Centrifugal Fans CNA and CNB

Dimensioning Curves

CNA-1000

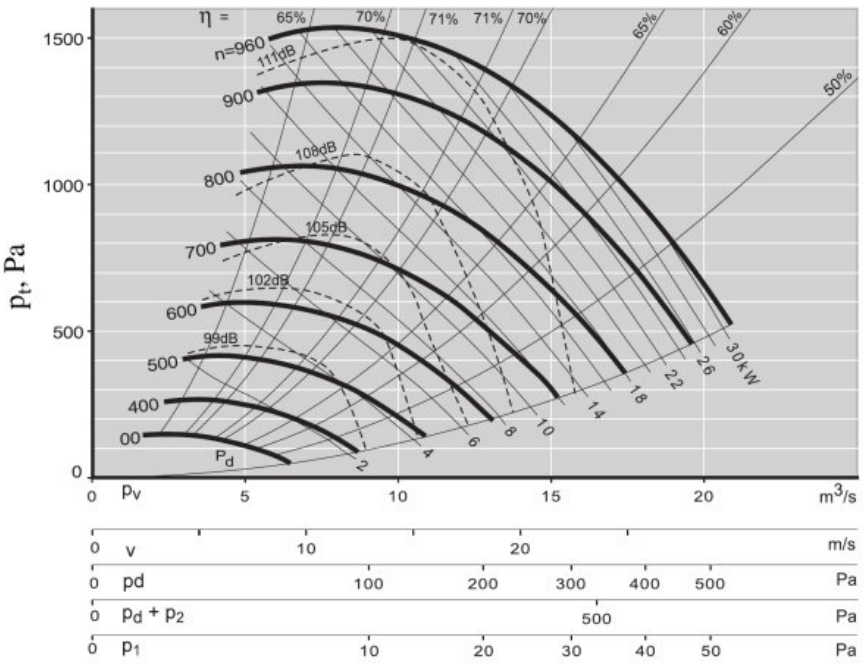
max. = 785 RPM
ρ = 1.20 kg/m^3
I_v = 14 kgm^2

CNB-1000

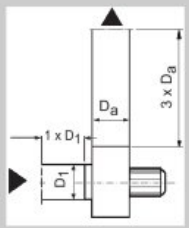
max. = 960 RPM
ρ = 1.20 kg/m^3
I_v = 14 kgm^2

Circumferential speed

u = 0.052 x n, m/s.



Basis for chart (Arr. D)



Symbols

p_t = total pressure
p_d = dynamic pressure, outlet
p_1 = connection loss, inlet
p_2 = connection loss, outlet
v = air speed, outlet
q_v = volume flow
n = RPM
0 = efficiency in %
kW = power demand, impeller
dB = sound power level, outlet

Centrifugal Fans CNA and CNB

Sound Conditions

When a fan is operated, sound is generated. This is partly electrical and mechanical sound in the motor, bearings and other mechanical parts, partly air sound that occurs as the air flows through the fan.
Sound generation is counteracted by the correct design and careful production of all parts of the fan, in particular the inlet funnel and impeller, where air sound is concerned. In this connection, it must be noted that poor installation conditions, for example a sharp duct bend immediately before the inlet opening, may increase sound generation considerably.

The electrical and mechanical sound, and that part of the air sound that passes out through the fan housing, can only be dampened by surrounding the fan with a casing or walls of low-vibration (heavy) materials.
The sound generated in the impeller is distributed through the inlet and outlet openings to the duct system and on to the ventilated rooms.
Calculation of the sound conditions in the duct system and the ventilated rooms, including dimensioning of any silencers in the system, is only possible on the basis of the sound power level in the fan's inlet and outlet openings.
In connection with all considerations concerning sound, a sharp distinction must be made between the two terms sound power level and sound pressure level.

The sound power level is an expression of the sound energy emitted through the fan's inlet and outlet openings and forms the basis for any calculation concerning the duct systems and in the rooms served by the fan.

The sound pressure level (often just called the sound level) is a measure of the sound impression perceived by the ear at a given location in the environment of the fan. It can be measured using a sound meter with a microphone mounted in the location in question.

The sound pressure level depends on the fan's sound power level, the distance from the fan and the silencing properties of the environment. When a fan's sound properties are characterised by stating a sound pressure level, it is therefore necessary also to give a precise description of the conditions under which the sound level stated occurs.
When comparing two fans' sound properties, a sound power level must never be compared with a sound pressure level, and it is only possible to compare two sound pressure levels when the distance from the fan and the silencing in the environment are the same in both cases.

For a correctly constructed fan, the sound power level depends mainly on the air flow rate supplied and the total pressure of the fan.
The sound power level of the individual fans is shown in the graphs on pages 10-14 and is stated in dB with a reference value of 10^{-12} W and applies within the fan's normal working range with a tolerance of ± 5 dB. If the sound power level needs to be divided into octave values, the sound power level in the different octave bands is determined by deducting the correction values in the table below from the total sound power level found.

For CAN and CNB, the correction values depend on the blade frequency

$$z \times \frac{n}{60}, \quad where$$

z = number of blades and
n = fan's speed in RPM.
For CNA and CNB, the number of blades is 12.

Correction Values

Octave band, Hz		63	125	250	500	1k	2k	4k	8k
CNA, CNB Blade frequency	90-180 Hz	7	4	7	12	17	22	27	32
	180-360 Hz	11	7	4	7	12	17	22	27
	360-710 Hz	13	11	7	4	7	12	17	22
	710-1400 Hz	15	13	10	6	4	7	12	18

Example: A centrifugal fan type CNA-315 has an output of 0.6 m^3/s at 300 Pa and 1400 RPM.
Blade frequency: 12 x 1400/60 = 280 Hz.
As the graph on page 10 shows, the total sound power level is 84 dB.
The correction value for 250 Hz is 4 dB.
The sound power level for this octave band is thus:
84 dB – 4 dB = 80 dB
The full octave analysis is shown in the table below.

Octave band, Hz	63	125	250	500	1k	2k	4k	8k

sound conditions in the connected

Octave band, Hz	63	125	250	500	1k	2k	4k	8k
Sound power level, dB	73	77	80	77	72	67	62	57

Continuous product development at Novenco may result in changes being introduced without prior notice.

Centrifugal Fans CNA and CNB

Sound Conditions

When a fan is operated, sound is generated. This is partly electrical and mechanical sound in the motor, bearings and other mechanical parts, partly air sound that occurs as the air flows through the fan.
Sound generation is counteracted by the correct design and careful production of all parts of the fan, in particular the inlet funnel and impeller, where air sound is concerned. In this connection, it must be noted that poor installation conditions, for example a sharp duct bend immediately before the inlet opening, may increase sound generation considerably.

The electrical and mechanical sound, and that part of the air sound that passes out through the fan housing, can only be dampened by surrounding the fan with a casing or walls of low-vibration (heavy) materials.
The sound generated in the impeller is distributed through the inlet and outlet openings to the duct system and on to the ventilated rooms.
Calculation of the sound conditions in the duct system and the ventilated rooms, including dimensioning of any silencers in the system, is only possible on the basis of the sound power level in the fan's inlet and outlet openings.
In connection with all considerations concerning sound, a sharp distinction must be made between the two terms sound power level and sound pressure level.

The sound power level is an expression of the sound energy emitted through the fan's inlet and outlet openings and forms the basis for any calculation concerning the sound conditions in the connected duct systems and in the rooms served by the fan.

The sound pressure level (often just called the sound level) is a measure of the sound impression perceived by the ear at a given location in the environment of the fan. It can be measured using a sound meter with a microphone mounted in the location in question.

The sound pressure level depends on the fan's sound power level, the distance from the fan and the silencing properties of the environment. When a fan's sound properties are characterised by stating a sound pressure level, it is therefore necessary also to give a precise description of the conditions under which the sound level stated occurs.
When comparing two fans' sound properties, a sound power level must never be compared with a sound pressure level, and it is only possible to compare two sound pressure levels when the distance from the fan and the silencing in the environment are the same in both cases.

Correction Values

Octave band, Hz		63	125
CNA, CNB Blade frequency	90-180 Hz	7	4
	180-360 Hz	11	7
	360-710 Hz	13	11
	710-1400 Hz	15	13

Example: A centrifugal fan type CNA-315 has an output of 0.6 m^3/s at 300 Pa and 1400 RPM.
Blade frequency: 12 x 1400/60 = 280 Hz.
As the graph on page 10 shows, the total sound power level is 84 dB.

Octave band, Hz	63	125
Sound power level, dB	73	77