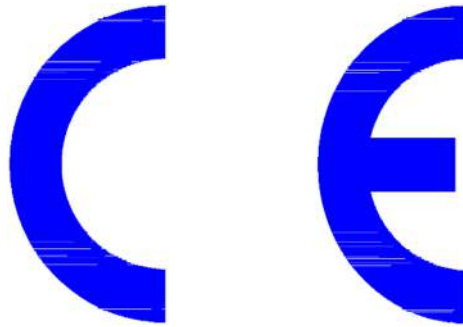










## **RADIAL VENTILATOR OPERATION AND MAINTENANCE MANUAL**



PLEASE DO NOT OPERATE THE FILTER WITHOUT READING  
THIS MANUAL.

GENERAL WARNINGS	
	The ventilator has been manufactured according to the level of the Technical safety rules. However, it can carry vital hazard for the operator and a third person or any form of hazards may form during the operation.
	This ventilator is a device having dynamic top level high current. This device can only be used by the authorized people.
	Do not make any operation related with the ventilator without reading this manual. In case of any question, please contact with the authorized personnel of Supplier.
	This product should be used in accordance with its intended use. Otherwise, the Supplier shall not be hold responsible due to the possible risks.
	All protection equipment, such as emergency stop button, axle protector, coupling protector, etc..., should have been assembled as an obligation.
	All technical information necessary for the maintenance and operation of this ventilator have been disclosed on the product type plate (See Annex I) and on the 3 <sup>rd</sup> page of this manual. Please do not digress over these values.

### GENERAL PRODUCT DESCRIPTION and PURPOSE OF USE

**This product provides the circulation of the air from one place to another place through creating pressure difference in the Industrial areas. This product cannot be used in domestic areas.**

**The Product is used for;**

- 1.Heating**
- 2.Cooling and**
- 3. Discharging the air from one point to another.**

**DEFINITION**

An instrument used for producing artificial currents of air, by the wafting or revolving motion of a broad surface. Some other names for fans are ventilator, exhauster (used to signify that gases are being removed from something), and blower (used to signify that gases are being supplied to something). The principle parts of any fan are the impeller and the housing. Various other parts may be necessary or useful in operation of the fan.

The impeller is the rotating element that transfers energy to the fluid. An impeller also called a wheel, a rotor or a squirrel cage. The blades (fins) are principal working surfaces of the impeller. The housing or casing is the stationary element that guides the air org as before and after impeller.

Two main fans are;

1. Radial (centrefugal ) fans
2. Axial fans

Radial fans: The flow through the impeller is radially outward with varying tangential components depending on design. Radial fans have scroll-shaped housings. Such fans with one inlet are called single-inlet fans, and those with two inlets are called double-inlet fans.

Axial fans: Axial flow fans are characterized by flow through the impeller which is generally paralel to the shaft axis, conventionally called axial direction. Axial flow fans have cylindrical housings.

**GENERAL WORKING PRINCIPLES**

Radial ventilator is used for to transfer energy to a flowing fluid. The flow through the impeller is radially outward with varying tangential componants depending on the design. This air flow is provided as rotating of fan's impeller by direct drive or v-belt drive or coupling drive from the electrical motor. The flow must enter the impeller axially, but there is generally an absence of axial components through the blading in most convential designs. Supplied air flow amount is adjusted by changing the pulleys or the motor speed. For appropriate air flow the suitable fan diameter, fin type, fin quantity and motor power are choosen.

Radial ventilators have scroll-shaped housings. Such ventilators with one inlet called single-inlet ventilators, and those with two inlets are called double-inlet ventilators

**Ventilator Specifications:**

<b>Factory No</b>	17823				
<b>Order No</b>					
<b>Ventilator Type</b>	AL-RS1N-B3-630				
<b>Customer Tag No.</b>	100-FA-002				
<b>Rotor Diameter</b>	900				
<b>Fan Speed (rpm)</b>	1.815 rpm				
<b>Drive Type</b>	STRAP-RIM				
<b>Position</b>	L-315				
<b>Coupling Type</b>	*				
<b>Fan Pulley / Fan Bushing</b>	SPB190X5 / 3020/Ø65				
<b>Motor Pulley / Motor Bushing</b>	SPB224X5 / 3020/Ø60				
<b>Belt Information</b>	*				
<b>Electric Motor</b>	45 kW/ 1500 min-1				
<b>Motor Protection</b>	IP 65				
	<b>Bearing Housing</b>	<b>Bearing</b>	<b>Locating Ring</b>	<b>Seal</b>	<b>Adapter Sleeve</b>
<b>Fan Side</b>	SNL515	22215EK	*	TSN 515 L	H315
<b>Motor Side</b>	SNL515	22215EK	2 FRB 12.5/130	TSN 515 L	H315
<b>Cooling Disc (mm)</b>	*				

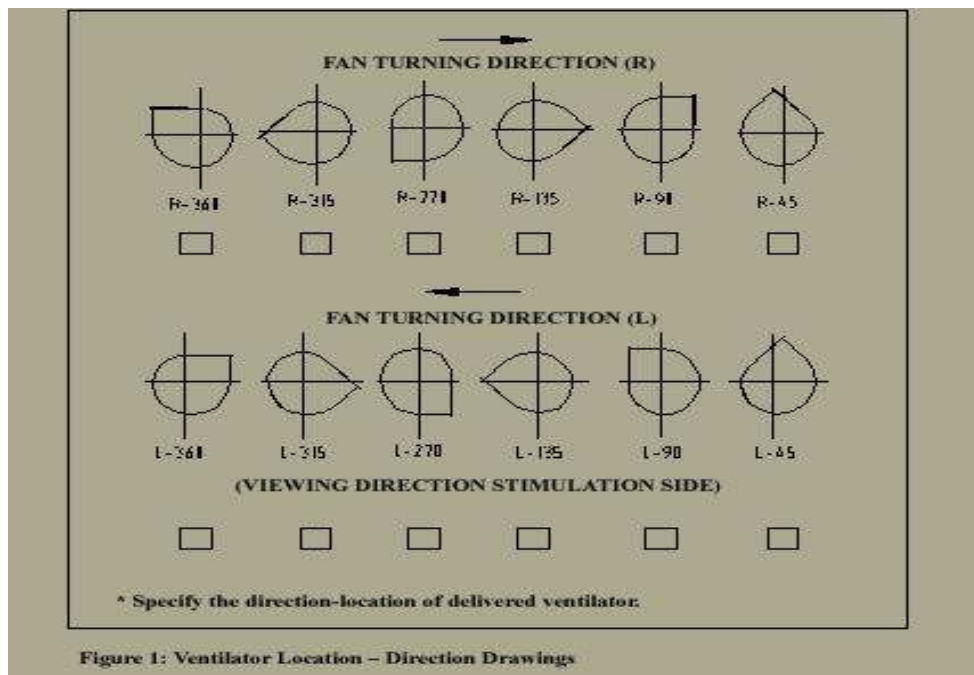



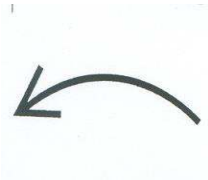



Figure 1: Ventilator Location – Direction Drawings

## 1. GENERAL INFORMATION

### 1.1. Warning Caution Marks and General Warnings

	<b>Defines the General Warnings.</b>
	<b>Do not work without earflap over 82 dB.</b>
	<b>Should not be operated without reading the Operation Manual.</b>
	<b>Shows that the fan is turning to the left side when looked at from the side of the motor.</b>
	<b>Shows that the fan is turning to the left side when looked at from the side of the motor.</b>

**Table 1: Definition of the Warning-Caution marks stated on the product and used in this manual.**

## 1.2. General Safety Data

Do not use other than the instructions of the Operation and Maintenance Manual and do not deviate from the given operation parameters.

The ventilator can only be used by the authorized people and the maintenance and repair of it can only be executed by these people.

Supplier. cannot be hold responsible from the accidents that may occur due to any change made on the machine without the consent of Manufacturer. No setting can be changed without consulting to Manufacturer.

The list of the accessories that may be added to the ventilator and the additional equipment has been given in Article 3.5. The stated accessories and additional equipment can be added under the control of Supplier. .

The ventilators can only be operated when the machine is fixed. (See Article 6: Locating Fan).

It is not acceptable to exceed the maximum number of cycles even for a short time. (Page 2: Technical values)

Please consider the safety and activation information of the motor manufacturer company before establishing the electrical connection of the motor. (See Annex 3. Motor catalogue)

If the motor belongs to the operator company, then the size of the motor and its operation warranty are not accepted by the manufacturer of the fan.

Operation balance changes performed by the customer on the rotor cannot be performed without the approval of Manufacturer..

Ensure that there is no liquid or foreign substance in the ventilator. Liquid transfer may damage the rotor! Ensure the correct flow of the condensation water from the body of the ventilator.

Crusting, stain and visible corrosion on the rotors are not appropriate! Please consult to manufacturer for taking the precautions.

Cleaning cover on the body of the ventilator can only be opened when the ventilator is in fixed position. Necessary precautions should be taken in order to avoid the operation of the ventilator during this time.

Electrical and mechanical protection setting during the assembly should be performed in accordance with DIN EN 60204-1, DIN EN 294 and DIN EN 349.

The maintenances should be executed periodically in accordance with the Operation and Maintenance Manual .

## 2. PRODUCT DESCRIPTION

### 2.1. Parts of Ventilator

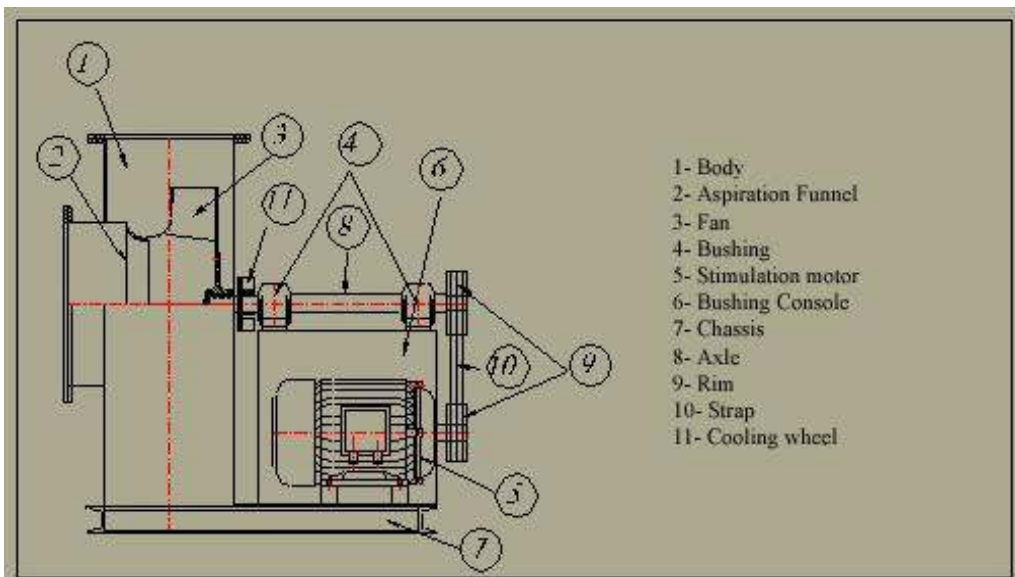


Figure 2.1 Strap rim stimulated single aspirated radial ventilator

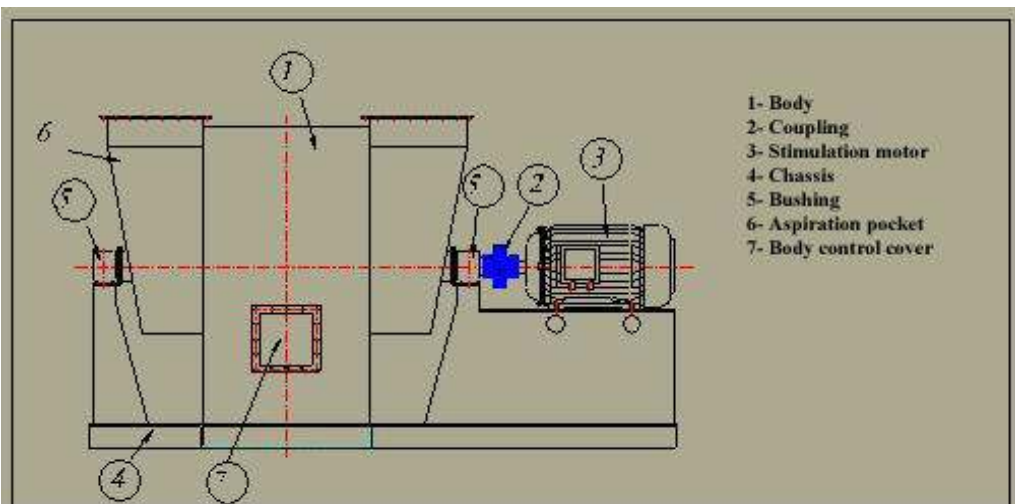


Figure 2.2 Coupling stimulated double aspirated aspiration pocketed radial ventilator

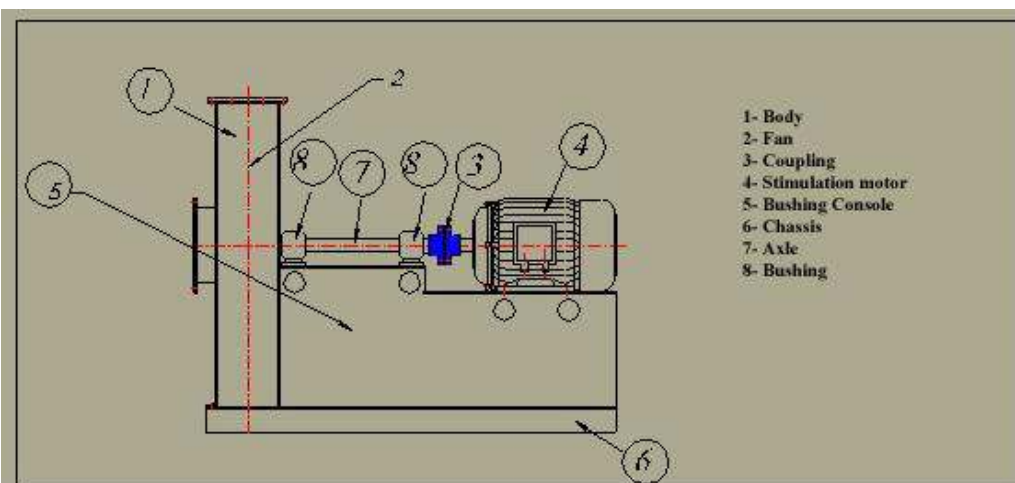


Figure 2.3 Coupling stimulated single aspirated radial ventilator

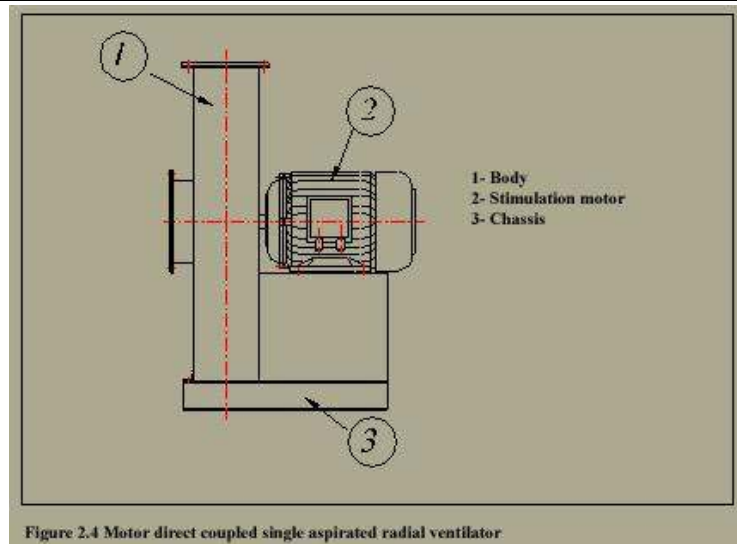


Figure 2.4 Motor direct coupled single aspirated radial ventilator

## 2.2. Motor

There are current carriers and turning parts inside the electrical motors. For this reason, the connection, activation and maintenance should be generally performed by an authorized person. The motors can work two minutes at most with an ampere that is 1.5 times of the values stated on the label of the ampere. The thermic of the motor protector power switch should be adjusted according to this. Generally during the operation, exceeding maximum 10% of the motor ampere label values can be acceptable.

### \*Electric Connections



The connection of the installation should be made without voltage!  
The installation should be entrenched for avoiding the re-malfunction.

For a continuous assurance, the electric connections should be guaranteed and the connections should be performed in accordance with the operation maintenance manual of the motor manufacturer.

## 2.3. Body

The body is a welding design, has aspiration and pressure flash. The welds on the external surface are continuous and the reinforcements are spaced welds.

There is a body cover sheet iron on the body for disassembling the parts inside.

The body control cover (if available) has been located over the circle frame of the ventilator. This can be opened when it is in fixed position. Necessary precaution should be taken during this time in order to avoid the operation of the ventilator.



Drainage valve (if available) is located in the deepest part of the body and closed with closing valve or with a blunt flange. The valve of the drainage should be opened if the accumulated condensation water should be discharged before and during the activation. If the condensation water came to the rotor, then should not be operated since can cause damage and unbalance.

#### 2.4. Rotor



The valid current number (stated on the Type Plate (Label) panel of the ventilator) should not be exceeded!

### 3- ACCESSORIES

#### 3.1- Damper

Used for regulating the air circulation.

#### 3.2- Compensators

Compensators divide the vibration between the installation and ventilators. Compensators are stated in the list of accessories in Article 4.5.

#### 3.3. Vibration Chock

Vibration chocks delivered together are used as vibration remover during the assembly of the ventilator on the basic ground. These are assembled over the ground, on the places marked according to the measurements with the bottom of the ventilator. (Wall Plug).

The vibration chock reduces the vibration of the machine at 90% due to the isolation output. The resonance frequency of the vibration chock is exactly between 250 and 300 min-l. For this reason, you can come across with a high balance during the start and stop action of the machine.

The rubber parts should be protected from oil, gasoline and seawater.

During the assembly, should pay attention to let the all parts of the machine to be stretch towards the sides. The environmental temperature should not exceed +70°C degrees.

In order to guarantee the correct operation of the vibration chock, it must work with free actions. For that reason, there must be no foreign substances around the ventilator. The information regarding the location of the ventilator has been provided in the locating ventilator titled 6<sup>th</sup> Article.

#### 3.4. Muffler

Used for reducing the noise level of the ventilator.

### 3.5. Other Accessories

***If Accessories and Additional Equipment;***

<i>Second Chassis</i>
<i>Rubber Chocks</i>
<i>Cooling Wheel</i>
<i>Aspiration and/or Pressing Nozzle Canvas</i>
<i>Aspiration and/or Pressing Nozzle Steel Compensator</i>
<i>Aspiration and/or Pressing Nozzle Reduction</i>
<i>Aspiration Nozzle Wing Damper</i>
<i>Drallregler Damper</i>
<i>Wing Damper</i>
<i>Opposite Working Damper</i>
<i>Lapel Stimulation Unit</i>
<i>Drainage Valve</i>
<i>Aspiration Funnel Aluminum Coating</i>
<i>Aspiration Filter</i>
<i>Pressing Nozzle Sunblind Lapel</i>
<i>Vibration Measurement Device</i>
<i>Bearing Heat Detector.</i>

The accessories and spare parts used without consulting Manufacturer or without its acknowledgment may not be suitable to the calculations regarding the product. As a result of this, some problems related with the product may occur. Necessary calculations should be made before adding any spare part or accessory to the product.

The terms to be taken into attention can be special production and delivery terms in respect of special and foreign parts; our company presents the spare parts to your evaluation in accordance with the newest technical norms and laws.

The things that you should state in your spare part orders:

Factory Number (On the Type Panel (Label)).

Product Type (On the Type Panel (Label)).

Requested part's name and quantity should be given

## 4. HANDLING AND PROTECTION

### 4.1. Handling

**4.1.1** The ventilator should have no stroke during the transportation. The bushings may be damaged, the turning parts may be squeezed and deformations may form due to the strokes occurred as a result of lack of attention.

**4.1.2.** The ventilator should only be lifted with the lifting parts (rings or the holes on the strength lamas located on the body). See Figure 2.5.



**Should not be lifted through holding from the sensitive parts (such as axle, fan, pressing and aspiration nozzle flanges).**



**For handling, the weight and dimensions stated in the Operation and Maintenance Manual and on the product's label should be taken into consideration.**

**4.1.3.** The ventilators delivered with all parts assembled should be kept in closed warehouses through protecting against humidity, chemical reactions, dust and rain.

**4.1.4.** The electric motor, axle (and bushings) and fan of the ventilators delivered with partial assembly due to transportation problems should be kept in closed warehouses. The body and the structures made of alloyed metal can be kept under the roof or in plastic plates. Processed parts should be lubricated against corrosion.

### 4.2. Storage

If the ventilator should be stored until the assembly; then should be stored and protected as stated in Article 4.2-1 as to especially avoid the corrosion of the axle and protect it against dust, rain, high humidity and over temperature changes.

#### 4.2-1. Storage and Protection Conditions

**a) If maximum 3 months,** then below mentioned terms should be taken into consideration for keeping and protecting during the interval storage:

- Aspiration and Pressing delivery systems should be closed,
- The straps of the machines with strap stimulation should be loosen slightly,
- In order to avoid the bushing damage, the internal parts should be turned from time to time,
- The necessary precautions should be taken in order to protect the ventilator against climatic effects (such as covering with folio or storing in a suitable building).

**b) If maximum 6 months,** then below mentioned terms should be taken into consideration for keeping and protecting during the interval storage:

- Aspiration and Pressing delivery systems should be closed.
- In order to avoid the bushing damage, the internal parts should be turned from time to time.
- The straps of the machines with strap stimulation should be loosen slightly.

- Humidity and damp should not enter into the machine, in other words if there is crack corrosions and if welding has been performed continuously from both sides, then should be closed with a suitable filling material. The motors are protected in accordance with the instructions of the manufacturer company.

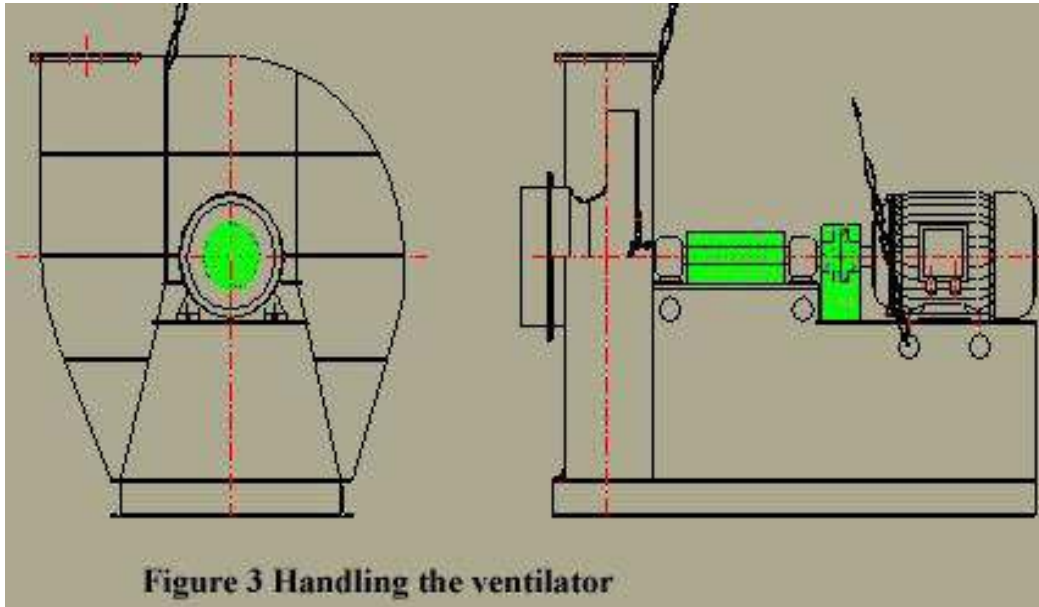


Figure 3 Handling the ventilator

## 5. ASSEMBLY (MONTAGE)



The protection wires of the ventilator located in the aspiration and pressing nozzles should not be disassembled until the ventilator is connected to the installation.



The protection should not be removed during free aspiration.

The ventilator should never be operated when the strap-rim, coupling and axle protectors are removed.

After the ventilator is correctly located, aspiration and pressing channels should be connected with the counter flanges delivered together with the ventilator.

During the assembly, should not be hit to the turning parts such as fan, axle and bearing with hammer or similar hard substances. These kinds of strokes can cause the malfunction of the bearings and unbalance of the fan.

The portion of the straps should be calculated as to leave 1.5 mm distance for each 100 mm axle and should be controlled from the middle point of the distance between the axles. The extension amount of the new straps as a result of first 15 operation hours is 80% of the total extension. If the straps should be stretched, then the tension of the strap should be adjusted with the stretching parts located on the motor sledges. (See **Motor Catalogue**).

The experiences show that the longest life of V-straps is provided when the sliding does not exceed 1%. The control of the strap tightness is performed according to the article 5.1.

#### **5.1. Control of belt Tightness:**

The portion of the straps should be calculated as to leave 1.5 mm distance for each 100mm axle and should be controlled from the middle point of the distance between the axles. The extension amount of the new straps as a result of first 15 operation hours is 80% of the total extension. If the straps should be stretched, then the tension of the strap should be adjusted with the stretching parts located on the motor sledges. The experiences show that the longest life of V-straps is provided when the sliding does not exceed 1%.

#### **The instructions that should be fulfilled during the operation with strap stimulation:**

Before activation, the straps should be stretched within the time intervals stated below in accordance with the abovementioned characteristics. **(Table 3)** The tightness of the strap should be adjusted with the stretching parts located on the motor sledges. **(Motor Catalogue)**

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<sup>1</sup> It is valid for the ventilators having Strap Rim stimulation. Stated in Operation and Maintenance Manual and on the Type Plate.

During stretching, should pay attention to make the rims in the same direction and make the ventilator axle and motor axle parallel to each other.

Strap control device suitable for the control and stretching should be used.

In case of strap control device absence, the control can be performed by pressing manually.

STRAP CONTROL PERIODS	
1. Control	Control after first 15 minutes operation.
2. Control	Control after first 3 days operation.
3. Control	Control after first 15 days operation.
4. Control	Control after first 45 days operation.
5. Control	Control after first 90 days operation.
Other Controls	Control once in each 90 days after the 5 <sup>th</sup> control.

Table 3: Belt tightness measurement period table.

Check the belt tension using a belt tension checker or similar spring scale. Excessive belt tension is the number one cause of blower bearing failure. Proper belt tension and pulley alignment are essential for trouble free operation. A simple "rule of thumb" for checking belt tension is to grasp the belt with one hand in the middle of the pulleys to obtain a total deflection of approximately 25mm [13mm each side] should be easily attained. Insufficient deflection indicates that the belt is too tight, resulting in noise from excessive vibration, premature bearing failure and short belt life. Tight belts may overload a motor that would otherwise be adequate. Fan RPM can be adjusted to achieve the desired airflow by setting the adjustable sheave on the motor shaft. Pulley set screw torque setting 120 cm kg to 150 cm kg.

If the ventilator is located in open air, then its electric motor and the ventilator itself should be protected against the external effects.

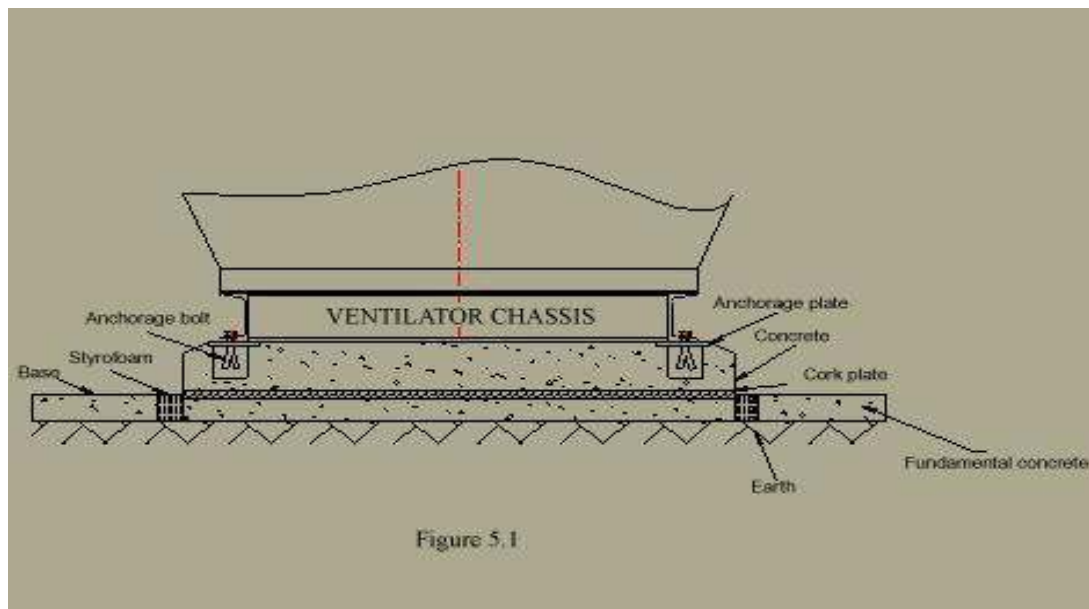
If there is a possibility that the water enters into the ventilator, then a drainage hole is opened under the inferior part of the body and water discharge should be provided through the aid of the pipe going to be connected to this hole.

## 6. LOCATING VENTILATOR

### 6.1. Ground

In order to avoid the shock effect the building, the ground of the ventilator should be separated from the concrete of the base. The fundamental concrete that will be spilled over earth and blockage in accordance with the construction techniques should be 5 cm higher than the basement level.

A cork plate with 3-5 cm thickness should be located on the fundamental concrete. The rate of the concrete going to be spilled must be around 1.5-3 times of the cork plate and while spilling this concrete, a hole should be left through putting wooden chock on the connection points of the ventilator chassis. See Figure 5.1.



Anchorage bolts;

For the ventilators between 100-100 000 m<sup>3</sup>/h, at least **200 mm long M12 bolt**

For the ventilators over 100 000 m<sup>3</sup>/h capacity, at least **200 mm long M 24** bolt should be selected.

(NOTE: For the ventilators in this capacity, the Assembly Drawing shall be attached. Please ask for the nonattached assembly drawings.)

The rubber should be settled on the isolators or cork plate according to the cycle of the ventilator. If the ventilator shall be settled over the rubber chocks, then the match of the ventilator chassis is anchored to the basic dimension, rubber isolators are connected on this chassis and the ventilator is settled over these isolators together with its chassis. See Figure 5.2.

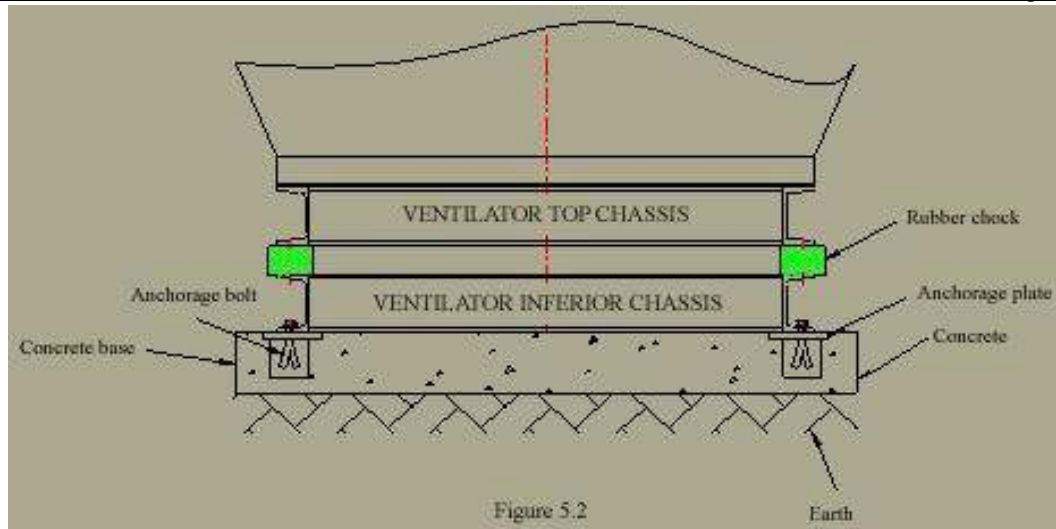


Figure 5.2

Generally, the types of the isolators used are selected as following.

$n_{\min} = 1200 \text{ min}^{-1}$       Rubber chock      /       $n = 3000 \text{ min}^{-1}$       Cork plate

Isolators should be located as to carry equal load and the distance between them should be maximum 1m.

Minimum number of isolators in respect of the stimulation type of the ventilators is stated below.

Strap-Rim stimulated      7 Pieces

Coupling stimulated      7 Pieces

Direct coupling to the motor      6 Pieces

The abovementioned terms are general information. The technical staff of our company shall help you in selecting the ground type in accordance with the location of the ventilator.

After the basement is completely hardened, the ventilator is located on the basement and assembled on the ground after it is controlled with water balance on the axle.

## 6.2- Locating Place

The distance of the double aspirated and free single aspirated ventilators from the wall or other handicaps that will avoid the aspiration of the ventilator should be at least half of the inlet cone diameter of the ventilator. (See Figure 6)

In order to guarantee the correct operation of the vibration chock, it must operate freely. For this reason, must pay attention to not leaving any foreign substance around the ventilator (at least within 0,5 m distance).

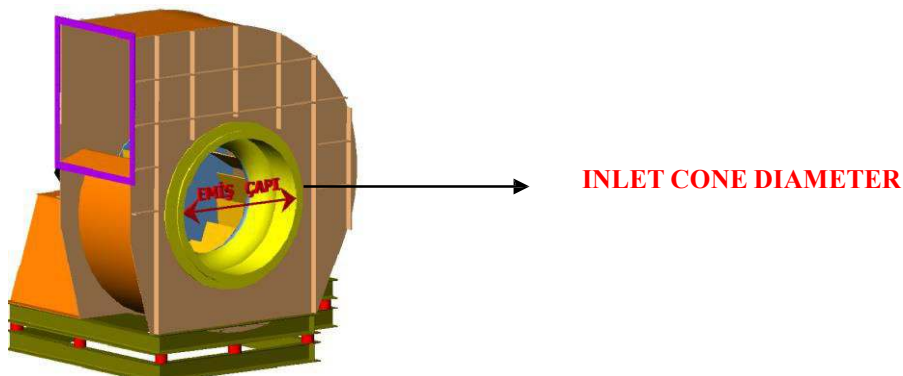


Figure 6: Inlet Cone Diameter Exhibition



## 7. START UP and OPERATION

Electric connections and panel shall be provided in accordance with EN 60204-1:1997 standard.

The electric motor should always be connected by an authorized electrician.

The compliance of the network voltage with the operational voltage rate written on the label of the motor should be controlled and the motor must be protected with a power switch adjusted according to the ampere of the motor.

Before operating the ventilator, check whether all protection and other precautions are taken or not.



**During the first start up of the ventilator, check whether there is any foreign substance within the channels or not and clean if necessary.**

Control whether the fan is turning correctly or not (the arrow direction on the ventilator) through switching on and off the power switch of the motor for a short time. If the turning direction is not correct, then change the pole connections of the motor and provide the correct turning. If there is no error, then you can operate. Control the current of the motor with ampere-meter after the ventilator is activated. The motors that are in compliance with the European standards can work maximum two minutes with an ampere 1.5 times of the label values. The motor protector switch thermic should be adjusted according to this. Generally, exceeding maximum 10% of the motor ampere label value during the operation can be acceptable. In case of over load in the motor, the switch should be closed immediately and let the air capacity reach to the requested value through reducing the lapel.

After the activation, the straps will extend within the time. The tightness of the strap should be regularly checked especially in the first weeks and if necessary, should be stretched. The straps should be stretched in periods stated in the Article 5.1. During stretching, pay attention to make the rims in the same direction and make the ventilator axle and motor axle parallel to each other.

The straps should be protected against dust, oil and chemical substances.

The housings should be controlled in respect of sound and heat during the first operation hours. If the housings go warmer in the beginning (if goes over 80 °C) then stop the ventilator and wait the housings to get cooler. Then re-operate. This process can be repeated for a few times during the first operation period.

Alarm: 80 °C

Shut Down: 90 °C ( In case operation above 90 °C during 20 minutes)



The ventilator has been chosen according to the operation conditions (flow, temperature, etc...) stated in the order and on the label. You can consult our company to use the ventilator under different conditions.

Please consult our company for increasing or decreasing the cycle of the fan through changing the diameter of the rim.



**If the distance between you and the ventilator is below 1 meters during over 82 dB(A) noise, then please wear earflap.**

### 7.1. Activation General Warnings

We recommend you to supply a specialist staff of our company in your company while start-up the machine for the first time.

Our company cannot be hold responsible for the faults resulting from the incorrect activation by the customer.

Ensure whether there is any foreign substance or not in the pipe lines or body of the ventilator before first operation.

Entrance of foreign substances in the rotor is not accepted.

Always avoid the immediate over liquid entrance in the rotor and flow of inadequate condensation water from the body of the ventilator.

Before first operation, control whether the axle turns easily or not and whether the rotor is working freely or not.

Always control the returning direction. (The arrows showing the returning direction are on the body of the ventilator).

Vibration and bearing temperature should be controlled.

Control whether the assembly of mechanical and electrical protection equipment is performed correctly or not.

Control the compliance of the operation voltage and the network voltage with the motor ampere. Check whether the electric connections are appropriate to norm standards or not.

There must be no one in front of the aspiration and pressing nozzle of the ventilator during the operation

According to ISO 14694 (Industrial fans — Specifications for balance quality and vibration levels);

Table 1 for Fan application categories and Table 5 for Seismic vibration limits for tests conducted *in situ*.

**Table 1 — Fan-application categories**

Application	Examples	Limits of driver power kW	Fan-application category, BV
Residential	Ceiling fans, attic fans, window AC	≤ 0,15	BV-1
		> 0,15	BV-2
HVAC and agricultural	Building ventilation and air conditioning; commercial systems	≤ 3,7	BV-2
		> 3,7	BV-3
Industrial process and power generation, etc.	Baghouse, scrubber, mine, conveying, boilers, combustion air, pollution control, wind tunnels	≤ 300	BV-3
		> 300	See ISO 10816-3
Transportation and marine	Locomotive, trucks, automobiles	≤ 15	BV-3
		> 15	BV-4
Transit/tunnel	Subway emergency ventilation, tunnel fans, garage ventilation, Tunnel Jet Fans	≤ 75	BV-3
		> 75	BV-4
		none	BV-4
Petrochemical process	Hazardous gases, process fans	≤ 37	BV-3
		> 37	BV-4
Computer-chip manufacture	Clean rooms	none	BV-5

NOTE 1 This standard is limited to fans below approximately 300 kW. For fans above this power refer to ISO 10816-3. However, a commercially available standard electric motor may be rated at up to 355 kW (following an R20 series as specified in ISO 10816-1). Such fans will be accepted in accordance with this International Standard.

NOTE 2 This Table does not apply to the large diameter (typically 2 800 mm to 12 500 mm diameter) lightweight low-speed axial flow fans used in air-cooled heat exchangers, cooling towers, etc. The balance quality requirements for these fans shall be G 16 and the fan-application category shall be BV-3.

**Table 5 — Seismic vibration limits for tests conducted *in situ***

Condition	Fan-application category	Rigidly mounted mm/s		Flexibly mounted mm/s	
		Peak	r.m.s.	Peak	r.m.s.
Start-up	BV-1	14,0	10	15,2	11,2
	BV-2	7,6	5,6	12,7	9,0
	BV-3	6,4	4,5	8,8	6,3
	BV-4	4,1	2,8	6,4	4,5
	BV-5	2,5	1,8	4,1	2,8
Alarm	BV-1	15,2	10,6	19,1	14,0
	BV-2	12,7	9,0	19,1	14,0
	BV-3	10,2	7,1	16,5	11,8
	BV-4	6,4	4,5	10,2	7,1
	BV-5	5,7	4,0	7,6	5,6
Shutdown	BV-1	Note 1	Note 1	Note 1	Note 1
	BV-2	Note 1	Note 1	Note 1	Note 1
	BV-3	12,7	9,0	17,8	12,5
	BV-4	10,2	7,1	15,2	11,2
	BV-5	7,6	5,6	10,2	7,1

NOTE 1 Shutdown levels for fans in fan-application grades BV-1 and BV-2 should be established based on historical data.

NOTE 2 The r.m.s. values given in this Table are preferred. They are rounded to a R20 series as specified in ISO 10816-1. Peak values are widely used in North America. Being made up of a number of sinusoidal wave forms, these do not necessarily have an exact mathematical relationship with the r.m.s. values. They may also depend to some extent on the instrument used.

## 8. MAINTENANCE AND REPAIR

All ventilators require periodical maintenance during the operation.

The basic principles of maintenance are described below.

### 8.1. General Maintenance



**Always wear protective clothes during the maintenances.**

Control whether all connection bolts are tight or not, the loosen bolts should be stretched.

Fan axle should be controlled, if there is any damage or bending then should be replaced with the new one.

If the axle is corroded, then it must be cleaned and protective oil must be applied.

When the paint of the ventilator is corrupted, then it must be repainted.

**General Maintenance Period is 3 months.**



**The ventilator is taken out before the body of the ventilator is opened; protective grill and flange connection are removed. The ventilator should not operate during this time. Ensure that the rotor is stopped. Before operating the ventilator again, ensure that all protective equipment are assembled correctly.**

### 8.2. Fan and Body

Fan and body are directly affected from the corrosion of climatic conditions. Especially if the delivered substance is formed of gas vapor, acid or similar chemical substances that may cause dust or corrosion, abrasion and accumulation, then the abrasion may be more.

The formed abrasions reduce the strength of the material and the accumulations on the wings of the fan cause unbalance and over load of the bushings.

For this reason, the fan and the body should be controlled and cleaned regularly. If any repair or modification is performed on the fan due to any reason, then the dynamic balance of the fan should be made before it is assembled to the ventilator. You should contact the Supplier.



**It is not appropriate to clean the ventilator with high pressured vapor repulsing machines. If humidity enters into the machine, then corrosion possibility in bearings, felts and related parts should be avoided.**

### 8.3. Bushing and Bearings

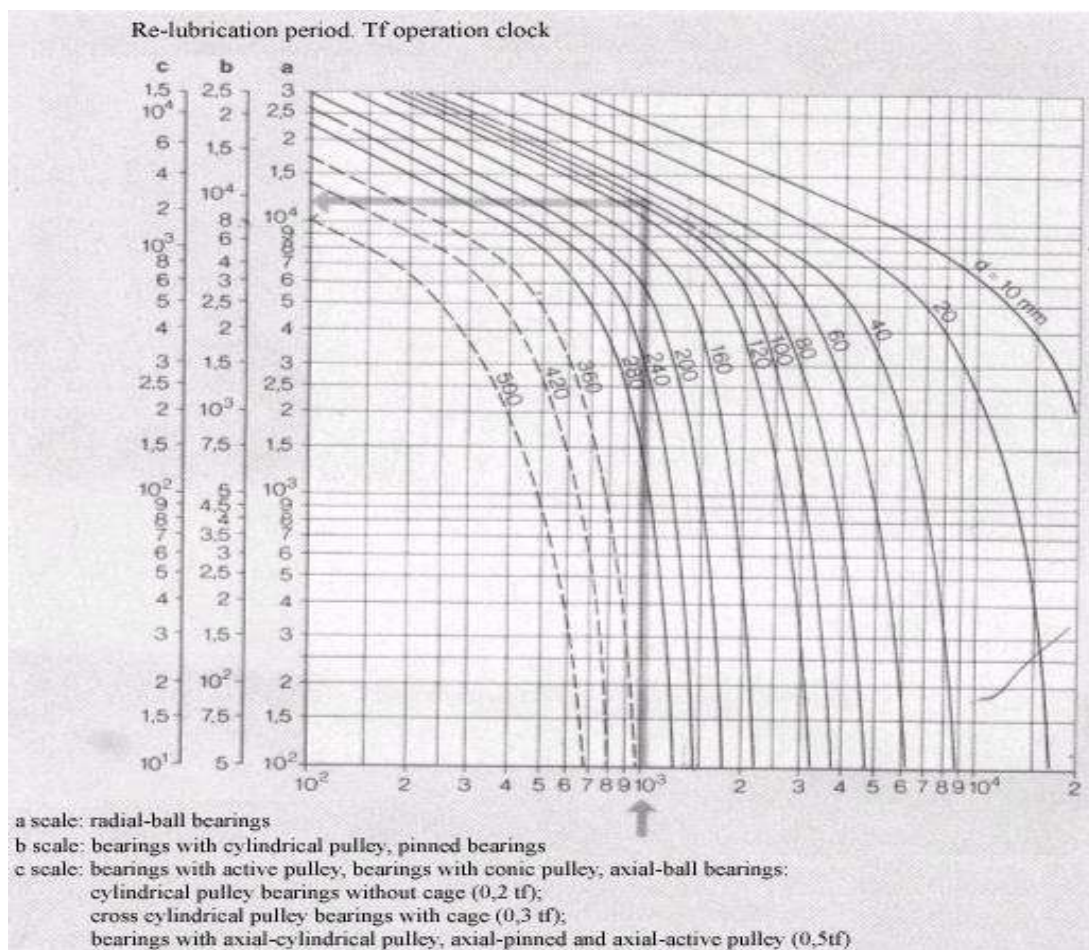
The bushings of the ventilator have been selected in accordance with the mechanic loads that may occur under the operation conditions, cycle and temperature of the ventilator.

In order to provide the life of the bushings stated for the operation, their maintenance should be performed periodically.

Even the smallest foreign materials within the bushings may cause sound and damage and make the bushings unusable before the end of their life.

As in all oils, the oils that are used for the bearings of the radial ventilators can fulfill their lubrication functions for a limited of time. After this, they loose their lubrication features and they must be changed.

#### 8.3.1. Lubrication Period



#### Sample:

A fixed ball bearing having 100 mm hole diameter (d) turns with 1000 d/min speed. The operation temperature changes between 60°C and 70°C (140-158°F). What is the necessary lubrication period?

In the diagram, draw a line upwards starting from the point showing 1000 d/min on x-axis and intersect with d=100 mm curve. Draw a parallel line from the current point to the x-axis and the exact value of 12000 is read in scale a (bearing with radial-ball). So, the re-lubricating period is obtained as 12000 operation hours.

## 8.4. Straps

Controls that should be performed during operation with strap are;

- Corrosion
- Correction
- Strap tightness

The terms to be taken into consideration in re-stretching, in other words in replacing the strap:

1. The straps are always changed as a complete set, never change only one strap!
2. Initially the straps are loosened; for this, the stretching screws and motor stretching screws are disassembled. In order to disassemble and assemble the straps without stretching, the motor is adequately moved aside.
3. New strap set is located to their place and stretched slightly. The parallelism of V strap is controlled with a ruler and corrected if necessary.
4. The strap is stretched according to the Article 5.1. The straps should be controlled with long intervals; the straps may be corroded before the normal time due to the inadequate tightness resulting from sliding.

## 8.5. Compensators

If available,

Terms to be taken into consideration during controls:

- External coating surface fading
- Crisping
- Over bending
- Too much deformation
- Whether there is a formation of crust due to dust, sand, etc...

## 8.6. Control of Bolted Connections

All screwed connections should be periodically controlled whether they are fixed and complete or not, such as:

- Body screw connections
- Compensator screw connections
- Basic ground screw connections
- Bearing bushing / Motor detection, etc...

## 8.7. Electric Supplies

The maintenance and cleaning of the electric supplies and switches should be performed by an authorized electrician.

Control whether the motor is getting warmer or not.

If any error occurs although all the instructions are fulfilled, then immediately contact Your Supplier.

## 8.8. Other Terms

In case if below mentioned events occur, then the necessary precautions should be taken without waiting the maintenance date and through notifying the MANufacturer.

1. Damages / cracks on the body,
2. Corrosion, Damage / Cracks, Stain formation on the fan and the balance

**Duration of Test:**

-60 minutes for V-Belt Drive and Coupling Drives

-30 minutes for direct coupling, axial and roof type

-This period shall be extended if ever the temperature over the bearing housing either remained as is or decreased.

-The permitted maximum temperature degree over the bearing housing is 80°C. In the event of any serious incident, testing stage is immediately gets terminated.

**9. POSSIBLE TROUBLE CHART OF VENTILATOR**

No	TROUBLE	REASON NO	SOLUTION
1	Electric motor does not rise under load or does not reach to operation cycle.	Poles or key has been wrongly connected.	Control and adjust.
		The key is not turned correctly or the connection is broken.	2 Correct the connections, control, repair or replace the key.
		The network voltage is low.	Control the network voltage.
		The moving parts of the ventilator are mechanically locked.	Separate the motor from the power transmitting elements (coupling or strap-rim).
		The motor is small. The ventilator needs more power.	Control the power in the operation curve of the ventilator and replace with the correct motor.
		Ventilator working with hot gas and making cold takeoff.	Control the power in the operation curve of the ventilator, close the lapel.
		Gas or air flow is not adjusted (lapel setting), over flow, so the motor withdraws more power. Pipe or filters are not bolted	Adjust the installation lapels according to the design parameters. Control the withdrawn power. Control the pipe and filter gaskets.
2	Electric motor is hardly lifted (after a long time) and/or electrical over load protection starts in the takeoff.	The motor is small. The ventilator needs more power.	Control the power in the operation curve of the ventilator and replace with the correct motor.
		Ventilator working with hot gas and making cold takeoff.	Control the power in the operation curve of the ventilator, close the lapel.
		Gas or air flow is not adjusted (lapel setting), over flow, so the motor withdraws more power. Pipe or filters are not bolted.	Adjust the installation lapels according to the design parameters. Control the withdrawn power. Control the pipe and filter gaskets.



		Over load protection (thermic) is set incorrectly.	Reset. Caution! In some cases, the over load protector may be reduced during the takeoff in order to prevent the fire.
		Sudden load increase due to a problem (break or crack in pipes, lapel opened suddenly, problems in the filters) in pipe installation.	Control and repair the pipe installation, lapels and filters.
		Too many takeoffs.	Control the time between the motor takeoffs stated in the motor operation instruction.
3	Over heating in the electric motor during the operation.	Poles or key has been wrongly connected.	Control and adjust.
		The key is not turned correctly or the connection is broken.	Correct the connections, control, repair or replace the key.
		Network or motor cuts the phase.	Control the continuity of the phases, control, repair or change the motor.
		The network voltage is low.	Control the network voltage.
		Ventilator working with hot gas and making cold takeoff.	Control the power in the operation curve of the ventilator, close the lapel.
		Gas or air flow is not adjusted (lapel setting), over flow, so the motor withdraws more power. Pipe or filters are not bolted.	Adjust the installation lapels according to the design parameters. Control the withdrawn power. Control the pipe and filter gaskets.
		There is friction between the moving parts of the ventilator or in the motor.	Stop, control and prevent friction.
		Motor radiator is blocked or the fan is damaged.	Clean and repair the fan.
		Too many takeoffs.	Control the time between the motor takeoffs stated in the motor operation instruction.
4	The cycle is reduced as the load increases.	Poles or key has been wrongly connected.	Control and adjust.
		The key is not turned correctly or the connection is broken.	Correct the connections, control, repair or replace the key.
		Network or motor cuts the phase.	Control the continuity of the phases, control, repair or change the motor.
		The network voltage is low.	Control the network voltage.
		Sudden load increase due to a problem (break or crack in pipes, lapel opened suddenly, problems in the filters) in pipe installation.	Control and repair the pipe installation, lapels and filters.
5	There is whizzing or an abnormal sound in the electric motor.	The key is not turned correctly or the connection is broken.	Correct the connections, control, repair or replace the key.
		Network or motor cuts the phase.	Control the continuity of the phases, control, repair or change the motor.
		There is friction between the moving parts of the ventilator or in the motor.	Stop, control and prevent friction.
6	There is an abnormal heating in the electric motor bushings.	Poles or key has been wrongly connected.	Control and adjust.
		The motor is small. The ventilator needs more power.	Control the power in the operation curve of the ventilator and replace with the correct motor.
		Gas or air flow is not adjusted (lapel setting), over flow, so the motor withdraws more power. Pipe or filters are not bolted.	Adjust the installation lapels according to the design parameters. Control the withdrawn power. Control the pipe and filter gaskets.
		Too many takeoffs.	Control the time between the motor takeoffs stated in the motor operation instruction.
		Ground is incorrectly assembled.	Control the ground or chassis connections, adjust the horizontality (bring to the balance)
		Bearings are lubricated excessively.	Discharge the exceeding amount of oil.



		There are foreign substances in the motor bearings.	Control, purify from foreign substances, if necessary, change the bearing.
		Incorrect bearing selection.	Replace with the correct bearing.
		Bearing stretching muff is deformed.	Control the assembly, if necessary, change the muff.
		Bearings without lubrication.	Lubricate, if necessary, change the bearings.
		Over axial forces in bearings.	Bring the bushing and axle to the axis.
		Straps are over stretched.	Control the tightness and adjust.
7	There is an abnormal heating in the ventilator bushings.	Ground is incorrectly assembled.	Control the ground or chassis connections, adjust the horizontality (bring to the balance)
		Bearings are lubricated excessively.	Discharge the exceeding amount of oil.
		There are foreign substances in the motor bearings.	Control, purify from foreign substances, if necessary, change the bearing.
		Incorrect bearing selection.	Replace with the correct bearing.
		Bearing stretching muff is deformed.	Control the assembly, if necessary, change the muff.
		Bearings without lubrication.	Lubricate, if necessary, change the bearings.
		Over axial forces in bearings.	Bring the bushing and axle to the axis.
		Straps are over stretched.	Control the tightness and adjust.
		Bearing stretching muffers are over squeezed.	Squeeze the safety nut in accordance with the diameter of the axle as stated in bearing catalogue.
		External case of the bearing is moving in the bushing or the bearing is moving on the axle.	Control, repair, if necessary, change the axle or bearing.
8	A sound is coming from the ventilator bushings.	Incorrect bearing selection.	Replace with the correct bearing.
		Bearing stretching muff is deformed.	Control the assembly, if necessary, change the muff.
9	A noise is coming from the bushings together with a knock.	There are foreign substances in the motor bearings.	Control, purify from foreign substances, if necessary, change the bearing.
		Bearing stretching muff is deformed.	Control the assembly, if necessary, change the muff.
		The space of the bearing between the core and the case is too much.	Change the bearing.
10	There is an abnormal heating in the rims.	Master setting of the rims is incorrect.	Control, make the master adjustment.
		Straps are leaning to the internal side of the rim channel.	Change the rims or straps.
		Rim profile is not appropriate.	Control and change the rims.
		Inadequate rim diameter.	Change the rim.
		Straps are not tight enough.	Stretch the straps.
		Inadequate number of strap or different lengths.	Correct the number of strap and appropriately select their lengths.
		Slippery straps dirtied with oil.	Clean the oil and avoid the lubrication of the straps.
11	The straps are corroded quickly.	Straps are over stretched.	Control the tightness and adjust.
		Master setting of the rims is incorrect.	Control, make the master adjustment.
		Rim profile is not appropriate.	Control and change the rims.
		Inadequate rim diameter.	Change the rim.
		Inadequate number of strap or different lengths.	Correct the number of strap and appropriately select their lengths.
12	There is great vibration in the	Ground is incorrectly assembled.	Control the ground or chassis connections, adjust the horizontality (bring to the balance)

	ventilators.	There are foreign substances in the motor bearings.	Control, purify from foreign substances, if necessary, change the bearing.
		Bearing stretching muff is deformed.	Control the assembly, if necessary, change the muff.
		Balance breakdown of disassembled parts.(rotor, motor, rim)	Control the balance, retake balance.
		Rim escaping from center, unbalance in fan, friction of fan to the body.	Control and place.
		Bushes in the elastic gaskets or connections are worn out.	Change.
		Coupling, rim or fan is assembled to the axle with over space.	Control the assembly.
		Ventilator is connected to the pipes without elastic gasket or the pipes connected to the ventilator as rigid caused the deformation of the body.	Stop aspiration (from motor power), disassemble the gaskets of the rigid pipes, start aspiration and control the vibration in pipe connections.
		Dust or foreign substances are adhered on the fan.	Replace with a suitable fan or clean the fan with short intervals.
13	There is abnormal noise in the ventilator.	There is friction between the moving parts of the ventilator or in the motor.	Stop, control and prevent friction.
		External case of the bearing is moving in the bushing or the bearing is moving on the axle.	Control, repair, if necessary, change the axle or bearing.
		Dust or foreign substances are adhered on the fan.	Replace with a suitable fan or clean the fan with short intervals.
		Fan is touching the body or pressing nozzle.	Stop the fan, control and adjust the assembly, control and center the fan and bushings and clean the foreign substances.
14	Rotor is corroded quickly.	Operation temperature of the fan is increasing.	Replace with a fan having better material quality.
		There are corrosive gases that are not stated in the order.	Replace with a fan having better material quality.
		Dust filter is blocked.	Clean the filter.
15	The ventilator does not reach to designed parameters.	Gas or air flow is not adjusted (lapel setting), over flow, so the motor withdraws more power. Pipe or filters are not bolted.	Adjust the installation lapels according to the design parameters. Control the withdrawn power. Control the pipe and filter gaskets.
		Sudden load increase due to a problem (break or crack in pipes, lapel opened suddenly, problems in the filters) in pipe installation.	Control and repair the pipe installation, lapels and filters.
		Dust filter is blocked.	Clean the filter.
		Fan is turning to opposite direction of the arrow on the ventilator.	Control and change the turning direction of the motor.
		Pressure loss or incorrectly assigned flow.	Control, change the ventilator.
		Cranks, reductions or special parts causes too much pressure lost (more than the rate foreseen in the design).	Control the dimensions and change.
16	There is vibration in the ventilator.	External case of the bearing is moving in the bushing or the bearing is moving on the axle.	Control, repair, if necessary, change the axle or bearing.
		Dust or foreign substances are adhered on the fan.	Replace with a suitable fan or clean the fan with short intervals.
		There is balance in fan.	Take balance as the permanent unbalance will be in compliance with ISO 1940 G 6.3.
		There is secretion in the axle of fan.	Control the secretion of the axle.

## **10. OTHER TERMS**

The technician commissioned with the operation and maintenance of the ventilator should pay attention to the general technical rules and the terms stated in this instruction. Not performing the periodical maintenance and controls of the ventilator (not changing the oils of the bushing and bearings, not controlling the straps and the current withdrawn by the motor, crushing that may occur within the ventilator's rotor due to any hard substance entrance to the ventilator during the operation) due to negligence and carelessness (operating the ventilator without strap rim protector, aspiration nozzle wire or rod cage protector, continue to use the unbalanced fan doing shock and vibration, etc...) are operation faults and the operator is responsible from the errors that may result from these events.

**INDUSTRIAL VENTILATOR WARRANTY**

Document No: 12255

Document Licence Date: 11.11.2002

This Document No and Document Licence Date was given according to the 4077 numbered law by The Ministry of Trade and Industry of The Republic of Turkey.

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**PRODUCT**

**Type** : INDUSTRIAL VENTILATOR  
**Brand** : ALFER  
**Model** : RADIAL  
**Ventilator Type** : AL-RS1N-B3-630  
**Drive Type** : STRAP-RIM  
**Factory No** : 17823  
**Order No** : ORD.2201S5885  
**Fan Speed** : 1.815 rpm