

INSTALLATION AND MAINTENANCE INSTRUCTION FOR CENTRIFUGAL FANS



EC Declaration of conformity

Manufacturer:

Company name J.L. BRUVIK A/S
Address Langarinden 3
5132 Nyborg
Norway
Phone/ Fax +47 55 53 51 50 / +47 55 19 31 43

Hereby declare that

Machine :

Product CENTRIFUGAL FANS AND AXIALFANS
ARR. 4 DIRECT DRIVEN
Model MT, SQ A/B, IN LINE DES 16 / BRV, BRS

Is in conformity with:

-Directive 94/9/CE (ATEX) complying with the following standard: prEN 13463-5
Zone I, gassgroup IIB, Temperature class T3

-Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery .

-COUNCIL DIRECTIVE of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits was manufactured in conformity with the following national standards that implements a harmonised standard:

EN 292-1
Basic terminology, methodology
EN-60269-1

Position: Production manager

Name: K. Falkhytten

Company: J. L. BRUVIK A/S

Date: 10.11.03 Sign.: _____

A handwritten signature in black ink, appearing to read 'K. Falkhytten', is written over a horizontal line.

CE-MARKING

Fans manufactured by J.L.Bruvik A/S are delivered with CE-marking as a standard, with declaration of conformity and warning signs. To fulfil the CE-marking claim, the fan must be completely installed with duct connection or protecting guards on inlet and outlet. Also the declared instructions for installation and maintenance, must be performed.

Installation

Check on the fan for any damages caused by transport. Report immediate.
Do not use shaft or bearings for lifting. Use assigned lifting points if mounted.

Installing must be done by qualified personnel.

Good results are obtained only with correct foundation.

The foundation must be level and rigid. Concrete is preferred for heavy fans and the mass should be about four times the fan's weight.

Use shim to avoid disalignment between fan and base, when tighten up the anchor bolts.

If the fan is mounted on a damping foundation made of concrete, align with mortar.

To obtain highest capacity, duct mounting on inlet and outlet is best performed as shown on the two following pages. Respectively centrifugal and axial fans.

Installation must be performed so that any contact with moving parts is impossible.

Safety devices such as engine protection kit, belt guards, shaft covers, and guards must not be dismantled or removed.

The fan shall not be mounted outdoor, without an agreement with the manufacturer.

Electrical connections must be done by an authorized electrician.

The fan is not to be used in Ex-area or connected to smoke gas duct, without adjustments done by manufacturer such as:

- Approved Ex-motor.

- Anti-sparking protection on moving parts.

- Proper protection on for instance the shaft, bearings, coupling and belt drive, considering the temperature.

Fan motors without thermostiches are connected to motor protection.

Fan motors with thermistors are connected to frequency regulators or other suitable control system.

Maintenance

Warning! Service and maintenance work must not be executed until the fan has been turned off (the fan and it`s connection has been isolated from the wiring) and all rotating parts are stopped.

The fan must be installed so that operating and maintenance can be done safely and correct.

Show precaution when opening the fan`s inspection and service covers.

The fan may have sharp edges and corners that may cause injury.

Always use requisite protective equipment, when working on or near to fans.

Preservation

If the fan is not to be installed promptly, special precautions as; rotating of shaft, rust preventative compound, proper covering and also storage in a dry and clean environment, must be performed.

Contact supplier for further information and procedure. Documentation of executed check routines, are required for the fan warranty to be valid.

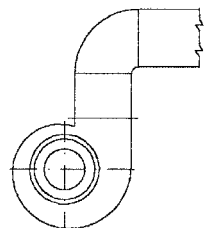
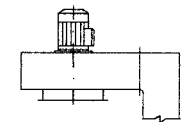
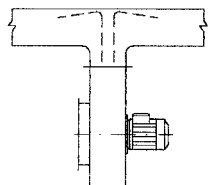
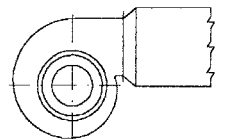
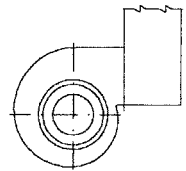
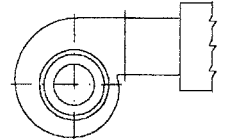
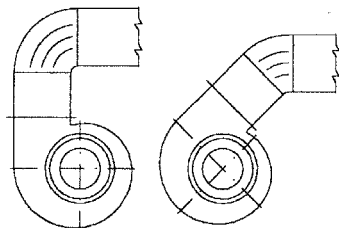
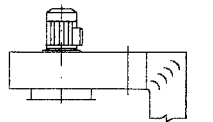
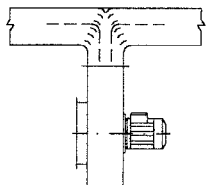
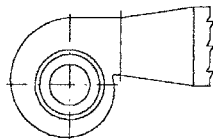
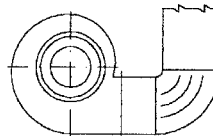
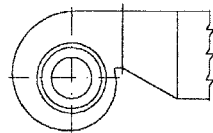
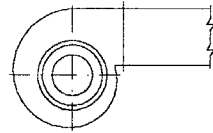
Duct mounting – centrifugal fans

- Compensators on inlet and outlet must be fitted to absorb motion caused by temperature variations and vibration loads.
- The compensators are fastened using tension bands or flanges.
- Anchorage of the duct must be as near as possible to the fan.

Duct connections, outlet

Right

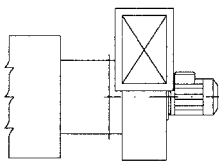
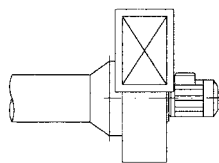
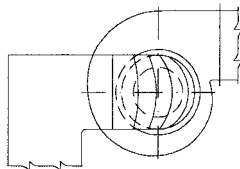
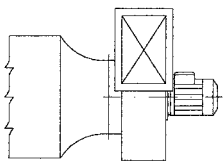
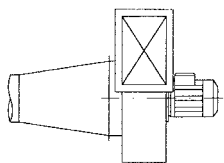
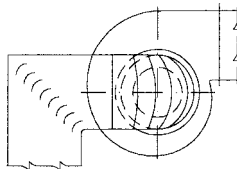
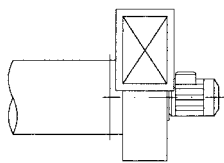
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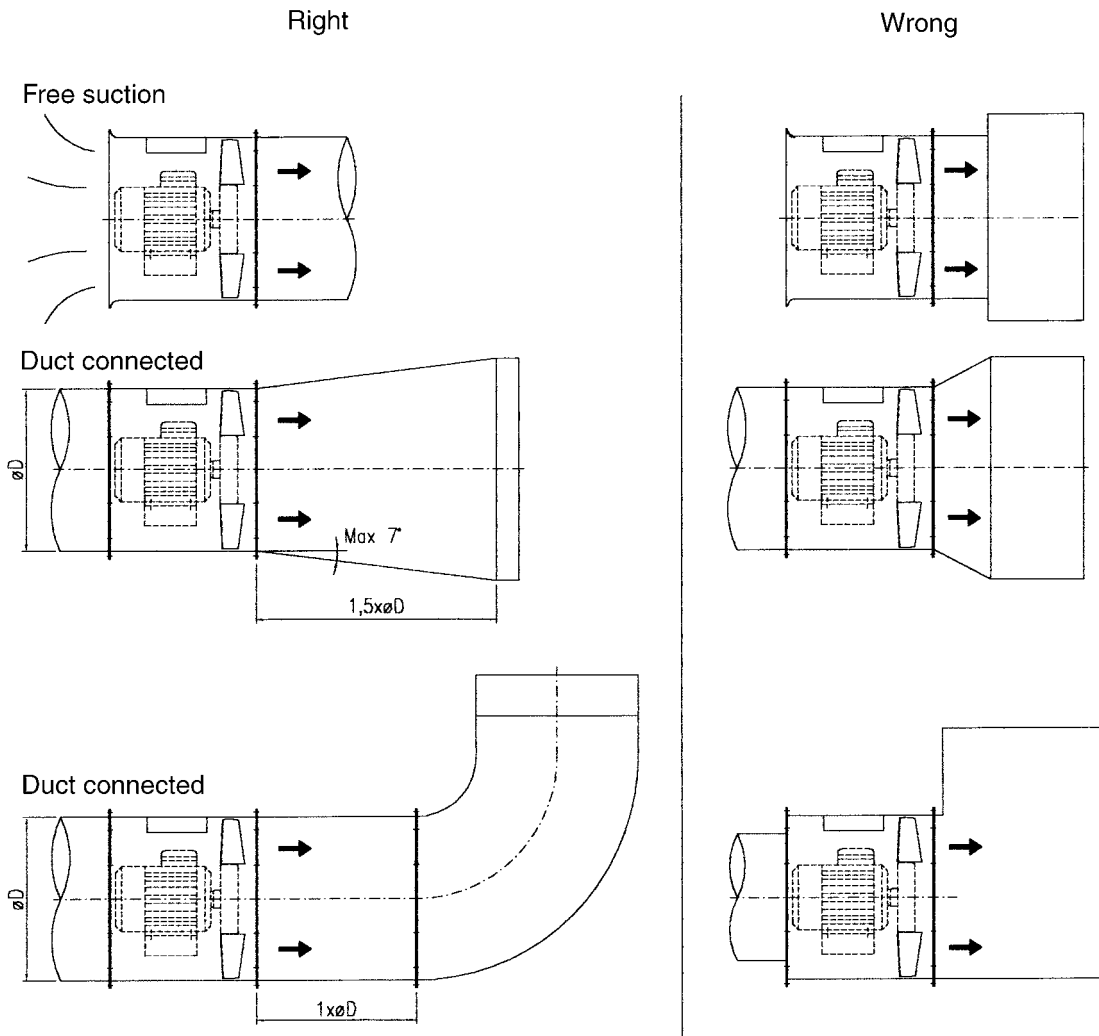
Duct connections, inlet

Right

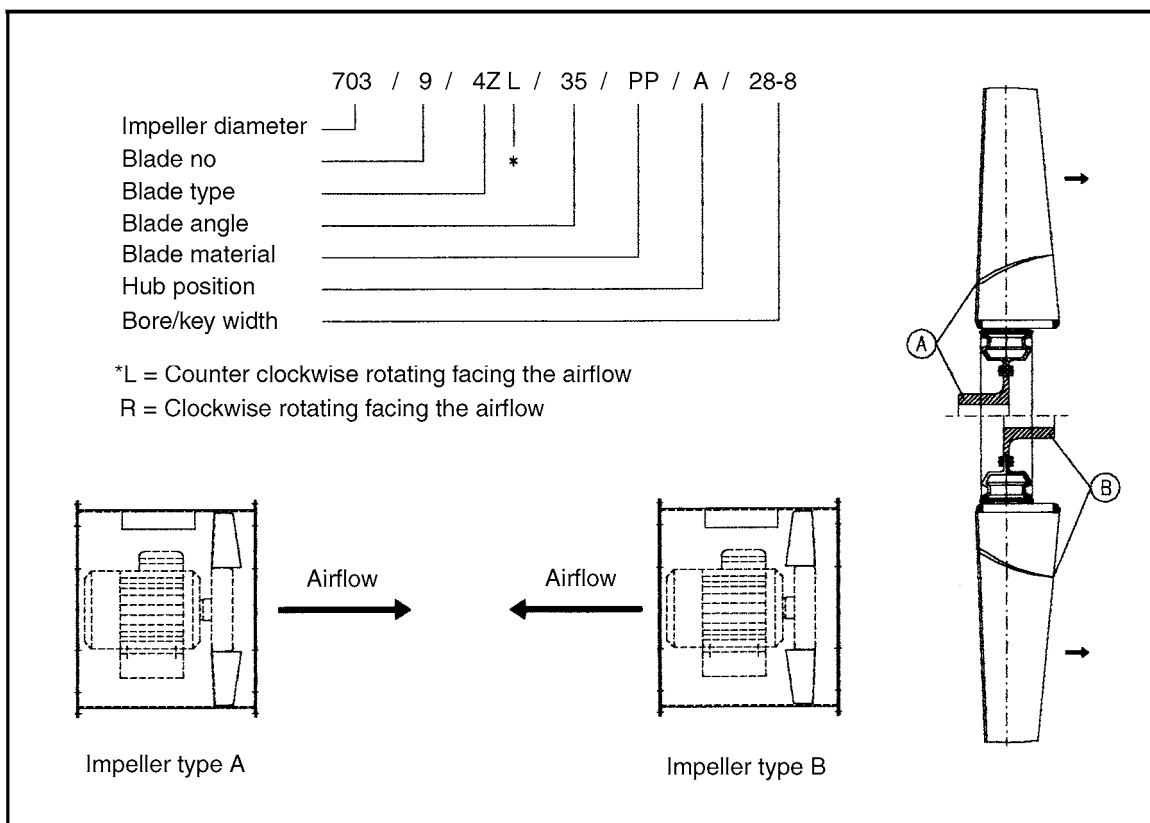
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Duct mounting – axial fans



Explanation of the impellerspecification

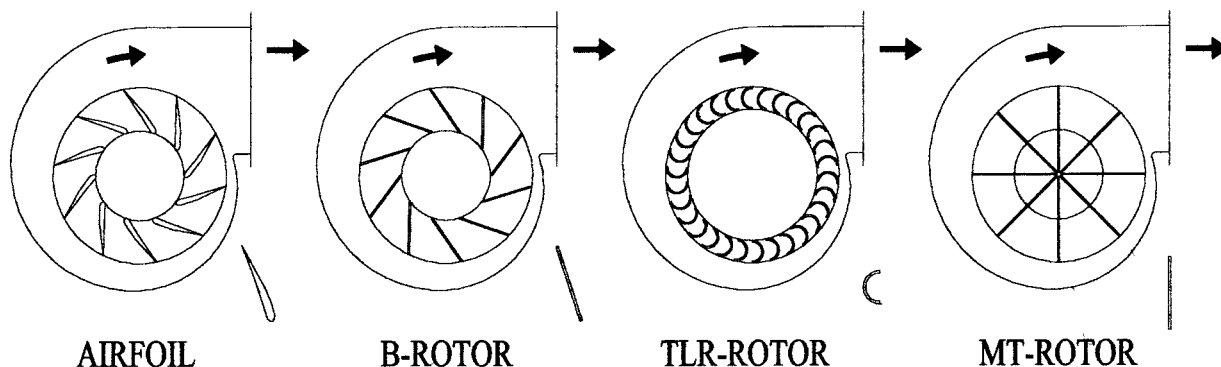


Start-up

Check *before* starting - That anchor bolts, motor bolts etc. are tightened up.
- Revolve fan wheel by hand to see if it runs easily.

Check *at* starting - If the direction of rotation is in accordance with directional marks. See figures below.

- After one or two weeks of running, check on bolts, set screws etc.
- Accordingly check the fan frequently and pay special attention to any imbalance in fan wheel (vibrations).



Bearings

Fans supplied by J.L.Bruvik AS are fitted with spherical rolling and ball bearings, that requires only a minimum of inspection and maintenance.

As a standard, one of the bearings below are used.

Either UKP bearing housing from NSK
or SNL bearing housing from SKF

Mounted bearings are fitted with grease by fan supplier. Relubrication must be done regularly.

If the fan is to be stored for more than one month, shaft must be rotated frequently not to damage the bearings.

Pages below shows lubrication routines for respectively NSK and SKF bearings.

Note! Time lag for lubrication is only meant as a guidance. Local conditions, such as moisture, dust and high temperature, necessitates more frequently lubrication.

Lubrication routines for NSK - UKP bearing housings.

LUBRICATION:

The NSK-UKP flanged bearings are prelubricated with high quality grease. As for other NSK bearings with rubber and steel sealing, relubrication is not necessary running at normal conditions.

However, in situations with high temperatures and moistured surroundings, the grease may loose its lubricating quality. With circumstances like this, relubrication is recommended to extend the fan's lifetime.

METHOD OF LUBRICATION:

To get the grease equally allocated in bearings, it is recommended to turn the shaft manually when lubricating.

GREASE QUANTITY WHEN RELUBRICATING:

Packed grease lubricates the inside of the bearing and the sliding part of the seal lip, and prevent dust and water from entering. However, if packed excessively, grease agitation resistance might cause the bearing temperature to rise. Thus, the grease might soften and lead to leakage.

The quantity of packed grease for ball bearing should be 30% to 35% of the bearing's free internal space. Generally, this amount is packed in the bearing. The proper replenishment quantity depends on the operating conditions. Though it is difficult to determine precisely, the target of the replenishment quantity should be 80% of the initially-packed quantity so that the packed grease is not excessive. The standard quantity of replenishment grease for each ball bearing is shown in **table 1**.

REPLENISHMENT INTERVALS:

The life of a bearing unit mostly depends on the life of the grease or seals. Therefore, the bearing unit life can be lengthened by replenishment with clean grease to maintain good lubricating conditions. The connection between recommended replenishment intervals and operating temperature, when running in good environment 8 – 10 hours per day, is listed in **table 2**.

If the conditions are severe, such as mud, splash or high temperature exceeding 150°C, it is necessary to shorten the interval between replenishments.

KIND OF REPLENISHMENT GREASES:

As a standard, a lithium based grease having a consistence NLGI 2-3 is used.

Generally, if different greases are mixed, both might adversely affect each other resulting in poor performance.

Always avoid mixing different soaps or thickeners.

Even if the soaps are the same, the performance of the grease might be reduced due to the difference in additives and base oils.

Table 1 Standard grease replenishment quantity.

Bearing no.	Quantity (g)
UKP 205	1,6
UKP 206	2,6
UKP 207	3,4
UKP 208	4,4
UKP 209	4,8
UKP 210	5,8
UKP 211	6,8
UKP 212	10
UKP 213	12
UKP 214	13,5
UKP 215	14,5
UKP 216	20
UKP 217	24
UKP 218	31

Table 2 Recommended replenishment intervals.

Operating temp.(°C)	Interval
+70 or less	-
+70 - +100	6 months
+100 - +120	3 months
+120 - +150	½ month

Lubrication routines for SKF - SNL bearing housings.

LUBRICATION:

Spherical roller and ball bearings shall be regularly relubricated. Replenishment intervals depends on the operating condition of the bearings.

METHOD OF LUBRICATION:

To get the grease equally allocated in bearings, it is recommended to turn the shaft manually when lubricating.

REPLENISHMENT INTERVALS:

Table 1 gives the greasing intervals at normal conditions:

- Dry indoor climate
- Approximately no mud or dust
- Bearing/ grease temperature less than +70°C
- Normal bearing loads.

Lubrication grease age fast at high temperature. If temperature exceeds 70°C, the replenishment intervals should be halved for each 15°C above the given 70°C.

GREASE REPLENISHMENT QUANTITY:

Required grease quantity for lubrication and *re*lubrication of SNL spherical roller and ball bearings, is given in **Table 2**.

KIND OF REPLENISHMENT GREASES:

As a standard, a polyurea based grease having a consistence NLGI 2 is used.

Generally, if different greases are mixed, both might adversely affect each other resulting in poor performance.

Always avoid mixing different soaps or thickeners.

Even if the soaps are the same, the performance of the grease might be reduced due to the difference in additives and base oils.

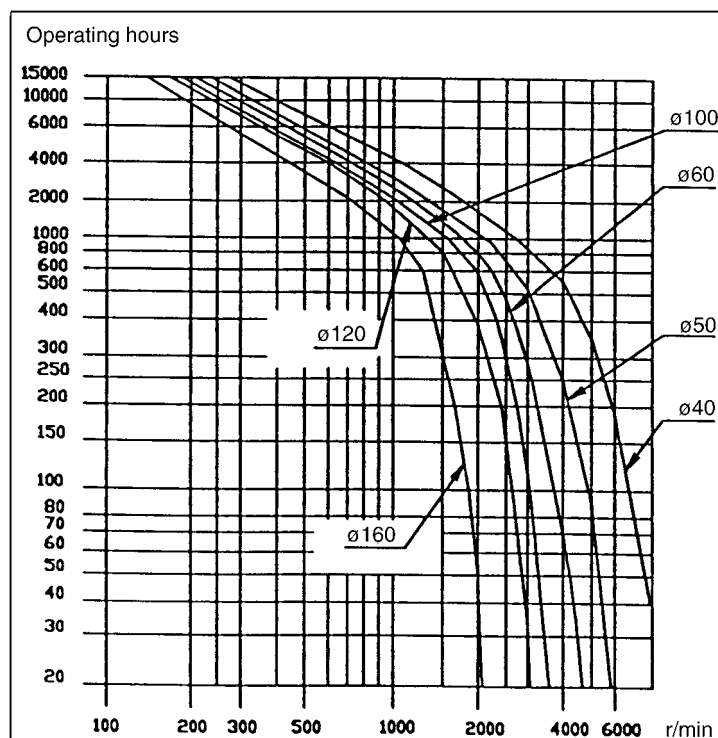


Table 1

Recommended grease quantities		
Bearing size	1. time lubrication (g)	Re-lubrication (g)
SNL 509	65	10
SNL 510	75	10
SNL 511	100	15
SNL 512	150	15
SNL 513	180	20
SNL 515	230	20
SNL 516	330	25
SNL 517	430	25
SNL 518	480	40
SNL 529	630	50
SNL 520	850	55
SNL 522	1000	70
SNL 524	1100	80
SNL 526	1400	95
SNL 528	1700	110

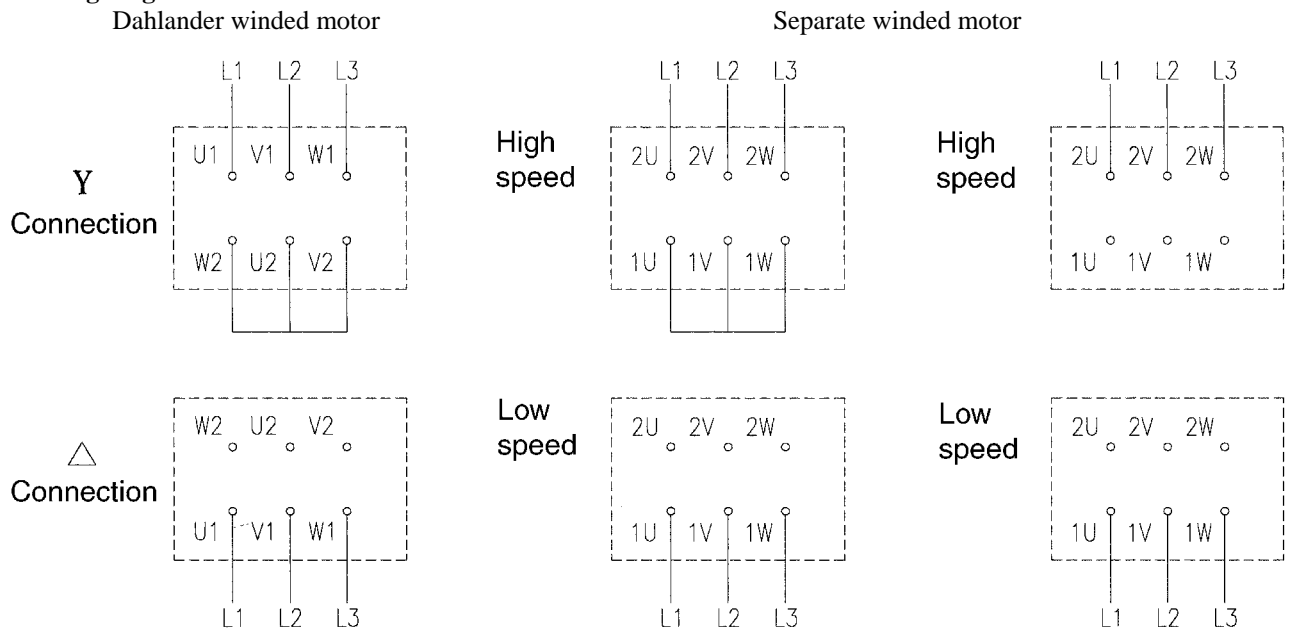
Table 2

Motors

Motors are equipped with disposable lubricated bearings, and designed for a lifetime of 10 000 (2p-motor) and 20 000 (4p-motor) hours at normal operating.

Exceeding this period, motor should be dismantled and the bearings changed. See motor supplier's own instruction for further information.

Wiring diagram:



Coupling arrangement

Arrangement: Direct driven fans using a flexible coupling, has got the designation "Arr. 8". As a standard, the coupling type "Omega" is used.

For inspection and maintenance, contact supplier to get separate instructions.

Spare parts

All fans manufactured by J.L.Brúvik A/S has got a name plate, that shows:

- Ordering number
- Fan type

The name plate data must be given to the supplier, when ordering spare parts.

V-Belt drive

Standard: As a standard, Gates' v-belts are used for transmissions.

Installing: Alignment of the v-belt drive must be controlled, using a straightedge. The belt tension should be correctly adjusted to obtain maximum life to belts and bearings. To get the proper belt tension, see the instructions below from Gates.

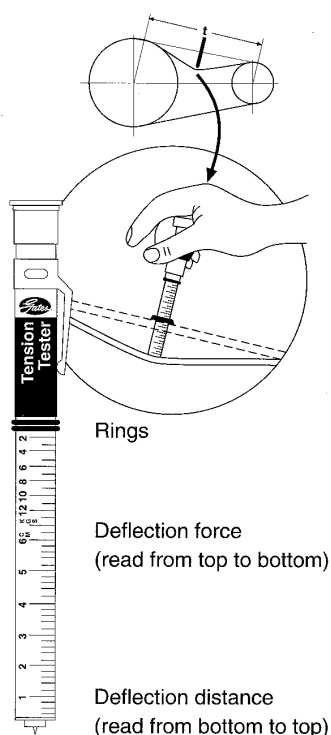
Fan bearings are designed to be running at "normal operating conditions". If the belts are tightened up too much, this may result in unnecessary bearing abrasion on fan and motor.

When using v-belt drives at power transmissions higher than 15kW, slipping at start is normal.

The belt drive should be checked and possibly retightened after 14 days (8 hours per day) of running.

Belt tension adjustment (Gates):

1. When belts are mounted, increase centre distance until they feel tightened.
2. Define the span length, t.
3. Deflection is to be 1mm per 100mm span length (1%).
4. Use the Gates' Tension Tester to get the right belt tension. The lower scale (mm) o-ring, should be set to the determined deflection distance.
5. The o-ring showing the deflection power (kg) is set to 0.
6. A straightedge is placed on the pulleys (when multi track drives, the behind standing belts may be used as straightedge).
7. The Tension Tester is located on the center of the span length t, perpendicular to the belt.
8. Press towards the belt, until the o-ring (showing the distance) hits the straightedge.
9. At the exact deflection, Tension Tester is removed and the used deflection power is read at the upper scale (kg) (1kg = 9,81N).
10. The needed deflection is compared to the values for the current belt type / minimum pulley dia. (table at right). Deflection power should be among min. and max. values. When installing new belts, it's recommended to multiply the values for deflection power by 1,3.
11. If the reading value is too high/low, adjust the center distance to obtain set value.
12. Start the belt drive and run for approx. 5 min. with load. Accordingly, when fan is stopped, belt tension should be checked and possibly adjusted.
13. Check the system again after 24 hours of running and later at regular intervals.



Belt type	Minimum pulley dia., mm	*Recommended deflection power, N	
		Min.	Max.
Super HC®/ Super HC® MN			
SPZ/3V	56 - 67	7	10
	71	8	11
	75 - 80	9	13
	85 - 95	10	15
	100 - 125	12	17
SPA	132 - 180	13	19
	80 - 95	12	16
	100 - 125	14	21
	132 - 200	19	28
SPB/5V	212 - 250	20	30
	112 - 150	23	36
	160 - 200	29	44
	212 - 280	36	50
SPC	300 - 400	38	58
	180 - 236	40	60
	250 - 355	51	75
XPZ	375 - 530	60	90
	Quad Power II		
	56	7	11
XPA	60 - 63	8	13
	67 - 71	9	14
	75 - 80	10	15
	85 - 95	11	16
	100 - 125	13	19
	132 - 180	16	24
XPB	80 - 125	18	27
	132 - 200	22	31
XPC	112 - 118	24	36
	125 - 140	27	41
	150 - 170	30	47
	180 - 200	36	53
	212 - 280	38	55
XPB	300 - 400	41	64
	XPC		

*Values are calculated for normal belt drives.

Critical cases should be specially determined.