INSTRUCTION MANUAL

INSTALLATION, OPERATION AND MAINTENANCE OF THE SICFLUX TITAN LINE

This manual aims to clarify the basic recommendations required for the proper installation, operation, and maintenance of fans/exhausters from the Sicflux Titan line. The installation, operation, and maintenance of a fan/exhauster from the Sicflux Titan line require special attention and care to ensure proper functioning and to preserve the service life of the equipment and the entire system connected to it.

Important: Please read the Warranty Certificate carefully at the end of this manual.

TABLE OF CONTENTS

A – RECEIPT AND STORAGE

When a product from the Sicflux Titan line is shipped, all fans/exhausters are individually tested and inspected to ensure they meet the specifications for which they were designed.

Upon receiving a Sicflux Titan fan/exhauster, make sure there is no damage that may have occurred during transportation.

It is MANDATORY that the customer perform a visual inspection of both the packaging and the product to verify its condition.

In the case of minor damage, such as scratches on the product's paint, it is up to the customer to decide whether to accept the equipment or not. Keep in mind that even seemingly minor visual damage may have affected a critical component of the fan/exhauster, and a thorough inspection of the product is recommended.

In the event of serious damage, the customer must refuse delivery of the product and immediately notify the factory through its representative/salesperson. Be sure to record a description of the damage on the carrier's delivery receipt.

The truck driver from the carrier must also sign this document.

The carrier is solely responsible for ensuring proper transportation and the integrity of the product.

A.1 Handling During Transportation

SICFLUX Titan fans/exhausters are usually delivered to the customer mounted on a wooden pallet. The product is wrapped in flexible plastic, which provides physical protection and shields it from the elements.

Large equipment may, in some cases, be shipped without packaging.

In all situations, during the loading and unloading of fans/exhausters, only the designated lifting points on the equipment must be used.

Never lift a fan by its shaft, rotor, flanges, motor, pulleys, or guards.

When unloading or transporting a packaged product, use a forklift whenever possible, taking care to avoid damage near the forklift's mast. Always position the motor side of the fan toward the mast.

For hoisting with a crane, chain hoist, or similar equipment, lift the fan using ropes or straps, or by using the lifting eyes or holes provided on the product.
Always be aware that the motor side is the heaviest; therefore, the product must be lifted from its center of gravity, not the physical center of the fan/exhauster.

A.2- Storage Conditions

If SICFLUX Titan line fans/exhausters are not installed immediately, they must be stored in a location free from dust, high temperatures, humidity, and other agents that could damage the product.

Never place a fan in any position other than the one in which it was shipped. Even in storage, a fan requires some maintenance to ensure it functions properly upon installation.

Always check the bearings and bearing housings periodically to confirm they are in suitable condition for installation.

When a fan remains inactive, the weight of the rotating assembly tends to displace the grease film between the contact surfaces of the bearing elements (balls or rollers and races), leading to metal-on-metal contact and the possible formation of corrosion spots—known as false brinelling—which can render the bearing unusable. This phenomenon may worsen if fans are stored near machines that cause vibrations.

Electric motors are also susceptible to the same kind of issue.

We recommend manually rotating the fan and motor shafts at least once a week to redistribute the lubricant inside the bearings.

For fans/exhausters that use belt-driven transmission, it is also advisable to remove the belts during storage.

Regarding the electric motor, the presence of moisture, high temperatures, or dirt during storage can compromise the insulation resistance of the windings. It is recommended to check and test this resistance before putting the motor into service, to avoid the risk of burning it out.

Keep the product in a secure area, away from unauthorized personnel, to prevent accidental damage and avoid the insertion of objects into the fan/exhauster, which may cause issues during installation.

A.3- Nameplate

The product nameplate contains all the essential data and values that define the structural and functional characteristics of the fan/exhauster.

Made of aluminum, it is attached in an easily accessible and visible location.

Avoid allowing it to detach from the equipment or become covered in a way that makes it unreadable or useless.

Additional labels with extra product information may also be affixed near the nameplate.

Whenever you need additional information, technical support, or spare parts, contact the factory and provide the product's tracking code.

B – INSTALLATION

B.1 – Foundations

In general, due to their relatively light weight, fans do not require special foundations at their operating location. A leveled base, properly designed to support the equipment entirely (never partially or overhanging), is sufficient. The equipment must be fully supported and fixed using vibration dampers or other appropriate components.

Never compensate for floor irregularities by modifying the equipment itself—this would deform its structure and impair its operation.

As the size of the equipment increases, so do its weight, rotational speed, and power, making the foundation requirements more demanding.

Even when carefully balanced, industrial fans are inherently vibration sources. These vibrations can propagate to the foundation, causing the transmission of highly undesirable noise.

Special care must be taken with the support and vibration isolation of large, low-speed fans, especially when installed on elevated floors.

SICFLUX Titan fans/exhausters may optionally be supplied with rubber or spring-and-rubber vibration dampers, according to the customer's requirements. These dampers ensure proper attenuation of vibrations produced by the fan-electric motor assembly.

The dampers are shipped separately from the fans/exhausters—either packed in a box or attached to the pallet corresponding to each unit.

They must only be installed at the final installation site to avoid damaging them. IF THE FAN/EXHAUSTER IS STORED BEFORE INSTALLATION, MAKE SURE THE VIBRATION DAMPERS ARE NOT PLACED INSIDE THE PRODUCT, TO AVOID DAMAGE AND SERIOUS ACCIDENTS. NEVER DRAG THE EQUIPMENT WITH THE DAMPERS INSTALLED.

B.2- Required Space and Clearances

When planning the installation area for the fan/exhauster, it is essential to provide enough space for duct connections, maintenance operations, bearing re-lubrication, and inspection access for components such as belts, filters, and the motor.

Clearance around the fan must also be considered to prevent issues with duct connections, airflow restrictions at the inlet or discharge, and to allow for rotor maintenance, which may require its removal.

- Below are some dimensional guidelines to be observed:

  Distance from inlet to wall: Should be at least one times the nominal diameter of the fan/exhauster.
  Example: Titan LD 560 – distance from inlet to wall = 560 mm (0.56 m).

  - Distance between motor and wall: Must allow the passage of a person for maintenance and inspection. Recommended: 800 mm (0.8 m).

  - Distance between units (side-by-side installation):

    - If both fans are operating simultaneously, allow two times the nominal diameter.
      Example: Titan LD 560 – distance between units = 1120 mm (1.12 m).
    - If fans are operated alternately (never simultaneously), allow one time the nominal diameter.
      Example: Titan LD 560 – distance between units = 560 mm (0.56 m).

  - Distance from fan/exhauster to ceiling: Must allow sufficient space for maintenance and inspection access.

  - Installation with flexible joint: A clearance of approximately ±180 mm (0.18 m) must be maintained between the fan/exhauster discharge and the wall or duct, to avoid tensioning the flexible joint.

B.3- Connection Fastening

After correctly positioning the fan/exhauster, level and secure the equipment. Then proceed with the remaining installation of the system. Use flexible connections at the suction and discharge ports to prevent vibration transmission to and from the ducts.

During the installation of other system components, ensure that no additional stress is applied to the body of the fan/exhauster, as it is not designed to support extra loads such as the weight of other components like ducts or hoods.

B.4- Electric Motors

B.4.1- Starting Systems

Direct Start
There are pre-assembled sets for direct starting of motors, which combine in a single box a three-pole contactor, a thermal overload relay (overload protection), and a fuse (short-circuit protection).
This is the simplest method, but it is only feasible when the starting current does not affect the power supply network.

Start with Autotransformer

The autotransformer start reduces the starting current, thus avoiding an overload on the circuit, while still allowing the motor to generate enough torque for starting and acceleration.

Star-Delta Start

For star-delta starting, it is essential that the motor can be connected in dual voltage, for example, 220/380 V; 380/660 V; or 440/760 V.
The motor's lower voltage must match the supply voltage.

Soft Start

Soft starters are primarily used for starting cage-type AC induction motors as an alternative to star-delta, autotransformer, or direct start methods. Their advantages include eliminating mechanical shocks to the system, limiting the inrush current, preventing current spikes, and providing soft stop functions along with integrated electrical protections.

B.4.2 - Motor Protection

Comparison of Motor Protection Systems

Causes of Overheating	Current-Based Protection		Protection with Thermal Probes in the Motor
	Fuse Only	Fuse and Thermal Protector	
Overload with current at 1.2 times the rated current	**NP**	**FP**	**FP**
Braking, reversing, and frequent starting	**NP**	**SP**	**FP**
Operation with more than 15 starts per hour	**NP**	**SP**	**FP**
Locked rotor	**NP**	**SP**	**FP**
Phase loss	**NP**	**SP**	**FP**
Excessive voltage variation	**NP**	**FP**	**FP**
Frequency variation in the power supply	**NP**	**FP**	**FP**
Excessive ambient temperature	**NP**	**FP**	**FP**
External heat exposure	**NP**	**NP**	**FP**
Ventilation blockage	**NP**	**NP**	**FP**

NP - Not protected **SP** - Semi-protected **FP** - Fully protected

C – OPERATION

C.1 - Preliminary Checks

Follow the recommendations below before starting the equipment:

a) Manually rotate the rotor to check if it moves freely and is correctly positioned in relation to the suction nozzles. If any blockage or noise is detected, it must be investigated and resolved. Also check the bearings for any unusual noise.

b) For equipment that has been stored for a long period (over 4 months), replace the bearing grease with new grease according to the quantities and types specified in the technical datasheets or in the “Maintenance” section of this manual.

c) Carefully inspect the rotor and housing internally to ensure there are no foreign objects. During construction work, cement or mortar used for finishing touches may fall inside the fan housing and adhere to the rotor blades, causing imbalance or obstructing drains. Objects such as bottles, cups, gloves, etc. may also be thrown or accidentally fall inside the unit. CHECK!

d) Ensure all bolts and nuts are properly tightened. Pay special attention to those securing the rotor to the central hub, the hub to the shaft, the bearing to the shaft, and the pulleys to their respective shafts on both rotor and motor. Check the tightness of the structure bolts, bases, and inspection door. This step is extremely important due to potential transport-related issues.

e) Check the pulley alignment and correct belt tension.

f) Check that the power supply voltage and frequency match those on the motor’s nameplate.

g) Ensure the motor's electrical connection follows the diagram printed on its nameplate. Poorly tightened terminals can cause serious issues; use properly rated electrical cables, control switches, and protective devices.

h) Make sure the motor is properly grounded. Even if no insulation specifications are required, grounding must follow the applicable standards for grounding electrical machines.

i) Perform a final external visual inspection of the fan/exhauster to ensure no materials, tools, or objects are near the suction area that could be drawn in. DO NOT place tools or accessories on top of the unit, especially near the suction area, as vibration may cause them to fall into the transmission or suction system.

C.2 - Precautions During Start-Up

After completing the checks in section C.1, the fan is ready to be started.

a) Turn the fan on and, after a few seconds, before it reaches full speed, turn it off.

b) During this brief interval, verify that the direction of rotation is correct and that there are no unusual noises or vibrations. If the direction is reversed (in three-phase motors), switch two of the motor's terminal connections. ALL noises, vibrations, or other abnormalities must be checked and corrected with the help of this manual.

C.3 - Observations During the First Hour of Operation

Once everything has been verified and is in perfect working condition, restart the fan.

a) Measure the current drawn by the motor in all phases and compare it with the nameplate value. If dampers or flow control valves are present, they should be adjusted in conjunction with current monitoring. Under normal conditions (continuous operation with stable load), the current reading should not exceed the motor's rated current. When operating at high temperatures, full airflow should only be allowed once the fan has reached its rated temperature (more power is required to move cold air).

b) ALL noises, vibrations, or other abnormalities must be checked and corrected with the help of this manual.

c) Check the bearing temperature (maximum 90°C for 20°C ambient temperature). After startup, bearing temperature typically rises due to excess grease and its redistribution, and tends to decrease after some operating time (up to two hours).

Note: The operator's hand is not a substitute for a thermometer. Use appropriate instruments.

d) Shut down the fan, wait until it comes to a complete stop, and recheck especially items D and E from the "Preliminary Checks" section. At this point, the fan will be ready for continuous operation. Do not attempt to speed up the rotor's stop with any tool or by hand. Allow it to stop naturally.

C.4 - Checks After 72 Hours of Operation

After 72 hours of operation, check the unit again, especially the belt tension. During this initial period, the belts may stretch slightly. Rubber dust from the belts may indicate pulley misalignment.
Belt tension should be checked at least every 3 months.

Recheck the tightness of all bolts and inspect the bearing lubricant condition, topping it up if necessary.

D – MAINTENANCE

D.1 – Cleaning

Periodic cleaning is mandatory to remove dust, oil, and other residues. Cleaning should be performed not only on the external parts of the fan and motor but also internally, especially on the rotor blades, to prevent imbalance.

If the application requires more frequent internal cleaning due to material buildup, use the inspection door on the housing (when available) to facilitate the process.

D.2 – Painting

Routinely check the condition of the equipment's paintwork, removing and treating any signs of corrosion. Scraping work on rotors (especially sirocco types) must be done with caution to avoid blade warping due to excessive pressure.
If touch-ups are needed, use the following specifications:

Tipo de pintura:

AP – Acrylic Paint

Blue – ACRYLIC PAINT NF BLUE RAL 5007 SB

Orange – ACRYLIC PAINT NF SAFETY ORANGE 2.5YR6/14 SB

Silver – ACRYLIC PAINT DP ALUMINUM LEAFING SB LT

PUV – Ultraviolet Paint / PCM – Anti-Corrosion (Seaside) Paint

Blue – POLYURETHANE PAINT BLUE RAL 5007

Orange – POLYURETHANE PAINT SAFETY ORANGE 2.5YR6/14

D.3 – Vibrations

One of the most important aspects to verify the operating condition of a Sicflux Titan fan/exhauster is the analysis of its vibration levels.

A quick and simple measurement can reveal the need for corrective maintenance on bearings, rotor or pulley balancing, shaft misalignment, or even defective belts. We RECOMMEND implementing a preventive maintenance plan through systematic analysis of periodic measurements, which allows for early detection of any replacement or repair needs.

Among the measurement parameters—amplitude, velocity, and acceleration—vibration velocity is the most important due to its reliability, safety, and alignment with human perception.

Measurement points should always be located on the fan bearings, and readings must be taken in both radial and axial directions.

Due to the difficulty in establishing a universal rule for the best radial plane (horizontal or vertical), both directions may be measured, or the one with the lowest structural stiffness may be used as a reference. However, once a measurement plane is selected, it is crucial that all future measurements be taken from the exact same point. In some cases, a threaded hole or a fixed connection point on the bearing can significantly simplify data collection.

Vibration measurements on electric motors should be taken on the motor housing near the bearings.

To evaluate and interpret the machine's vibration levels, the criteria published in ISO 2372 and VDI 2056 standards may be used.

Vibration Quality of Rotating Machines – ISO 2372

Vibration Velocity Limits (RMS in mm/s)	Rigid Base	Base resiliente
0.28	**Very Good**	**Very Good**
0.45		
0.71		
1.12		
1.8		
2.8	**Good**	
4.5		**Good**
7.1	**Fair**	
11.2		**Fair**
18	**Poor**	
28		**Poor**
45		

Rigid base corresponds to Class III of the standard = Fan mounted on a rigid foundation
Resilient base corresponds to Class IV of the standard = Fan mounted on shock absorbers

Based on the vibration level of a machine, it is possible to determine its operating condition and take the necessary corrective actions.

Through regular monitoring, it is possible to track the trend in vibration levels and anticipate the appropriate time for maintenance.

It is important to highlight that even if a fan falls into a category such as "Fair," this does not necessarily mean it urgently requires maintenance.

Only experience and practice, combined with an evaluation of installation and operating conditions, can truly determine its operating state.

The following table helps identify the most common vibration characteristics and causes based on the frequency at which they occur.

Vibration Identification

Cause	Frequency	Amplitude	Corrective Actions
Unbalance.	1 * RPM	Constant and repeatable. Greater in the radial direction.	Balance.
Misalignment. Bent shaft. Looseness in couplings.	Usually 1 × RPM, sometimes 2 × RPM, up to 3 to 4 × RPM	Greater in the axial direction (50% or more of the radial).	Realign. Check couplings with a dial indicator.
Defective belts.	1, 2, 3 or 4 × RPM.	Unstable in the radial direction.	Replace belts. Check pulley keyways.
Resonance.	1 × RPM or very close.	Constant and repeatable.	Reinforce the structure, mounting bases, and bearing or motor supports.

As soon as vibration levels become excessive or reach the poor range, the fan must be taken out of operation.

Carefully inspect the rotor, bearings, and belts to identify the cause.

There are many cases with simple solutions: if any type of material or object is found on the rotor or blades, cleaning may resolve the issue; minor wear can be corrected with a new balancing; if bolts become loose frequently, retighten them and perform a complete analysis of the fan and ventilation system to accurately determine the source of the problem.

In cases of rotor impact or denting, a simple repair and rebalancing may not be sufficient and could be dangerous. Any moving part of the fan, especially the rotor blades, can become extremely hazardous if they come loose at high speeds. A thorough inspection is always necessary, as cracks or fractures may occur and not be easily visible to the naked eye.

D.4 – NOISE

The analysis and assessment of noise in fans must be carried out carefully.

Vibrations generate noise. Many common cases of excessive noise do not originate from actual acoustic sources but rather from vibration-related issues.

Check and address all the alternatives and procedures described in the previous section (Vibrations) before focusing your efforts on solving a purely acoustic issue.
Noise often results from rotor contact with the inlet cone, pulley guard, or belts touching the pulleys, loose bolts, etc., or from poor connection between the fan and the ventilation system.

Before requesting support from technical assistance or a sales representative, make sure the issue is not a simple one caused by failure to follow the recommendations in this manual.

Acoustics

The noise produced by a fan is directly related to its design, airflow, total pressure, and especially its efficiency.

The lowest noise level occurs at the fan's optimal performance point, which is approximately at the center of its performance curve.

If for any reason—such as dirty filters, damper adjustments, etc.—the fan shifts away from its optimal operating point, this may cause a significant increase in noise level, up to 13 dB, potentially raising the total noise level to unbearable levels depending on the situation.

Undersized grilles, sharp bends, lightweight ducts without proper reinforcement, and direct mounting of ducts and machines to masonry are also considerable sources of noise.

Summary of Common Acoustic Design Flaws

Equipment	Common design flaws
Fans	- Selection at an inefficient operating point. - Inadequate clearance or poor condition of the inlet duct. - Accessories or attenuators placed too close to the fan's inlet or discharge. - Improper vibration isolators. - Lack of flexible connectors in the ductwork. - Use of adjustable pulleys in motors above 3.5 kW.
Duct system	- Undersized ducts – excessive air velocity. - High pressure loss (turbulence) due to components (elbows, bends, attenuators, dampers, etc.). - Components installed too close to one another. - Lack of acoustic lining in ducts or silencers. - Ducts in contact with walls or slabs. - Use of rectangular ducts that do not control low-frequency noise. - Use of acoustic lining or silencers that are too short to attenuate low-frequency noise.

D.5 - Rotors and Impellers

The task of removing the rotor or impeller from a fan must be carried out carefully to avoid compromising future operations.

After each disassembly and reassembly, manually rotate the impeller or rotor and follow the startup routine for new fans.

-Disassembly and reassembly of overhung rotors

First, remove the inlet cone.

The rotors are fixed to the shaft end with a set screw and a bolt with a washer at the tip.

Remove them and extract the rotor using a puller through the opening made available by removing the inlet cone.

Reassembly should follow the reverse order.

-Disassembly and reassembly of rotors mounted at the center of the shaft

First, remove the belt guard.

Next, remove the pulley. The rotor and shaft can only be removed from this side.

Loosen the bolts fixing the inlet cone as well as those securing the bearing support (frame) to the fan housing.

Loosen the bolts fastening the bearings to the base (on both sides).
Using a hoist or winch, lift the shaft-bearing assembly from one end and remove the inlet cone.

Then, carefully remove the shaft-bearing assembly.

To remove the rotor from the shaft, loosen the locking screws on the hub, clean and smooth out any burrs or dirt on the shaft surface, and slide the rotor off.

Using lubricating oil always helps with both the removal and reinstallation of rotors onto shafts.

D.6 - Pulleys and Belts

Proper alignment and tensioning of the belts are essential to keep the rotating assembly in good operating condition and within the load limits for bearings, supports, and the overall structure.

A misaligned assembly causes unnecessary radial stress on the bearings, generates vibrations, and leads to premature belt wear.
Using a straightedge of appropriate length, position the pulleys so that the faces of both pulleys touch the edge of the straightedge evenly.

To check proper belt tension, a general rule is a perpendicular deflection of approximately 1 mm for every 100 mm of span, which typically results in a deflection range between 10 and 20 mm in most cases.

When replacing the belts, pay attention to the following points:

a) Replace the entire set of belts.

b) Use only belts from the same manufacturer and with the same code number.

c) Do not force the belts into the grooves by over-tensioning them. Loosen the tensioner so that the belts can be installed naturally.

d) Align the pulleys correctly.

e) Tension the belts within the specified parameters.

f) Reinstall the pulley and belt guard in its proper position. Never leave the drive assembly without its guard.

g) After approximately 72 hours of operation, recheck the belt tension, as they tend to settle into the pulley grooves.

D.7 - Flexible Couplings

In some constructions, the fan may be directly coupled to an electric motor or another fan using sleeves or flexible couplings.

In most cases, Sicflux Titan fans/exhausters use dry (non-lubricated) couplings with elastic elements, which do not require lubrication.

In applications involving higher loads or special project specifications, gear-type (lubricated) couplings are used, equipped with horizontally or vertically split covers.

Gear couplings must be re-lubricated at regular intervals (maximum every six months).

To re-lubricate, remove the plugs from both covers and screw a grease fitting into one of the openings.

Using a manual grease gun, lubricate until grease comes out of the opposite hole. Then remove the grease fitting and replace the plugs.

Disassembly of Flexible Couplings

If the coupling needs to be removed for maintenance purposes, such as bearing replacement, rotor removal, or others, follow the steps below.
You will need Allen keys, open-end wrenches, and flathead screwdrivers.

Elastic element coupling
Loosen the set screws that fix the hubs to the shaft.
Slide the hubs horizontally in opposite directions along the shaft.
Remove the elastic element.

Grid coupling
Remove the cover bolts.
Displace the covers carefully to avoid damaging the seals.
To remove the grid, begin at the end loop, inserting a flathead screwdriver into the loop and using the hub teeth as leverage. Alternate sides gradually until the grid comes out of the grooves.

Reassembly of Flexible Couplings

To reassemble the couplings, you will need open-end wrenches, a fiber or rubber mallet, a straightedge (or preferably a dial indicator), a feeler gauge, and Allen keys.
First, ensure perfect alignment between the shafts. This can be checked using a straightedge or dial indicator.
Next, check that the faces of the two shaft ends are parallel, with a gap that varies according to the coupling's size and type.

Elastic element coupling

Insert the two hubs onto the respective shaft ends so that the hub faces are flush with the shaft ends.
The gap between the hub faces should be between 2 and 3 mm.
Check and adjust the parallel alignment by placing the straightedge perpendicularly across the hubs or using the dial indicator. Rotate the coupling and repeat the check.
Slide the hubs horizontally to insert the elastic element, then bring them back together without applying pressure.
Tighten the set screws that secure the hubs to the shafts.

Make sure the alignment is correct by repeating the procedure with the straightedge or dial indicator. Realign if necessary.

Grid coupling

Insert the two covers with seals onto the respective shaft ends.
Insert the two hubs onto the respective shaft ends so that the hub faces are flush with the shaft ends.
Use the feeler gauge to check the gap between the hub faces, which should be 3.2 mm.
Check and adjust the parallel alignment by placing the straightedge perpendicularly across the hubs or using the dial indicator. Rotate the coupling and repeat the check.
Tighten all the fastening bolts and repeat the procedures for checking the face gap and parallel alignment.
Realign if necessary.
Fill the gap and grooves with grease and seat the grid using a fiber or rubber mallet.
Fill the spaces around the grid with grease and install the covers with their respective seals, tightening the bolts.
Ensure the lubrication points have been closed with plugs.
Axial or angular misalignment between the shafts will cause vibrations, noise, and unwanted stress on other components.
Never forget to reinstall the keys and properly tighten the locking bolts.
All shielding elements, sealing rings, gaskets, and covers must be properly seated to avoid oscillations and leaks.

D.8 - Electric Motors

Electric motor maintenance is essentially reduced to periodic inspections of bearing temperature, insulation levels, possible wear, and occasional checks of the fan. The frequency of inspections depends on the motor type and local operating conditions.
ANY MOTOR MAINTENANCE, PART REPLACEMENT, OR LUBRICATION MUST FOLLOW THE MOTOR MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.

D.9 - Bearings and Housings

The SICFLUX Titan line is equipped with high-quality shielded self-aligning ball bearings.

Refer to the table below to determine the housing/bearing used in your product or check the product identification label to obtain this information (some models may not have this information available).

Identify the bearing/housing for your equipment according to the shaft diameter:

SHAFT DIAMETER (mm)	BEARING TYPE (UC)	HOUSING TYPE (P)	HOUSING TYPE (F)	SHEET METAL HOUSING TYPE (PFT)	SPHERICAL CARTRIDGE (RABR)
20	204	204	204	205	204
25	205	205	205	206	205
30	206	206	206	207	206
35	207	207	207	208	207
40	208	208	208	209	208
45	209	209	209	210	209
50	210	210	210	211	210

55	211	211	211	212	211
60	212	212	212	213	212
65	213	213	213	214	213
					

Disassembly and Reassembly of Bearings

For occasional bearing replacements, after removing the belt guard, pulleys, and coupling (if present), proceed as follows:
- Loosen the bolts securing the bearing housing/mount to the fan frame or base.
- Remove the bearing-housing assembly.
- Spray a small amount of light oil between the housing and the bearing to help loosen it, and using an appropriate tool that does not stress the inner race of the bearing, rotate the bearing within the housing to remove it.

This task should only be performed by a trained and knowledgeable professional.
- Replace the bearing.
- For reassembly, proceed in exactly the reverse order.

Notes

When reinstalling the bearing into the housing seat, the insertion force should be just enough for the bearing to fit snugly into the housing.

If the bearing fits too loosely (e.g., it remains loose and has play), replace the housing with one that has a better fit.

On the other hand, excessive insertion force can eliminate the internal clearance of the bearing, making it unsuitable for operation or even damaging it.

The proper insertion force for the bearing into the housing can only be determined through practical experience and good judgment.

This operation, like many others involving fan maintenance, should be performed by experienced personnel.

A skilled mechanic who “feels” that the bearing is going to be forced into the housing should stop the operation and either replace the housing or adjust the inner race fit using a scraper or emery cloth.

Only replace the housing/bearing with products of the same quality and technical specifications as the original.

Important:

Before securing the bearing to the shaft, align the rotor and gently tap the shaft and bearing housings with a rubber hammer to relieve stresses between the shaft and bearing. Then secure the bearing to the shaft.

Before putting the fan back into operation, manually rotate the rotor to ensure it moves freely, and perform a startup test as described in item 4.

Bearing Relubrication

The relubrication intervals (in operating hours) can be calculated using the formula below, valid for normal load conditions and temperatures of 70 ºC measured on the outer ring.

Intervals should be halved for every 15 ºC above 70 ºC or extended proportionally for every 15 ºC below 70 ºC.

In any case, it is advisable not to exceed periods longer than 6 months.

Lubrication interval = $K (14.\ 10^{6} / N (d)^{1/2} - 4.d)$

where:
N = bearing operating speed in rpm.
d = shaft diameter in mm.

Values of K		
Type of bearing	Lubrication interval	Grease service life
Radial ball bearings	10	20

In most cases, relubrication intervals are relatively long, allowing for scheduled maintenance.

After removing the used grease, refill properly with new grease.

For frequent lubrication, install a grease fitting on the top cover of the housing.

With the fan running, slowly inject new grease using a manual grease gun until the used grease is expelled through the seals.

The amount of grease for each relubrication can be calculated using the formula below:

Amount of grease for frequent relubrication

$$G = 0.005 . D . B$$

where:

G = amount of grease in grams.

D = outer diameter of the bearing in mm.

B = total width of the bearing in mm.

Sicflux Titan fans/exhausters that use bearings leave the factory with an initial amount of grease, allowing ideal operation until the first relubrication interval.

Types of Grease for Bearings

Only use special bearing grease for re-lubrication of the bearings in Sicflux Titan fans/exhausters.

Only use special bearing grease for re-lubrication of the bearings in Sicflux Titan fans/exhausters.

Use multi-purpose lubricant grease based on mineral oil and lithium soap, resistant to corrosion and oxidation. Below is a table showing some grease brand:

Manufacturer of grease	Designation
NSK	NSK Lub
SKF	LGMT 3
Petrobras	LUBRAX LITH 2
Mobil	Mobil Polyrex EM
Shell	ALVANIA RL2

D.10 – Safety

The attention and care required with fans are related to their size, rotation speed, power, and especially their installation location.

If there is the slightest possibility of danger to passersby, operators, or mechanics, preventive measures and strict rules must be established and followed to avoid any accidents.

a) The transmission system must be properly guarded. Never remove the guard while the fan is running and never forget to replace it.

b) Exposed intake and/or discharge openings must be adequately protected to prevent foreign objects from entering the system or accidental contact. Sicflux Titan Fans/Exhausters already come standard with guards on the openings.

c) Sicflux Titan fans/exhausters are designed to operate at the temperature and speed specified on the nameplate. Changing these operating conditions without prior consultation not only voids the warranty but can also lead to serious risks.

d) Never allow inspection doors to be opened while the fan is operating. They may be violently ejected as soon as they are released.

e) During maintenance, ensure it is impossible for anyone to inadvertently start the fan. Install a disconnect switch near the fan or remove fuses from the panel and place warning signs.

f) Never install the electric motor without an effective protection and grounding device. Avoid so-called “temporary wiring,” which is often forgotten and only properly replaced after an accident.

g) Do not allow a fan to continue operating if there are noises or vibrations without identifying and correcting their causes. Cracks in pulleys, shafts, rotors, bearings, motor housing, etc., require immediate replacement of the component.

h) Never forcibly stop the fan by hand or with a tool on the belts, pulleys, or rotor.

i) After any maintenance that requires disassembly and reassembly of components, perform the preliminary checks and precautions related to fan startup.

D.11 - Preventive Tests

Visual inspection

- Visually check the external conditions of the fan, motor, and bearings for the presence of cracks, broken welds, or any other irregularities.

- Excess rubber dust near the guard indicates excessive belt wear, usually due to pulley misalignment.

- Grease or oil leaking from the bearings may indicate defective seals or that the lubricant has expired, with soap and oil separating. This can compromise or even leave the bearing without lubrication, as well as allow moisture and dirt to enter.

- Excessive vibrations can also be assessed by simply placing your hand on the fan housing or the bearings.

Temperature test

The operating temperatures of the fan must be checked using a thermometer on the fan and motor bearings (maximum 90°C for an ambient temperature of 20°C). Refer to item C.3 C of this manual.

Listening test

We recommend using a mechanic's stethoscope for this test, which is readily available on the market.
If unavailable, and with extreme caution, a long screwdriver may be used—placing one end on the bearing and the other end against the ear.
If the bearing emits a soft whistling sound, everything is in order.
A knocking sound indicates excessively loose belts.

Vibration test (see item C.3 Vibrations)

Whenever possible, use a vibration analyzer with a frequency filter.

Measurement points should always be located on the fan bearings, and readings must be taken in both radial and axial directions.

Vibration measurements on electric motors must be performed on the housing near the bearings.

E - TROUBLESHOOTING INSTRUCTIONS

E.1 - Airflow Below Expected

Probable Cause	Inspection / Correction
Incorrect direction of rotation	- Check if the direction of rotation is correct and matches the one indicated by the arrows (scroll direction).
Impeller installed with reversed rotation direction	- Ensure the impeller's direction of rotation matches the blade design.
Rotation speed too low	- Check the motor's rotation speed using measurement. - Verify that pulley diameters match the specifications. - Check belt tension. Loose belts may slip. Overly tight belts can cause overload, especially in small fans, preventing the motor from reaching its nominal speed.

System pressure loss higher than designed	- Recalculate the system's pressure loss (poor inlet or discharge conditions generate additional losses). - Ensure the ductwork system complies with the project design. - Make sure the air filters are clean.
Duct obstruction	- Ensure there are no obstructions in the duct system, such as protective plastic sheets, rags, etc.
Closed dampers	- Make sure all dampers are properly adjusted to the correct position.
Leaks	- Check that the ductwork system is properly connected, all joints are sealed, and inspection doors are closed.

E.2 - Airflow Above Expected

Probable Problem	Check / Correction
Rotation too high	- Check the rotation speed of the electric motor by measurement. - Verify that the pulley diameters match the specifications.
System pressure loss below the designed value	- Recalculate the system's pressure loss. - Verify that the duct system is in accordance with the design. - With clean air filters, the pressure loss is lower.
Dampers fully open	- Make sure all dampers are properly adjusted to the correct position.
False air intake	- Check that the duct system is properly connected, joints are sealed, and inspection doors are closed.

E.3 - Excessive Vibrations (see also item D.3 – Vibrations)

Probable Problem	Check / Correction
Damaged or unbalanced rotor	- Check the rotor for any material adhered to its blades. - Ensure that all welds are in perfect condition. - Verify that the rotor is not dented or bent.
Excessive belt tension	- Belt tension above the recommended level may cause excessive shaft deflection, resulting in operation within the resonance range. Correct the belt tension.
Incorrect bearing alignment	- Check the alignment.
Defective bearings	- While the fan is running, listen to the sound of the bearings. Defective bearings produce a rumbling noise.
Bent or eccentric shaft	- Use a dial indicator to check the shaft concentricity. - When replacing the shaft, also replace bearings, bushings, and bearing housings.
Incorrect pulley alignment	- Check the alignment and ensure the belts have not been damaged due to misalignment.
Incorrect flexible coupling alignment	- Check the alignment of both coupling halves using a dial indicator. - Make sure the coupling has not been damaged due to misalignment.
Improper dampers	- Ensure the dampers are of the recommended type, correctly installed, and properly secured.

Airflow much higher than expected	- In some fans, the operating point may exceed the maximum limit, causing vibration and noise. - Make the necessary correction as indicated in “Airflow Above Expected.”
Loose or slack joints	- Check that all bolts are properly tightened.
Rotation too high	- Check the motor rotation using the nameplate data and by direct measurement. - Verify that pulley diameters match the specifications on the data sheets and that they are not installed backwards.
Reversed direction of rotation.	- Check that the direction of rotation is correct and matches the arrows on the fan housing. - Verify that the rotor’s direction of rotation is compatible with the blade design.
Electrical issue.	- If vibration ceases immediately after cutting off power, inspect the electrical installation and ensure the motor is in perfect working condition.
Defective belts.	- Replace the belts and inspect the pulley grooves.
Unstable foundation.	- Make sure the fan is properly installed and secured to the base.
Unbalanced electric motor rotor.	- Uncouple the motor and check its vibration level without load.

E.4 - Excessive Noise

Probable Problem	Check / Correction
Rumbling sound	- Excessive velocity in the duct. Replace with a larger duct or add another one. Replace high pressure-loss accessories with others offering better aerodynamic performance. - Excessive fan noise due to poor selection. Replace the fan with a more efficient one. Install noise attenuators or apply acoustic lining to the ducts. - Damaged bearings. "Listen" to their operation.
Vibration noise	-Poor inlet or discharge conditions of the fan. Move the fan, reconfigure the inlet or discharge duct according to standard recommendations, or remove the obstruction. -Inefficient fan isolation from the building. Install proper dampers. All ductwork must be installed using resilient mounting.
Whistling or hissing sound	-Duct leakage. Inspect and seal any leaks. -Excessive airflow in VAV boxes or grilles. Reduce the air volume using dampers. -Belts or pulleys scraping against guards. Correct the position of the guard. -Inlet bell in contact with the rotor.
Surging	-Fan instability due to poor inlet or discharge conditions. Review the inlet or discharge conditions by increasing intake areas and improving the aerodynamic performance of system components. -Fans in parallel operating at different speeds. Adjust speeds within a maximum tolerance range of 10%.
Humming sound	-Misaligned rotor or rubbing against the inlet bell or housing. Rebalance the rotor. -Inadequate vibration isolation in high-speed machines, such as a chiller. Ensure the equipment rests freely on the dampers without contact with the floor or walls. -Piping or ductwork with rigid contact between equipment and building. Install flexible connectors and joints.

E.5 – Electric Motor Overload

Probable Problem	Check / Correction
Airflow Above Expected.	- Conduct the verification as per item E.2 – Airflow Above Expected. - System pressure loss below calculated. - Fan speed too high.
Supply voltage too low.	- Check if the supply voltage is within normal limits.
Fluid density.	- Check if the fluid density matches the design specifications. Density may vary due to temperature changes, altitude, or differences in gas mixtures.
Restricted rotational freedom.	- Verify that the rotor, shaft, bearings, and motor rotate freely. - Ensure there is no obstruction to the free movement of the transmission. - Overly tight seals can hinder shaft movement.
Incorrect direction of rotation.	- Verify that the direction of rotation is correct and matches the arrows marked on the housing.
Rotor mounted with reversed direction of rotation.	- Verify that the rotor's rotation direction is compatible with the design of its blades.

WARRANTY CERTIFICATE

SICTELL IND E COM DE PROD ELET E MET LTDA guarantees its SICFLUX TITAN product line equipment against manufacturing defects, under the terms of this certificate, for a period of 12 (twelve) months from the date of issue of the respective invoice (3 months of legal warranty + 9 months of manufacturer's warranty, totaling the 12 months mentioned above).

This warranty also extends to components purchased from third parties, regardless of whether their manufacturer assumes any responsibility or not, except for electric motors, which are covered by the motor manufacturer directly. The motor's serial number and manufacturing date, necessary for service, can be found on the motor nameplate and assistance must be sought through the manufacturer's service network.

This warranty does not cover damages or defects proven to be caused by misuse, lack of skill, recklessness, negligence, overloads, electrical network deficiencies, weather conditions, and damages resulting from transportation, as well as damages to parts and/or components subject to natural wear.

The warranty will be void if:

a) recommendations in this manual are not followed during transportation and/or storage;

b) the equipment is not installed and/or operated according to the recommendations established in this manual;

c) the technical recommendations established in this manual are not followed during any period of equipment downtime;

d) maintenance services established in this manual are not performed during the warranty period;

e) the nameplate or any other identification attached to the equipment is tampered with or destroyed;

f) partial or total destruction of the equipment occurs, or defects caused by improper control of temperature, electrical voltage, air volume, entry of foreign materials into the equipment, or force majeure events (fire, flooding, war, strike, etc.) as provided by current legislation;

g) modifications are introduced to the equipment and/or replacement of parts and/or components with non-original factory parts without prior written authorization;

h) the buyer fails to make any payment due within the established deadlines.

Claims of ignorance regarding the content, form, or terms of the Manual will not exempt the client from the warranty-voiding conditions stated in this certificate.

Malfunction or stoppage of the equipment, even due to manufacturing defects, will under no circumstances impose any liability on **SICTELL IND E COM DE PROD ELET E MET LTDA** for any consequential or incidental damages.

In case of replacement of any part or component, such replacement is conditioned upon the customer's return of the replaced item.

The warranty period will not be extended under any circumstances, whether due to equipment downtime, prolonged storage, or technical assistance during its validity.

If warranty service is required, all procedures will be carried out at **SICTELL IND E COM DE PROD ELET E MET LTDA's** headquarters. Transportation costs, freight, packaging, insurance, and product handling, both for delivery and return, are the customer's responsibility.