Wolter Bifurcated Fans

A09.BIF

Table of Content

Fan type code

AXV 450-26° LH100 -2 AL SU 400°C/2Std

- Smoke extract fan
  400°C/120min, 300°C/120min
- Air flow and form of running
  S, D, SU, SO, DU, DO
- Material of blade
- number of poles
- Casing version
  SH = Short-cased
  LH1 = Long-cased
- Pitch angle
- AXV: impeller-ø
  355...1000
- Axial impeller blade type

Design features

WOLTER Bifurcated Fans

The WOLTER ranges of Bifurcated fans are design for application that required motor to be isolated from the air stream. It is specially developed to meet the need for an axial fan where it can handle heavy corrosive fumes, hot air and gas, saturated and dust-laden atmospheres, which may normally detriment the life of the fan motor.

WOLTER Bifurcated fans is suitable for handling air temperature of up to 150°C or, with special features, for handling air temperature up to 200°C. These fans have a split airway with direct driven motor operating in ambient air within the motor compartment. Adequate space is provided within the motor compartment to ensure a plentiful supply of cooling air. The air within the motor compartment must not exceed 40°C, for ambient in excess of this, please consults us.

On high temperature unit, the motor compartment is lined with asbestos-free thermo-insulation and a cooling fan is fitted on the motor shaft between motor and compartment.

Range - Type 355 to 1000

The WOLTER Bifurcated fans range cover 8 diameters -Type 355 mm, Type 400 mm, Type 450 mm, Type 500 mm, Type 560 mm, Type 630 mm, Type 800 mm, Type 1000 mm. Fan size above 1000mm can be supplied upon requested.

Fan performance capacity up to from 800,000 cubic Meter per hour and operating at a static pressure of up to 1000 Pascal (Pa) can be obtained.

Casing

The casing can be manufactured of plastic, stainless steel or steel. All standard casings come with steel type, hot-dipped galvanised after fabrication. Motor mounting and all fixing need in the assembly of the fan is stainless steel, zinc plated and passivated.

Impellers

All WOLTER impellers have non-overloading characteristics and have an aero-dynamically design with aerofoil type blade. All blades has an adjustable pitch angle from 8° to 32°in 2° steps, which allow a wide range of air output to be selected.

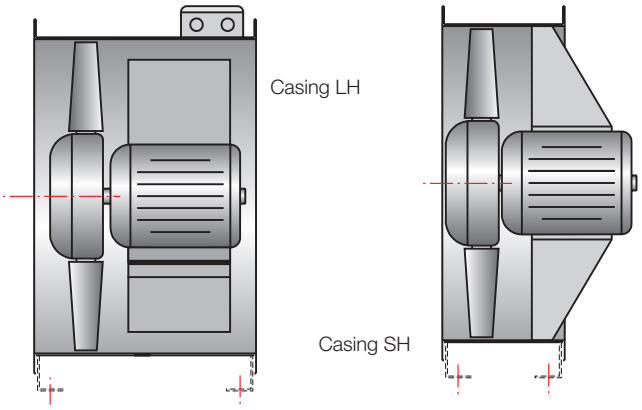
Woltrer ranges of impellers are precision injection moulded, design with cast-in metal hub to high quality standard. Depending on the type of application, impeller can be made of ABS, Glass/Polypropylene, Glass/Nylon, Polycarbonate etc…

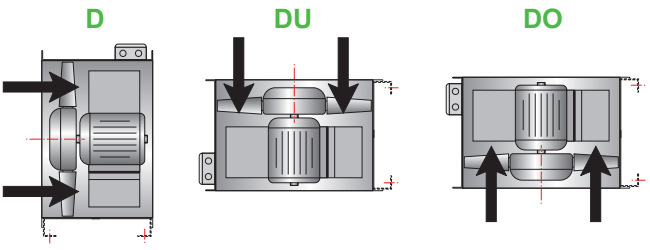
The hubs are designed for use with taper-bushes and are made of high-grade cast insert to guarantee high reliability at the high peripheral speeds.

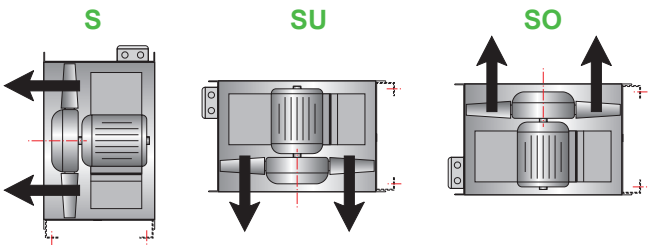
All standard WOLTER Bifurcated fans impellers are supplied with aluminium alloy blade unless otherwise specific.

Motor

Wolter Bifurcated fan motor is specially design to operate within the motor compartment with the air stream in the duct system at an elevated temperature. Motor is B3 foot mounting type, totally enclosed and fan cooled, complying







with VDE 0530 and IEC recommendation No. 72.

The standard motors are suitable for 220/380, 3 phase 50Hz supply.

Fans can be supplied with single phase 50Hz depending upon motor size and temperature required. All motor selected are suitable for direct on line starting.

Motor are fitted with two ball bearing of the same size liberally dimensioned to give a high degree of mechanical strength and greased for life.

Motor for use in temperatures up to 200 °C are fitted with C3 fit bearings. Class H insulation winding is used. All motors have an integral terminal box. The correct cable selection is important, particularly when wiring the fans at the higher temperatures

Minimum IP54 enclosure as standard suitably for operation in ambient temperature of minus 10°C to plus 40°C. However, IP55 will be supplied for fully weatherproof and against harmful deposits of dust application

Corrosive atmospheres

For application where heavy corrosive atmospheres are to be handled, WOLTER Bifurcated fans can be supplied with any of the following systems, depending on the requirement.

SYSTEM 1

Hot-dipped galvanised steel casing with die cast aluminium alloy impellers. Fan range from 355 mm to 1000 mm diameters. Come as standard range. Applicable for use at temperature up to 150°C. With special feature - up to 200°C.

SYSTEM 2

Stainless steel casing with injection moulded polypropylene impeller. Fan range from 355 mm to 1000 mm diameters. Strong resistant to heavy corrosive fumes and gas with temperature up to 120°C.

SYSTEM 3

GRP (Max. 110°C), Polypropylene (Max. 80°C) or PVC (Max. 60°C) casing with injection moulded Polypropylene impeller. Fan range from 355 mm to 800 mm diameters. Strong resistant to heavy corrosive fumes.

For performance details of Bifurcated fans may however be obtained by taking the performance of WOLTER Axial flow fan and adding 6° to the pitch angle of the blades.

Forms of running

Wolter AXV-BIF axial flow fans are available for all forms of running. The right chart shows all standard forms of running. Please indicate the required configuration when ordering. Without specific instructions, fans will be delivered in configuration S. Arrows outside the fan casing indicates the correct direction of rotation and airflow.

Fan performance curves

The performance curves for these fan types have been established in mounting position D (according to AMCA 210, duct connected to inlet and outlet sides) and represent the total pressure increase Δp_t as a function of the volume flow. The dynamic pressure p_{d2} is related to the flange cross-sectional area at the of the fan.

Sound levels

The ascertaining of the sound level follows the Reverberant Room Method in accordance to AMCA 300. The A-weighted sound power levels is shown on the performance curves.

Hazardous Location Fans

WOLTER hazardous bifurcated fan coupled with motor that are fully certified by SAA & Dept of Mines to suit non-sparking, Flameproof, Dust Ignition proof, and increased safety applications

Accessories

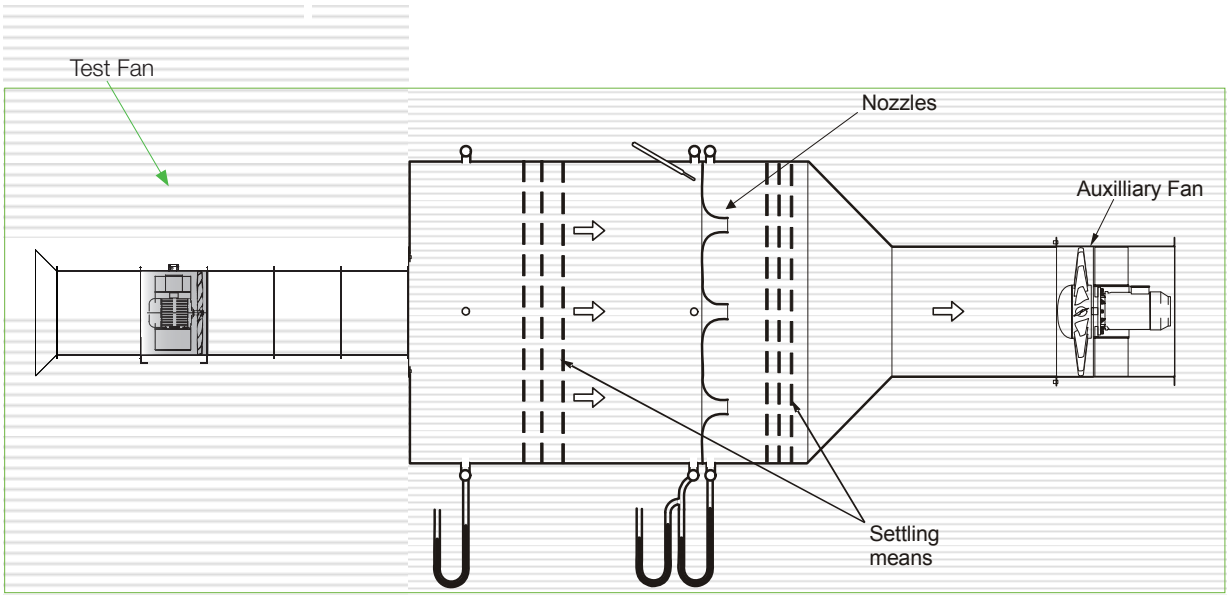
Anti-Vibration Spring Mountings, Dampers, Inlet Cones, Connecting Flange, Cylindrical Attenuators Flexible Connectors, Guide Vanes, Mounting Feet Mounting Plates, Wire Guards etc,

Catalogue, dimensions and detail information on specification and performance are available upon requested.

Ordering designations

When ordering, please provide the following information:

- fan type code (see above), casing version and form of running
- duty required at standard air temperature (air volume in m^3/h at static pressure in Pa)
- motor power rating in kW
- electrical supply
- required ancillary equipment



AMCA 210 Figure 12
ISO 5801 Figure 73b

Fan selection and installation

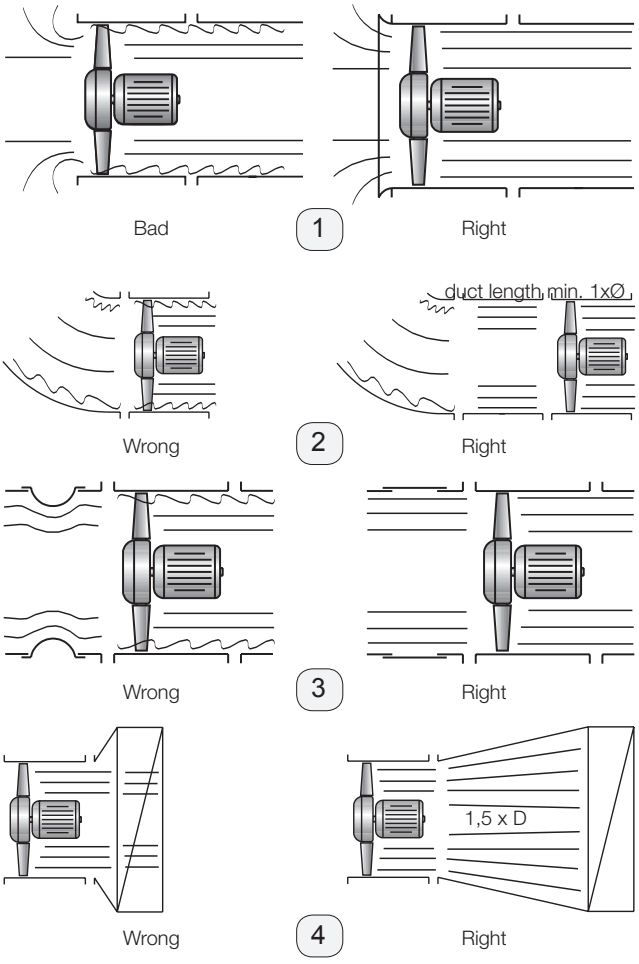
Fan selection

Please select fans according to the nearest performance curve above the required duty point. The middle range of each fan curve is the area of highest efficiency. Do not select fans at the upper end of the fan curve, as this might cause the fan to work in stall. In order to avoid motor overloading, please select motors according to the peak power of the respective performance curve. Please refer to the selection example on the following page.

Fan installation

When installing the fan, please consider the following instructions:

- Fans with free inlet and outlet should be installed with an unobstructed distance of at least 1,5 x fan diameter on suction and pressure sides. Fans should have a bellmouth on the inlet side in order to assure optimal incoming flow. A diffusor mounted on the pressure side will increase efficiency.
- When installing fans in a ducted system, adequate distance to other structural parts such as bends, filters and silencers should be provided for. A sharp bond radius of the duct near the suction or pressure side of the fan is to be avoided. Flexible connections are to be installed in a way that does not obstruct the outlet cross section of the fan (see following page).



Selection example

Required duty point

- Volume flow : 5.000 m3/h
- Static pressure: 110 Pa

  In order to calculate the total pressure, please add velocity pressure to static pressure (30 Pa dynamic pressure + 110 Pa static pressure = 140 Pa total pressure)
- Fan speed: 1.440 1/min (4-pole)

Using the fan curve

Having chosen a fan with adequate performance range for the required duty point, plot volume flow and pressure.

At the point of intersection, the following data can be read:

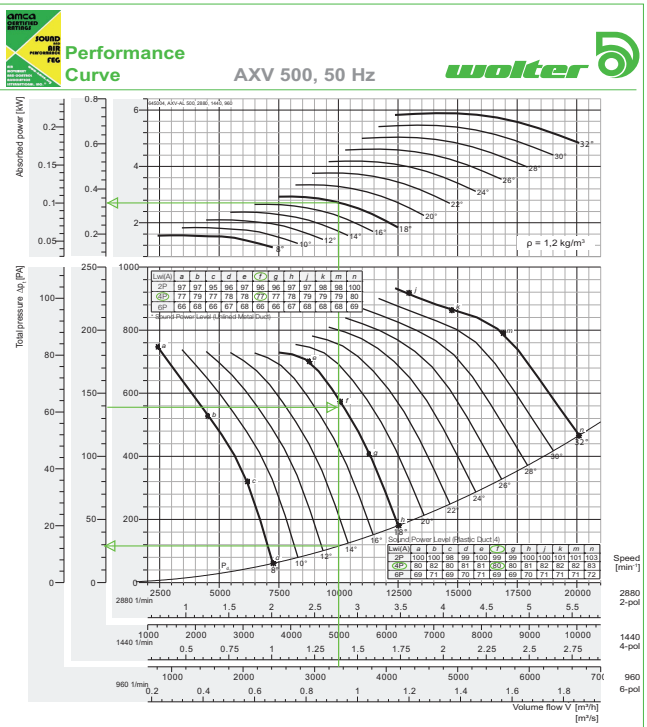
- Motor speed or number of poles 1.440 1/min - 4-pole
- Pitch angle: 18 degrees
- FEG Rating: FEG71 (see page 5)
- Inlet sound power level: 80 dB(A) if use of plastic duct
  77 dB(A) if use of unlined metal duct

Calculation of motor power:

There are two possibilities to calculate the motor power:

1) Calculation of absorbed power by using the fan curve in duty point: 0,338 kW
   Motor power: 0,37 kW
2) Calculation according to peak absorbed power, see table below the fan curve: 0,366 kW
   Motor power: 0,37 kW

   The given peak absorbed power is the maximum shaft absorbed power over the whole pitch angle curve in.



Peak absorbed power [kW]

n	Pitch angle [°]															
[min⁻¹]	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
960	0,058	0,068	0,078	0,088	0,098	0,108	0,124	0,141	0,155	0,171	0,187	0,202	0,218	-	-	-	-
motor	0,37																
1440	0,194	0,228	0,262	0,297	0,331	0,366	0,419	0,471	0,524	0,577	0,630	0,683	0,736	-	-	-	-
motor	0,37						0,55			0,75							
2880	1,55	1,83	2,10	2,37	2,65	2,93	3,35	3,77	4,19	4,61	5,04	5,46	5,89	-	-	-	-
motor	2,2			3			4		5,5				7,5				

Fan test laboratory AMCA 210/99 Fig.12, Test Chamber, Performance certified is for installation type D - Ducted inlet, Ducted outlet. Performance ratings do not include the effects of appurtenances (accessories-belt cover, pulley & belt).
Dimensions + Accessories Page 49-52; Sound power frequency spectrum Page 54-57.

The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for inlet LwiA sound power levels for installation Type D: ducted inlet, ducted outlet. Ratings include the effects of duct end correction.
** Sound power level with unlined metal duct were obtained from the test in the reverberant room. Data are not licensed by AMCA.*

Acoustic data

General information

Noise produced by axial flow fans is basicly in a high frequence level. The sound power depends on careful selection of the fan regarding duty, efficiency, characteristics and above all quality of installation. There is a strong correlation between sound power and aerodynamic loss of the fan. Generally speaking, sound power of fans is a function of air volume and total pressure.

This will be confirmed by the following rough calculation formula:

$$L_{WG}\,[dB] = L_{WS} + 10 \cdot lg\left(\dot{V}\,[m^3/s]\right) + 20 \cdot lg\left(\Delta p_{tot}\,[Pa]\right) \pm 5$$

where:

L_{WG} = total sound power;

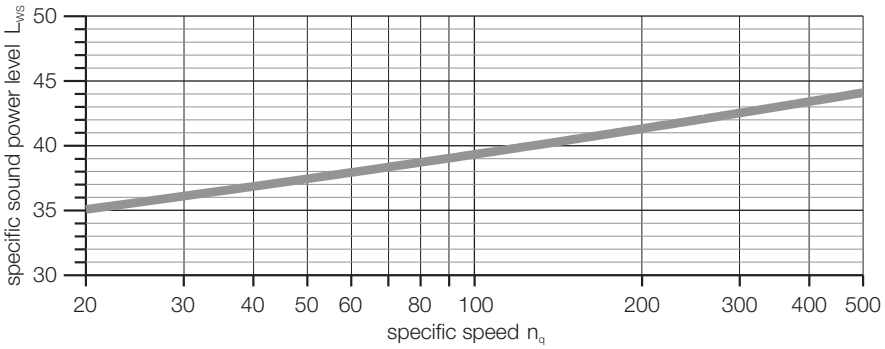
L_{WS} = specific sound power by speed (see figure as below)

Sound power levels

This term refers to the power which a source radiates as sound. Sound power levels are expressed in decibels with a reference level of 1 picoWatt. The sound power level of a source remains the same regardless of its environment and the distance to the listener.

If the sound power frequency spectrum is needed, for as follows: example, the design of sound attenuators, the A- rated sound power levels at particular octave band frequency LWA can be calculated by subtracting the relative sound Lwrel.

$$L_{WA} = L_{wi} + L_{wrel}$$



$$nq = n[min\text{-}1] \cdot \frac{\sqrt{\dot{V}\,[m^3/s]}}{\left(\frac{\Delta p_{tot}\,[Pa]}{\rho_m\,[kg/m^3] \cdot 9{,}81}\right)^{3/4}}$$

Sound pressure level

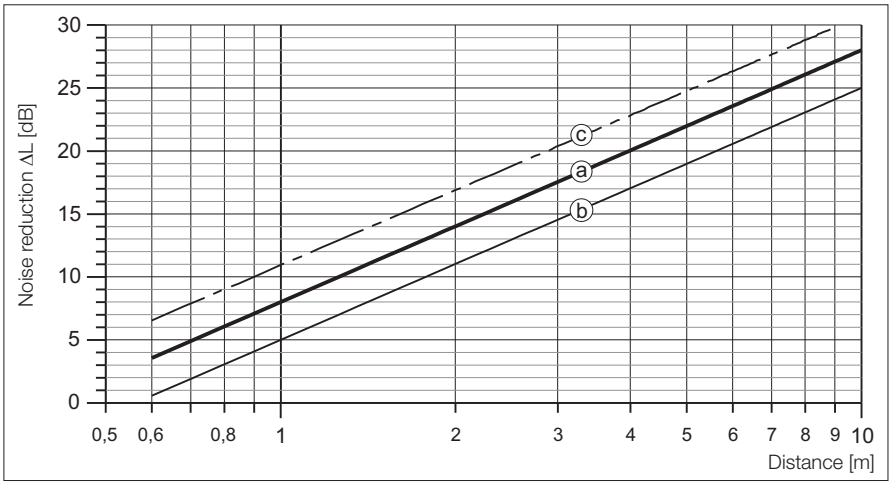
These are pressure fluctuations generated by a source expressed in decibels with a reference level of 20 µPa. The sound pressure level varies with the distance of a sound source to the listener and its environment.

Sound level reduction half sphere

a: without reflexion

b: with reflexion

c: full sphere without reflexion



Frequencies

Sound is split into different frequencies. Frequencies of human hearing range from about 20 cycles per second (Hz) to 20.000 cycles per second (Hz). For practical purposes, WOLTER publishes noise data in eight octave bands with the centre frequencies of (63,) 125, 250, 500, 1000, 2000, 4000 and 8000 Hz.

Each fan has its own specific correction factor which is to be deducted from sound power according to the octave band and is shown on the buttom line of each perfomance curve

A-weighted sound pressure level in dB (A)

The human ear is more sensitive to sound in some frequencies than in others. The A-weighting is an attempt to reflect this natural perception of sound. The A-weighting is a set of figures which are applied to the sound pressure levels. The levels in each of the octave bands are added logarithmically to give a single figure. The A-weighting over the octave band is as follows:

Table 1)

Frequency [Hz]	63	125	250	500	1000	2000	4000	8000
A-weighting [dB]	-26,2	-16,1	-8,6	-3,2	0	+1,2	+1,0	-1,1

Table 2)
Addition of sound levels

Difference between two sound levels [dB]	Add to the higher level [dB]
0 - 1	3
2 - 3	2
4 - 9	1
≥10	0

$$L_{\Sigma} = 10 \cdot \lg\left(10^{0,1 \cdot L_1} + 10^{0,1 \cdot L_2} + \ldots + 10^{0,1 \cdot L_n}\right)$$

where:
L_1 = sound level of a source 1
L_{Σ} = resulting summation sound level

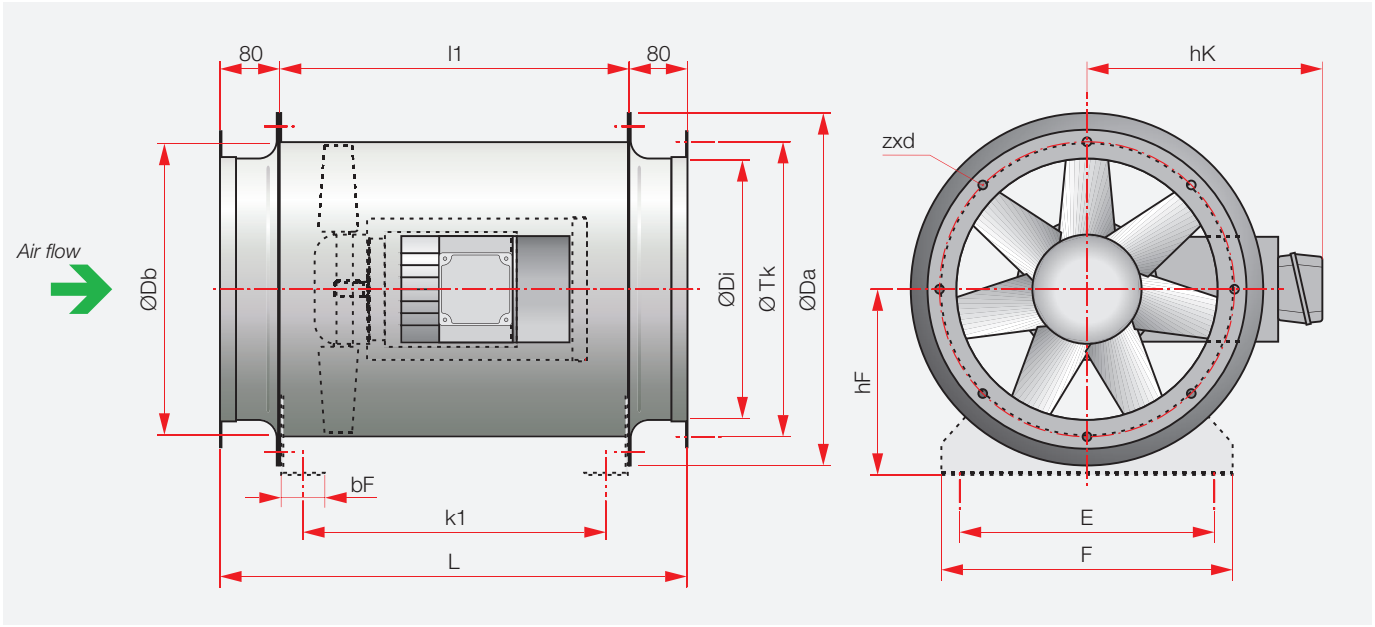
Summation of several congeneric sound levels

$$L_{\Sigma} = L_1 + 10 \cdot \lg(z)$$

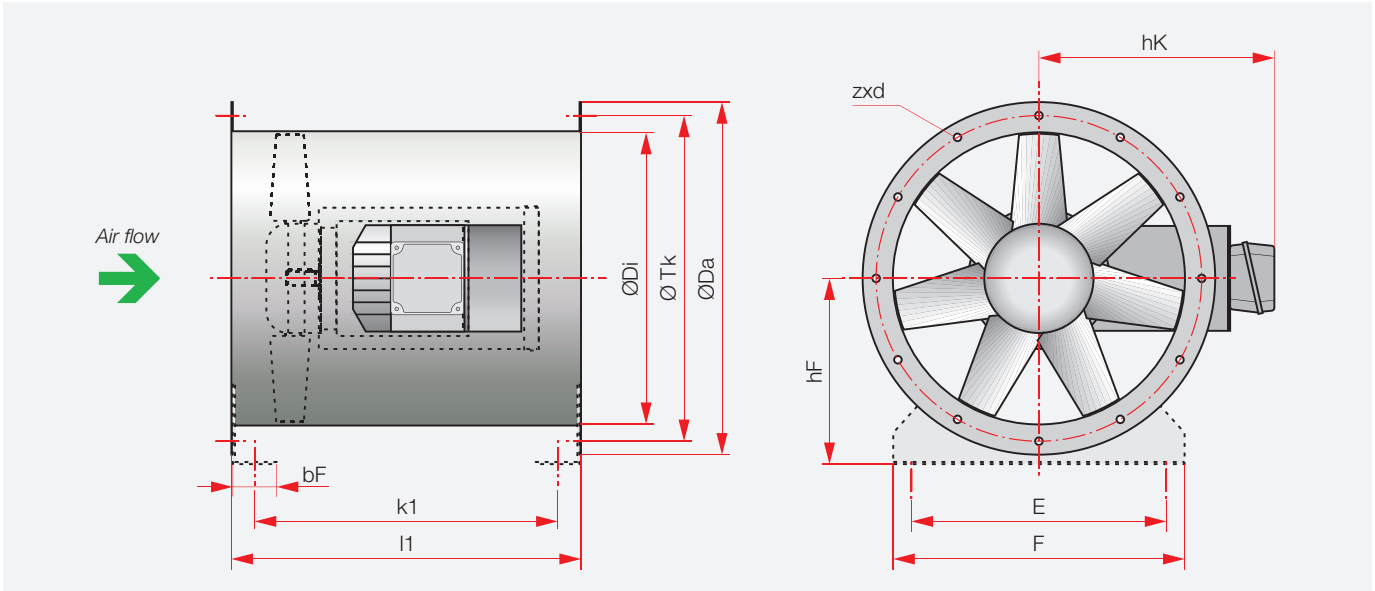
where:
z = number of sources
L_1 = sound level of a single source
L_{Σ} = resulting summation sound level

Special casing

Fan selection upon request only!



Größe size	ØDa [mm]	ØDb [mm]	ØDi [mm]	ØTk [mm]	E [mm]	F [mm]	zxd	hF [mm]	bF [mm]	k1 [mm]	l1 [mm]	L [mm]	hK [mm]	Motor max.	Art.Nr.:
AXV-BIF 355	484	400	355	405	350	400	8xØ12	250	60	415	480	640	324	90(2.2 kW)	303718
AXV-BIF 400L	534	450	400	448	400	450	12xØ12	280	60	415	480	640	331	90(2.2 kW)	303715
AXV-BIF 500	664	560	500	551	500	560	12xØ12	345	70	624	700	860	410	132(5.5 kW)	303721



Größe	ØDa [mm]	ØDi [mm]	ØTk [mm]	E [mm]	F [mm]	zxd	hF [mm]	bF [mm]	k1 [mm]	l1 [mm]	hK [mm]	Motor max.	Art.Nr.:
AXV-BIF 400S	484	400	448	350	400	12x12	250	60	415	480	324	90(2.2 kW)	303719
AXV-BIF 450	534	450	497	400	450	12x12	280	60	415	480	331	90(2.2 kW)	303720
AXV-BIF 560	664	560	629	500	560	16x14	345	70	624	700	410	132(7.5 kW)	303721
AXV-BIF 630	734	630	698	570	630	16x14	400	70	624	700	435	100(2.2 kW)	303722
AXV-BIF 710	814	711	775	650	710	16x14	450	70	624	700	476		303723
AXV-BIF 800	904	800	861	730	800	12x14	500	80	614	700	504	112(4.0 kW)	303716
AXV-BIF 900	1004	894	958	830	900	12x14	580	80	612	700	572	132(7.5 kW)	303717
AXV-BIF1000	1105	1000	1067	930	990	12x14	630	80	692	780		160(15.0kW)	303724

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