and d_4 are equal in size. Other dimensions are available to special order.

$\text{Ø}d_1$ nom	$\text{Ø}d_3$ $\text{Ø}d_4$ nom	t mm	l_3 mm	l_4 mm	m kg
80	80	0,7	191	65	0,70
100	100	0,7	213	67	0,80
125	125	0,7	242	71	0,90
140	140	0,7	259	73	1,10
150	150	0,7	270	74	1,20
160	160	0,7	281	75	1,30
180	180	0,7	304	73	1,60
200	200	0,7	327	76	2,00
224	224	0,7	354	79	2,50
250	250	0,7	383	82	2,90
300	300	0,7	440	82	4,40
315	315	0,7	457	84	4,70
350	350	0,7	497	89	5,40
400	400	0,9	554	96	9,00
450	450	0,9	610	102	10,8
500	500	0,9	667	109	13,1
560*	560*	0,9	735	155	17,0
600*	600*	0,9	780	160	19,5
630*	630*	0,9	814	164	20,5
650*	650*	0,9	837	167	23,0
710*	710*	0,9	905	195	27,0
750*	750*	0,9	951	201	30,0
800*	800*	0,9	1007	207	38,0
900*	900*	0,9	1121	221	47,0

* Supplied with flange FL

Ordering example



Saddle

PSVTR30



Description

Saddle.

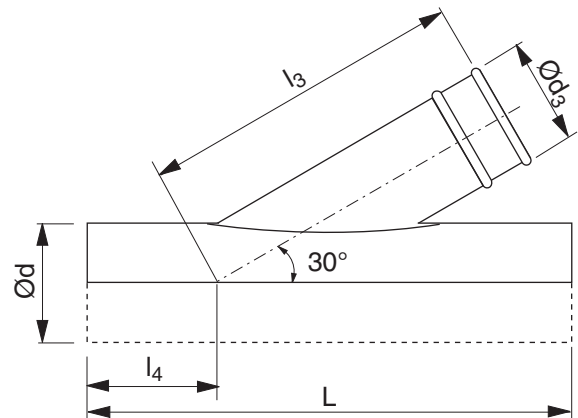
The saddle is fixed with two sealing clamps MFK.

This product should not be installed with screws or blind rivets when used in chip extraction installations.

NB

To save space, the adjacent table only contains a limited selection from our range the saddles where all dimensions d and d₃ are equal in size. Other dimensions are available to special order.

Dimensions



Ød nom	Ød ₃ nom	t mm	L mm	l ₃ mm	l ₄ mm	m kg
80	80	0,7	410	221	136	0,50
100	100	0,7	450	263	138	0,60
125	125	0,7	500	317	142	0,80
140	140	0,7	530	349	144	0,90
150	150	0,7	550	370	145	1,00
160	160	0,7	570	391	146	1,20
180	180	0,7	610	434	149	1,50
200	200	0,7	650	477	152	1,70
224	224	0,7	700	528	156	2,10
250	250	0,7	750	584	159	2,40
300	300	0,7	850	690	165	3,10
315	315	0,7	880	722	167	3,60
350	350	0,7	950	797	172	5,60
400	400	0,9	1050	904	179	6,50
450	450	0,9	1150	1010	185	8,20
500	500	0,9	1250	1117	192	9,80
560	560 *	0,9	1370	1245	200	11,2
600	600 *	0,9	1450	1330	205	13,8
630	630 *	0,9	1510	1394	209	14,0
650	650 *	0,9	1550	1437	212	16,0
710	710 *	0,9	1670	1565	220	18,0
750	750 *	0,9	1750	1651	225	21,0
800	800 *	0,9	1850	1757	232	24,0
900	900 *	0,9	2050	1971	245	28,0

* Supplied with flange FL

Ordering example

Product	PSVTR30	400	160
Dimension Ød			
Dimension Ød ₃			

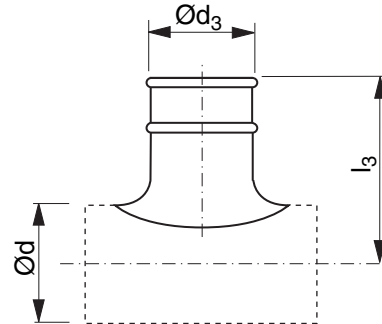


Collar saddle

PSTR



Dimensions

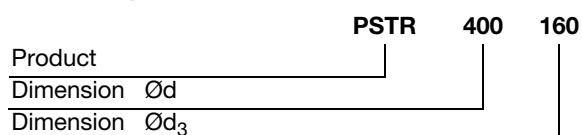


Description

Collar saddle.

Ød nom	Ød ₃ mm	t mm	l ₃ mm	m kg
80	80	0,6	143	0,20
100	80	0,6	156	0,20
100	100	0,6	131	0,30
125	80	0,6	166	0,20
125	100	0,6	144	0,30
125	125	0,6	149	0,40
140	80	0,6	173	0,20
140	100	0,6	176	0,40
140	125	0,6	121	0,30
140	140	0,6	181	0,50
150	80	0,6	178	0,20
150	100	0,6	181	0,40
150	125	0,6	186	0,50
150	140	0,6	186	0,50
150	150	0,6	186	0,50
160	80	0,6	183	0,20
160	100	0,6	161	0,30
160	125	0,6	166	0,40
160	140	0,6	191	0,50
160	150	0,6	191	0,50
160	160	0,6	171	0,50
180	80	0,6	193	0,20
180	100	0,6	196	0,40
180	125	0,6	201	0,50
180	140	0,6	201	0,50
180	150	0,6	201	0,50
180	160	0,6	206	0,60
180	180	0,6	202	0,90
200	80	0,6	203	0,20
200	100	0,6	181	0,30
200	125	0,6	181	0,40
200	140	0,6	211	0,50
200	150	0,6	211	0,50
200	160	0,6	191	0,50

Ordering example



Collar saddle

PSTR

Ød nom	Ød ₃ mm	t mm	l ₃ mm	m kg
200	180	0,6	212	0,90
200	200	0,6	212	1,00
224	80	0,6	215	0,20
224	100	0,6	218	0,40
224	125	0,6	223	0,50
224	140	0,6	223	0,50
224	150	0,6	223	0,50
224	160	0,6	228	0,60
224	180	0,6	224	0,80
224	200	0,6	224	0,80
224	224	0,6	224	1,00
250	80	0,6	228	0,30
250	100	0,6	206	0,40
250	125	0,6	211	0,40
250	140	0,6	236	0,50
250	150	0,6	236	0,50
250	160	0,6	241	0,60
250	180	0,6	237	0,90
250	200	0,6	237	0,90
250	224	0,6	237	1,20
250	250	0,6	257	1,30
300	80	0,6	201	0,20
300	100	0,6	201	0,20
300	125	0,6	201	0,30
300	140	0,6	201	0,40
300	150	0,6	201	0,40
300	160	0,6	201	0,40
300	180	0,6	197	0,60
300	200	0,6	197	0,60
300	224	0,6	197	0,70
300	250	0,6	197	0,80
315	80	0,6	261	0,30
315	100	0,6	264	0,40
315	125	0,6	244	0,40
315	140	0,6	269	0,50
315	150	0,6	269	0,50
315	160	0,6	273	0,50
315	180	0,6	273	0,90
315	200	0,6	269	0,90
315	224	0,6	269	0,90
315	250	0,6	289	1,10
315	300	0,6	259	1,50
315	315	0,6	283	1,90
350	100	0,6	226	0,30
350	125	0,6	226	0,30
350	140	0,6	226	0,40
350	150	0,6	226	0,40
350	160	0,6	226	0,40
350	180	0,6	222	0,60
350	200	0,6	222	0,70

Ød nom	Ød ₃ mm	t mm	l ₃ mm	m kg
350	224	0,6	222	0,70
350	250	0,6	222	0,80
350	300	0,6	216	0,90
350	315	0,6	216	1,10
350	350	0,6	216	1,60
400	125	0,6	311	0,40
400	140	0,6	251	0,30
400	150	0,6	311	0,40
400	160	0,6	316	0,50
400	180	0,6	247	0,40
400	200	0,6	312	0,90
400	224	0,6	312	0,90
400	250	0,6	332	1,10
400	300	0,6	301	1,10
400	315	0,6	326	1,60
400	350	0,6	326	1,90
400	400	0,7	321	2,40
450	100	0,6	331	0,40
450	125	0,6	336	0,50
450	140	0,6	276	0,40
450	150	0,6	336	0,40
450	160	0,6	341	0,50
450	180	0,6	272	0,40
450	200	0,6	337	0,90
450	224	0,6	337	0,90
450	250	0,6	357	1,10
450	300	0,6	266	1,00
450	315	0,6	351	1,50
450	400	0,7	371	2,30
450	450	0,7	266	1,40
500	100	0,6	356	0,40
500	125	0,6	361	0,50
500	140	0,6	301	0,30
500	150	0,6	361	0,40
500	160	0,6	366	0,50
500	180	0,6	297	0,50
500	200	0,6	362	0,90
500	224	0,6	322	0,70
500	250	0,6	382	1,10
500	300	0,6	291	0,90
500	315	0,6	376	1,50
500	350	0,7	291	1,70
500	400	0,7	396	2,30
500	450	0,7	291	1,50
500	500	0,7	291	1,70
560	250	0,7	412	1,50
560	300	0,7	321	1,30
560	315	0,7	406	1,90
560	350	0,7	381	2,00
560	400	0,9	426	3,10

Collar saddle

PSTR

Ød nom	Ød ₃ mm	t mm	l ₃ mm	m kg
560	450	0,9	321	2,70
560	500	0,9	321	3,10
560	560 *	0,9	321	5,70
600	300	0,7	341	1,40
600	315	0,7	426	1,90
600	350	0,7	341	1,70
600	400	0,9	446	3,10
600	450	0,9	341	2,70
600	500	0,9	341	3,30
600	560 *	0,9	341	5,80
600	600 *	0,9	341	6,30
630	315	0,7	441	2,10
630	350	0,7	356	1,80
630	400	0,9	461	3,30
630	450	0,9	356	2,80
630	500	0,9	356	3,50
630	560 *	0,9	356	5,90
630	600 *	0,9	356	6,40
630	630 *	0,9	356	6,80
650	350	0,7	366	1,90
650	400	0,9	366	2,60
650	450	0,9	366	2,90
650	500	0,9	366	3,60
650	560 *	0,9	366	6,00
650	600 *	0,9	366	6,50
650	630 *	0,9	366	6,90
650	650 *	0,9	366	7,20
710	400	0,9	396	3,00
710	450	0,9	396	3,10
710	500	0,9	396	3,80
710	560 *	0,9	396	6,10
710	600 *	0,9	396	6,70
710	630 *	0,9	396	7,10
710	650 *	0,9	396	7,40
710	710 *	0,9	396	8,50
750	450	0,9	416	3,20
750	500	0,9	416	3,80
750	560 *	0,9	416	6,20
750	600 *	0,9	416	6,70
750	630 *	0,9	416	7,10
750	650 *	0,9	416	7,40
750	710 *	0,9	416	8,60
750	750 *	0,9	416	9,00
800	500	0,9	441	3,80
800	560 *	0,9	441	6,30
800	630 *	0,9	441	7,30
800	650 *	0,9	441	7,70
800	710 *	0,9	441	8,70
800	750 *	0,9	441	9,20
800	800 *	0,9	441	10,1

Ød nom	Ød ₃ mm	t mm	l ₃ mm	m kg
900	560 *	0,9	491	6,60
900	600 *	0,9	491	7,20
900	630 *	0,9	491	7,60
900	650 *	0,9	491	8,00
900	710 *	0,9	491	9,10
900	750 *	0,9	491	9,70
900	800 *	0,9	491	10,6
900	900 *	0,9	491	12,2

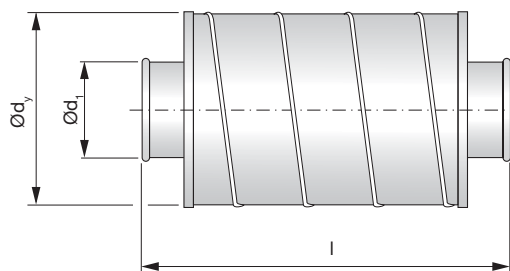
* Supplied with flange FL

Circular straight silencer

SLTR



Dimensions



Nominal insulation thickness 50 mm.

Ød _{1 nom} mm	Ød _y mm	Length l mm	m kg
80	190	390	1,90
80	190	690	3,30
80	190	990	4,90
80	190	1290	6,50
100	210	390	2,20
100	210	690	3,20
100	210	990	4,80
100	210	1290	6,40
125	235	390	2,60
125	235	690	4,40
125	235	990	6,70
125	235	1290	8,90
160	270	390	3,20
160	270	690	6,20
160	270	990	7,50
160	270	1290	10,0
200	310	390	3,50
200	310	690	7,00
200	310	990	9,60
200	310	1290	12,2
250	365	690	8,60
250	365	990	11,9
250	365	1290	15,0

Nominal insulation thickness 100 mm.

Ød _{1 nom} mm	Ød _y mm	Length l mm	m kg	
315	510	690	12,0	
315	510	990	18,4	
315	510	1290	23,9	
400	625	690	16,0	
400	625	990	22,3	
400	625	1290	32,0	
500	735	990	26,0	
500	735	1290	39,0	
630	*	880	1040	62,0
630	*	880	1340	48,0
800	*	1030	1080	76,0
800	*	1030	1680	93,0

* Supplied with flanges, type FL.

Description

Circular straight silencer with transfer connections.

SLTR with Ød_{1 nom} 80 -250 mm
=> Nominal insulation thickness 50 mm.

SLTR with Ød_{1 nom} 315 -800 mm
=> Nominal insulation thickness 100 mm.

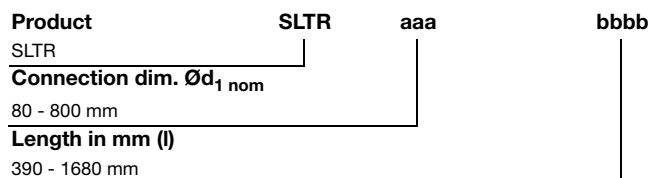
The attenuation material is Rockwool.

For sound attenuation values, see SLU50 and SLU100.

Tested according to ISO 7235 standard.

Special materials and sizes, please contact Lindab sales.

Order code



Example: SLTR - 125 - 990

Take-off

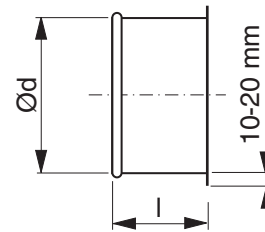
ILTR



Description

Take-off.

Dimensions



Ød nom	t mm	l mm	m kg
80	0,7	50	0,10
100	0,7	50	0,10
125	0,7	50	0,20
140	0,7	50	0,20
150	0,7	50	0,20
160	0,7	50	0,20
180	0,7	45	0,30
200	0,7	45	0,30
224	0,7	45	0,30
250	0,7	45	0,40
300	0,7	40	0,40
315	0,7	40	0,50
350	0,7	40	0,50
400	0,9	40	0,70
450	0,9	40	0,80
500	0,9	40	0,90

Ordering example

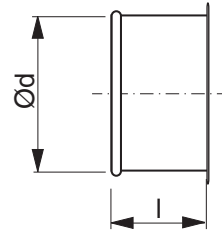
Product	ILTR	315
Dimension Ød		

End cover

EPTR



Dimensions



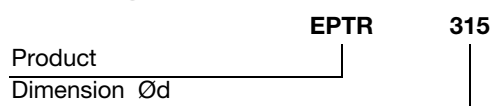
Description

End cover.

Ød nom	t mm	l mm	m kg
80	0,7	56	0,30
100	0,7	56	0,40
125	0,7	56	0,40
140	0,7	56	0,40
150	0,7	56	0,50
160	0,7	56	0,60
180	0,7	52	0,60
200	0,7	52	0,80
224	0,7	52	0,80
250	0,7	52	0,80
300	0,9	46	0,90
315	0,9	46	1,00
350	0,9	46	1,00
400	0,9	46	1,40
450	0,9	46	1,60
500	0,9	46	1,80
560 *	0,9	70	5,40
600 *	0,9	70	6,10
630 *	0,9	70	6,30
650 *	0,9	70	6,70
710 *	0,9	90	7,80
750 *	0,9	90	8,30
800 *	0,9	90	9,00
900 *	0,9	90	10,7

* Supplied with flange FL

Ordering example

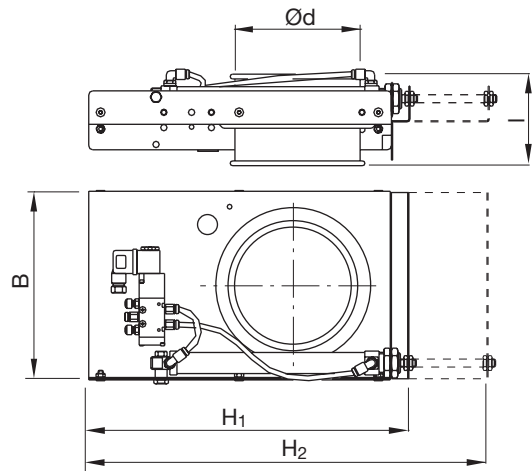


Sliding damper – pneumatic

SKPTR



Dimensions



Description

Pneumatic shut-off sliding damper with transfer joint

The damper meets the requirements for tightness class 4 at pressure class C.

The damper meets the requirements for tightness class C only in fully closed or fully opened position.

Pressurized air cylinder with mounted regulation valve is included.

There is a separate assembly, measuring, balancing and maintenance instruction for this product.

SPZZ pinch protection available as accessories to dimension 80–200.

Technical data

Cylinder

Power pressure, normal 0,6 MPa (6 bar)
 , max 1,0 MPa (10 bar)
 Ambient temperature range -20 °C (dry air) to +80 °C
 Working fluid Air, clean and dry

Solenoid valve

Power pressure max 7 bar
 Ambient temperature max +50 °C
 Power supply, standard 230 V~
 , special 24 V~ or 24 V-
 Power tolerance ±10 %
 Power requirements appr. 5 W
 Protection class IP 65
 Insulation class F
 Air connection Quick release for Ø 6 mm hose

Ordering example

Product **SKPTR** **200**
 Dimension Ød

Ød nom	H ₁ [mm]	H ₂ [mm]	B [mm]	l [mm]	m [kg]
80	223	338	157	125	3,00
100	263	398	177	125	3,30
125	314	475	202	125	4,00
140	363	548	227	125	5,00
150	363	548	227	125	5,00
160	383	574	237	125	5,20
180 *	463	699	277	125	6,20
200 *	463	699	277	125	6,20
224 *	562	847	347	165	11,3
250 *	562	849	371	165	13,5
300 *	692	1050	422	165	20,1
315 *	692	1050	422	165	21,1
350 *	763	1160	472	165	25,0
400 *	863	1310	522	165	27,4

* Provided with 2 pneumatic cylinders

Accessories and spare parts

Art.

SPDA-01 Solenoid valve, complete
 SPDA-021 Coil for solenoid valve 24 V DC
 SPDA-022 Coil for solenoid valve 24 V AC
 SPDA-06 Micro switch
 SPDA-07 Support for micro switch
 SPDA-08 Sensor cylinder
 SPDA-09 Support for sensor

Transition piece

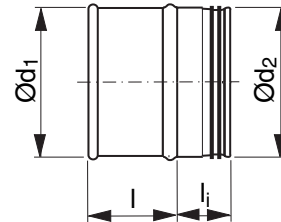
OUTR



Description

Coupling between Transfer and Safe systems.

Dimensions



Ød ₁ nom	Ød ₂ nom	t mm	l mm	l _i mm	m kg
80	80	0,7	40	40	0,15
100	100	0,7	40	40	0,15
125	125	0,7	40	40	0,20
140	140	0,7	40	40	0,20
150	150	0,7	40	40	0,30
160	160	0,7	40	40	0,30
180	180	0,7	40	40	0,30
200	200	0,7	40	40	0,30
224	224	0,7	40	40	0,40
250	250	0,7	60	60	0,40
300	300	0,7	46	60	0,70
315	315	0,7	46	60	0,50
350	350	0,9	46	60	0,80
400	400	0,9	46	80	1,20
450	450	0,9	46	80	1,40
500	500	0,9	46	80	1,60
560	560	0,9	80	80	4,6
600	600	0,9	80	80	4,9
630	630	0,9	80	80	5,1
650	650	0,9	80	80	5,4
710	710	0,9	100	100	6,1
750	750	0,9	100	100	6,8
800	800	0,9	100	100	7,5
900	900	0,9	125	125	8,5

Ordering example

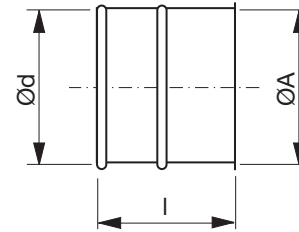
Product	OUTR	315
Dimension Ød		

Transition piece

OTR



Dimensions



Description

Coupling between Transfer and other joining system.

As standard the length is 100 mm. If a specific length is desired it can be stated when order. The length depends on dimensions and joining system. Minimum length is 50 mm.

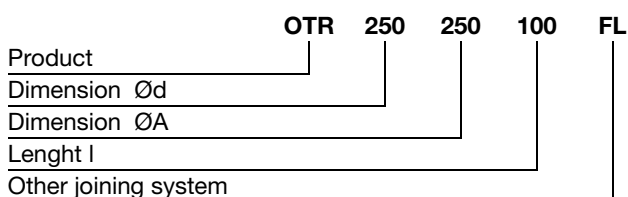
Ød : dimension for Transfer

ØA : dimension for other system

At order state the type of the other joining system.

Ød nom	t mm
80	0,7
100	0,7
125	0,7
140	0,7
150	0,7
160	0,7
180	0,7
200	0,7
224	0,7
250	0,7
300	0,9
315	0,9
350	0,9
400	0,9
450	0,9
500	0,9

Ordering example



- 1
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- 18

Transition piece

LORTR



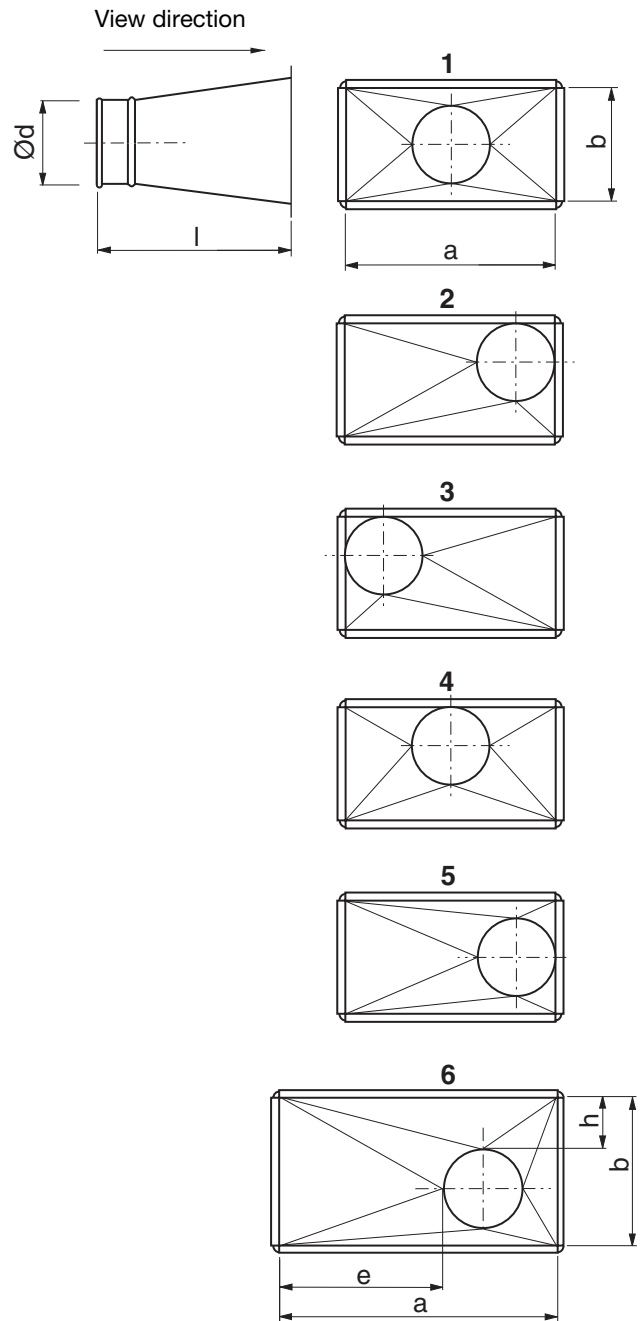
Description

Coupling between Transfer and rectangular connection.

The measures e and h only need to be specified for alternative 6. A negative value for e, for example, means that e is outside side a.

The measures e and h only need to be specified for alternative 6. A negative value for e, for example, means that e is outside side a.

Dimensions



Ordering example

Product	LORTR	500	300	160	1
Largest side	a				
Smallest side	b				
Diameter in mm	$\varnothing d$				
The alt. displacement are seen from the circular end 1-6					

a, b Largest side mm	l mm
100 – 350	300
351 – 750	450
751 – 1200	600

Extraction hood

SH

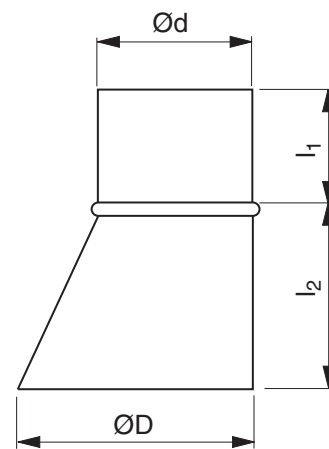


Description

Extraction hood for all types of extraction.

Available in two standard sizes with various accessories such as a damper, net and magnet.

Dimensions



Ød nom	ØD nom	l ₁ mm	l ₂ mm	m kg
80	160	80	95	0,31
160 *	315	120	155	1,00

* Supplied with handle

Ordering example

Product	SH	160
Dimension Ød		

1

2

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6

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15

16

17

18

Extraction hood

SHTR

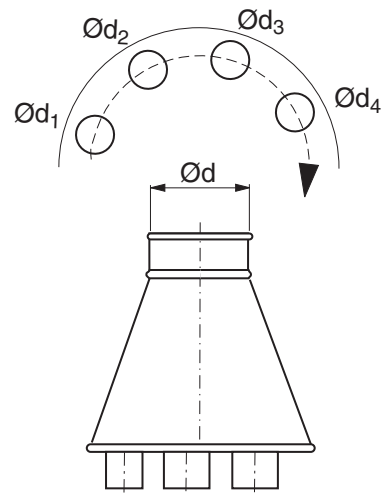


Description

Extraction hood.

To order, specify $\text{\O}d$ and dimensions for stubs $\text{\O}d_1$, $\text{\O}d_2$, $\text{\O}d_3$ etc. and the sequence they should be located on the pitch circle.

Dimensions



$\text{\O}d$ nom	t mm
80	0,7
100	0,7
125	0,7
140	0,7
150	0,7
160	0,7
180	0,7
200	0,7
224	0,7
250	0,7
300	0,7
315	0,7
350	0,7
400	0,9
450	0,9
500	0,9

Ordering example



Extraction hood

SPTR

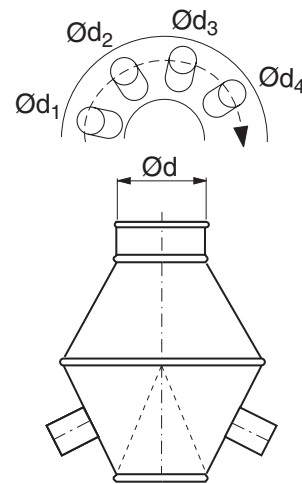


Description

Extraction hood.

To order, specify $\varnothing d$ and dimensions for stubs $\varnothing d_1$, $\varnothing d_2$, $\varnothing d_3$ etc. and the sequence they should be located on the pitch circle.

Dimensions



$\varnothing d$ nom	t mm
80	0,7
100	0,7
125	0,7
140	0,7
150	0,7
160	0,7
180	0,7
200	0,7
224	0,7
250	0,7
300	0,7
315	0,7
350	0,7
400	0,9
450	0,9
500	0,9

Ordering example

Product	SPTR	315	xxx - xxx - xxx
Dimension $\varnothing d$			
Dimension $\varnothing d_1, \varnothing d_2, \varnothing d_3$			

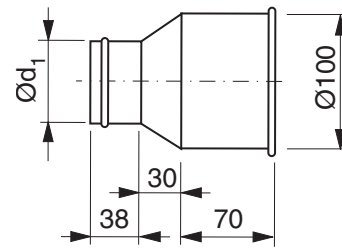
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- 18

Transition piece

OTRTH



Dimensions



Description

Coupling between Transfer and flexible hose THVTR.

Ød ₁ nom	m kg
25	0,19
32	0,20
38	0,20
45	0,20
50	0,21
63	0,21
76	0,22

Dim 80–250 use TSRTR page 480.

Ordering example

Product	OTRTH	50
Dimension Ød ₁		

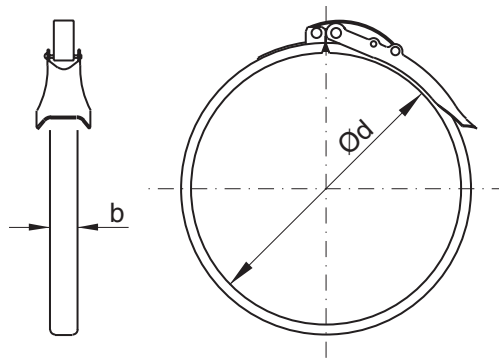
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- 18

Clip

SB



Dimensions



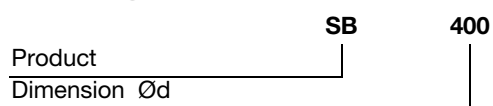
Description

The clip is provided with a rubber gasket. The clip handles can be secured against inadvertent opening by means of a lock pin.

Temperature range -30 to +75 °C continuous
-40 to +85 °C intermittent

Ød nom	b mm	m kg
80	14	0,10
100	14	0,10
125	14	0,10
140	14	0,10
150	14	0,10
160	14	0,10
180	19	0,20
200	19	0,30
224	19	0,30
250	19	0,30
300	25	0,40
315	25	0,50
350	25	0,60
400	25	0,60
450	25	0,70
500	25	0,80

Ordering example

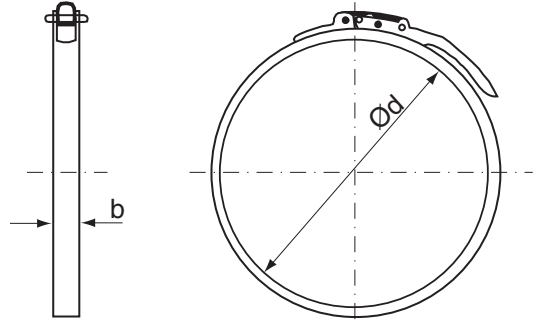


Clip

SB1



Dimensions



Description

Provided with a rubber gasket of EPDM rubber and a thread spring. The clip handle can be secured against inadvertent opening by means of a lock pin.

Temperature range -30 to +75 °C continuous
-40 to +85 °C intermittent

Ød nom	b mm	m kg
80	14	0,10
100	14	0,10
125	14	0,10
140	14	0,10
150	14	0,10
160	14	0,10
180	19	0,20
200	19	0,30
224	19	0,30
250	19	0,30
300	25	0,40
315	25	0,50
350	25	0,60
400	25	0,60
450	25	0,70
500	25	0,80

Ordering example

Product	SB1	250
Dimension Ød		

Clip

SB-2

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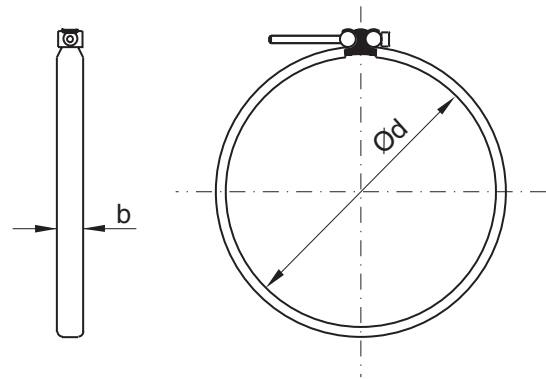


Description

The clip is provided with a rubber gasket. The clip is tensioned by means of a hexagonal socket cap screw. Suitable for tightening with a screw tightener.

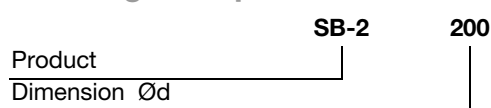
Temperature range -30 to +75 °C continuous
 -40 to +85 °C intermittent

Dimensions



Ød nom	b mm	Key size mm	m kg
80	14	3	0,10
100	14	3	0,10
125	14	3	0,10
140	14	3	0,10
150	14	3	0,10
160	14	3	0,10
180	19	3	0,20
200	19	3	0,30
224	19	3	0,30
250	19	3	0,30
300	25	5	0,40
315	25	5	0,50
350	25	5	0,60
400	25	5	0,60
450	25	5	0,70
500	25	5	0,80

Ordering example



Flat bar flange

FL



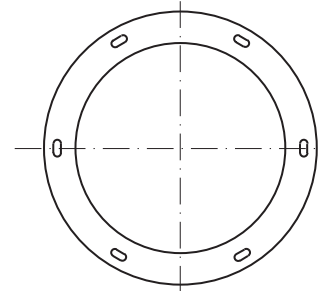
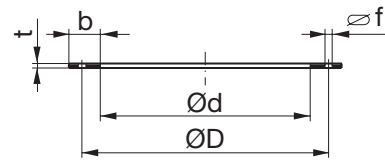
Description

Heavy flange made from flat bar which then is hot dip galvanised. It suits both spirally swaged and lengthways swaged ducts. Oval bolt holes facilitate assembly.

Other dimensions and hole spacings can be provided for large orders.

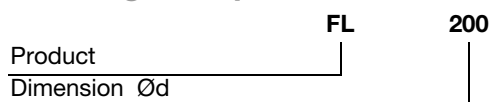
To achieve maximum airtightness between the flanges, use RJSM 12×4 as flange sealing. See separate catalogue page for RJSM.

Dimensions



Mounting RJSM on to the brim of the duct or fitting as flange sealing.

Ordering example



Flat bar flange

FL

Dimensions

Ød			ØD		f [mm]	Bolts to DIN 601			b × t [mm]	m [kg]				
nom [mm]	real [mm]	tolerance [mm]	real [mm]	tolerance [mm]		quantity pcs	dim	L [mm]						
80	82,5	+1,0 -0,0	108	±1,0	7,0 × 16	4	M6	16	25 × 3	0,18				
100	102		129							0,22				
112	114		141							0,25				
125	127		155							0,30				
140	142	+1,5 -0,0	176			±1,5			9,5 × 20	6	M8	20	30 × 4	0,49
150	152		184											0,52
160	162		194		0,55									
180	182		213		0,60									
200	203		235		0,70									
224	227		259		0,74									
250	253	286	0,81											
280	283	+2,0 -0,0	322	±1,5	11,5 × 24		8	M10	20	35 × 5		1,31		
300	303		341									1,40		
315	319,5		356									1,47		
355	359,5		395				1,63							
400	404,5		438				1,80							
450	454,5		487			2,02								
500	505	541	2,35											
560	565,5	+2,0 -0,0	605		±1,5	11,5 × 24	16		M10	20	40 × 5	2,81		
600	605,5		644									3,00		
630	635,5		674									3,15		
710	716		751									3,54		
800	806,5		850									3,90		
900	907		951										4,39	
1000	1007,5	1052	4,89											
1120	1128	+2,0 -0,0	1174			±1,5	11,5 × 24			24	M10	25	50 × 6	8,36
1250	1258		1311											9,32
1400	1410		1465											10,4
1500	1510		1565							11,1				
1600	1610		1665	11,8										

Sealing clamp

MFK

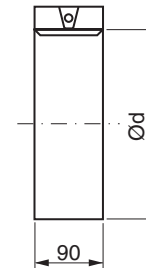


Description

The inside of the sealing clamp is clad with longlife resistant EPDM rubber.

Used for sealing joints on slide-on stub PTR and saddle PSVTR.

Dimensions



Ød mm	m kg
80	0,30
100	0,30
125	0,40
140	0,40
150	0,50
160	0,50
180	0,50
200	0,50
224	0,60
250	0,60
300	0,60
315	0,70
350	0,70
400	0,80
450	1,10
500	1,20

Ordering example

Product	MFK	200
Dimension Ød		